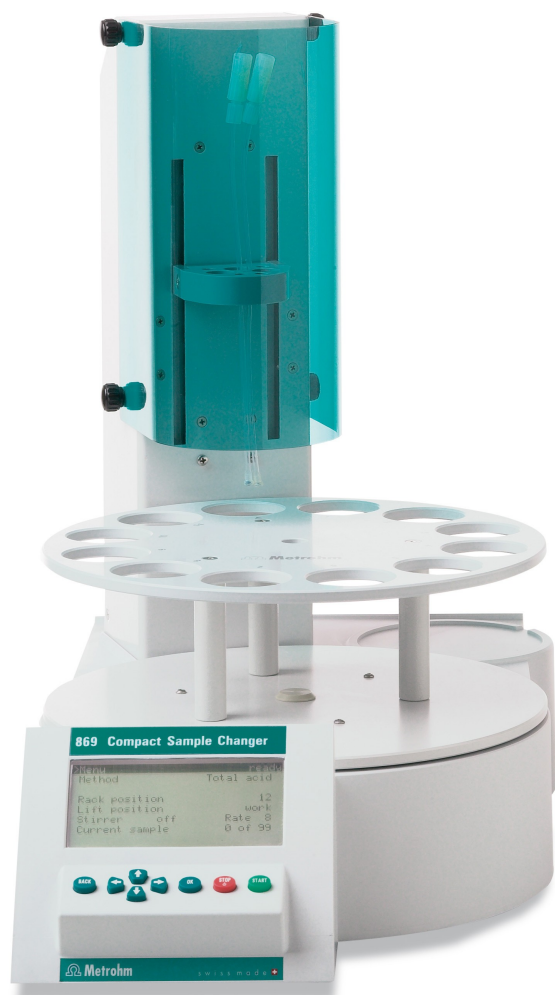


# 869 Compact Sample Changer



Manual  
8.869.8002EN





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# **869 Compact Sample Changer**

**Manual**

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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.

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# 1 Introduction

## 1.1 Instrument description

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

The specified method sequences can be parameterized individually and saved as sample-specific methods. Methods can be exported on a USB stick and then copied onto another device quickly and easily.

### 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 2 electrodes, 1 rod stirrer, 2 dosing tips, 1 aspiration tip and 3 rinsing nozzles.
- **Stirrer connection**  
For a 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 stick (for system backup or method export).
- **Remote connector**  
For connecting a titrator, a Dosimat and/or an 843 Pump Station.

### 1.1.2 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.



## 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 have to be followed by the user 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)	<b>Cross-reference to figure legend</b> The first number refers to the figure number, the second to the instrument part in the figure.
1	<b>Instruction step</b> Carry out these steps in the sequence shown.
<b>Method</b>	<b>Dialog text, parameter</b> in the software
<b>File ▶ New</b>	Menu or menu item
<b>[Next]</b>	<b>Button</b> or <b>key</b>
	<b>Warning</b> This symbol draws attention to a possible life hazard or risk of injury.
	<b>Warning</b> This symbol draws attention to a possible hazard due to electrical current.
	<b>Warning</b> This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	<b>Warning</b> This symbol draws attention to a possible biological hazard.
	<b>Caution</b> 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 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. Pre-installed safety shields are not allowed to be removed.

The 869 Compact Sample Changer 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 blockage 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 device is switched on. Blockages can only be cleared when the instrument is in a voltage-free status; this action generally involves a **considerable risk of injury**.



### Warning

The 869 Compact Sample Changer is **not** suitable for utilization in bio-chemical, 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

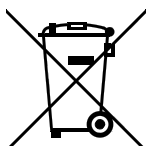


### Warning

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 fluids 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

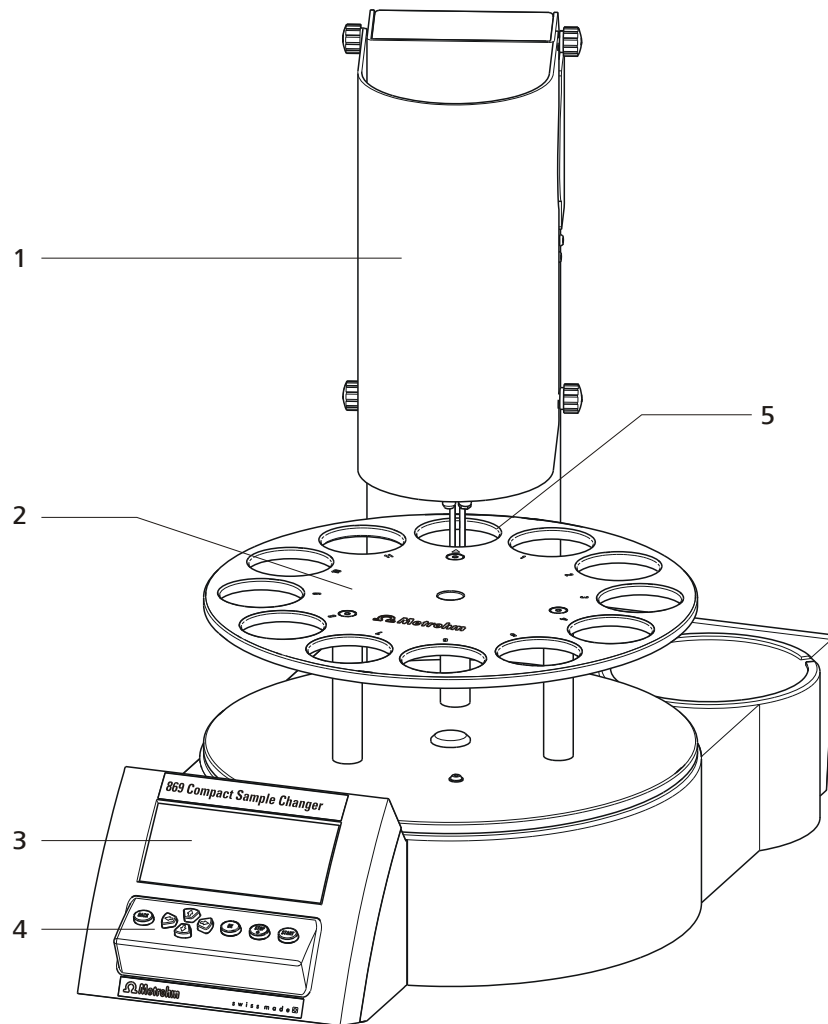


Figure 1 Front 869 Compact Sample Changer

**1 Safety shield**

With knurled screws for mounting. The safety shield can be folded up.

**3 Display**

**5 Special position**

For a rinsing beaker

**2 Sample rack**

For 11 sample beakers and 1 rinsing beaker (6.1459.300, 120 mL)

**4 Keypad**

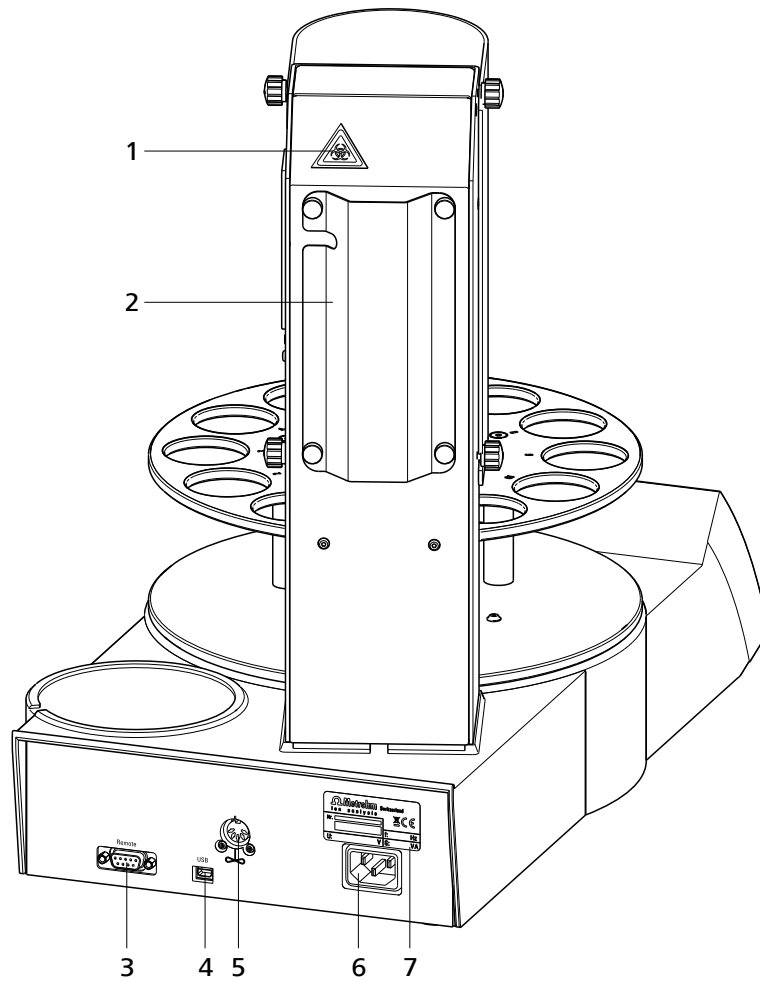


Figure 2 Rear 869 Compact Sample Changer

<p><b>1 Warning symbol</b> (see Chapter 1.3.4, page 4)</p>	<p><b>2 Tubing and cable cover</b></p>
<p><b>3 Remote connector</b> For connecting instruments with a remote interface. D-Sub, 9-pin.</p>	<p><b>4 USB (OTG) connector</b> For connecting printers, USB sticks, USB hubs, etc.</p>
<p><b>5 Stirrer connection</b> For 802 Stirrer (rod stirrer).</p>	<p><b>6 Mains connection socket</b></p>
<p><b>7 Type plate</b> Contains specifications concerning mains voltage and serial number.</p>	



## 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 Removing the safety shield and cable cover

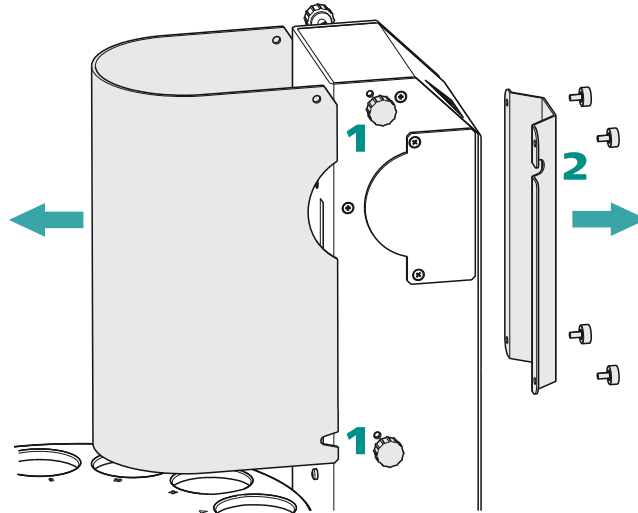


Figure 3 Removing shields

If you remove the safety shield and the cable cover before, the installation of the accessories is easier to carry out. 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 cover.

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

### 3.3 Setting up the titration head

#### Equipping the titration head without rinsing equipment

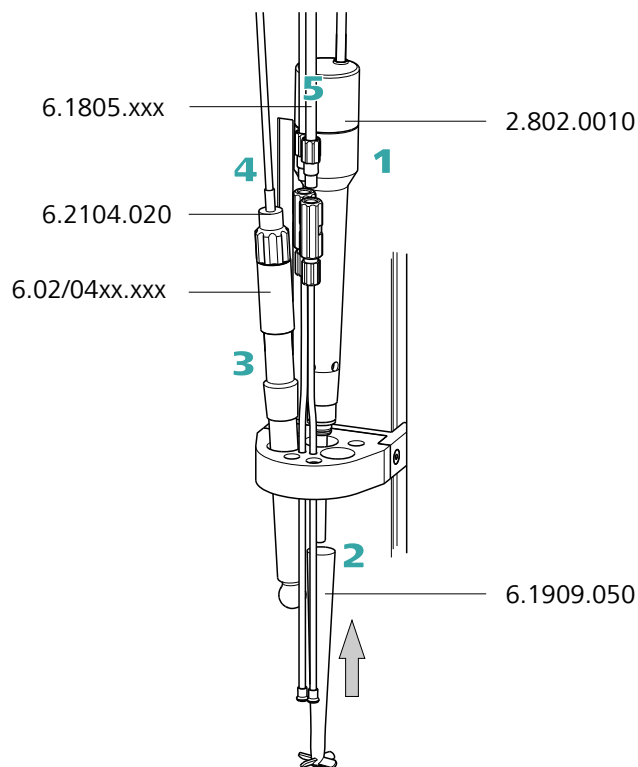


Figure 4 Equip the titration head

- 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:

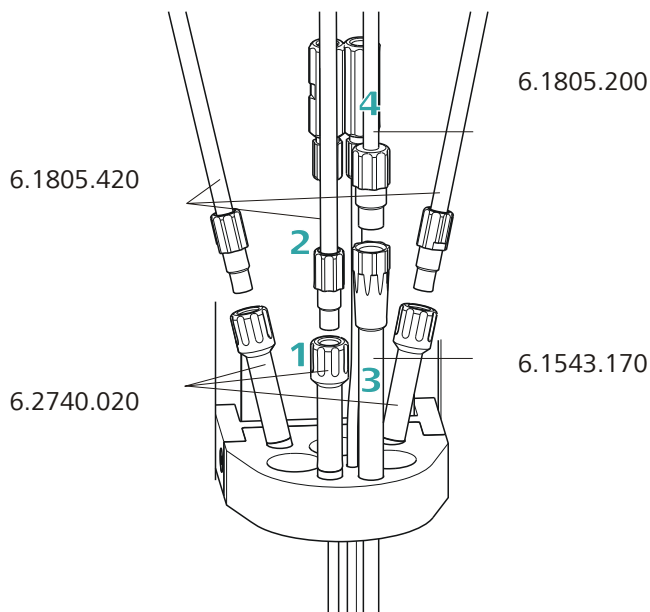


Figure 5 Installing rinsing nozzles and aspiration tip

- 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:

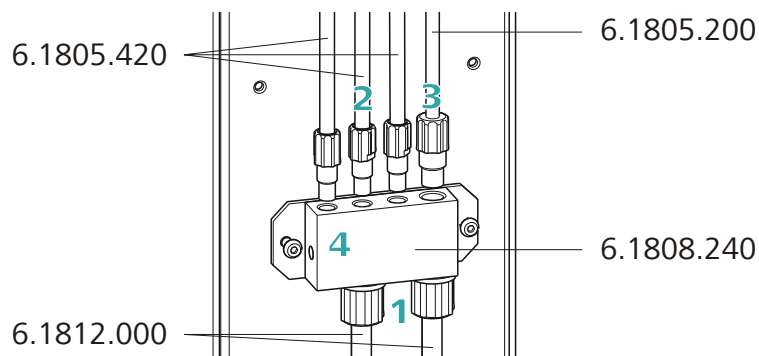


Figure 6 Setting up the distributor

- 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.

## 3.4 Connecting a stirrer

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

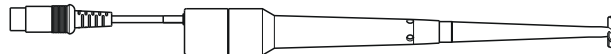


Figure 7 Rod stirrer 802 Stirrer

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.

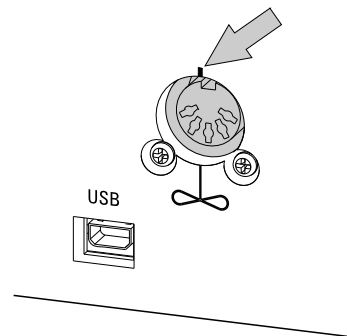


Figure 8 Connecting a stirrer

### 3.5 Connecting 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.

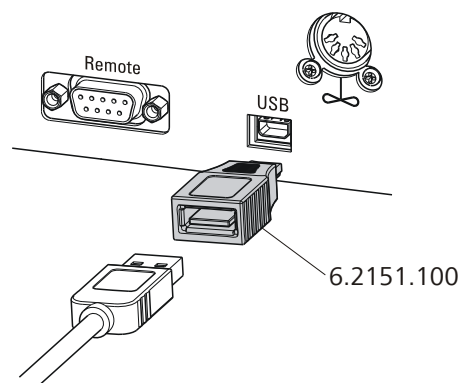


Figure 9 Connecting USB devices



#### Caution

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

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

The following devices can directly be operated 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 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 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 a **variety of 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:

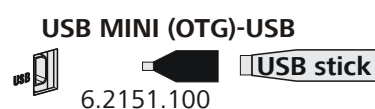


Figure 10 Connecting the USB stick



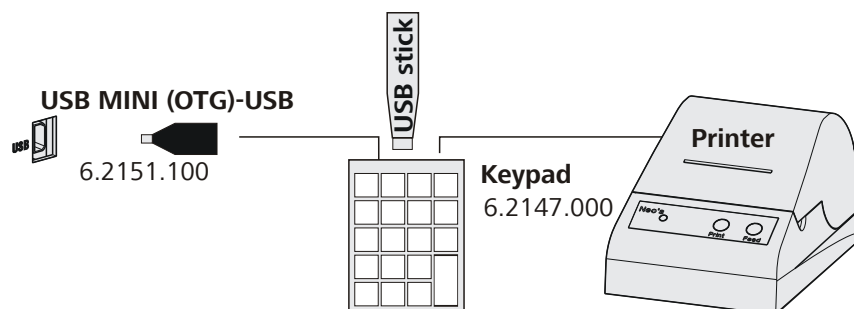


Figure 11 Connecting the 6.2147.000 USB keyboard with USB stick and printer

## 3.6 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.

### 3.6.1 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

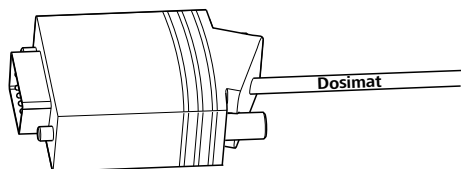
- Dual cable for connections with a Dosimat and other instruments directly at the 869 Compact Sample Changer .

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*

## 3.6.2 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.



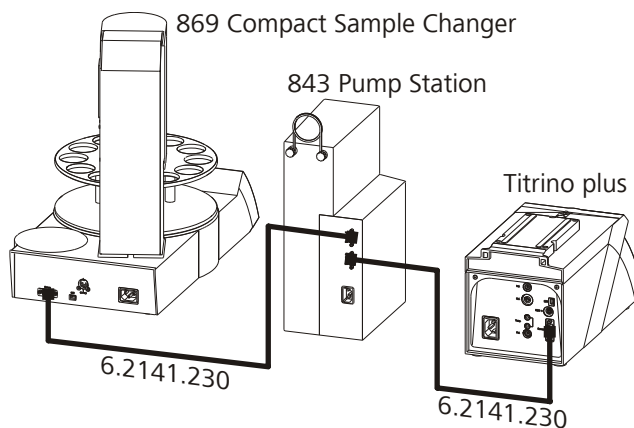


Figure 15 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus

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.

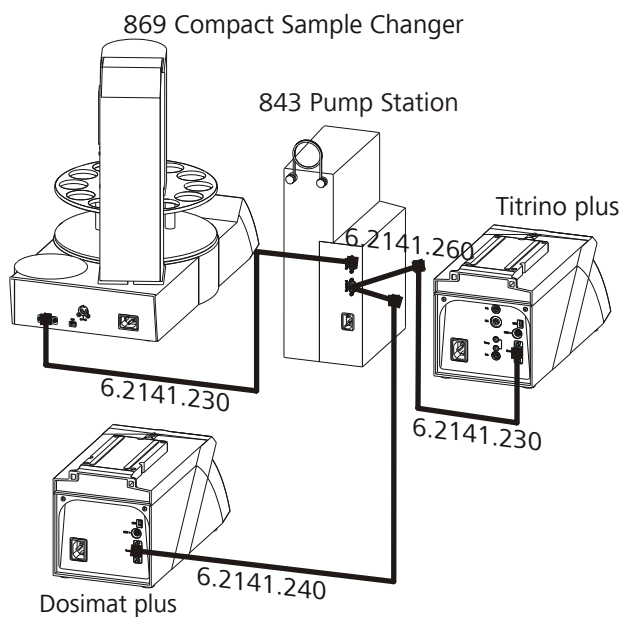
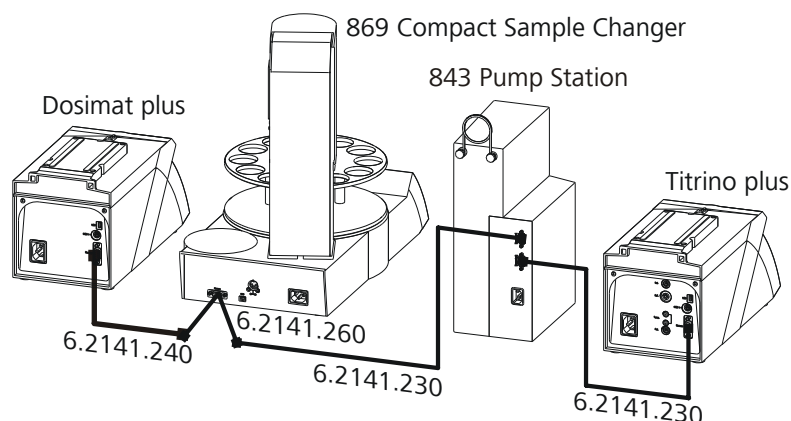


Figure 16 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus - Dosimat plus

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)

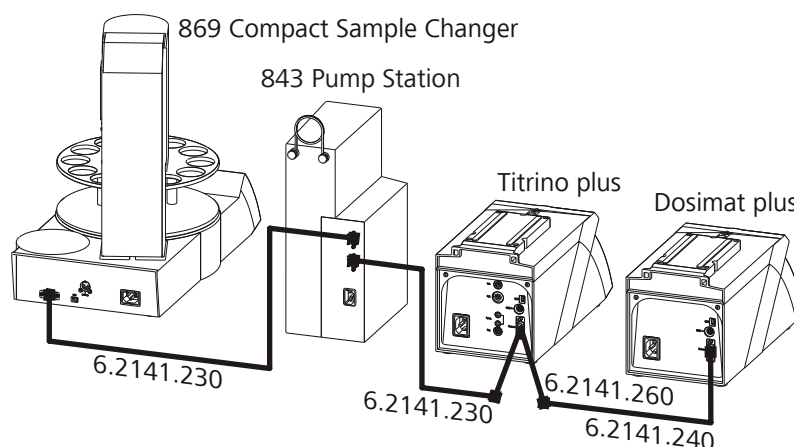


Figure 17 Remote connection 869 Compact Sample Changer - 843 Pump Station - Titrino plus - Dosimat plus

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.

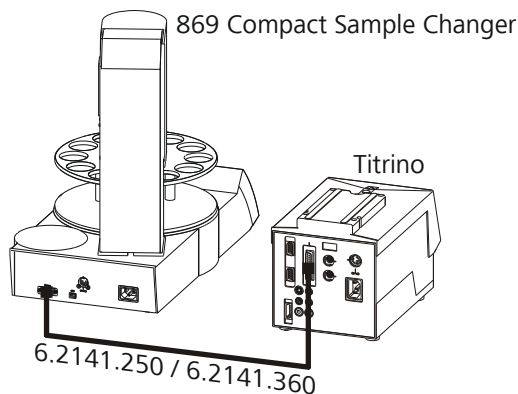


Figure 18 Remote connection Dosimat - 869 Compact Sample Changer - Titrino

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 occurring 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.

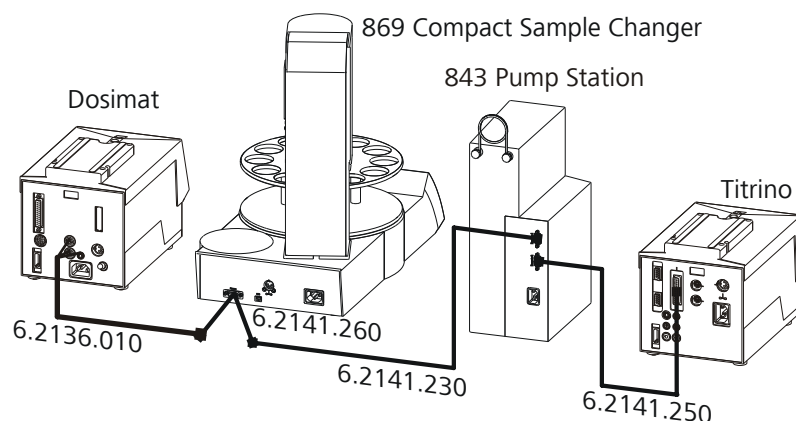


Figure 19 Remote connection Dosimat - 869 Compact Sample Changer - 843 Pump Unit - Titrino

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).

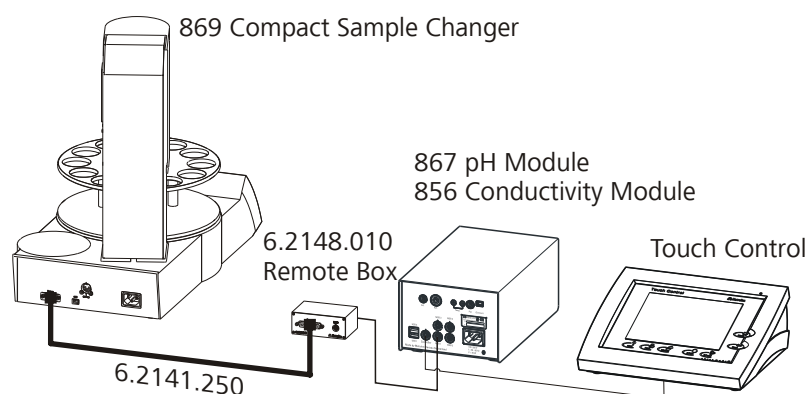


Figure 20 Remote connection 869 Compact Sample Changer - Remote Box 867 - pH Module / Conductivity Module

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.

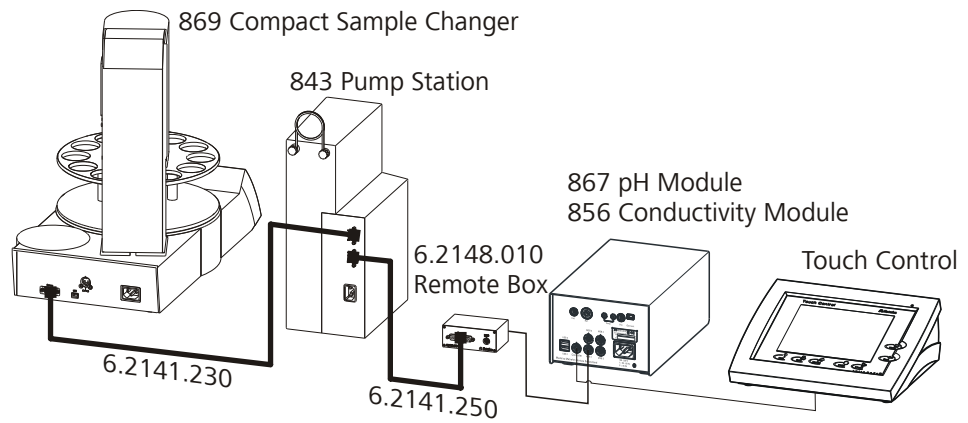


Figure 21 Remote connection 869 Compact Sample Changer - 843 Pump Unit - Remote Box - 867 pH Module / Conductivity Module

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

### 3.7 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.

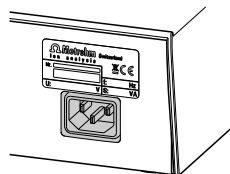


Figure 22 Connecting the mains cable



### 3.8 Mounting the cable cover and the safety shield

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

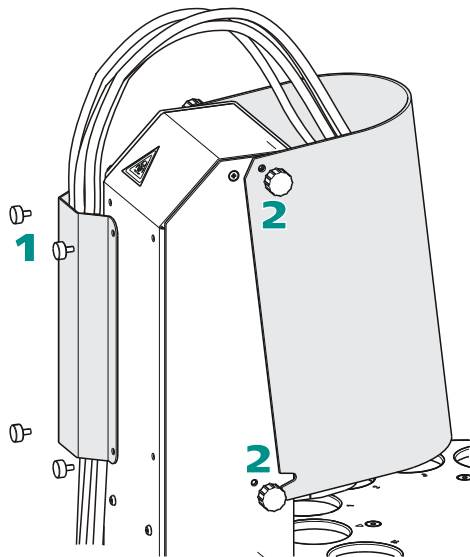


Figure 23 Mounting the shields

#### 1 Mount the cable cover

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

#### 2 Mount the safety shield

Fasten the safety shield with the four black knurled screws to the sides of the tower. When each of the lower knurled screws is slightly loosened, the safety shield can be folded up if needed.



#### Warning

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



## 4 Automation sequences

### 4.1 Dipping in special

This automation sequence is suitable for simple determinations.

No pump is required for rinsing or for aspiration of the sample vessels. The titration head with electrode and burette 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.

A filled rinsing beaker should be placed on the **special beaker position**.

#### The individual steps:

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

After the last sample:

- Lower the lift in the rinsing beaker to work position

## 4.2 Dipping in special 2

This automation sequence 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.

A filled rinsing beaker should be placed on **rack position 11** and on 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** to be completed
- Switch off the stirrer and move the lift upward
- Wait for **Dripping time** to be completed

For each sample:

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

After the last sample:

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



## 4.3 Double dipping

This automation sequence is suitable for simple determinations.

No pump is required for rinsing or for aspiration of the sample vessels. The titration head with electrode and burette 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.

A filled rinsing beaker should be placed on **rack position 11** and on the **special beaker position**.

### The individual steps:

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

After the last sample:

- Lower the lift in the rinsing beaker to work position

## 4.4 Rinsing in sample

This automation sequence 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.

A filled rinsing beaker should be placed on the **special beaker position**.

### The individual steps:

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

After the last sample:

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



## 4.5 Rinsing in special

This automation sequence 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.

An empty rinsing beaker should be placed on the **special beaker position**.

### The individual steps:

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

After the last sample:

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

## 4.6 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 given time. The sequences cannot be modified.

You can define the duration of the rinsing and aspiration procedures under **Menu ▶ Parameters**, see page 58ff.



### 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 **mains switch**.

## 4.7 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 3.6.2, page 18).

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 55, 58ff. Select a 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 select a dosing rate as high as possible.



# 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:

```

>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.



## 5.2 Fundamentals of operation

### 5.2.1 The keypad

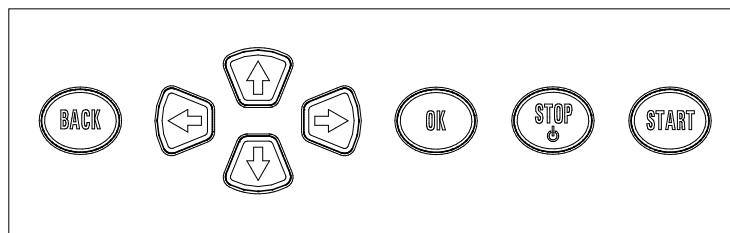
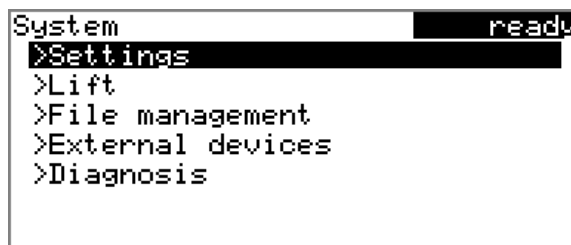


Figure 24 Keypad 869 Compact Sample Changer

<b>BACK</b>	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.
<b>OK</b>	Confirm the selection.
<b>STOP</b>	Stop an ongoing method run or a manual function. Switch the instrument on/off.
<b>START</b>	Start a method run or a manual function.

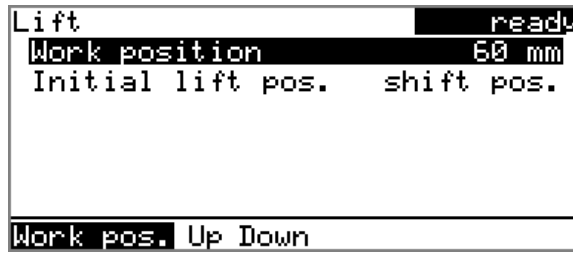
### 5.2.2 Structure of the dialog windows



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.

<b>ready</b>	The instrument is in normal state.
<b>busy</b>	A method has been started.
<b>hold</b>	A method has been paused.

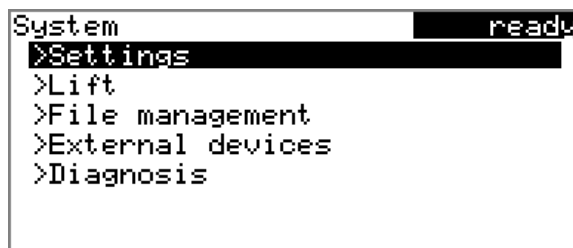
Some dialogs have a so-called function bar on the bottom line. The functions contained therein can be selected with the arrow keys [←] or [→] and executed with [OK].



### 5.2.3 Navigating in the dialog

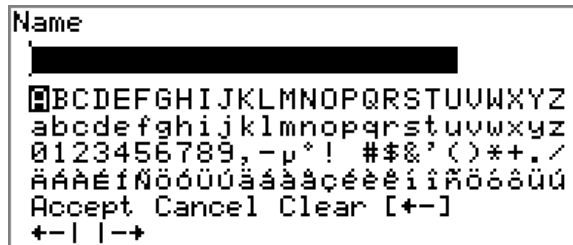
The selection bar is displayed in inverted style. Use the arrow keys [↑] and [↓] to move the selection bar upward or downward one line at a time. If a dialog text is marked with "> ", then additional settings are available in a subordinate dialog. Use [OK] to access this dialog.

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
<b>Accept</b>	The modification is applied and the editing dialog is exited.
<b>Cancel</b>	The editing dialog is exited without applying the modification.
<b>Delete</b>	The contents 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 <b>[OK]</b> is pressed.
-->	Text editor only The cursor within the input field is shifted to the right by one character each time that <b>[OK]</b> is pressed.
<b>[BACK]</b>	The modification is applied and the editing dialog is exited.

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

## 5.3 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 individually parameterized, depending on the application. An optimized method run can be saved as a reusable method.

### 5.3.1 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 electrodes and buret tips are immersed twice in the special beaker (position ▲).
- Dipping in special2** The electrode and buret tips are immersed once before the sample series and after each determination in the filled beaker on rack position 11. After the sample series the electrode is immersed in the special beaker (position ▲).
- Double dipping** After the determination, the electrodes and buret tips are first immersed in the rack position 11 and afterwards in the special beaker (position ▲).



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

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

You will find a detailed description of the methods in chapter 4 *Automation sequences*, page 26ff.

### 5.3.2 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**.

### 5.3.3 Saving a method

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

To save a method, proceed as follows:

#### 1 Open the method table

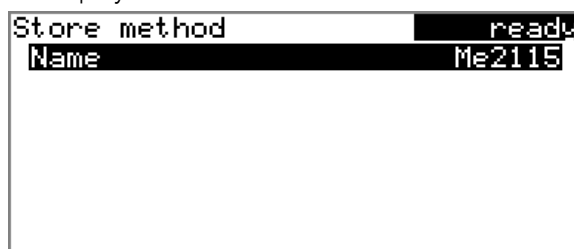
- In the main dialog, select **Method** and press **[OK]**.

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.





## 2 Select a method

- Select the desired method.

## 3 Export the method

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

The method is exported. The directory structure on the USB stick is listed in *chapter 6.2, page 49*.

## 5.4 Performing a sample series

Samples can be placed anywhere on the rack. They are processed in accordance with 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 sequence, *see chapter 4, page 26ff*.



### 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:

- Entering the sample data, such as sample size, etc. (enable the Sample table/Silo)
- Loading the determination method
- Deactivating the **Autostart** function.
- Rinsing the electrode
- Flushing the tubing (PREP function)



## 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 5.3.4, page 38). The necessary parameters ) can then be modified.



#### 1 Define the sample series

Press the **[START]** key.

```
Sample series          ready
Number of samples     99
Next sample pos.      1

Press [START] key to continue
```

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.
- Close the entry dialog with **[BACK]** or **Accept**.



#### Note

Take care to ensure that the number of samples matches the number of sample data entered in the Titrino/Titrino plus.

#### 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 entry 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.

#### 5 Start 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.

## 5.4.2 Pausing a sample series and continuing

### Interrupting a sample series

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

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

```

Me4155          busy
Move to sample

Current sample 0 of 99
Hold Stirrer
  
```

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.



```

Me4155                                     hold
Move to sample
Current sample 0 of 99
Continue Stirrer
  
```

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 a sample series

If a method run is paused, then the "**Hold**" status is displayed in the title bar, see previous illustration. 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.

```

Sample series                               hold
Number of samples                           99
Press [START] key to continue
  
```

- 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 printed out.

The following reports can be printed out manually:

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



## 5.6.2 Moving the lift

```

>Menu                      ready
Method                      Rinsing in sample

Rack position                1
Lift position                shift
Stirrer                      off          Rate 8
Current sample                0 of 99
Work

```

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** (see Chapter 6.3, page 51).

**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 Controlling the stirrer

```

>Menu                      ready
Method                      Rinsing in sample

Rack position                1
Lift position                shift
Stirrer                      off          Rate 8
Current sample                0 of 99
On Stir- Stir+

```

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** Switches on the stirrer if it is switched off.

**Off** Switches off the stirrer if it is switched on.

**Stir-** Reduces the stirring rate by one increment.

**Stir+** Increases the stirring rate by one increment.

The status and the stirring rate that has been set 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 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*.

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

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

---

Input range	<b>-15 - 15</b>
Default value	<b>8</b>

---

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

## 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.

Entry	<b>max. 12 characters</b>
Default value	<b>empty</b>

#### Instrument name

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

Entry	<b>max. 10 characters</b>
Default value	<b>empty</b>

#### 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 a 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 869 Compact Sample Changer 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	<b>Expert   Routine</b>
Default value	<b>Expert</b>

#### **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	<b>150 - 240</b>
Default value	<b>212</b>



### 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 switched on, then a short beep will be heard in the following cases:

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

Selection	<b>on   off</b>
Default value	<b>on</b>

## 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 50).



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

### Import

Import the selected method.

### Delete

Delete the selected method.

### Backup

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



#### Note

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

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

### Restore

Load the backup copy 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:

##### Backup

All of the files of the backup copy are stored in this directory. The directory will be created the first time a backup copy is saved.

##### 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.

## 6.3 Lift settings (Lift)

Menu ▶ System ▶ Lift

Lift	ready
Work position	60 mm
Initial lift pos.	shift pos.
Work pos. Up Down	

### Work position

The working height of the lift can be set to the desired value. This is accomplished by means of the direct operation of the lift.

Three functions can be selected from the function bar with [←] and [→] and then run 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 momentary lift position will be applied as **Work position**.

Input range	<b>0 - 132 mm (Increment: 6)</b>
Default value	<b>60 mm</b>

### Initial lift pos.

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. It can then be moved back down to the working height if desired.

Selection	<b>Shift pos.   Work pos.</b>
Default value	<b>Shift pos.</b>

#### **Shift pos.**

Resting position (0 mm) all the way up

#### **Work pos.**

The set working height



## 6.4 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	<b>Citizen (ESC-POS)   Custom (ESC-POS)   Epson   Epson (ESC-POS)   HP DeskJet   HP LaserJet   Seiko (ESC-POS)</b>
Default value	<b>HP DeskJet</b>

### Keyboard layout

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

Selection	<b>English US   French FR   German CH   German DE   Spanish ES</b>
Default value	<b>English US</b>

### Editing the COM2 settings

## 6.5 Instrument diagnosis

### 6.5.1 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** whereas

XXX = Instrument type (e.g. 848 for the 848 Titrimo 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** whereas

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 port on the instrument.
- Switch on the instrument.

### 2 Open the update dialog

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

```
Software update      ready
Program version     58480011

Press [START] key to continue
```

### 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.

**6.5.2 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

### 7.1 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	<b>0 - 999 s</b>
Default value	<b>10 s</b>

#### Dripping time

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

Input range	<b>0 - 999 s</b>
Default value	<b>3 s</b>

#### Rinsing time

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

Input range	<b>0 - 999 s</b>
Default value	<b>5 s</b>

#### Stirring rate

Setting the stirring rate. It can be set in steps of  $-15$  to  $+15$ . The default setting **8** corresponds to 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*. The optimum stirring rate can be tested in the manual control.

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

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

Input range	<b>-15 - 15</b>
Default value	<b>8</b>



## 7.2 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	<b>0 - 999 s</b>
Default value	<b>10 s</b>

#### Dripping time

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

Input range	<b>0 - 999 s</b>
Default value	<b>3 s</b>

#### Rinsing time

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

Input range	<b>0 - 999 s</b>
Default value	<b>5 s</b>

#### Stirring rate

Setting the stirring rate. It can be set in steps of  $-15$  to  $+15$ . The default setting **8** corresponds to 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*. The optimum stirring rate can be tested in the manual control.

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

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

Input range	<b>-15 - 15</b>
Default value	<b>8</b>



## 7.3 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	<b>0 - 999 s</b>
Default value	<b>10 s</b>

### Dripping time

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

Input range	<b>0 - 999 s</b>
Default value	<b>3 s</b>

### Rinsing time

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

Input range	<b>0 - 999 s</b>
Default value	<b>5 s</b>

### Stirring rate

Setting the stirring rate. It can be set in steps of  $-15$  to  $+15$ . The default setting **8** corresponds to 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*. The optimum stirring rate can be tested in the manual control.

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

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

Input range	<b>-15 - 15</b>
Default value	<b>8</b>



## 7.4 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	<b>0 - 999 s</b>
Default value	<b>10 s</b>

#### Dripping time

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

Input range	<b>0 - 999 s</b>
Default value	<b>3 s</b>

#### Aspiration time

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

Input range	<b>0 - 999 s</b>
Default value	<b>10 s</b>

#### Rinsing time

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

Input range	<b>0 - 999 s</b>
Default value	<b>5 s</b>

#### Stirring rate

Setting the stirring rate. It can be set in steps of  $-15$  to  $+15$ . The default setting **8** corresponds to 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*. The optimum stirring rate can be tested in the manual control.

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

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

Input range	<b>-15 - 15</b>
Default value	<b>8</b>

## 7.5 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	<b>0 - 999 s</b>
Default value	<b>10 s</b>

### Dripping time

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

Input range	<b>0 - 999 s</b>
Default value	<b>3 s</b>

### Aspiration time

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

Input range	<b>0 - 999 s</b>
Default value	<b>10 s</b>

### 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	<b>0 - 999 s</b>
Default value	<b>5 s</b>

### Stirring rate

Setting the stirring rate. It can be set in steps of  $-15$  to  $+15$ . The default setting **8** corresponds to 1000 U/min. The formula for calculating the rotational speed is specified in *chapter 9.2, page 64*. The optimum stirring rate can be tested in the manual control.

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

- "+": counterclockwise rotation



- "-": clockwise rotation

---

Input range	<b>-15 - 15</b>
Default value	<b>8</b>

---

## 8 Handling and maintenance

### 8.1 General

The 869 Compact Sample Changer 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.

### 8.2 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/](http://www.metrohm.com/com/) under **Support**.

## 9 Appendix

### 9.1 Remote interface

#### 9.1.1 Pin assignment of the remote interface

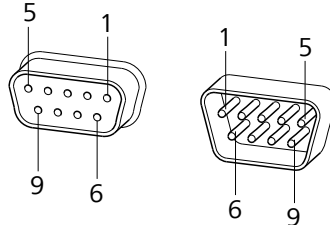


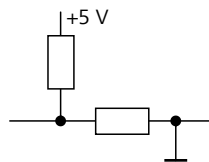
Figure 25 Pin assignment of remote socket and plug

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

Table 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 volts	
8	Input 0	Continue
9	Input 1	Stop

#### Inputs



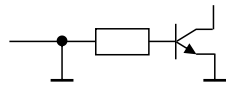
approx. 5 k $\Omega$  Pull-up

$t_p > 100$  ms

active = low, inactive = high



**Outputs**



Open Collector

$$t_p > 200 \text{ ms}$$

active = low, inactive = high

$$I_C = 20 \text{ mA}, V_{CE0} = 40 \text{ V}$$

+5 V: maximum load = 20 mA

**9.1.2 Status diagram of the remote interface**

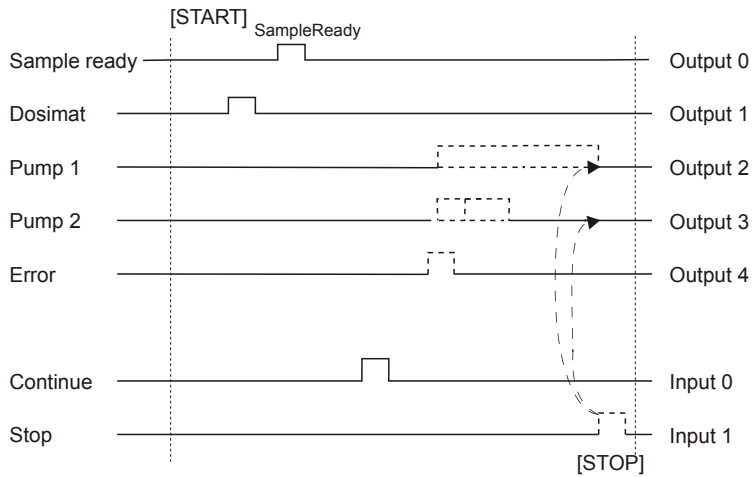


Figure 26 Remote status diagram

**9.2 Stirring rate**

The stirring rate can be adjusted in steps of -15 to +15.

The approximate rotational speed can be calculated with the following formula:

$$\text{Rotational speed/min (r/min)} = 125 \cdot \text{stirring rate}$$

Example:

Stirring rate set: 8

$$\text{Rotational speed in rpm} = 125 \cdot 8 = 1000$$



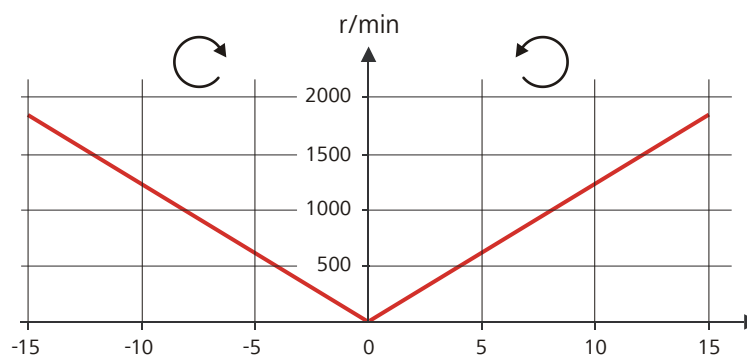


Figure 27 Rotational speed depending on stirring rate

## 9.3 USB devices



### Note

USB peripheral devices that are to be connected directly must support the USB 1.0/1.1 (Full Speed) or 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.

### 9.3.1 Numerical USB keypad 6.2147.000

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

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

Table 2 Keyboard assignment

Key of the 869 Compact Sample Changer or function in the editing dialog	Key on the numerical USB keypad
<b>[BACK]</b>	<b>[Home]</b>
<b>[↑] [↓]</b>	<b>[↑] [↓]</b>
<b>[←] [→]</b>	<b>[←] [→]</b>
<b>[OK]</b>	<b>[Enter]</b>
<b>[+-]</b>	<b>[BS]</b> (backspace)
<b>Delete</b>	<b>[Del]</b>



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

### 9.3.2 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 BJI 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.

## 9.4 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.

```
System reset request detected.  
>> Press [BACK] key twice  
to confirm !  
>> Time remaining: 8 sec
```

## 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 Technical data

### 10.1 Lift

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

### 10.2 Turntable

<i>Rack positions</i>	12
<i>Maximum load</i>	17 N
<i>Shift rate</i>	13 degrees/s (typical)

### 10.3 Interfaces and connectors

<i>Stirrer connector</i>	DIN socket
<i>Stirring rate</i>	Rod Stirrer 722/802: 180...3000 rpm Adjustable in 15 steps each in both directions of rotation.
<i>USB (OTG) connector</i>	For connecting USB devices.
<i>Remote connector</i>	For connecting instruments with a remote interface.

### 10.4 Mains connection

<i>Voltage</i>	100...240 V
<i>Frequency</i>	50...60 Hz
<i>Power consumption</i>	45 W
<i>Fuse</i>	1.0 ATH

## 10.5 Safety specifications

<i>Design and testing</i>	According to EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, EN/IEC 61010-2-081, protection class I
<i>Safety instructions</i>	This document contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

## 10.6 Electromagnetic compatibility (EMC)

<i>Emission</i>	Standards fulfilled: <ul style="list-style-type: none"> <li>▪ EN/IEC 61326-1</li> <li>▪ EN/IEC 61000-6-3</li> <li>▪ EN 55022 / CISPR 22</li> </ul>
<i>Immunity</i>	Standards fulfilled: <ul style="list-style-type: none"> <li>▪ EN/IEC 61326-1</li> <li>▪ EN/IEC 61000-6-1</li> <li>▪ EN/IEC 61000-4-2</li> <li>▪ EN/IEC 61000-4-3</li> <li>▪ EN/IEC 61000-4-4</li> <li>▪ EN/IEC 61000-4-5</li> <li>▪ EN/IEC 61000-4-6</li> <li>▪ EN/IEC 61000-4-11</li> <li>▪ EN/IEC 61000-4-14</li> <li>▪ NAMUR</li> </ul>

## 10.7 Ambient temperature

<i>Nominal function range</i>	5...45 °C Humidity < 80 %
<i>Storage</i>	-20...60 °C
<i>Transport</i>	-40...60 °C



## 10.8 Reference conditions

*Ambient temperature*      25 °C ( $\pm 3$  °C)

*Relative humidity*       $\leq 60$  %

## 10.9 Dimensions

*Width*                      0.26 m

*Height*                     0.47 m

*Depth*                     0.43 m

*Weight*                    8.82 kg (without accessories)

### *Material*

*Housing*                   Lower part: Crastin PBTP  
Lift: Metal, surface-treated

*Rack*                        PVC

# 11 Conformity and warranty

## 11.1 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*

---

### **869 Compact Sample Changer**

Sample changer 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: 2004, EN 55022 / CISPR 22: 2006

Immunity: EN/IEC 61326-1: 2006, EN/IEC 61000-6-1: 2001, EN/IEC 61000-4-2: 2001, EN/IEC 61000-4-3: 2002, EN/IEC 61000-4-4: 2004, EN/IEC 61000-4-5: 2001, EN/IEC 61000-4-6: 2001, EN/IEC 61000-4-11: 2004, EN/IEC 61000-4-14: 2004, NAMUR: 2004

*Safety specifications*

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



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 61010-2-081	Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

*Manufacturer*

This instrument meets the requirements of the ETL Listed Mark for the North American market. It conforms to the electrical safety standards UL 61010-1 and CSA-C22.2 No. 61010-1. This product is listed in Intertek's Directory of Listed Products.

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, 28 September 2009

D. Strohm

Vice President, Head of R&D

A. Dellenbach

Head of Quality Management

## 11.2 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.



## 11.3 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.


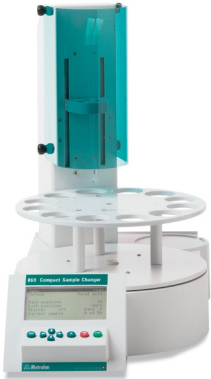
## 12 Accessories





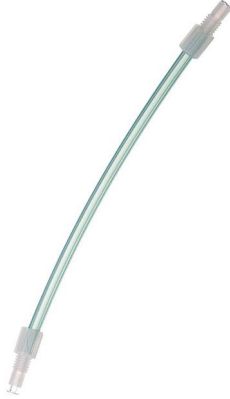

### Note

Subject to change without notice.

### 12.1 Scope of delivery 2.869.0010

Qty.	Order no.	Description
1	1.802.0010	<b>802 Stirrer</b> Rod stirrer. With fixed cable.
		
1	1.869.0010	<b>869 Compact Sample Changer</b> The 869 Compact Sample Changer allows automation in a minimum of space.
		



Qty.	Order no.	Description
1	6.1458.050	<b>Titration head for 869 Compact Sample Changer</b> Titrationhead with 3 x NS14, 4 x 6.4 mm and two inserted dosing tubings with anti-diffusion valve Material: PVC
		
1	6.1459.300	<b>Sample beaker / 120 mL / 100 pieces</b> Sample beaker with screw cap for sampling, 100 pieces. Material: PP Height (mm): 113 Outer diameter (mm): 40 Volume (mL): 120
		
2	6.1805.110	<b>FEP tubing / M6 / 80 cm</b> With light and kink protection Material: FEP Inner diameter (mm): 2 Length (mm): 800
		
1	6.1815.010	<b>Spiral band 0.5 m</b> For holding together different cables or tubing. Length (m): 0.5
		

Qty.	Order no.	Description
1	6.1909.050	<b>Propeller for 120 mL beaker (6.1459.300)</b> Propeller for 802 Stirrer when this is used with sample racks for 120 mL beakers (6.1459.300) Material: ETFE Length (mm): 111
		
1	6.2151.100	<b>Adapter USB MINI (OTG) - USB A</b> For connecting USB instruments.
		
1	6.2621.130	<b>Hexagon key 2 mm</b> 2 mm.
		
1	6.2621.140	<b>Hexagon key 2.5 mm</b>
		



Qty.	Order no.	Description
1	6.2751.130	<b>Splash protection for Compact Autosampler and Compact Sample Changer</b>  Splash protection for safe working with needles (Compact Autosampler) and titration equipment (Compact Sample Changer) Material: Plexiglas (PMMA)
1	6.2122.0x0	<b>Mains cable with C13 line socket IEC-60320-C13</b>  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	8.869.8002EN	<b>869 Compact Sample Changer Manual</b>



## 12.2 Optional accessories

Order no.	Description
2.843.0020	<b>843 Pump Station (membrane)</b>  The 843 Pump Station (membrane) has two built-in membrane pumps. These can be controlled directly via the interface using remote signals or manually by pressing a button.



Order no.	Description
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**2.843.0030      843 Pump Station (membrane) - rinse/aspirate for Compact Sample Changer**

The 843 Pump Station (membrane) has two built-in membrane pumps. These can be controlled directly from the 869 Compact Sample Changer via remote signals. The Rinse / Aspirate version is provided with all the accessories needed for automatically emptying the titration beaker and rinsing the titration equipment.



**2.843.0120      843 Pump Station (peristaltic)**

The 843 Pump Station (peristaltic) has two built-in peristaltic pumps. These can be controlled directly via the interface using remote signals or manually by pressing a button.



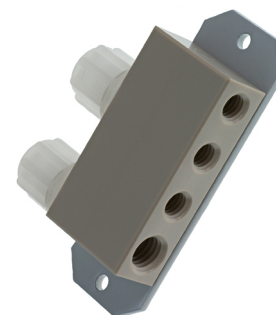
**2.843.0130      843 Pump Station (peristaltic) - rinse/aspirate for Compact Sample Changer**

The 843 Pump Station (peristaltic) has two built-in peristaltic pumps. These can be controlled directly from the 869 Compact Sample Changer via remote signals. The Rinse / Aspirate version is provided with all the accessories needed for automatically emptying the titration beaker and rinsing the titration equipment.



**6.1808.240      Distributor Rinsing / Aspiration for 869 Compact Sample Changer**

Distributor with 3 x M6, 1 x M8 and 2 x 1/8 connections for the use of rinsing and / or aspiration equipment on the 869 Compact Sample Changer.







Order no.	Description
6.2151.120	Cable USB MINI (OTG) - USB B, 1.8 m

For connecting USB instruments.





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