843 Pump Station

with peristaltic pumps

Manual

8.843.8003EN/2019-11-29

Metrohm

Metrohm AG
CH-9100 Herisau
Switzerland
Phone +41 71 353 85 85
Fax +41 71 353 89 01
info@metrohm.com
www.metrohm.com

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Technical Communication
Metrohm AG
CH-9100 Herisau
techcom@metrohm.com

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.

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1 Introduction

1.1 Instrument description

The 843 Pump Station has the following characteristics:

- Two peristaltic pumps.
- Two remote connectors:
  - Remote 1 for connecting instruments that control pumps.
  - Remote 2 for connecting other instruments.
- An integrated power supply unit (100 – 240 V) which runs the peristaltic pumps.

1.2 Sales versions

The 843 Pump Station is available in three different sales versions:

2.843.0120	Standard instrument
2.843.0130	Standard instrument, with special accessories for automatic emptying of the titration beaker and cleaning the titration equipment while working with sample changers.
2.843.0140	Standard instrument with special accessories for VA applications.

1.3 Intended use

The 843 Pump Station is designed for usage in automated systems in analytical laboratories. It is not suitable for usage in biochemical, biological or medical environments in its basic equipment version.

1.4 About the documentation

CAUTION

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

1.4.1 Symbols and conventions

The following symbols and styles are used in this documentation:

*(5-**12**)*	**Cross-reference to figure legend** The first number refers to the figure number, the second to the instrument part in the figure.
1	**Instruction step** Carry out these steps in the sequence shown.
	**Warning** This symbol draws attention to a possible life hazard or risk of injury.
	**Warning** This symbol draws attention to a possible hazard due to electrical current.
	**Warning** This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	**Warning** This symbol draws attention to a possible biological hazard.
	**Caution** This symbol draws attention to a possible damage of instruments or instrument parts.
	**Note** This symbol marks additional information and tips.

1.5 Safety instructions

1.5.1 General notes on safety

WARNING

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

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

1.5.2 Personnel safety

WARNING

Wear protective glasses and working clothes suitable for laboratory work while operating the 843 Pump Station. It is also advisable to wear gloves when caustic liquids are used or in situations where glass vessels could break.

WARNING

Install the safety shield supplied with the equipment whenever using the instrument.

The 843 Pump Station cannot be operated without a safety shield.

Any manipulations in order to avoid the safety shutdown may not be carried out.

WARNING

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

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

WARNING

In the event of a possible jamming of a drive, the 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 843 Pump Station is **not** suitable for usage in biochemical, biological or medical environments in its basic equipment version.

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

1.5.3 Electrical safety

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

WARNING

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

WARNING

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

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

Supply voltage

WARNING

An incorrect supply voltage can damage the instrument.

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

Protection against electrostatic charges

WARNING

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

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

1.5.4 Tubing connections

CAUTION

Leaks in tubing connections are a safety risk. Tighten all connections well by hand. Avoid applying excessive force to tubing connections. Damaged tubing ends lead to leakage. Suitable tools can be used for disconnecting connections.

Regularly check the leak-tightness of the tubings. If the instrument is used mainly in unattended operation, then weekly inspections are mandatory.

1.5.5 Working with liquids

CAUTION

Periodically check all system connections for leaks. Observe the relevant regulations in respect to working with flammable and/or toxic fluids and their disposal.

1.5.6 Working with flammable liquids 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.

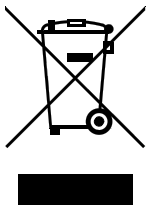
1.5.7 Chemical resistance

CAUTION

Before utilizing any particularly aggressive media, it is imperative that you determine whether or not the parts of the instrument that have media contact are resistant to them.

Above all, the proper tubing material must be selected.

1.5.8 Recycling and disposal



This product is covered by European Directive 2012/19/EU, WEEE – Waste Electrical and Electronic Equipment.

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

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

2 Overview of the instrument

2.1 Front of the instrument

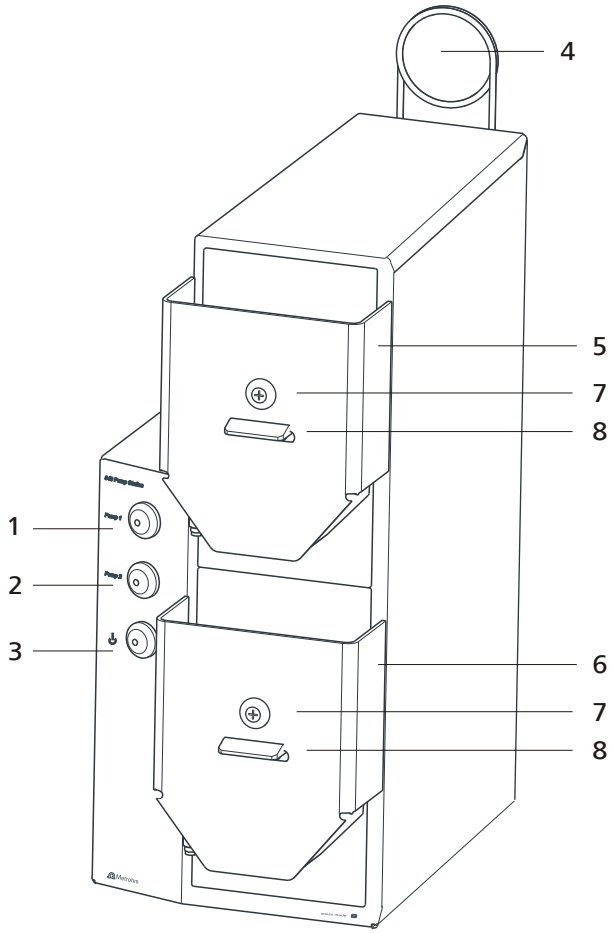


Figure 1 Front 843 Pump Station with peristaltic pumps

1	**Pump 1** For switching peristaltic pump 1 on and off.
2	**Pump 2** For switching peristaltic pump 2 on and off.
3	**Mains switch/Emergency stop switch** For switching the instrument on and off.
4	**Tubing guide** For bundling up the tubings.
5	**Peristaltic pump 1 with safety shield** For rinsing.
6	**Peristaltic pump 2 with safety shield** For aspiration.
7	**Contact pin with screw** Arranges the safety shutdown of the peristaltic pump with a photoelectric barrier.
8	**Tab** For attaching the safety shield.

2.2 Rear of the instrument

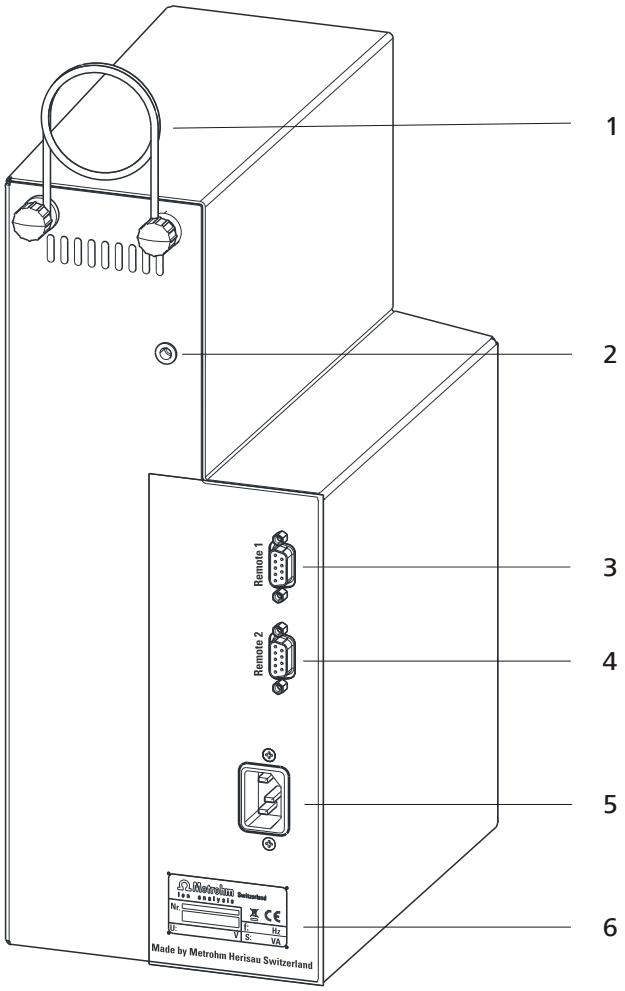


Figure 2 Rear 843 Pump Station with peristaltic pumps

1 Tubing guide For bundling up the tubings.	**2 Bore hole** Additional hole for screwing in the tubing guide in situations where Pump Station is to be operated in a lying position.
3 Remote 1 For connecting an instrument that controls the pump.	**4 Remote 2** For connecting other system instruments.
5 Mains connection For connecting the Pump Station to the mains supply.	**6 Type plate** Contains specifications concerning mains voltage, instrument type and serial number.

2.3 Peristaltic pump

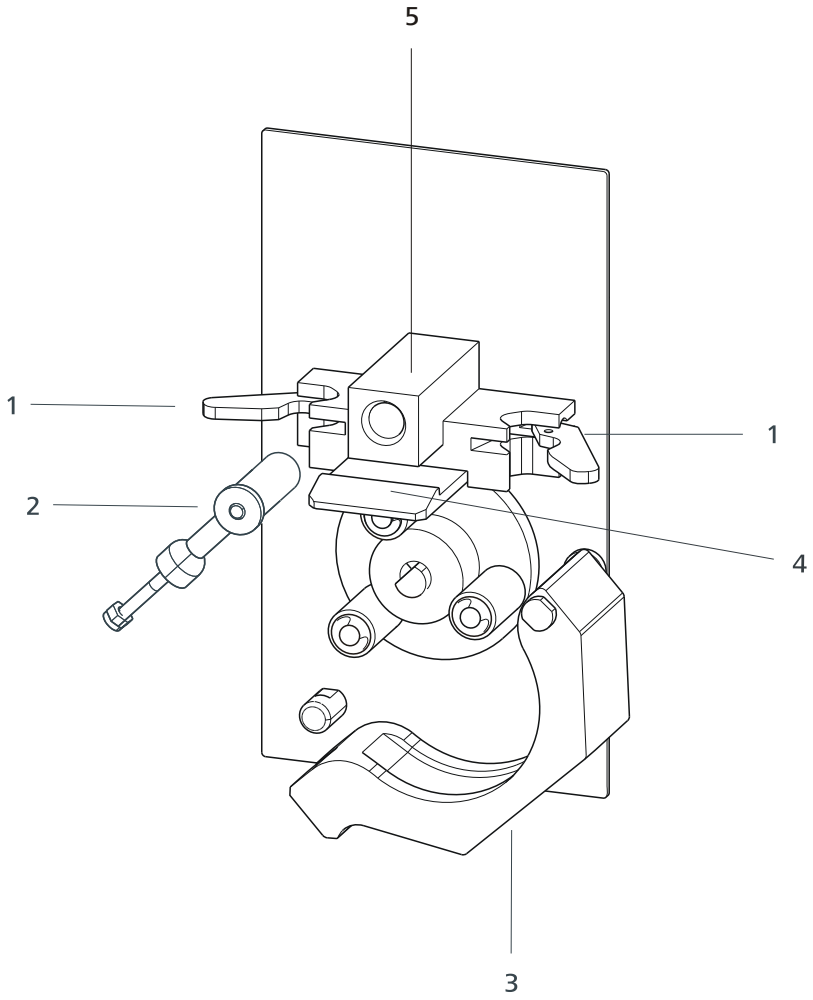


Figure 3 Peristaltic pump

1	**Tube clamp** For fixing the tubing in place with the tubing olive.
2	**Fixing lever with clamping screw** For fixing the pressure clip in place and for regulating the flow of liquid.
3	**Pressure clamp** For fixing the tubing in place.
4	**Tab** For attaching the safety shield.
5	**Guidance with sensor** For inserting the contact pin.

2.4 Safety shield

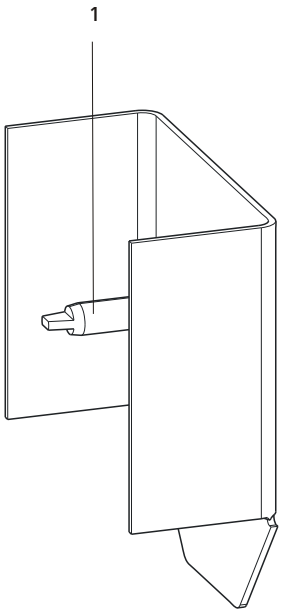


Figure 4 Rear of the safety shield

1 Contact pin
Arranges the safety shutdown of the peristaltic pump with a photoelectric barrier.

3 Installation

3.1 Setting up the instrument

3.1.1 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.

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 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.

3.2 Mounting the tubing

3.2.1 Pump tubing

PharMed® tubing is recommended as the pump tubing for the peristaltic pump.

Mount the pump tubing as follows:

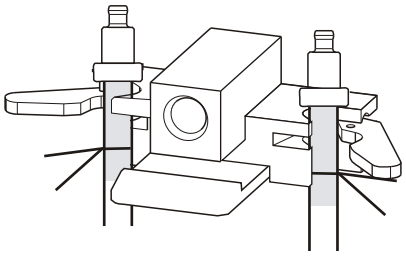
1 Cut the pump tubing to a length of approx. 16 cm.

2 Insert the included tubing olives into the two tubing ends.

3 Where appropriate, use additional cable ties to fasten the tubing on both ends at the tubing olives.

This prevents liquid from leaking under excessive pressure.

4 Insert the pump tubing into the pump head as shown in the figure.



5 Use the tubing clamps to fix the tubing in place.

Make sure the tubing is as centered on the roller as possible.

6 Apply pressure to the pressure clamp and clamp tightly with the locking lever *(see chapter 2.3, page 9)*.

7 Tighten the clamping screw so that the pump tubing cannot slip and the liquid is pumped with a uniform flow.

If necessary, the clamping screw can be readjusted while the pump is running.

3.2.2 Inlet and outlet tubing

Two different types of tubings are available as inlet and outlet tubing. Both of them are included in the scope of delivery :

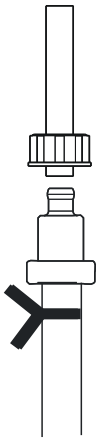
- PVC tubing (6.1801.120), 2 x 2 m
- PTFE tubing (6.1812.000), 1 x 4 m

The question of which of the two types of tubing you should use is primarily dependent on the type of solvent used. PVC tubing is more flexible and has the advantage of making less noise during the pumping operation.

Mount the inlet and outlet tubing as follows:

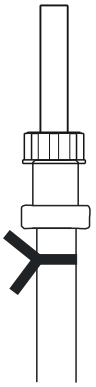
1 Cut the inlet and outlet tubing to the appropriate lengths.

2 Mount them to the screw connectors of the tubing olives of the pump tubing.



To fasten PTFE tubing in place, you have to widen their openings (e.g. using a Phillips screwdriver). You can use a piece of sandpaper to make the PTFE tubing easier to handle.

3 Screw the union nuts tightly to ensure a secure tubing connection.



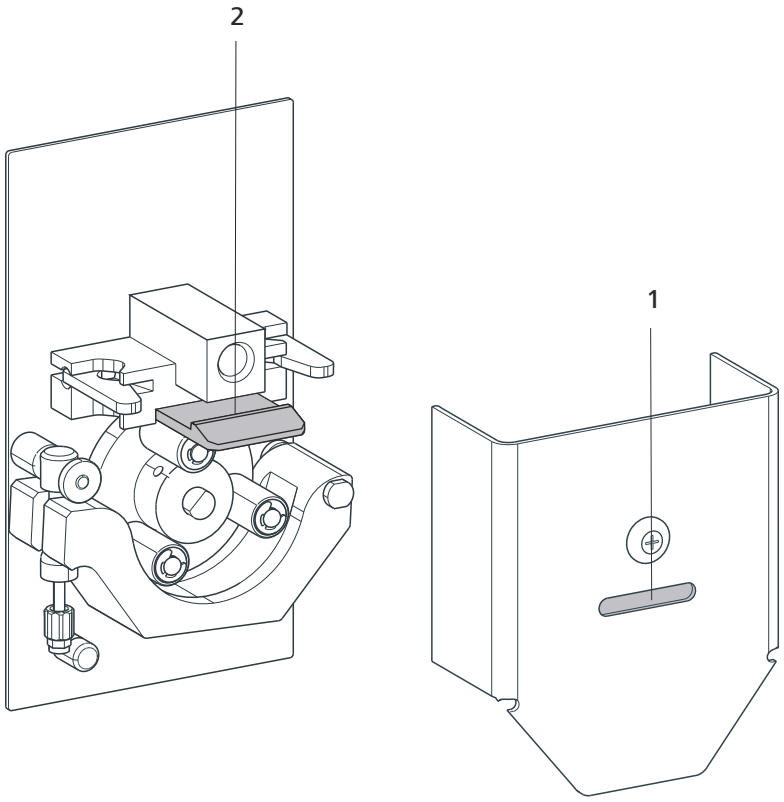
4 Hold the inlet and outlet tubings together with a cable tie.

5 Put the tubing through the tubing guide to fix them in place.

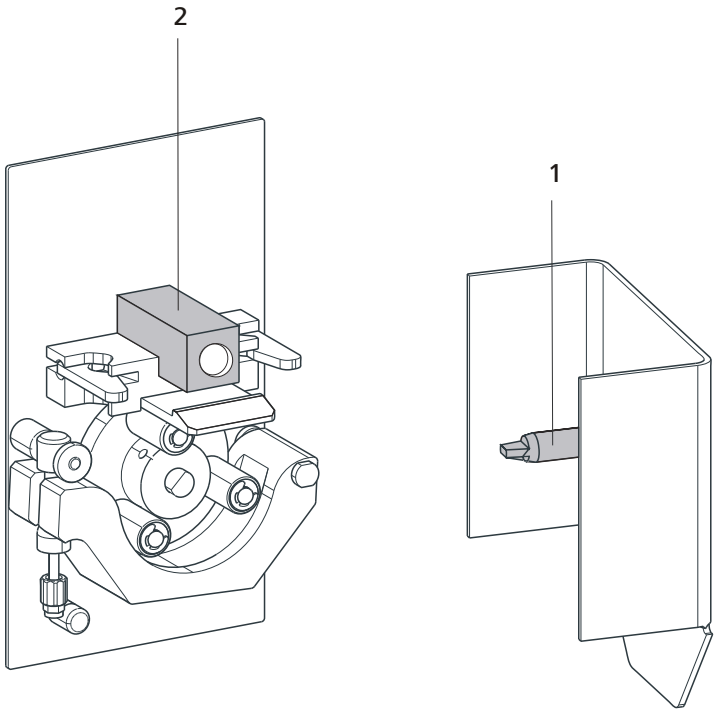
3.2.3 Mounting the safety shield

Attaching the safety shield

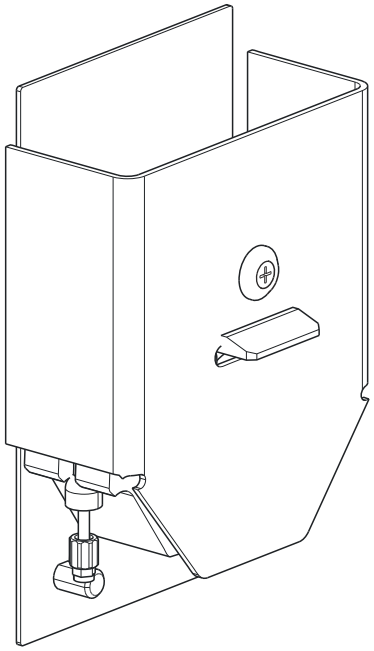
1 Attach slot (1) of the safety shield onto the retaining lug (2) of the peristaltic pump.



2 Attach contact pin (1) on the safety shield onto the opening (2) of the sensor.



3 Slide the safety shield all the way to the rear until it audibly snaps in.



Remove the safety shield

1 Press the retaining lug slightly down.

2 Remove the safety shield.

3.3 Connecting control instruments

Various options for connecting different instruments to the 843 Pump Station are shown below. Instruments which control the pumps of the Pump Station are connected to **Remote 1**, while all other instruments are connected to **Remote 2**. The figures also contain the order numbers of the required cables.

Example 1

Connection of a Compact Sample Changer (**Remote 1**) and a Titrino plus (**Remote 2**) to the Pump Station.

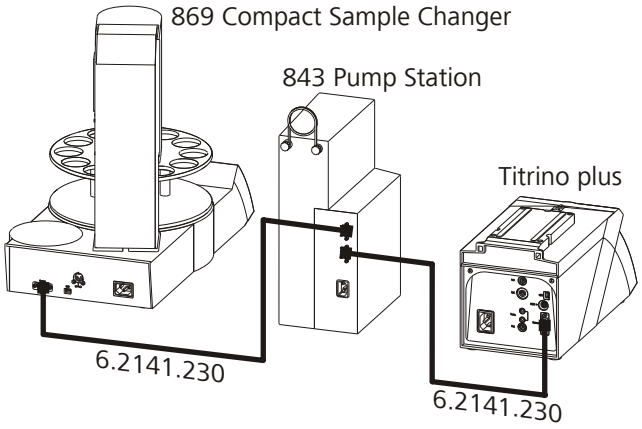


Figure 5 Remote connection 869 — 843 — 8xx Titrino plus

Example 2

Connection of a Dosimat plus, a Compact Sample Changer (**Remote 1**) and a Titrino plus (**Remote 2**) to the Pump Station.

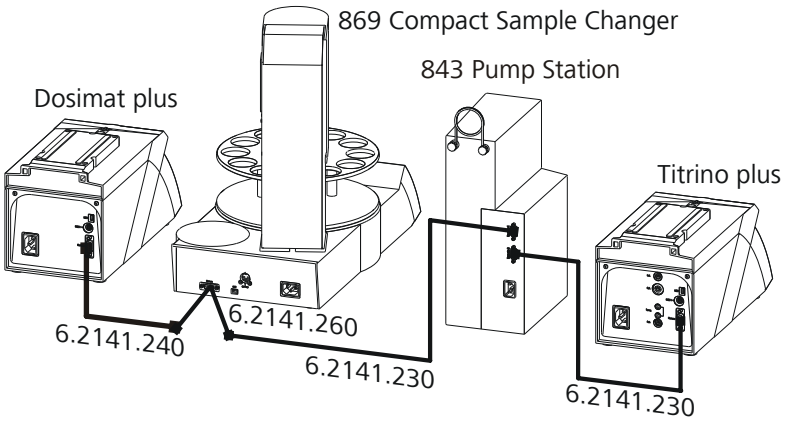


Figure 6 Remote connection 8xx Dosimat plus — 869 — 843 — 8xx Titrino plus

or

Connection of a Compact Sample Changer (**Remote 1**) and a Titrino plus and a Dosimat plus (both to **Remote 2**) to the Pump Station.

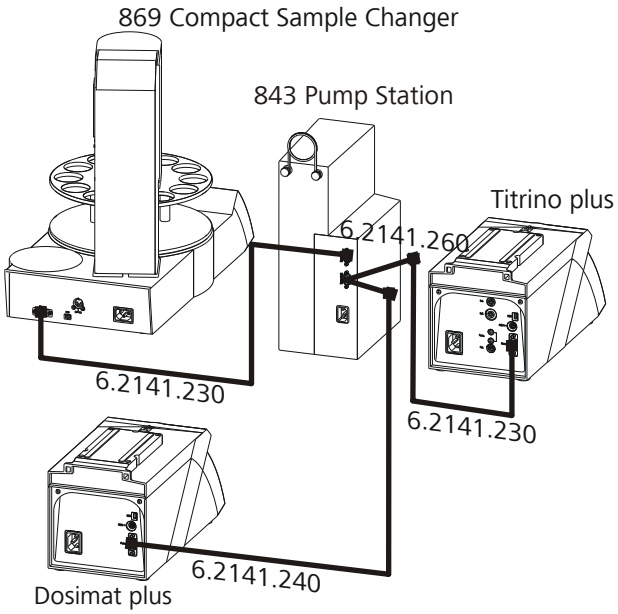


Figure 7 Remote connection 869 — 843 — 8xx Titrino plus — 8xx Dosimat plus

Example 3

Connection of a Compact Autosampler (**Remote 2**) and a VA Computrace (**Remote 1**) to the Pump Station.

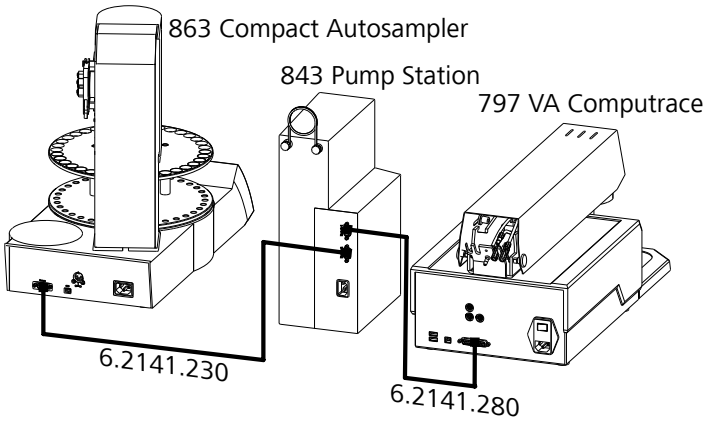


Figure 8 Remote connection 863 — 843 — 797

Example 4

Connection of an Advanced Sample Processor (**Remote 2**) and a VA Computrace (**Remote 1**) to the Pump Station.

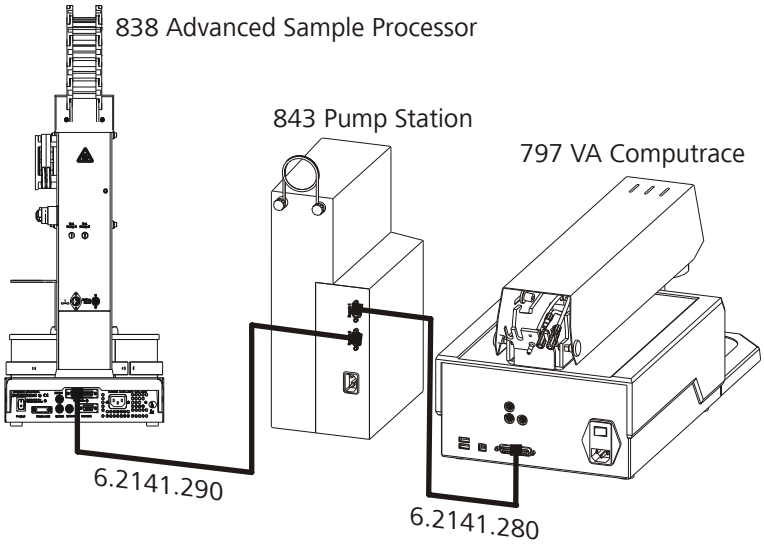


Figure 9 Remote connection 838 — 843 — 797

Example 5

Connection of a USB Sample Processor (**Remote 2**) to the Pump Station.

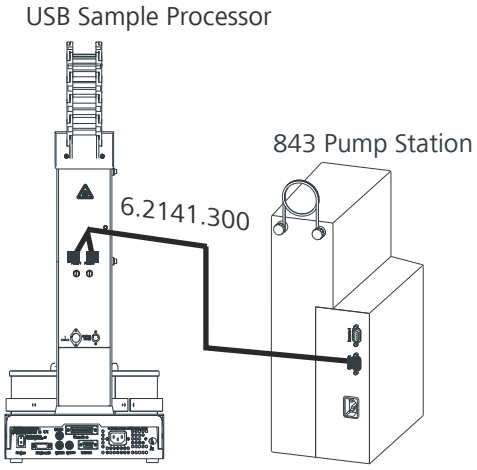


Figure 10 Remote connection 814/815 — 843

Example 6

Connection of a Remote Box (**Remote 1**) in order to connect a titration system. Pump 1 and Pump 2 are controlled by output lines 9 and 10, respectively.

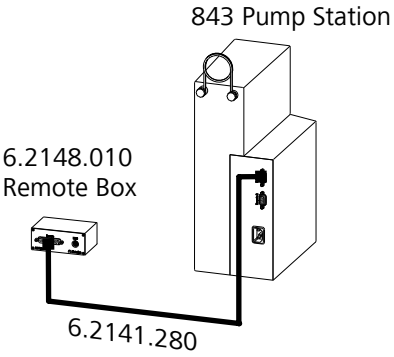


Figure 11 Remote connection Remote Box — 843

3.4 Connecting the instrument to the power grid

WARNING

Electric shock from electrical potential

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

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

Connecting the power cord

Accessories

Power cord with the following specifications:

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

NOTICE

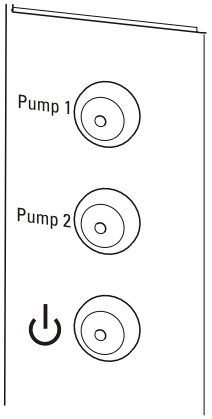
Do not use a not permitted power cord!

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 Operation

The control of the Pump Station is handled via remote signal by the 869 Compact Sample Changer or the 797 VA Computrace. It can however also be operated manually.



Mains switch/ Emergency stop — Switching the Pump Station on and off. Press switch for emergency stop. Illumination of the LED indicates ready-for-operation status.

Pump 1 — Hold down the peristaltic pump 1 switch for manual rinsing.

Pump 2 — Hold down the peristaltic pump 2 switch for manual aspiration.

5 Operation and maintenance

5.1 General notes

5.1.1 Care

The 843 Pump Station requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the service life of the otherwise sturdy mechanics and electronics.

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

CAUTION

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

5.1.2 Maintenance by Metrohm Service

Maintenance of the 843 Pump Station is best carried out as part of annual service, which is performed by specialist personnel from Metrohm. A shorter maintenance interval may be necessary if you frequently work with caustic and corrosive chemicals.

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

5.2 Pump

CAUTION

If the peristaltic pump gets jammed, the Pump Station must be switched off immediately with the emergency stop switch. Otherwise, the pump can become damaged from overheating.

5.3 Tubing

5.3.1 Safety instructions

Since the pump wears away the tubing, the tubing must be replaced regularly. Worn, defective pump tubing poses a safety hazard, particularly when aggressive liquids are being pumped.

NOTICE

Check the pump tubing regularly for cracks, leaks and ingress of air

Use separate pump tubing for different liquids. Dispose of worn-out tubing immediately.

5.3.2 Selection of pump tubings

The most important decision when using peristaltic pumps is the selection of suitable tubing material. Always use tubings particularly intended for peristaltic pumps.

The peristaltic pump of the Pump Station is supplied with a PharMed® pump tubing (order no. 6.1826.100; ⌀ 6.4/9.5 mm, made of thermoplastic polypropylene). It is especially suitable for aqueous media.

For the transport of nonaqueous solutions, we recommend fluoro rubber pump tubing (order no. 6.1826.160).

If you need other tubings for your application, take care to ensure the following points when evaluating the pump tubings:

- Chemical resistance
- Pressure build-up in the pump tubing
- Sterilizability
- Temperature of the pump medium and the environment
- Viscosity of the liquid
- Permeability of the pump tubing
- Demanded flow rate

- Tubing dimensions

5.3.3 Tubing replacement and service life

Pump tubing has a limited service life and therefore has to be replaced regularly. The following are examples of factors that can influence the service life of tubing in the peristaltic pump:

- Pump rate
- Properties of the pumped liquid
- Outlet pressure
- Ambient temperature
- Shearing force of the rollers
- Twisting or kinking of the tubing
- Too much tubing length under the pressure clamp
- Changes to the wall thickness

When using the tubing, observe the following:

- If the tubing is not tightened sufficiently around the rotor, this has a negative impact on the service life of the tubing. In this case, the tubing tends to fold up. If the tubing is tightened too much, the flow is restricted.
- The tubing will last longer if you detach the pressure clamp when the pump is not in use.
- In order to achieve good repeatability of flow rate following a change in tubing, it is imperative that you always select the same tubing length.
- **Before replacing the tubing** switch off the peristaltic pumps with the power switch, or pull out the power cord of the Pump Station in order to prevent any unintended starting of the pump.
- **Before replacing tubing**, make sure that all liquid has been pumped out of it.
- Detach the pressure clamp and remove the old tubing.

NOTICE

Replace the pump tubing only with PharMed® tubing.

5.3.4 Suitability test for tubing

Put a short piece of the tubing in a closed container filled with the liquid to be pumped and let it sit for 48 hours. Then examine the piece of tubing for signs of swelling, embrittlement or other damage.

CAUTION

Selecting the incorrect tubing material can put users and instruments at risk.

6 Troubleshooting

6.1 Problems

Problem	Cause	Remedy
The flow is not set correctly.	*The flow is too strong or too weak.*	Loosen or tighten the locking lever with the clamping screw.
The liquid is not aspirated, but just "bubbles" instead.	*The inlet and outlet tubing have been switched. The outlet tubing dips into the solution to be aspirated instead of the inlet tubing.*	Switch the tubing so that the inlet tubing goes into the solution and the outlet tubing goes into the waste canister.
The peristaltic pump is not running.	*The power cord is not connected.*	Connect the power cord.
	The safety shield is not correctly mounted.	Remove the safety shield and mount it anew. It must snap in audibly.
The peristaltic pump is pumping too little or not at all.	*The contact pressure of the peristaltic pump is too weak.*	Correctly set the contact pressure.
	Tubing breakage. The tubing clamp is clamping the tubing instead of the tubing olive with the tubing.	Fasten the tubing piece with the tubing olive in the tubing clamp.
The tubing connection of the inlet tubing and/or outlet tubing is dripping.	*The tubing is not screwed on correctly.*	Check the screw connector.
The tubing connection of the pump tubing is dripping or spraying.	*Pressure is too high.*	Loosen the locking lever of the pressure clamp slightly. If necessary, also use a cable tie to tie down the tubing at the tubing olive.
A connected instrument does not run.	*The power cord is not connected.*	Connect the power cord.
	Remote connectors are connected incorrectly.	Check the remote connectors.
	Remote connectors have been switched.	Check connected instruments *(see chapter 3.3, page 15)*.

7 Appendix

7.1 Remote interface

7.1.1 Pin assignment of the remote interface

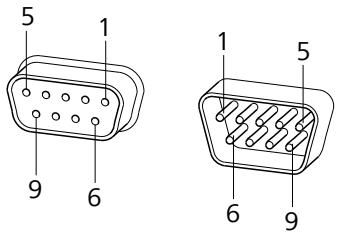


Figure 12 Pin assignment of remote socket and plug

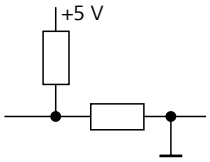
The above pin assignment display applies for all Metrohm instruments with 9-pin D-Sub remote connectors.

The two remote interfaces are linked with one another in the instrument. Various signal lines are looped through from Remote 1 to Remote 2, without executing a function in the instrument.

Table 1 Functions and connections of the remote interfaces

Remote 1		**Remote 2**
Pin No.	**Function/Connection**	**Pin No.**
1	———	8
2	———	2
3	Pump 1	3
4	Pump 2	4
5	———	9
6	0 Volt (GND)	6
-		-
8	———	1
9	———	5

Remote 1: Inputs (Pin 3 and 4)

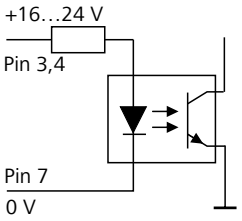


approx. 5 kΩ Pull-up

t_p t_p > 100 ms

active = low, inactive = high

Remote 2: Inputs (Pin 3 and 4)



active = with voltage, inactive = without voltage

8 Technical specifications

8.1 Peristaltic pump

Type	1-channel peristaltic pump
Rotation direction	Clockwise
Rotational speed	300 rpm
Flow rate	900 mL/min Typical value with PharMed® pump tubing 6.4 mm/9.6 mm/1 m (6.1826.100). Depends on contact pressure.
Pump tubing material	PP pump tubing (PharMed®)

8.2 Power connection

Potential	100 - 240 V
Frequency	50 - 60 Hz
Power consumption	45 W
Lock	1.0 ATH

8.3 Ambient temperature

Nominal function range	+5 - +45 °C
Storage	–40 - +70 °C
Transport	–40 - +70 °C

8.4 Reference conditions

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

8.5 Dimensions

Width	0.16 m
Height	0.40 m
Depth	0.30 m
Weight (without accessories)	5.08 kg
Material	Polyurethane, coated (upper part) Steel housing, stove-enameled (lower part)

8.6 Interfaces

Remote interfaces	For connecting instruments with a remote interface.

9 Accessories

Up-to-date information on the scope of delivery and optional accessories for your product can be found on the Internet. You can download this information using the article number as follows:

Downloading the accessories list

1. Enter *https://www.metrohm.com/* into your Internet browser.
2. Enter the article number (e.g. **843**) into the search field.
   The search result is displayed.
3. Click on the product.
   Detailed information regarding the product is shown on various tabs.
4. On the **Included parts** tab, click on **Download the PDF**.
   The PDF file with the accessories data is created.

NOTICE

Once you have received your new product, we recommend downloading the accessories list from the Internet, printing it out and keeping it together with the manual for reference purposes.

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