

# 843 Pump Station



with membrane pumps

Manual

8.843.8001EN/2019-11-29





Metrohm AG

CH-9100 Herisau

Switzerland

Phone +41 71 353 85 85

Fax +41 71 353 89 01

[info@metrohm.com](mailto:info@metrohm.com)

[www.metrohm.com](http://www.metrohm.com)

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## **with membrane pumps**

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

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

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# 1 Introduction

## 1.1 Instrument description

The 843 Pump Station has the following characteristics:

- Two membrane 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 membrane pumps.

## 1.2 Sales versions

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

<b>2.843.0020</b>	Standard instrument
<b>2.843.0030</b>	Standard instrument with special accessories for automatic emptying of the titration beaker and cleaning the titration equipment while working with the 869 Compact Sample Changer.
<b>2.843.0040</b>	Standard instrument with special accessories for VA applications.

## 1.3 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.

### 1.3.1 Symbols and conventions

The following symbols and styles are used in this documentation:



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

## 1.4 Safety instructions

### 1.4.1 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.

## 1.4.2 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.

### 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.



### 1.4.3 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.

### 1.4.4 Chemical resistance



#### CAUTION

The instrument must not be used for pumping organic solvents or aqueous solutions containing solids.



#### CAUTION

Before using particularly aggressive media, be sure to clarify whether the parts of the instrument coming into contact with the media are resistant to them.

This concerns parts made of the following materials:

- **PTFE**  
Tubing 6.1812.000, pump parts
- **PVC**  
(Tubing 6.1801.120)
- **FFKM**  
Pump parts, valve parts
- **PP**  
Pump parts, valve parts
- **PVDF**  
Connection nipples of the tubing connectors, union nuts

### 1.4.5 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

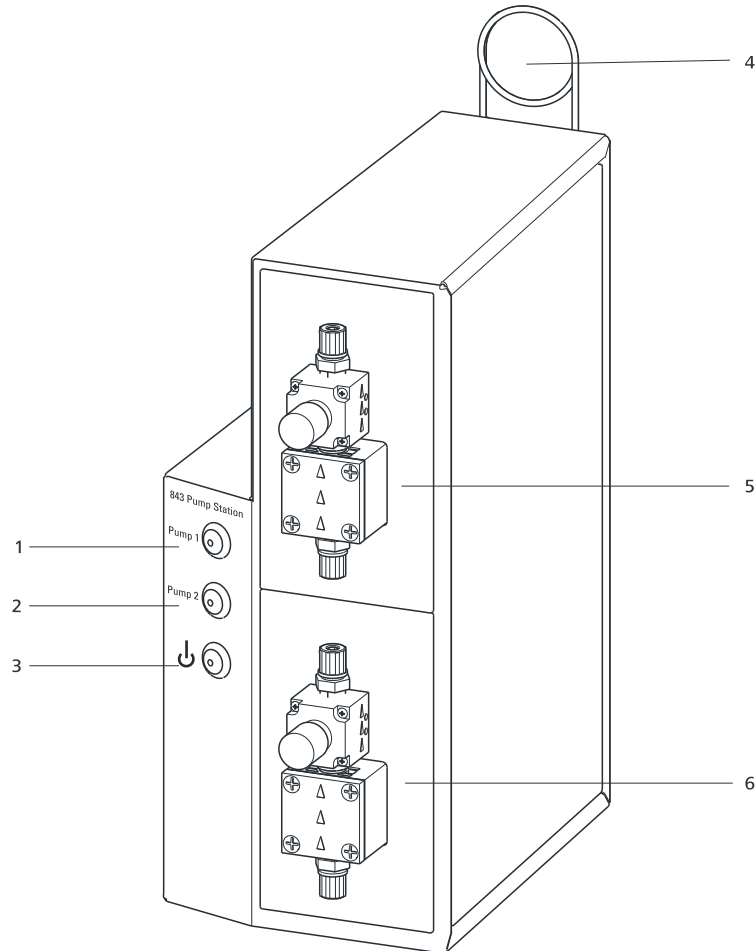


Figure 1 Front of 843 Pump Station with membrane pumps

#### 1 Pump 1

For switching membrane pump 1 on and off.

#### 2 Pump 2

For switching membrane pump 2 on and off.

#### 3 Mains switch/Emergency stop switch

For switching the instrument on and off.

#### 4 Tubing guide

For fixing the tubings in place.

#### 5 Membrane pump 1

For rinsing.

#### 6 Membrane pump 2

For aspiration.



## 2.2 Rear panel of the instrument

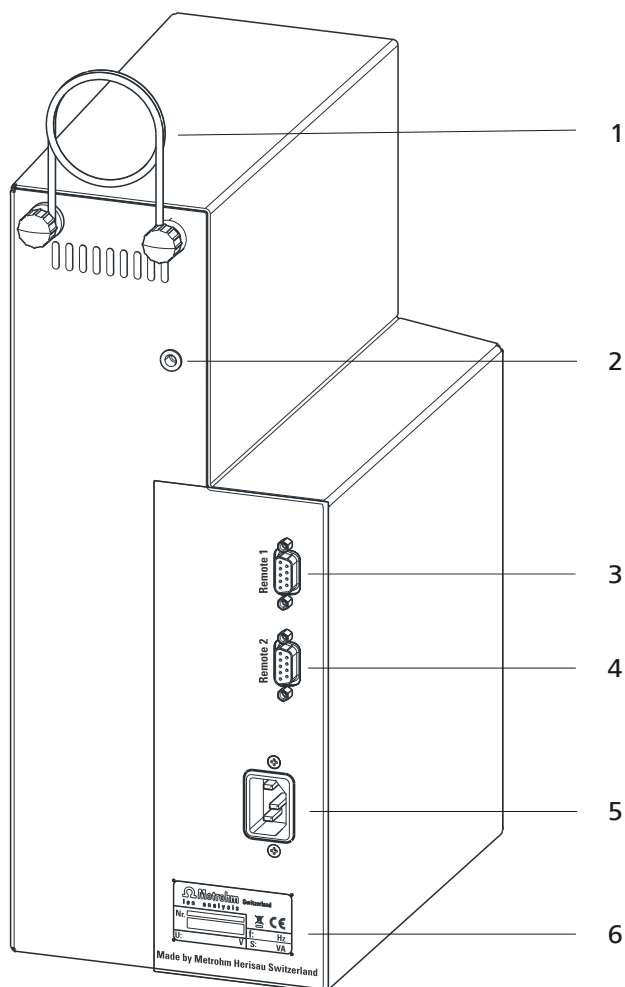


Figure 2 Rear 843 Pump Station with membrane pumps

### 1 Tubing guide

For fixing the tubings in place.

### 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 socket

For connecting the Pump Station to the mains supply.

### 6 Type plate

Contains specifications concerning mains voltage, instrument type and serial number.

### 2.3 Membrane pump

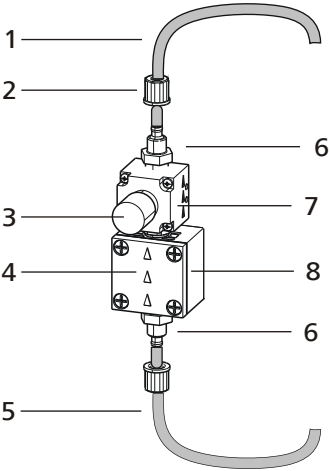


Figure 3 Membrane pump with inlet and outlet tubing

<b>1</b> Outlet tubing (e. g. 6.1812.000)	<b>2</b> Union nut
<b>3</b> Valve opening with protective cap	<b>4</b> Specification of flow direction
<b>5</b> Inlet tubing (e. g. 6.1812.000)	<b>6</b> Tube connection
<b>7</b> Valve	<b>8</b> Pump head



## 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

Two different types of tubing are available as inlet and outlet tubing, both of which are included in the scope of delivery (*see chapter 9, page 24*):

- 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 therefore has the advantage of making less noise during the pumping operation.

If your application allows, mount PVC tubing at least as outlet tubing (**3-1**) because the valve (**3-7**) in particular can generate loud pump noise.

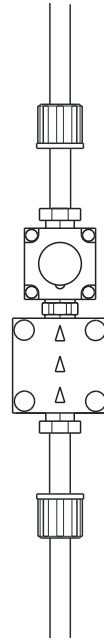
#### Mounting the tubing

Mount the tubing as follows:

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

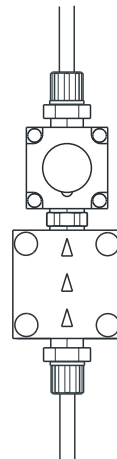






The tubing absolutely must be pushed up to the limit stop so that the tubing connections are secure.

- 5** Put the union nuts on the tubing connector and screw them tightly to ensure a secure tubing connection.



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

- 6** Hold the inlet and outlet tubing together with a cable tie.
- 7** Put the tubing through the tubing guide to fix them in place.

### 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**).

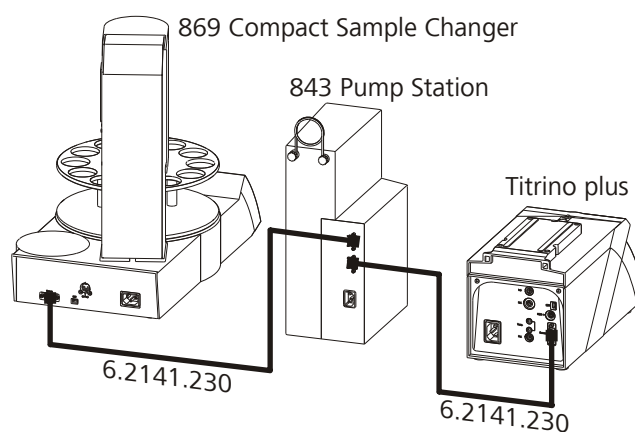


Figure 4 Remote connection 869 — 843 — 8xx Titrino plus

#### Example 2

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

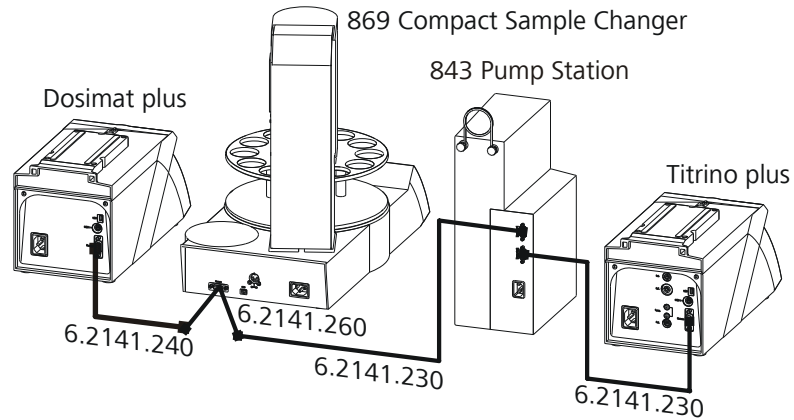


Figure 5 Remote connection 8xx Dosimat plus — 869 — 843 — 8xx Titrino plus

or

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

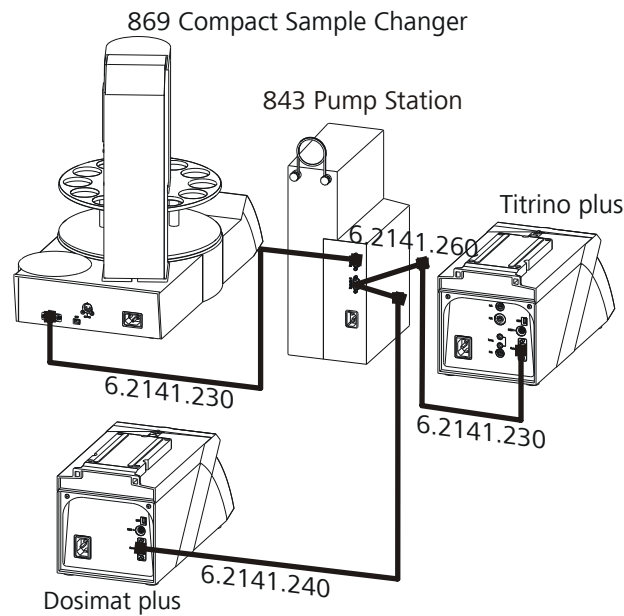


Figure 6 Remote connection 869 — 843 — 8xx Titrino plus — 8xx Dosimat plus

**Example 3**

Connection of a Compact Autosampler (**Remote 2**) and a VA Compu-trace (**Remote 1**).





## 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<sup>2</sup> / 18 AWG
- Power plug:
  - according to customer requirement (6.2122.XX0)
  - min. 10 A



### NOTICE

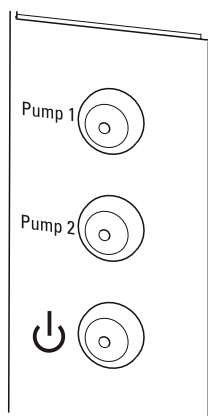
Do not use a not permitted power cord!

#### 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 the switch for an emergency stop. Illumination of the LED indicates ready-for-operation status.

### **Pump 1**

Hold down the membrane pump 1 switch for manual rinsing.

### **Pump 2**

Hold down the membrane 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 Tubings

The tubing requires regular inspection in order to work properly:

- Do not kink PTFE tubing.
- Ensure resistance to solvents .
- Check the tubing regularly for any damage.



## 6 Troubleshooting

### 6.1 Problems

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
<b>The liquid is not aspirated, but just "bubbles" instead.</b>	<i>The inlet and outlet tubing are mixed up. The outlet tubing dips into the solution to be aspirated instead of the inlet tubing.</i>	Switch the tubing so that the inlet tubing goes into the solution and the outlet tubing goes into the waste canister.
<b>A connected instrument does not run.</b>	<i>The power cord is not connected.</i>	Connect the power cord.
	<i>Remote connectors are connected incorrectly.</i>	Check the remote connectors.
	<i>Remote connectors are mixed up.</i>	Check connected instruments ( <i>see chapter 3.3, page 11</i> ).
<b>The membrane pump does not aspirate the solution.</b>	<i>Inlet valve or outlet valve is blocked.</i>	Contact Metrohm Service at your Metrohm representative.
<b>The membrane pump is pumping too little or not at all.</b>	<i>PTFE tubing is kinked.</i>	Remove the kinks.
	<i>The membrane platelets stick to each other. This may occur if the membrane pump has not been in use for an extended period.</i>	Spray some water into the inlet valve with a wash bottle, close the valve and allow to react for some minutes.
	<i>Too much air is trapped between the membrane platelets during aspirating and pumping.</i>	Contact Metrohm Service at your Metrohm representative.

## 7 Appendix

### 7.1 Functioning of the membrane pump

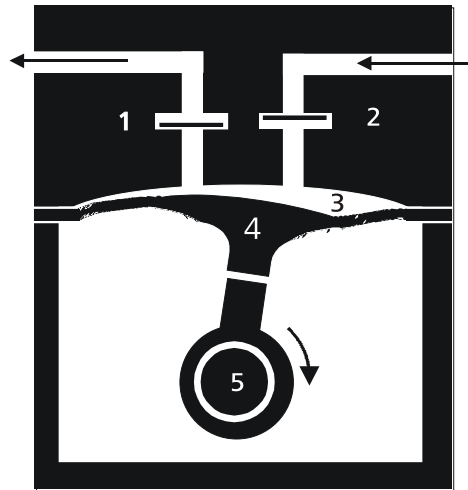


Figure 9 Functioning of the membrane pump

**1** Outlet valve

**2** Inlet valve

**3** Conveyor space

**4** PTFE membrane

**5** Eccentric

#### Principle

The membrane pump is located in the pump head (see chapter 2.3, page 7). The membrane **4** made of PTFE is moved upward and downward by means of an eccentric **5**. These results in periodic volumetric changes in the conveyor space **3**. The medium to be conveyed is therefore aspirated through the inlet valve **2** during the downstroke. The membrane presses the medium through the outlet valve **1** back out of the conveyor space during the upstroke.

The following properties characterize the membrane pump:

- Self-priming, thanks to its sophisticated membrane technology.
- Secure against dry-running, e.g. the pump suffers no damage if gases are conveyed instead of liquids.
- Can be operated in any conceivable position.
- Small construction dimensions, therefore space-saving.
- High chemical resistance: the utilization of chemical-resistant materials such as PTFE, PP and FPM in the components that have contact with the media permits the conveyance of practically all neutral and aggressive media.



## NOTICE

Before utilizing any particularly aggressive media, it is imperative that you determine whether or not the materials mentioned above are resistant to them

In addition, the membrane pump has an exceptionally long service life. The only parts subject to wearing are the membrane and the valve plates.

The dosing precision of the membrane pump is significantly enhanced by a valve (*see figure 3, page 7*) on the pump outlet. This is responsible for the following three functions:

- **Pressurizing function**  
The pressurizing valve ensures constant backpressure while conveying in systems with fluctuating pressures, in a vacuum or out of a depressurized area.
- **Overflow function**  
The valve prevents non-permitted high rises in pressure in the pressure system.
- **Anti-injector function**  
The pressurizing valve prevents the occurrence of an injector effect (aspiration of outside air caused by negative pressure) while dosing in tubing systems with high flow speeds.

## 7.2 Remote interface

### 7.2.1 Pin allocation of the remote interface

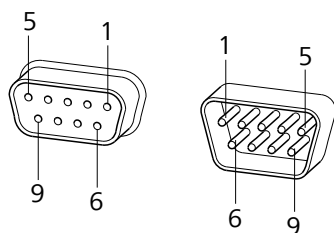


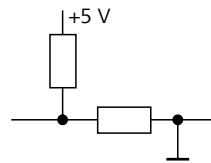
Figure 10 Pin allocation of remote socket and plug

The above pin allocation 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	-
4	Pump 2	-
5	————	9
6	0 Volt (GND)	6
-		-
8	————	1
9	————	5

**Inputs (Pin 3 and 4)**approx. 5 k $\Omega$  Pull-up

 $t_p > 100 \text{ ms}$ 

active = low, inactive = high



## 8 Technical specifications

### 8.1 Membrane pump

*Flow rate* > 450 mL/min (at a pressure head of 2 m)

### 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 ( $\pm 3$  °C)

*Relative humidity*  $\leq 60\%$

## 8.5 Dimensions

*Width* 0.16 m

*Height* 0.40 m

*Depth* 0.31 m

*Weight (without accessories)* 5.26 kg

*Material* Polyurethane, coated (upper part)  
Steel housing, stove-enameled (lower part)

## 8.6 Interfaces

*Remote interfaces* For connecting instruments with a remote interface.





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