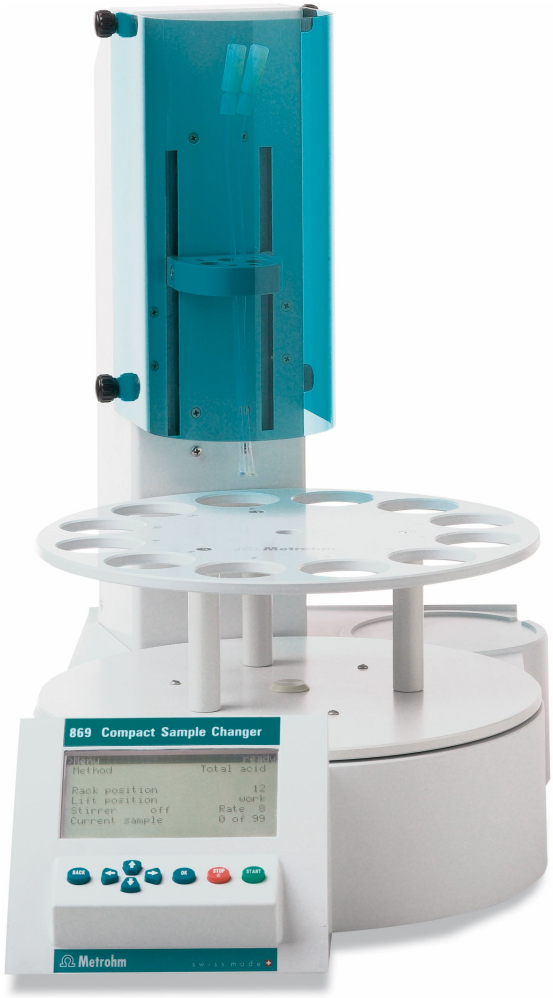
869 Compact Sample Changer



Manual

8.869.8002EN / v6 / 2023-12-01

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Technical Communication
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This documentation is an original document.

This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

Disclaimer

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

Table of contents

Table of figures

1 Introduction

1.1 Instrument description

The 869 Compact Sample Changer is a sample changer for titration with a wide variety of applications. It is the central control instrument in an automation system that in addition to a titrator, can also include a Dosimat (for adding auxiliary solutions) and a pump for rinsing and aspirating the sample vessels.

Specified method runs can be individually parameterized and saved as sample-specific methods. The methods can be exported to a connected USB flash drive. This function enables you to copy methods quickly and easily from one instrument to another.

1.1.1 Instrument components

The 869 Compact Sample Changer has the following components:

- **Turntable**
  Permanently mounted sample rack with 11 positions for sample beakers and 1 position for a rinsing beaker.
- **Lift with lift head**
  For two electrodes, one rod stirrer, two dosing tips, one aspiration tip and three rinsing nozzles.
- **Stirrer connector**
  For one rod stirrer with propeller stirrer.
- **USB (OTG) connector**
  The 6.2151.100 adapter can be used to connect, for example, a printer or a USB flash drive (for system backup or method export).
- **Remote connector**
  For connecting a titrator, a Dosimat, and/or an 843 Pump Station.

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 exhibited no flaws in terms of technical safety at the time it left the factory. To maintain this state and ensure non-hazardous operation of the instrument, the following instructions must be observed carefully.

2.1 Intended use

The 869 Compact Sample Changer is designed for usage as an automation system in analytical laboratories. It is **not** suitable for usage in biochemical, biological or medical environments in its basic equipment version.

2.2 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.

2.3 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.

2.4 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.

2.5 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.

2.6 Personnel safety

WARNING

Wear protective glasses and working clothes suitable for laboratory work while operating the 869 Compact Sample Changer. It is also advisable to wear gloves when caustic liquids are used or in situations where glass vessels could break.

WARNING

Always install the safety shield supplied with the equipment before using the instrument for the first time. Never remove the pre-installed safety shields.

The 869 Compact Sample Changer may not be operated without a safety shield!

WARNING

Personnel may not 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 power 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. Jamming can only be cleared when the instrument is in a de-energized state; this action is generally associated with a **considerable risk of injury**.

WARNING

The 869 Compact Sample Changer 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.

2.7 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.

2.8 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.

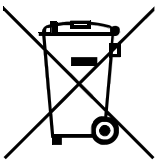
WARNING

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.

2.9 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.

3 Overview of the instrument

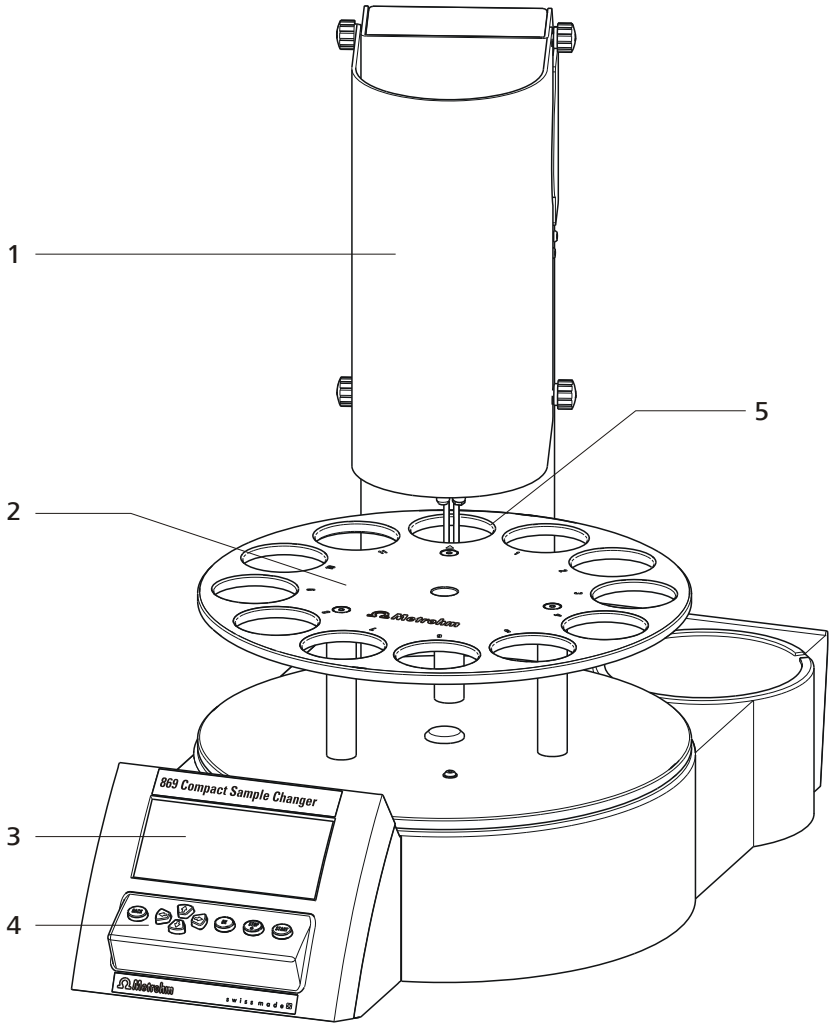


Figure 1 Front 869 Compact Sample Changer

1 **Safety shield** With knurled screws for mounting. The safety shield can be folded up.	**2** **Sample rack** For 11 sample beakers and 1 rinsing beaker (6.1459.300, 120 mL)
3 **Display**	**4** **Keypad**
5 **Special position** For a rinsing beaker	

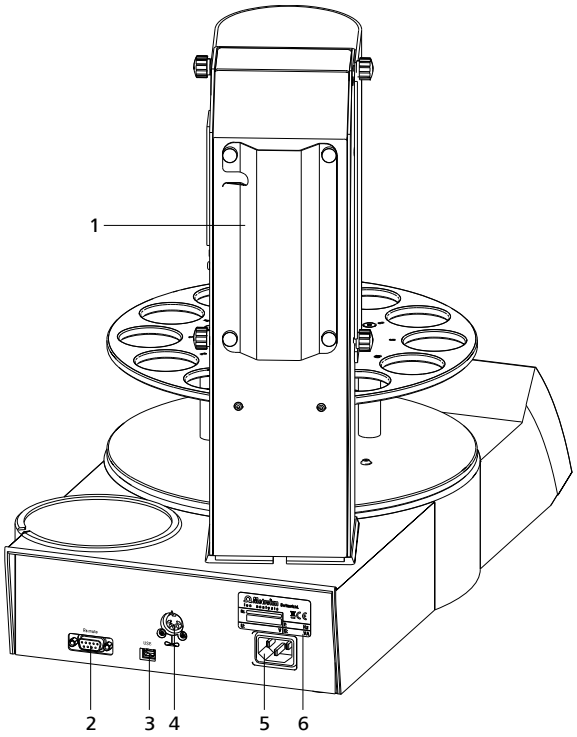


Figure 2 869 Compact Sample Changer rear

1 **Tubing and cable guide**	**2** **Remote connector** For connecting instruments with a remote interface. D-sub, 9-pin.
3 **USB (OTG) connector** For connecting printers, USB flash drives, USB hubs, etc.	**4** **Stirrer connection** For 802 Stirrer (rod stirrer).
5 **Power socket**	**6** **Type plate** Contains specifications concerning supply voltage and serial number

4 Installation

4.1 Setting up the instrument

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 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 and free of vibrations and which provides protection against corrosive atmosphere and contamination by chemicals.

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

4.2 Removing the safety shield and cable guide

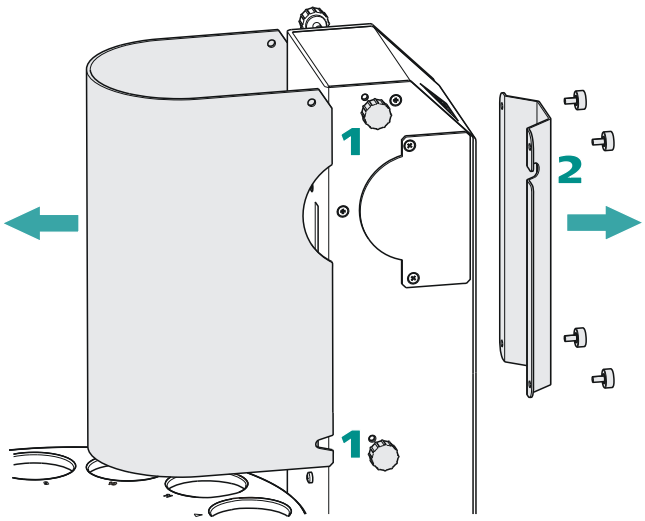


Figure 3 Removing shields

The installation of the accessories is easier to carry out if you remove the safety shield and the cable guide beforehand. Proceed as follows:

1 Loosen the knurled 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 guide.

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

4.3 Setting up the titration head

Equipping the titration head without rinsing equipment

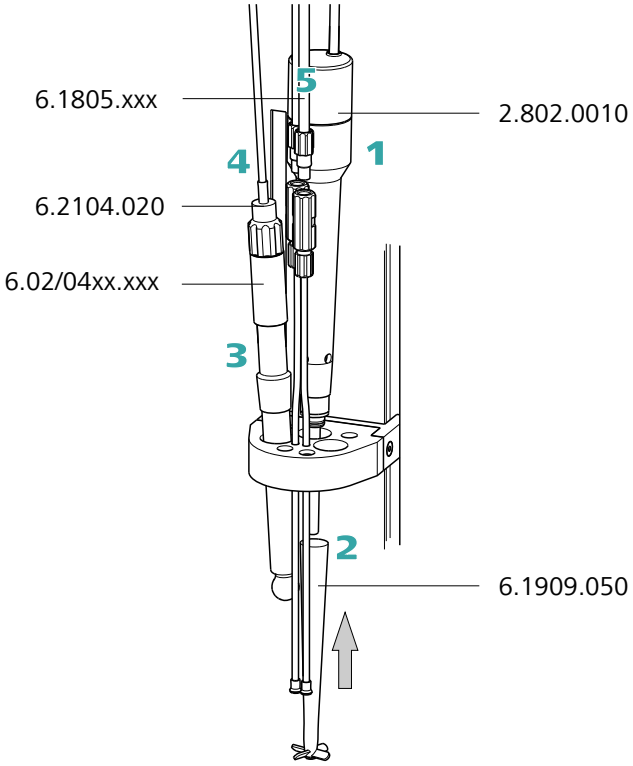


Figure 4 Equip the titration head

1 Insert the rod stirrer (802 Stirrer) from above into the rear opening of the titration head.

2 Guide the 6.1909.050 stirring propeller over the drive shaft of the rod stirrer from below and press firmly.

3 Insert an electrode into the left-hand opening of the titration head.

4 Connect a 6.2104.020 electrode cable to the electrode. Connect the other end to the titrator.

5 Manually screw the two enclosed 6.1805.110 FEP tubings firmly to the dosing tips mounted on the titration head. Connect the two other ends of the tubings with the exchange units on the titrator or on the Dosimat.

The remaining openings of the titration head can be sealed with the enclosed stoppers provided.

Equipping the titration head with rinsing equipment

An 843 Pump Station (with two pumps) can be used when the sample processing requires the rinsing of the electrodes and the aspiration of the processed sample solution. The 843 Pump Station is available as model version with complete rinsing and aspiration equipment. The rinsing and aspiration equipment is installed as follows:

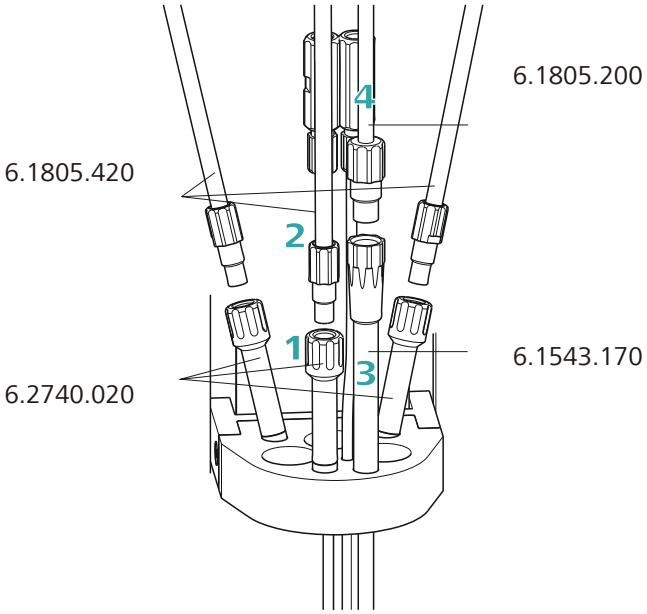


Figure 5 Installing rinsing nozzles and aspiration tip

1 Insert the three 6.2740.020 spray nozzles into the titration head according to the illustration. The position of the individual spray nozzles can also be adjusted as required in terms of height.

2 Manually screw the three 6.1805.420 FEP tubings (with M6 thread) firmly to the spray nozzles.

3 Insert the 6.1543.120 aspiration tip into the front opening of the titration head. It can be adjusted in terms of height and its tip can be cut as required to the necessary length.

4 Manually screw the 6.1805.200 aspiration tubing (with M8 thread) firmly to the aspiration tip.

Setting up the distributor

The 6.1818.240 distributor must be mounted on the rear side of the tower for complete installation of the rinsing and aspiration equipment. It is supplied with the 843 Pump Station.

First loosen the knurled screws of the cable and tubing cover and then remove it. Proceed as follows:

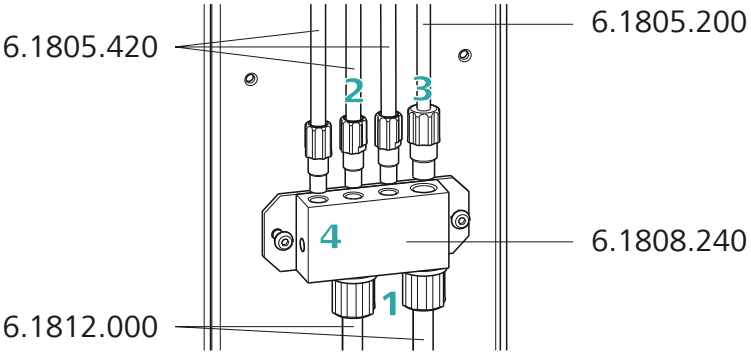


Figure 6 Setting up the distributor

1
- Loosen both union nuts on the distributor and guide each of them over the end of one 6.1812.000 PTFE tubing.
- Fasten the tubing ends to the distributor and fix in place with the union nuts.
- Connect the free tubing ends with a disposal or rinsing canister.

2 Manually screw the 6.1805.420 rinsing tubings already mounted on the titration head firmly into the openings with M6 threaded bores on the distributor.

3 Manually screw the 6.1805.200 aspiration tubing with M8 thread firmly into the remaining opening on the distributor.

4 Loosen the two screws on the rear panel of the instrument with a hexagon key and use it to screw the distributor firmly.

NOTE

Enclosed with the 869 Compact Sample Changer is the 6.1815.010 spiral band. You can wrap cables and tubings with it. This will ensure that the cables and tubings are arranged in an organized manner.

5 Use the four knurled screws to remount the cable and tubing cover.

CAUTION

Close the safety shield again after the titration head has been equipped. The 869 Compact Sample Changer is not permitted to be operated unless the safety shield is correctly mounted.

4.4 Connecting the stirrer

A DIN socket for connecting a rod stirrer **802 Stirrer** is located on the rear of the instrument.

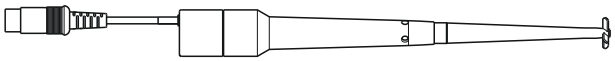


Figure 7 Rod stirrer 802 Stirrer

Take care to observe correct orientation of the contact pins when plugging in the connection cable. The rib on the outside of the plug must match the reference mark (above) on the socket.

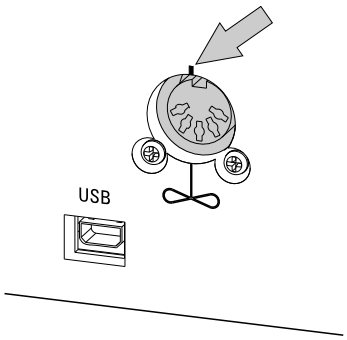


Figure 8 Connecting a stirrer

4.5 Connecting a keyboard, printer and other USB devices

The 869 Compact Sample Changer 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.

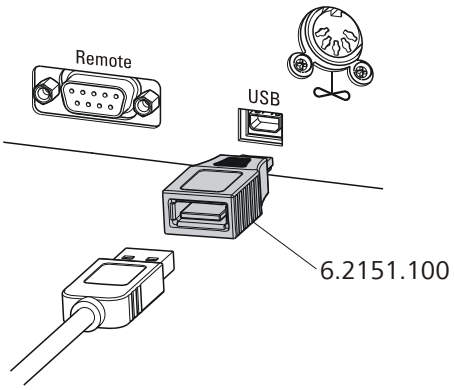


Figure 9 Connecting USB devices

NOTE

Up to and including program version 5.869.0022:

Switch the device off before connecting or removing a USB device or a USB flash drive.

The 869 Compact Sample Changer can only recognize the device immediately after switching on.

Starting with program version 5.869.0030:

USB flash drives and printers can be connected or removed at any time.

A double beep is heard when connecting and removing a USB stick.

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

- USB flash drives (for the backup or storing of methods)
- 6.2147.000 numerical USB keypad
  The **6.2147.000 numerical USB keypad** is used for convenient numerical input and for navigating in the dialog. In addition, it provides two USB connectors. Connect additional USB devices to the keyboard.
- USB hub (with or without its own power supply)

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 869 Compact Sample Changer 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 scanner (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 869 Compact Sample Changer is not designed for supplying power to several devices with elevated electricity requirements.

Examples:

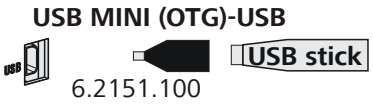


Figure 10 Connecting the USB flash drive

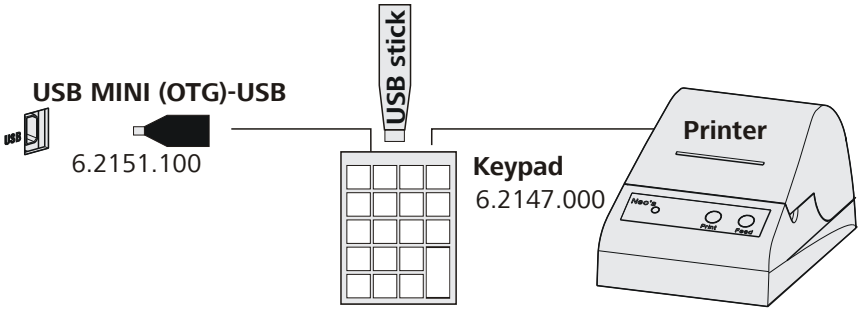


Figure 11 Connecting the 6.2147.000 USB keyboard with USB flash drive and printer

4.6 Remote connections

The 869 Compact Sample Changer can be used as a control instrument 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.

4.6.1 Miscellaneous remote cables

The following connecting cables can be used with the 869 Compact Sample Changer:

6.2136.010

- For connections with a Dosimat with dosing contact (banana plug socket).

The cable transmits only a starting pulse from the 869 Compact Sample Changer to the connected Dosimat.

6.2141.230

- For connections with a Titrino plus and/or an 843 Pump Station.

The cable transmits start and stop pulses from the 869 Compact Sample Changer to the connected Titrino plus. In case of the 843 Pump Station, these signal pulses are forwarded to the remote interface 2.

The 869 Compact Sample Changer receives a stepping pulse (EOD/ready) via this cable or, in case of an error at the Titrino plus, a stop signal.

6.2141.240

- For connections with a Dosimat plus.

The cable transmits start and stop pulses from the 869 Compact Sample Changer to the connected Dosimat plus.

In case of an error at the connected Dosimat, the cable transmits a stop signal to the 869 Compact Sample Changer.

6.2141.250

- For connections with a Titrino or other devices with a 25-pin remote interface (or with a 6.2148.010 Remote Box).

The cable transmits start and stop impulses from the 869 Compact Sample Changer to the connected Titrino.

The 869 Compact Sample Changer receives a stepping pulse (EOD/ready) via this cable or, in case of an error at the connected Titrino, a stop signal.

6.2141.360

- For connections with a Titrino or other devices with a 25-pin remote interface (or with a 6.2148.010 Remote Box).

The cable transmits start and stop impulses from the 869 Compact Sample Changer to the connected Titrino.

The 869 Compact Sample Changer receives a stepping pulse (EOD/ready) via this cable. Any case of error at the connected Titrino is not recognized.

6.2141.260

- Dual cable for connections with a Dosimat and other instruments directly at the 869 Compact Sample Changer.

The signal lines at the metallic plug (connector at the 869 Compact Sample Changer or at the **Remote 2** connector of the 843 Pump Station) are divided up into two different strands. The cable end that is printed with *865* must be connected with a 6.2141.240 or 6.2136.010 Dosimat connecting cable. The other cable end is connected with a 6.2142.230 or 6.2141.250 cable; for examples, see *Figure 16* or *Figure 17*.

CAUTION

Some of these cables have asymmetrical wiring. You must connect the correct plug to a particular instrument in each case. Observe the lettering on the ends of the cables. The designation of the instrument is explicitly printed on the end of the cable wherever necessary.

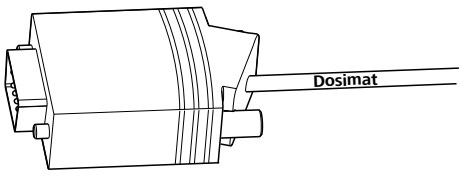


Figure 12 Remote cable with lettering

4.6.2 Example systems

The following illustrations show typical automation systems with different instrument combinations. It is in any case recommended that the rod stirrer connected to the 869 Compact Sample Changer be used for stirring.

869 — Titrino plus

For determinations without auxiliary solutions, without rinsing or aspiration.

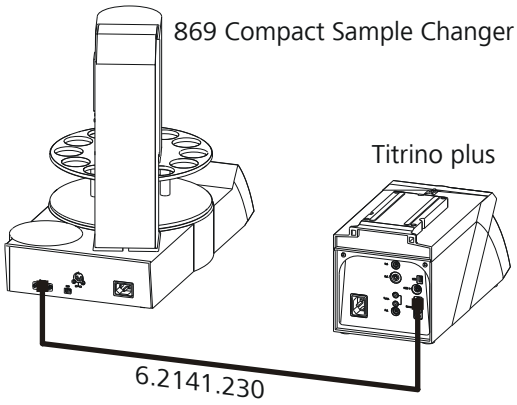


Figure 13 Remote connection 869 Compact Sample Changer - Titrino plus

The sample series is started on the 869 Compact Sample Changer

869 — Titrino plus — Dosimat plus

For determinations with addition of auxiliary solutions, without rinsing or aspiration.

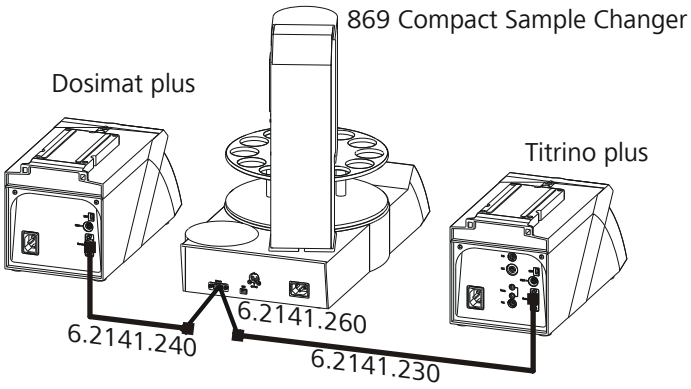


Figure 14 Remote connection Dosimat plus - 869 Compact Sample Changer - Titrino plus

The Dosimat plus is operated in XDOS mode. The volume of the auxiliary solution is defined in the Dosimat plus. The sample series is started on the 869 Compact Sample Changer

869 — 843 Pump Station — Titrino plus

For determinations without addition of auxiliary solutions, with rinsing and aspiration.

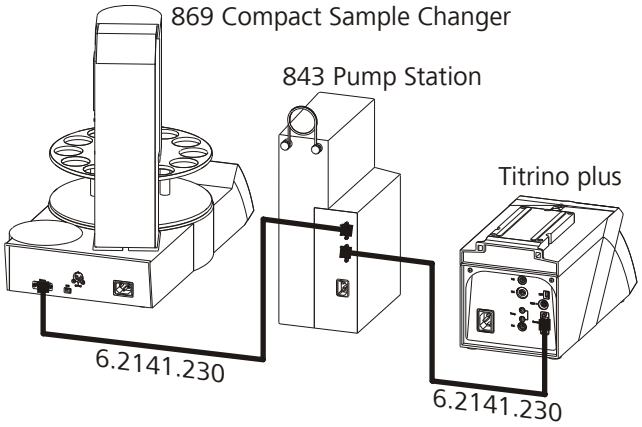


Figure 15 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus

At the 843 Pump Station, the 869 is connected to **Remote 1**, the Titrino plus to **Remote 2**. Pump 1 is used for rinsing the electrode, Pump 2 for aspirating the sample solution. The sample series is started on the 869 Compact Sample Changer

869 — 843 Pump Station — Titrino plus — Dosimat plus

For determinations with addition of auxiliary solution (controlled by the sample changer), with rinsing and aspiration.

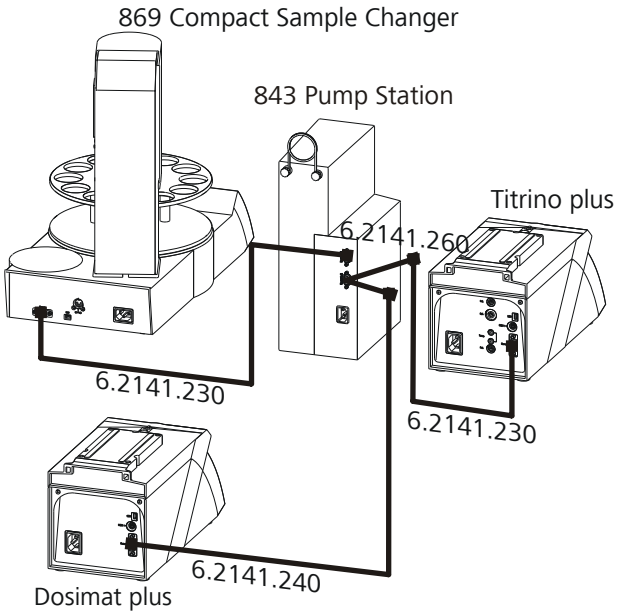
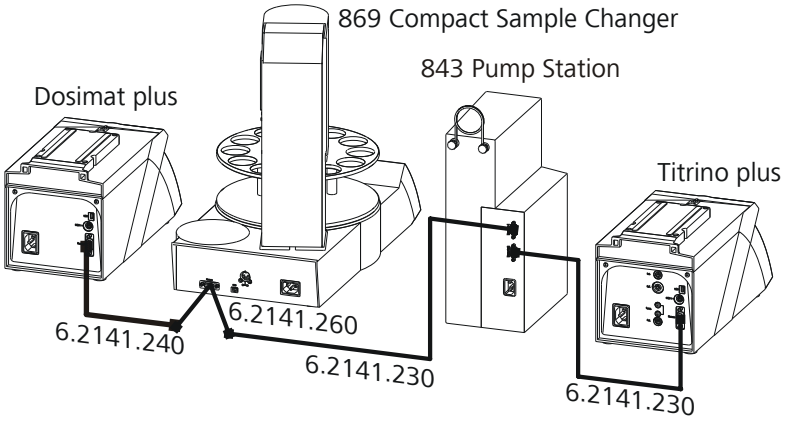


Figure 16 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus - Dosimat plus

or



The Dosimat plus is operated in XDOS mode. The volume of the auxiliary solution is defined at the Dosimat plus. At the 843 Pump Station, the 869 is connected to **Remote 1**, the Titrino plus and the Dosimat plus to **Remote 2** with the aid of a 6.2141.260 cable. Pump 1 is used for rinsing the electrode, Pump 2 for aspirating the sample solution. The sample series is started on the 869 Compact Sample Changer

869 — 843 Pump Station — Titrino plus — Dosimat plus

For determinations with addition of auxiliary solution (controlled by Titrino plus)

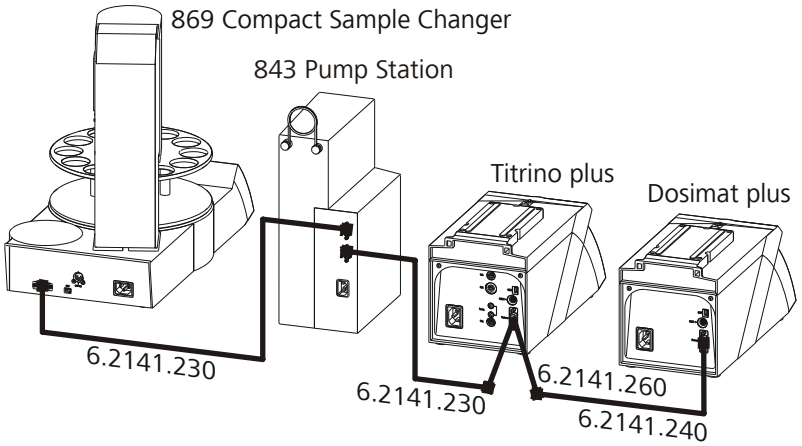


Figure 17 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus - Dosimat plus

Parameterization can be carried out at the Titrino plus, no matter whether an auxiliary solution is to be added or not (Activate pulse on/off). The Dosimat plus is operated in XDOS mode. The volume of the auxiliary solution is defined at the Dosimat plus. At the 843 Pump Station, the 869 is connected to **Remote 1**, the Titrino plus to **Remote 2**. Pump 1 is used for rinsing the electrode, Pump 2 for aspirating the sample solution. The connection to the 843 Pump Station is set up on the Titrino plus with the aid of a 6.2141.260 cable. The Dosimat plus is connected to the other

end of this cable. The sample series is started on the 869 Compact Sample Changer

869 — Titrino

For determinations with a Titrino of the 7xx series, without rinsing or aspiration.

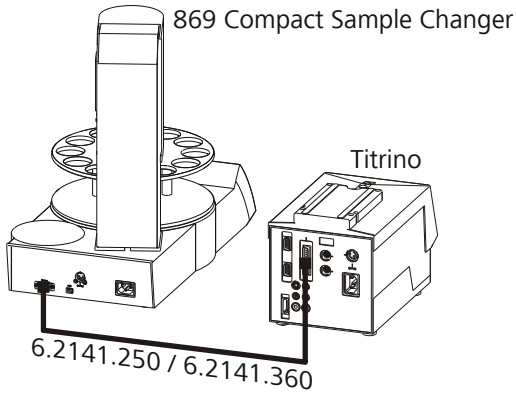


Figure 18 Remote connection Dosimat - 869 Compact Sample Changer - Titrino

The addition of the auxiliary solution can possibly (depending on the model) be accomplished with the Titrino. The sample series is started on the 869 Compact Sample Changer

The 6.2141.250 connection cable transmits an error signal possibly occuring at the Titrino. The method run is stopped. If this is not the intended behavior, use the 6.2141.360 connection cable, which does not transmit any error signal.

869 — 843 Pump Station — Titrino — Dosimat

For determinations with a Titrino of the 7xx series, with the addition of auxiliary solution by a Dosimat of the 6xx/7xx series, with rinsing and aspiration.

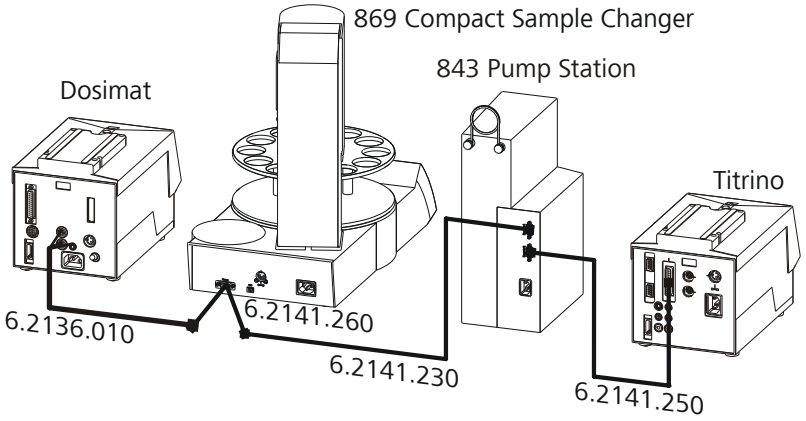


Figure 19 Remote connection Dosimat - 869 Compact Sample Changer - 843 Pump Unit - Titrino

The Dosimat plus is operated in DIS mode. The volume of the auxiliary solution is defined at the Dosimat. At the 843 Pump Station, the 869 is connected to **Remote 1**, the Titrino plus to **Remote 2**. Pump 1 is used for rinsing the electrode, Pump 2 for aspirating the sample solution. The sample series is started on the 869 Compact Sample Changer

869 — Remote-Box 867 — pH Module / Conductivity Module

For determinations with an instrument of the Titrando line of instruments (for example 867 pH Module / 856 Conductivity Module).

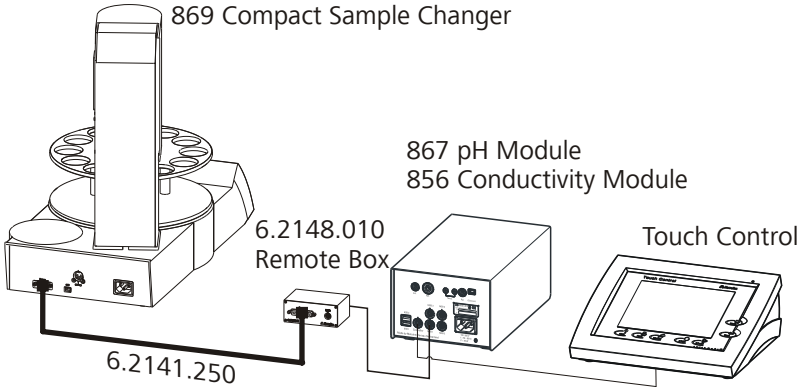


Figure 20 Remote connection 869 Compact Sample Changer - Remote Box 867 - pH Module / Conductivity Module

The 6.2148.010 Remote Box must be connected to **MSB 1** of the 867 pH Module or the 856 Conductivity Module. The sample series is started on the 869 Compact Sample Changer

869 — 843 Pump Station — Remote-Box 867 — pH Module / Conductivity Module

For determinations with an instrument of the Titrando line of instruments (for example 867 pH Module / 856 Conductivity Module), with rinsing and aspiration.

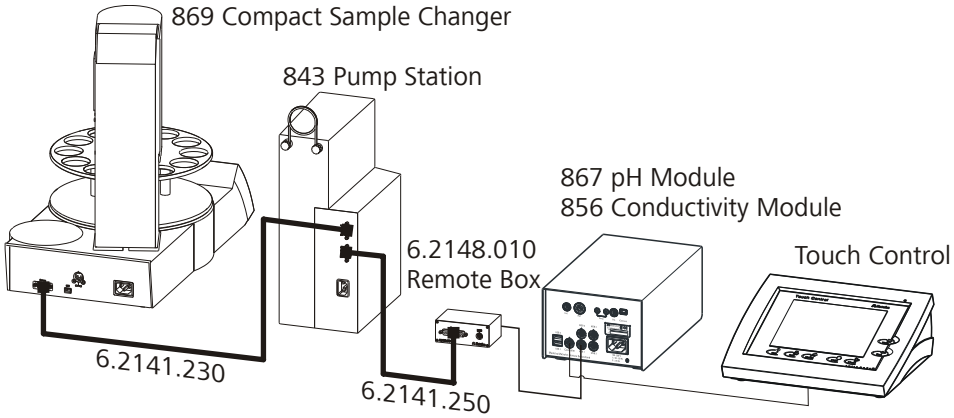


Figure 21 Remote connection 869 Compact Sample Changer - 843 Pump Unit - Remote Box - 867 pH Module / Conductivity Module

The 843 Pump Station is controlled by the 869 Compact Sample Changer. The 6.2148.010 Remote Box must be connected to **MSB 1** of the 867 pH Module or the 856 Conductivity Module. The sample series is started on the 869 Compact Sample Changer

4.7 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. 1.0 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.

4.8 Mounting the cable guide and the safety shield

After having installed all accessories you can remount the shields. Proceed as follows:

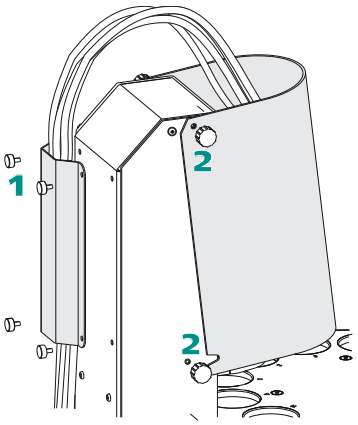


Figure 22 Mounting shields

1 Mounting the cable guide

Fasten the cable guide with the four red knurled screws to the rear of the tower. Ensure that all cables and tubing are routed in order.

2 Mounting the safety shield

Fasten the safety shield with the four black knurled screws to the sides of the tower. The safety shield can be folded up if needed once each of the lower knurled screws has been slightly loosened.

WARNING

The 869 Compact Sample Changer may not be operated without a safety shield!

5 Automation runs

5.1 Dipping in special

This automation run is suitable for simple determinations.

No pump is required for rinsing or for aspiration of the sample vessels. The titration head with electrode and buret tips is immersed in the filled rinsing beaker on the special beaker position after each determination. At the same time, the rinsing solution is stirred.

If required, auxiliary solution can be added prior to the beginning of a determination with a Dosimat/Dosimat plus.

NOTE

A beaker full of rinsing solution needs to be placed in the **special beaker position**.

The individual steps:

- Move to sample
- Lower the lift to the work position
- Start the determination
- If necessary, initiate dosing (**Activation pulse**) and switch on the stirrer
- Wait for **Start delay time** if necessary
- Wait for end of determination
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**
- Move to special beaker position
- Lower the lift to work position and switch on the stirrer
- Wait for **Rinsing time**
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**

After the last sample:

- Lower the lift in special beaker to work position.

5.2 Dipping in special 2

This automation run is suitable for simple determinations.

No pump is required for rinsing or for aspiration of the sample vessels. The titration head with electrode and buret tips is immersed in the filled beaker on rack position 11 at the beginning of the sample series and after each determination. At the same time, the rinsing solution is stirred. The electrode is immersed on the special beaker position after the sample series.

If required, auxiliary solution can be added prior to the beginning of a determination with a Dosimat/Dosimat plus.

NOTE

A beaker filled with rinsing solution needs to be placed in **rack position 11**.

A beaker filled with storage solution needs to be placed in the **special beaker position**.

The individual steps:

Before the first sample:

- Move to rack position 11
- Lower the lift to work position and switch on the stirrer
- Wait for **Rinsing time**
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**

For each sample:

- Move to sample
- Lower the lift to the work position
- Start the determination
- If necessary, initiate dosing (**Activation pulse**) and switch on the stirrer
- Wait for **Start delay time** if necessary
- Wait for end of determination
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**
- Move to rack position 11
- Lower the lift to work position and switch on the stirrer
- Wait for **Rinsing time**
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**

After the last sample:

- Move to special beaker position
- Lower the lift in special beaker to work position

5.3 Double dipping

This automation run is suitable for simple determinations.

No pump is required for rinsing or for aspiration of the sample vessels. The titration head with electrode and buret tips is immersed in the filled rinsing beaker on rack position 11 and on the special beaker position after each determination. At the same time, the rinsing solution is stirred.

If required, auxiliary solution can be added prior to the beginning of a determination with a Dosimat/Dosimat plus.

NOTE

A filled rinsing beaker must be placed in **rack position 11** and in the **special beaker position**.

The individual steps:

- Move to sample
- Lower the lift to the work position
- Start the determination
- If necessary, initiate dosing (**Activation pulse**) and switch on the stirrer
- Wait for **Start delay time** if necessary
- Wait for end of determination
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**
- Move to rack position 11
- Lower the lift to work position and switch on the stirrer
- Wait for **Rinsing time**
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**
- Move to special beaker position
- Lower the lift to work position and switch on the stirrer
- Wait for **Rinsing time**
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**

After the last sample:

- Lower the lift in special beaker to work position

5.4 Rinsing in sample

This automation run requires an 843 Pump Station for rinsing and aspirating. The sample solution is aspirated after each determination. The titration head with electrode and buret tips is subsequently rinsed in the sample vessel. The rinsing solution is also aspirated.

If required, auxiliary solution can be added prior to the determination with a Dosimat/Dosimat plus.

NOTE

A beaker full of rinsing solution needs to be placed in the **special beaker position**.

The individual steps:

- Move to sample
- Lower the lift to the work position
- Start the determination
- If necessary, initiate dosing (**Activation pulse**) and switch on the stirrer
- Wait for **Start delay time** if necessary
- Wait for end of determination
- Switch off the stirrer and switch on the aspiration pump
- Wait for **Aspiration time**, the aspiration pump remains switched on
- Switch on the rinsing pump and wait for **Rinsing time**
- Switch off the rinsing pump and wait for **Aspiration time** again
- Switch off the aspiration pump and move the lift upward
- Wait for **Dripping time**

After the last sample:

- Move to special beaker position
- Lower the lift to work position

5.5 Rinsing in special

This automation run requires an 843 Pump Station for rinsing and aspirating. The titration head with electrode and buret tips is rinsed in the rinsing beaker after each determination. The rinsing solution is aspirated at the same time.

If required, auxiliary solution can be added prior to the determination with a Dosimat/Dosimat plus.

NOTE

An empty beaker should be placed in the **special beaker position**.

The individual steps:

- Move to sample
- Lower the lift to the work position
- Start the determination
- If necessary, initiate dosing (**Activation pulse**) and switch on the stirrer
- Wait for **Start delay time** if necessary
- Wait for end of determination
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time**
- Move to special beaker position
- Lower the lift to work position
- Switch on the rinsing pump and the aspiration pump
- Wait for **Rinsing time**, the aspiration pump remains switched on
- Switch off the rinsing pump and wait for **Aspiration time**
- Switch off the aspiration pump and move the lift upward
- Wait for **Dripping time**

After the last sample:

- Lower the lift in special beaker to work position
- Switch on the rinsing pump and wait for **Rinsing time**
- Switch off the rinsing pump

5.6 Pump control

Rinsing the electrode and aspirating the sample vessels is carried out with the aid of an 843 Pump Station with two membrane or peristaltic pumps. These are connected to the 869 Compact Sample Changer by means of a remote cable . The pumps can be operated manually by push-button or controlled by means of remote lines.

The method runs of the 869 Compact Sample Changer automatically switch the pumps on or off at a predefined moment. The runs cannot be modified.

You can define the duration of the rinsing and aspiration procedures under **Menu ► Parameters**, see *page 60*ff.

NOTE

The pumps of the 843 Pump Station **cannot be stopped manually** on the 869 Compact Sample Changer. In the event of an **Emergency stop**, switch off the 843 Pump Station with the red **power switch**.

5.7 Dosing auxiliary solutions

The addition of an auxiliary solution can be carried out with a 6xx/7xx Dosimat or a Dosimat plus. This is connected via remote cable to the 869 Compact Sample Changer *(see chapter 4.6.2, page 19)*.

The method runs of the 869 Compact Sample Changer start the dosing on the Dosimat immediately prior to a determination. The dosing proceeds automatically and is not monitored by the 869 Compact Sample Changer. For the duration of the dosing, a waiting time must be observed in each case in the method run. Define a sufficiently long **Start delay time** under **Menu ► Parameters**, see *page 57*, *60*ff. Select the value that is sufficiently large so that the entire volume is dosed before the determination begins.

NOTE

The dosing of an auxiliary solution is parameterized on the Dosimat. An **8xx Dosimat plus** must be operated in **XDOS** mode, a **6xx** or **7xx Dosimat** in **DIS** mode. Enter the dosing volume on the Dosimat and activate a dosing rate as high as possible.

6 Operation

6.1 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:

```
>Menu                          ready
 Method      Dipping in special

 Rack position                  12
 Lift position                shift
 Stirrer      off           Rate  8
 Current sample             0 of 99
```

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.

6.2 Fundamentals of operation

6.2.1 The keypad

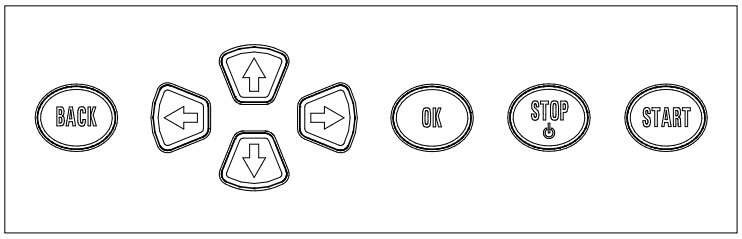
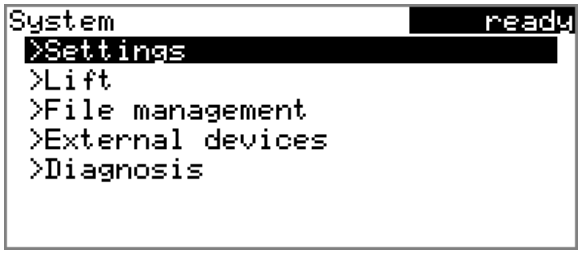


Figure 23 Keypad 869 Compact Sample Changer

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 or off.
START	Start method runs.

6.2.2 Structure of the dialog windows



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

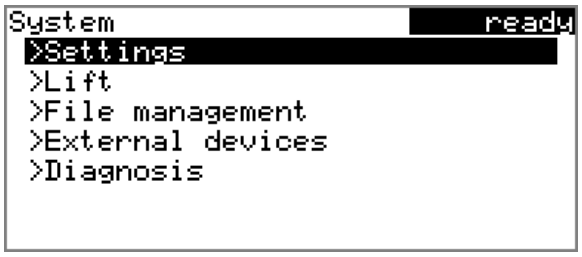
ready	The instrument is in normal status.
busy	A method has been started.
hold	A method has been paused.

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]**.

6.2.3 Navigating in the dialog

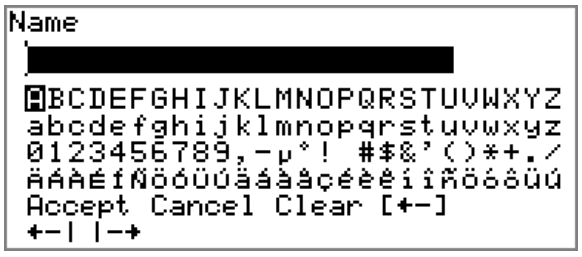
The selection bar is displayed in inverted style. Use the arrow keys **[⇧]** and **[⇩]** to move the selection bar upward or downward one line at a time. If a dialog text is marked with ">", then additional settings are available in a subordinate dialog. Use **[OK]** to access this dialog.

Example: System settings



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

6.2.4 Entering text and numbers



In the editing dialog for text input or numerical input, 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.

Editing function	Description
[←–]	The character left of the cursor is deleted (back-space).
←–|	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**.

6.3 Methods

The 869 Compact Sample Changer works with process methods that are based on specified method templates. Individual working steps of a method run can be configured individually, depending on the application. An optimized method run can be saved as a reusable method.

NOTE

Methods which were created on a program version starting with **5.869.0030** are not reverse-compatible with program versions **5.869.0022** and earlier.

6.3.1 Method templates

The 869 Compact Sample Changer contains method templates which are already configured except for a few parameters.

The following method templates can be selected:

Dipping in special After the determination, the electrode and the buret tips are immersed in the special beaker (position ▲).

Dipping in special2 Electrodes and buret tips are immersed at rack position 11 once before the sample series and after each determination. After the sample series, the electrode is immersed in the special beaker (position ▲).

Double dipping After the determination, the electrode and the buret tips are first immersed at rack position 11 and then in the special beaker (position ▲).

Rinsing in sample After the determination, the electrode and the buret tips are rinsed in the sample beaker and the sample solution is extracted.

Rinsing in special After the determination, the electrode and the buret tips are rinsed in the special beaker (position ▲) and the sample solution is extracted.

You can find a detailed description of the methods in chapter *5 Automation runs, page 28 and subsequent pages*.

6.3.2 Creating a new method

Proceed as follows to create a new method:

1 Open the method table

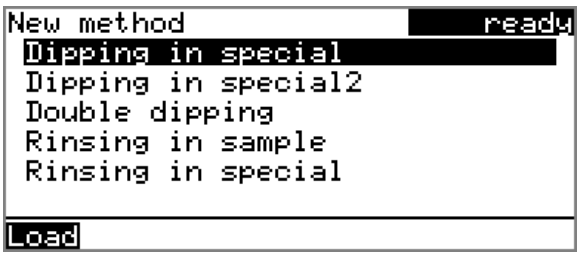
- In the main dialog, select **Method** and press **[OK]**.

The method table opens:

2 Select the method template

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

The list of method templates opens:



3 Load the method template

- Select the desired template 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**.

6.3.3 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 Opening the method table

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

The method table opens:

2 Modifying/applying 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:

Applying the name:

- Press **[BACK]**.

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

Entering 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.

6.3.4 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**.

6.3.5 Exporting a method

The methods can be exported to a connected USB flash drive.

NOTE

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

To export a method, proceed as follows:

1 Opening the method table

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

The method table with the stored methods opens:

2 Selecting the method

- Select the desired method.

3 Exporting the method

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

The method is being exported. The directory structure on the USB flash drive is listed in *chapter 7.2, page 52*.

The method is being exported. The directory structure on the USB flash drive is described in the more detailed manual.

6.4 Performing a sample series

Samples can be placed anywhere on the rack. They are processed according to ascending rack position.

The following is to be observed:

- In addition to the sample vessels, a rinsing beaker has to be placed on the last rack position, marked with the sign ▲. This vessel must be either empty or filled with a rinsing solution, depending on the automation run, *see chapter 5, page 28ff*.

NOTE

For the actual determination, you must have an analysis instrument, e.g. a Titrino plus or a Titrino, connected by means of a remote connecting cable. The preparation of the Titrino/Titrino plus is also part of the preparation for the sample series:

- Entry of the sample data, e.g. size, etc. (enable sample table / silo)
- Loading the determination method
- Disablement of the **Autostart**-function
- Rinsing the electrode
- Rinsing the tubings (PREP function)

6.4.1 Starting the sample series

Starting a sample series

A suitable method must be loaded before a sample series is started *(see chapter 6.3.4, page 40)*. The necessary parameters) can then be modified.

1 Defining a sample series

Press the **[START]** key.

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

2 Entering the number of samples

- **Number of samples** and press **[OK]**.
- Enter the number of samples.
- 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 Entering the rack position of the first sample

- **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 stored 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 **Closing the sample series dialog**

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

5 **Starting the sample series**

Press the **[START]** key.

Stopping a sample series

A sample series can be canceled at any time.

A sample series can be canceled at any time. When this is done, instruments connected via remote connections, such as Titrino/Titrino plus, Dosimat plus or an 843 Pump Station will also be stopped.

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

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

6.4.2 Stopping and continuing the sample series

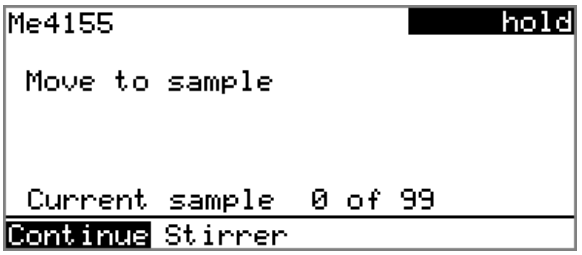
Pausing a sample series

A method run of the 869 Compact Sample Changer can be paused and then continued again. The connected devices are, however, **not** stopped.

No interruption is possible while the 869 Compact Sample Changer waits for the end of a determination.

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 interrupted. 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 a 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 "**Hold**" status, a method run, and thus the entire sample series, can be canceled in its entirety, 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 canceling it.

2 Press the **[OK]** key and enter the number of samples that still need to be processed. The current sample must be included at this time.

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

The sample series continues.

6.5 Printing a report manually

Menu ► Print reports

Proceed as follows to print a report manually:

1 Opening the main menu

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

2 Opening the print dialog

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

The dialog window with the available reports opens:

3 Selecting the report

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

The report is printed out.

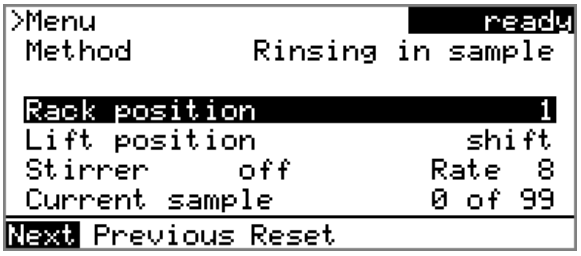
The following reports can be printed out manually:

Parameters	Report with all method parameters of the loaded method.
System	System report with system settings, solution list, external devices, etc.

6.6 Manual control

The manual control of sample rack, lift and stirrer is accomplished directly in the main dialog. If one of the lines **Rack position**, **Lift position** or **Stirrer** is selected, then a function bar will appear at the lowest line with the selection of available functions.

6.6.1 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 highest rack position is placed in front of the lift.

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

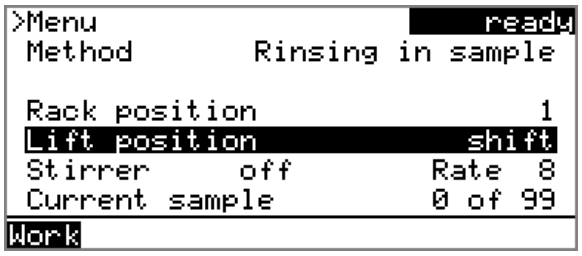
Previous — The lift is moved upward and the next lowest rack position is placed in front of the lift.

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

Reset — The rack is being initialized. The lift is moved upward and the sample rack is rotated to the starting position. At the same time, the starting position is reset (**Next sample pos.**) 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.

6.6.2 Moving the lift

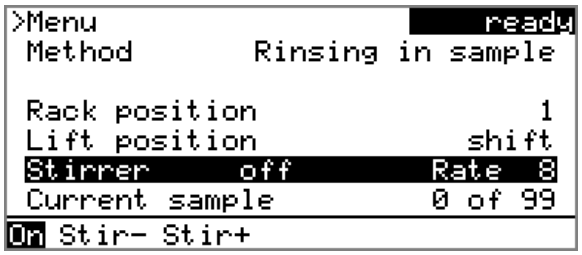


If the **Lift position** line is selected, then the lift can be moved to the position suggested in the function bar by pressing **[OK]**. Only two positions are possible:

Work pos.	The working height. It can be set under **Menu ► System ► Lift** .
Shift pos.	The rotation height. The lift moves all the way to the top.

The current lift position is displayed. Each other possible position is provided in the function bar.

6.6.3 Controlling the stirrer



If the **Stirrer** 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]**:

On	Switch on the stirrer if it is switched off.
Off	Switch off the stirrer if it is switched on.
Stir-	Reduce the stirring rate by one step.
Stir+	Increase the stirring rate by one step.

The status and the configured stirring rate are displayed in the main dialog.

Stirring rate and shift direction

Stir- / Stir+

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation
- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

The stirring rate can also be modified when the stirrer is switched off.

7 System settings

7.1 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.

Entry	**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.

Entry	**max. 10 characters**
Default value	**Empty**

Serial number

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

Program version

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

Time

Current time. Only numbers that make sense can be entered.

Format: hh:mm:ss

Date

Current date. Only numbers that make sense can be entered.

Format: YYYY:MM:DD

Language

Set the dialog language.

Up to and including program version 5.869.0022:

One additional language can be selected besides English.

NOTE

In order to ensure that a second language can be selected, it must first be installed. This installation must be carried out by specialist personnel. In chapter *Loading program versions and language files, page 54*, you will find details regarding the installation of a second language.

Starting with program version 5.869.0030:

All available languages are installed on the device. No additional languages can be installed.

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 will take effect as soon as you exit the main menu.

The limitation of the dialog results in the following:

- 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 for routine operation is activated, then the expert dialog cannot be activated during ongoing operation. To change the dialog type, the 869 Compact Sample Changer must be switched off and then back on again. The expert dialog can be forced as soon as the instrument is started up again. 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.

Input range	**150 to 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 enabled, then a short beep will sound at the press of a key.

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

7.2 File management

Menu ► System ► File management

NOTE

This menu item is visible only if a USB flash drive has been connected as an external storage medium.

Methods can be imported and deleted from a USB flash drive in this dialog. Only methods located in the **Files** directory are displayed in the list *(see "Directory structure on the USB flash drive", page 52)*.

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

NOTE

Methods and backups which were created on a program version starting with **5.869.0030** are not reverse-compatible with program versions **5.869.0022** and earlier.

Import

Import the selected method.

Delete

Delete the selected method.

Backup

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

NOTE

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

If a backup is already stored on the flash drive, then this will be overwritten as soon as the function is executed again.

Restore

Load the backup from a connected USB flash drive.

Directory structure on the USB flash drive

A directory with the instrument number will be created on the USB flash drive. The structure within this directory appears as follows:

Backup	All of the files of the backup are stored in this directory. The directory is created as soon as a backup is created for the first time.
Files	Exported methods are stored in this directory. The directory is created as soon as a method is exported for the first time. Only methods located in this directory can be imported.

7.3 Lift settings (Lift)

Menu ► System ► Lift

Work position

The working height of the lift can be set to the desired value. This is carried out by directly operating the lift.

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 closed, the respective current lift position will be applied as **Work position**.

Input range	**0 to 132 mm** (Increment: **6**)
Default value	**60 mm**

Starting pos. lift

After the 869 Compact Sample Changer has been switched on, the lift moves all the way to the top (shift position) for initialization of the drive. If desired, the lift can be moved back to working height.

Selection	**shift pos.** | **Work pos.**
Default value	**shift pos.**

shift pos.
Home position (0 mm) all the way up

Work pos.
The set working height

7.4 Configuring external devices

Menu ► System ► External devices

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.

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

7.5 Instrument diagnosis

7.5.1 Loading program versions and language files

Menu ► System ► Diagnosis

New program versions or language files can be loaded from a USB flash drive. The corresponding file must be saved on the USB flash drive in the following directory:

- Program file
  - Up to and including program version **5.869.0026**:
    Directory **869**
  - Starting with program version **5.869.0030:**
    Directory **869 ► SwUpdates**

- Language file
  - Up to and including program version **5.869.0026**:
    Directory **869**
  - Starting with program version **5.869.0030:**
    All available languages are installed on the device. No additional languages can be installed.

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

Program files

Program files are device-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

Language files can be recognized by means of the two-digit language code in the file name. A language file contains the dialog texts for various device 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 Connecting the USB flash drive

- Plug in the USB flash drive with the 6.2151.100 adapter (USB MINI (OTG) - USB A) at the instrument's USB port.
- Switch on the instrument.

2 Opening the update dialog

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

3 Opening the file selection

- Press **[OK]**.

The selection list with the program and language files present on the USB flash drive opens.

4 Selecting the file

- Use the arrow keys to select the required file.
- Press **[OK]**.

5 Starting the update

- Press **[START]**.

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

7.5.2 Diagnosis functions

The electronic and mechanical functional groups of Metrohm devices can and should be checked by specialist personnel from Metrohm as part of a regular maintenance schedule. Please ask your regional Metrohm representative regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement.

8 Parameters

8.1 Automation: Dipping in special

Menu ▶ Parameters

Automation

Display of the template used for the automation sequence.

Start delay time

Waiting time during which the dosing of an auxiliary solution takes place.

Input range	**0 to 999 s**
Default value	**10 s**

Dripping time

Waiting time after the titration head moves out of the sample beaker and out of the rinsing beaker.

Input range	**0 to 999 s**
Default value	**3 s**

Rinsing time

Waiting time during which the electrode remains immersed in the rinsing beaker.

Input range	**0 to 999 s**
Default value	**5 s**

Stirring rate

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*. The optimum stirring rate can be tested in the manual control.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation
- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

8.2 Automation: Dipping in special 2

Menu ► Parameters

Automation

Display of the template used for the automation sequence.

Start delay time

Waiting time during which the dosing of an auxiliary solution takes place.

Input range	**0 to 999 s**
Default value	**10 s**

Dripping time

Waiting time after the titration head moves out of the sample beaker and out of the rinsing beaker.

Input range	**0 to 999 s**
Default value	**3 s**

Rinsing time

Waiting time during which the electrode remains immersed in the rinsing beaker.

Input range	**0 to 999 s**
Default value	**5 s**

Stirring rate

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*. The optimum stirring rate can be tested in the manual control.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation
- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

8.3 Automation: Double dipping

Menu ► Parameters

Automation

Display of the template used for the automation sequence.

Start delay time

Waiting time during which the dosing of an auxiliary solution takes place.

Input range	**0 to 999 s**
Default value	**10 s**

Dripping time

Waiting time after the titration head moves out of the sample beaker and out of the rinsing beaker.

Input range	**0 to 999 s**
Default value	**3 s**

Rinsing time

Waiting time during which the electrode remains immersed in the rinsing beaker.

Input range	**0 to 999 s**
Default value	**5 s**

Stirring rate

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*. The optimum stirring rate can be tested in the manual control.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation
- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

8.4 Automation: Rinsing in sample

Menu ▶ Parameters

Automation

Display of the template used for the automation sequence.

Start delay time

Waiting time during which the dosing of an auxiliary solution takes place.

Input range	**0 to 999 s**
Default value	**10 s**

Dripping time

Waiting time after the titration head moves out of the sample beaker.

Input range	**0 to 999 s**
Default value	**3 s**

Aspiration time

Aspiration time of Pump 2, in case an 843 Pump Station is connected. It is applied before the rinsing and after the rinsing.

Input range	**0 to 999 s**
Default value	**10 s**

Rinsing time

Rinsing time of Pump 1, in case an 843 Pump Station is connected. Rinsing pump **and** aspiration pump run during the rinsing time.

Input range	**0 to 999 s**
Default value	**5 s**

Stirring rate

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*. The optimum stirring rate can be tested in the manual control.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation
- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

8.5 Automation: Rinsing in special

Menu ► Parameters

Automation

Display of the template used for the automation sequence.

Start delay time

Waiting time during which the dosing of an auxiliary solution takes place.

Input range	**0 to 999 s**
Default value	**10 s**

Dripping time

Waiting time after the titration head moves out of the sample beaker and out of the rinsing beaker.

Input range	**0 to 999 s**
Default value	**3 s**

Aspiration time

Aspiration time of Pump 2, in case an 843 Pump Station is connected. It runs after the rinsing time.

Input range	**0 to 999 s**
Default value	**10 s**

Rinsing time

Rinsing time of Pump 1, in case an 843 Pump Station is connected. It runs before the aspiration time. Rinsing pump **and** aspiration pump run during the rinsing time.

At the end of a sample series, the rinsing time determines how long rinsing solution will be filled into the rinsing beaker.

Input range	**0 to 999 s**
Default value	**5 s**

Stirring rate

Setting the stirring rate. It can be set in steps of –15 to +15. The default setting **8** corresponds to 1,000 rpm. The formula for calculating the rotational speed is specified in *chapter 10.2, page 65*. The optimum stirring rate can be tested in the manual control.

The algebraic sign of the stirring rate changes the stirring direction. When the stirrer is viewed from above, this means:

- "+": counterclockwise rotation

- "–": clockwise rotation

Input range	**–15 to 15**
Default value	**8**

9 Operation and maintenance

The 869 Compact Sample Changer requires appropriate care. Excess contamination of the instrument may result in functional disruptions 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. In particular, the plug connections (particularly the power plug) must be protected against contamination.

Check all tubing connections regularly for leaks.

10 Appendix

10.1 Remote interface

10.1.1 Pin assignment of the remote interface

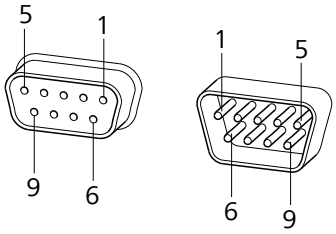


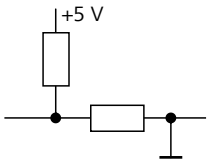
Figure 24 Pin assignment of remote socket and remote plug

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

Table 1 Inputs and outputs of the remote interface

Pin no.	Assignment	Function
1	Output 0	Sample ready
2	Output 1	Dosimat
3	Output 2	Pump 1
4	Output 3	Pump 2
5	Output 4	Error
6	0 volt (GND)	
7	+5 volt	
8	Input 0	Continue
9	Input 1	Stop

Inputs

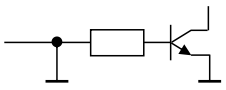


approx. 5 kΩ Pull-up

t_p > 100 ms

active = low, inactive = high

Outputs



Open Collector

t_P > 200 ms

active = low, inactive = high

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

+5 V: maximum load = 20 mA

10.1.2 Status diagram of the remote interface

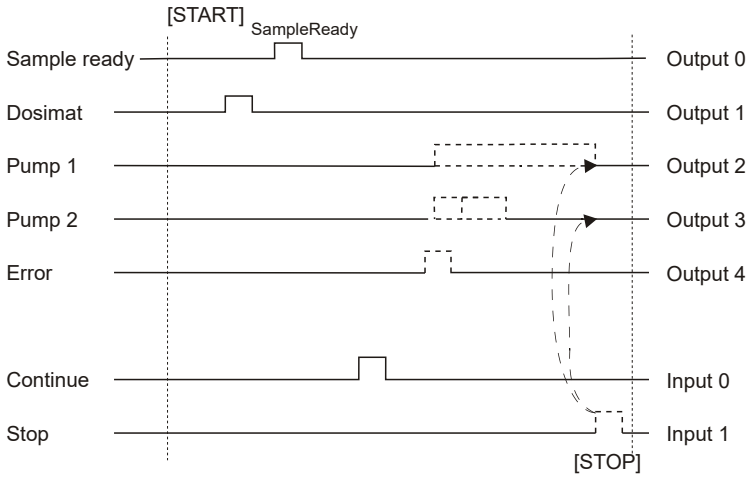


Figure 25 Remote status diagram

10.2 Stirring rate

The stirring rate can be adjusted in steps from –15 to +15.

The approximate rotational speed for the internal magnetic stirrer (depends on the product version) can be calculated with the following formula:

Rotational speed/min (r/min) = 125 · Stirring rate

Example:

Configured stirring rate: 8

Rotational speed in revolutions per minutes = 125 · 8 = 1,000

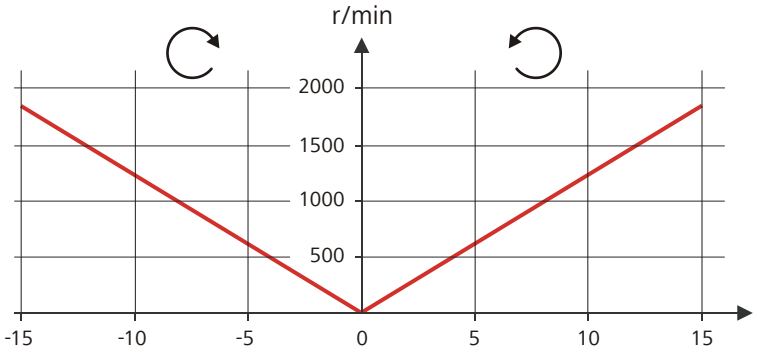


Figure 26 Rotational speed depending on the stirring rate

The information on the separately connectable 802 propeller stirrer can be found in the "802 Stirrer" manual.

10.3 USB devices

NOTE

USB peripheral devices that are to be connected must support either the *USB 1.0/1.1 (Full Speed)* or the *USB 2.0 (High Speed)* standard. The maximum data transfer rate is however in any case 12 MBit/s.

Keyboards, PC mice and barcode readers are so-called HID devices (**H**uman **I**nterface **D**evice) and can be connected via a USB hub only.

Printers should also be connected via a USB hub. Depending on the manufacturer or printer type a direct connection is however possible.

10.3.1 6.2147.000 numerical USB keypad

The **[Num Lock]** key must be pressed for navigating in the dialog. The arrow keys are effective in conjunction with it.

The respective editing dialog must be opened for the numerical input.

Table 2 Key assignment

Key of the 869 Compact Sample Changer or function in the editing dialog	Key on the numerical USB keypad
[BACK]	**[Home]**
[⇧] [⇩]	**[↑] [↓]**
[⇦] [⇨]	**[←] [→]**
[OK]	**[Enter]**
[⇤⌫]	**[BS]** (backspace)

Key of the 869 Compact Sample Changer or function in the editing dialog	Key on the numerical USB keypad
Clear	**[Del]**
Accept	**[Home]**

10.3.2 Printer

The range of USB printers available is extremely varied and constantly changing. The following points must be taken into account when selecting a printer:

- USB interface necessary
- Printer language: HP-PCL, Canon BJL Commands, Epson ESC P/2 or ESC/POS

NOTE

Inexpensive printers are often designed solely for use with a PC and may not be equipped with one of the printer languages listed above. Such models are not suitable for this reason.

10.4 System initialization

In very rare instances, a faulty file system (e.g. because of a program crash) may lead to an impairment of program functioning. The internal file system must 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 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 the system initialization:

1 Switching off the instrument

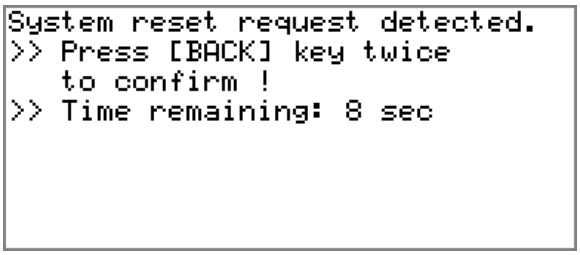
- Keep the red **[STOP]** key pressed down for at least 3 s.

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

2 Switching 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 Confirming the initialization

NOTE

If the request is not confirmed within 8 s, then the procedure will be canceled.

- Press **[BACK]** twice.

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

11 Technical specifications

11.1 Lift

Stroke path	132 mm
Maximum load	5 N
Lift rate	15 mm/s (typical)

11.2 Turntable

Rack positions	12
Maximum load	17 N
Turntable speed	13 degrees/s (typical)

11.3 Interfaces and connectors

Stirrer connector	DIN socket
Stirring rate	722/802 rod stirrer: 180–3000 rpm Adjustable in 15 steps each in both shift directions.
USB (OTG) connector	For connecting USB devices.
Remote connector	For connecting instruments with a remote interface.

11.4 Power connection

Voltage	100–240 V ± 10%
Frequency	50–60 Hz ± 3 %
Power consumption	45 W
Fuse	1.0 ATH

11.5 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 above sea level / min. 800 mbar
Overvoltage category	II
Pollution degree	2

11.6 Reference conditions

Ambient temperature	25 °C (±3 °C)
Relative humidity	≤ 60%

11.7 Dimensions

Width	0.26 m
Height	0.47 m
Depth	0.43 m
Weight	8.82 kg (without accessories)
Material	
Housing	Lower part: Crastin PBT Lift: Metal, surface-treated
Rack	PVC

Index