# 823 Membrane Pump Unit


Manual

8.823.8001EN / 2019-11-29

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## Manual

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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 823 Membrane Pump Unit is a versatile membrane pump. It was designed specifically for the production operation and laboratory environment and enables a wide range of applications. Particularly when used in a Metrohm automation system with Sample Processor and various analysis instruments, it is of indisputable service in processing large sample series in the complete titration area and in various measuring applications or other analytical tasks.

The 823 Membrane Pump Unit uses the membrane pump principle *(see chapter 2.1, page 6)* and is suitable for pumping all types of liquid media.

**NOTICE**

The 823 Membrane Pump Unit is not suitable for pumping liquids with solids content.

The flow rate of at least 450 mL/min opens up a wide range of applications.

### 1.1.1 Model versions

The 823 Membrane Pump Unit is available in the following three versions:

| | | |
|---|---|---|
| 2.823.0010 | 823 Membrane Pump Unit | |
| 2.823.0020 | 823 Membrane Pump Unit | with aspiration equipment |
| 2.823.0030 | 823 Membrane Pump Unit | with rinsing equipment |

Each version includes different accessories according to its use *(see chapter 8, page 20)*.

### 1.1.2 Connectors

The 823 Membrane Pump Unit needs 16 - 24 V DC voltage.

Power is supplied to the pump via the direct connection to a Sample Processor (e.g. 814 or 815) or to the 731 Relay Box (connection via adapter cable 6.2160.010).

### 1.1.3 Intended use

The 823 Membrane Pump Unit is designed for usage in automated systems in analytical laboratories.

This instrument is suitable for pumping chemicals and flammable samples. Use of the 823 Membrane Pump Unit therefore requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory.

## 1.2 About the documentation

**CAUTION**

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

### 1.2.1 Symbols and conventions

The following symbols and formatting may appear in this documentation:

| | |
|---|---|
| *(5-**12**)* | **Cross-reference to figure legend**<br>The first number refers to the figure number, the second to the instrument part in the figure. |
| **1** | **Instruction step**<br>Carry out these steps in the sequence shown. |
| **Method** | **Dialog text**, **parameter** in the software |
| **File ▸ New** | Menu or menu item |
| **[Next]** | **Button** or **key** |
|  | **WARNING**<br>This symbol draws attention to a possible life-threatening hazard or risk of injury. |

| | |
|---|---|
|  | **WARNING**<br>This symbol draws attention to a possible hazard due to electrical current. |
|  | **WARNING**<br>This symbol draws attention to a possible hazard due to heat or hot instrument parts. |
|  | **WARNING**<br>This symbol draws attention to a possible biological hazard. |
|  | **CAUTION**<br>This symbol draws attention to possible damage to instruments or instrument parts. |
|  | **NOTE**<br>This symbol highlights additional information and tips. |

## 1.3 Safety instructions

### 1.3.1 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.

### 1.3.2 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.

### 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.

## 1.3.3 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.

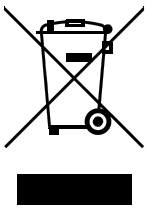
### 1.3.4 Flammable solvents and chemicals

**WARNING**

All relevant safety measures are to be observed when working with flammable solvents and chemicals.

- Set up the instrument in a well-ventilated location (e.g. fume cupboard).
- Keep all sources of flame far from the workplace.
- Clean up spilled liquids and solids immediately.
- Follow the safety instructions of the chemical manufacturer.

### 1.3.5 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

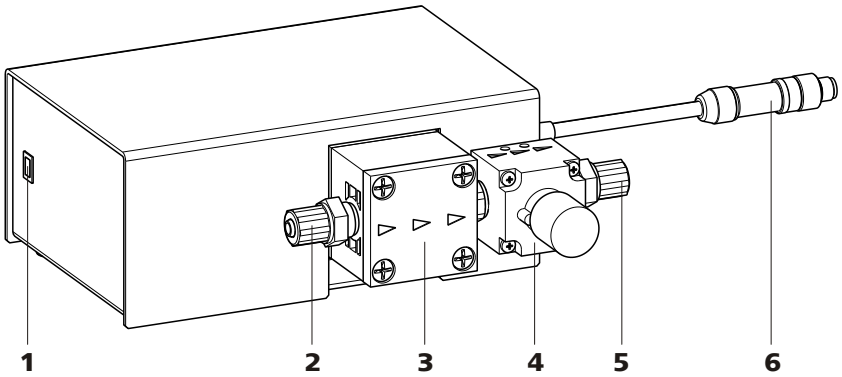



*Figure 1 Front 823 Membrane Pump Unit*

| | |
|---|---|
| **1 Status LED**<br>For displaying the operating state. | **2 Inlet connector**<br>With union nut for the aspiration tubing. |
| **3 Membrane pump**<br>With arrows to indicate the flow direction. | **4 Pressurizing valve** |
| **5 Outlet connector**<br>With union nut for the drainage tubing. | **6 Connection cable**<br>With M8 plug for connection to a Sample Processor. |

## 2.1 Mode of operation of the membrane pump

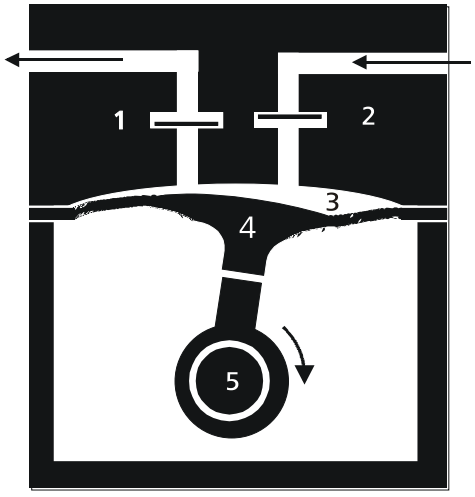



*Figure 2 Mode of operation of the membrane pump*

| | |
|---|---|
| **1 Outlet valve** | **2 Inlet valve** |

| | |
|---|---|
| **3** | **Pump chamber** |
| **4** | **PTFE membrane** |
| **5** | **Eccentric** |

### Principle

The membrane pump is located in the pump head. The membrane made of PTFE **4** is moved up and down by an eccentric **5**. This results in a periodic volume change of the pump chamber **3**. On the downstroke, the medium to be pumped is therefore aspirated through the inlet valve **2**. On the upstroke, the membrane forces the medium out of the pump chamber through the outlet valve **1**.

The following features characterize the membrane pump:

- Self-aspirating, due to the ingenious membrane technology.
- Dry run safe, i.e., the pump is not damaged if gases are pumped instead of liquids.
- Operational in any position.
- Small-sized and thus space-saving.
- High chemical resistance:
  As chemically resistant materials such as PTFE, PP and FFPM are used in all parts that come into contact with the media, nearly all neutral and aggressive media may be pumped.

**NOTICE**

If you use particularly aggressive media, make sure that the above-mentioned materials are resistant to them prior to using the instrument.

In addition, the membrane pump has a very long lifetime. The only expendable parts are the membrane and the valve plates.

The dosing accuracy of the membrane pump is considerably further increased by a valve at the pump outlet. This valve has the following three functions:

- **Pressurizing function**
  When media are pumped into systems with fluctuating pressures, into a vacuum or from an overpressure area, the pressurizing valve ensures a constant backpressure.
- **Overflow function**
  The valve prevents an excessive rise in pressure in the system on the pressure side.
- **Anti-injector function**
  When the pump is used for dosing into piping systems with high flow rates, the pressurizing valve prevents an injector effect (aspiration of ambient air as a result of the underpressure).

# 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 Installing the inlet tubing and outlet tubing

As the inlet tubing and outlet tubing, two different tubing types are available. Both tubings 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

**NOTICE**

Which of the two tubings to use depends largely on the solvent used. PVC tubing is more flexible and has the advantage of making less noise during the pumping operation. It must be noted that the PVC tubing is not resistant to solvents.

Install the inlet tubing and outlet tubing as follows:

**1** Cut the inlet tubing and outlet tubing to the suitable length.

**2** Connect the tubings to the tubing olives of the pump tubing using union nuts.

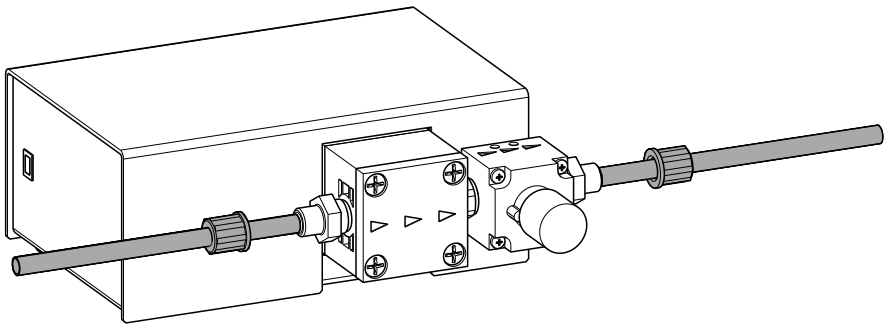


*Figure 3 Connecting the tubings*

**NOTICE**

To fasten PTFE tubings 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.

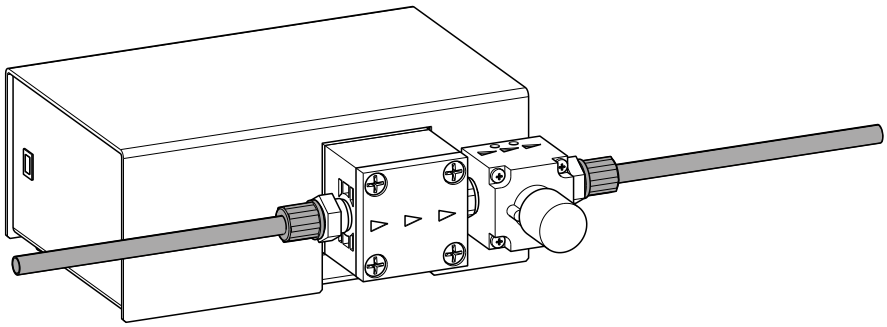


*Figure 4 Screwing the union nuts tightly*

# 3.3 Connecting the membrane pump

**WARNING**

Follow the instructions listed below for connecting to a control device. The instrument can be damaged if operated with the wrong supply voltage.

### Voltage

The 823 Membrane Pump Unit needs 16 - 24 V DC voltage. It can be connected directly to Sample Processor models 814, 815, 855 or 864.

When using the 823 Membrane Pump Unit in an automation system with remote control, we recommend using a 731 Relay Box for the power supply.

## 3.3.1 Connection to a Sample Processor

- Plug the M8 plug into the socket on the Sample Processor provided for this purpose.

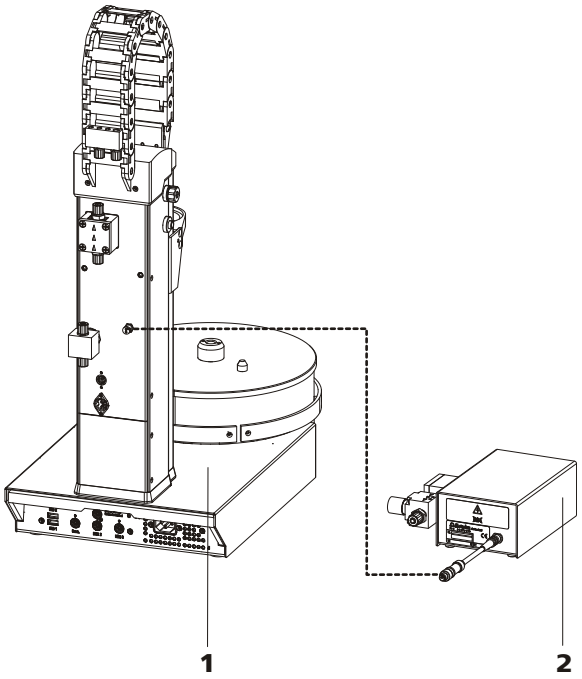



*Figure 5 823 Membrane Pump Unit connected directly to the Sample Processor*

| | |
|---|---|
| **1 Sample Processor 814, 815, 855, 864**<br>Instruments with Pump Connector. | **2 823 Membrane Pump Unit**<br>Membrane pump with M8 plug. |

**NOTICE**

The 823 Membrane Pump Unit is not suitable for use in conjunction with the 824 Easy Sample Changer processor.

### 3.3.2 Connection to the 731 Relay Box

Connect the 823 Membrane Pump Unit with connection via the Remote Box (6.2148.010) and the 731 Relay Box to a remote interface.

- Connect the M8 plug of the 772 Pump Unit to the corresponding socket on the adapter cable.
- Plug the adapter cable into low-voltage DC current output DC1 or DC2 of the 731 Relay Box.

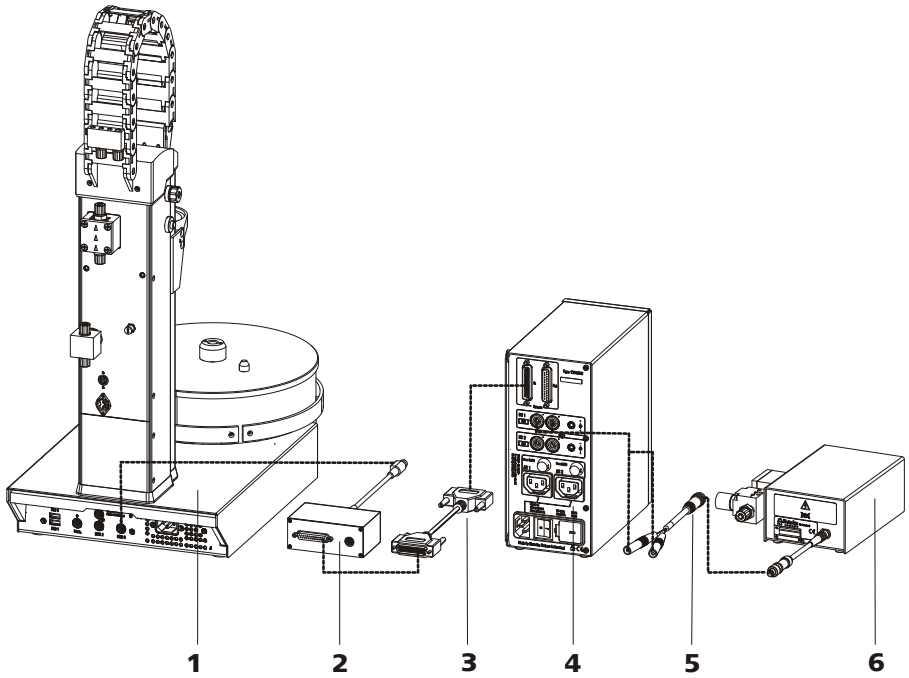



*Figure 6 823 Membrane Pump Unit via the Remote Box and 731 Relay Box*

| | | | |
|---|---|---|---|
| **1** | **Sample Processor 814, 815, 855, 864**<br>Connection to remote interface. | **2** | **Remote Box (6.2148.010)** |
| **3** | **Remote cable (6.2125.100)** | **4** | **731 Relay Box (2.731.0010)** |
| **5** | **Adapter cable (6.2160.010)** | **6** | **823 Membrane Pump Unit** |

**NOTICE**

Ensure the correct polarity of the banana plugs. The red plug (positive pole) belongs in the red socket, the black plug (negative pole) belongs in the black socket.

**NOTICE**

For information on controlling the 823 Membrane Pump Unit using the 731 Relay Box and a suitable control device, refer to the manual of the 731 Relay Box.

# 4 Operation

The 823 Membrane Pump Unit does not have its own operating units. It is operated and controlled via the main instrument in the linked system.

# 5 Operation and maintenance

## 5.1 General notes

### 5.1.1 Care

The 823 Membrane Pump Unit requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the lifetime of the 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 mains connection socket) should be protected from contamination.

**CAUTION**

Although this is extensively prevented by design measures, the mains plug should be unplugged immediately if aggressive media have penetrated the inside of the instrument, so as to avoid serious damage to the instrument electronics. In such cases, Metrohm Service must be informed.

### 5.1.2 Maintenance by Metrohm Service

Maintenance of the 823 Membrane Pump Unit is best carried out as part of an annual service, which is performed by specialist personnel of the Metrohm company. If working frequently with caustic and corrosive chemicals, a shorter maintenance interval could be necessary.

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

| Problem | Cause | Remedy |
|---|---|---|
| **The liquid is not aspirated, but just "bubbles" instead.** | *The inlet tubing and the outlet tubing have been switched.* | Switch the tubings so that the inlet tubing goes into the solution and the outlet tubing goes into the waste canister. |
| **The tubing connection of the inlet tubing and/or outlet tubing is dripping.** | *The tubings are not screwed on correctly.* | Check the screw connectors. |
| **The membrane pump does not aspirate the solution.** | *The inlet valve or the outlet valve is blocked.* | Contact Metrohm Service at your Metrohm representative. |
| **The membrane pump is pumping too little or not at all.** | *The PTFE tubings are kinked.* | Straighten the kinked part or use flawless tubings. |
| | *The membrane platelets stick to each other. This may occur if the membrane pump has not been in use for an extended period.* | Spray some water into the inlet valve with a spray bottle, close the valve and allow to react for some minutes. |
| | *Too much air is trapped between the membrane platelets during aspirating and pumping.* | Contact Metrohm Service at your Metrohm representative. |

# 7 Technical specifications

## 7.1 Membrane pump

| | |
|---|---|
| *Flow rate* | > 450 mL/min |

## 7.2 Power supply

| | |
|---|---|
| *Voltage* | 16 - 24 V DC |
| *Power consumption* | ≤ 650 mA |

## 7.3 Interfaces and connectors

The 823 Membrane Pump Unit does not have any control interfaces. It is operated and controlled via the power supply.

## 7.4 Safety specifications

This instrument fulfills the following electrical safety requirements:

CE designation in accordance with the EU directives:

- 2006/95/EC (Low Voltage Directive, LVD)
- 2004/108/EC (EMC Directive, EMC)

*Design and testing*

- EN/IEC/UL 61010-1
- CSA-C22.2 No. 61010-1
- Protection class III
- EN/IEC 60529
- Protection class IP20

*Safety instructions*

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

## 7.5 Electromagnetic compatibility (EMC)

*Emission*

*Standards fulfilled*

- EN/IEC 61326-1
- EN/IEC 61000-6-3
- EN 55011 / CISPR 11

*Immunity*

*Standards fulfilled*

- EN/IEC 61326-1
- EN/IEC 61000-6-2
- EN/IEC 61000-4-2
- EN/IEC 61000-4-3
- EN/IEC 61000-4-4
- EN/IEC 61000-4-5
- EN/IEC 61000-4-6
- EN/IEC 61000-4-11
- EN/IEC 61000-4-14
- EN/IEC 61000-4-28

## 7.6 Ambient temperature

| | |
|---|---|
| *Nominal function range* | +5 - +45 °C |
| *Transport and storage* | –40 - +70 °C |

## 7.7 Reference conditions

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

## 7.8 Dimensions/material

| | |
|---|---|
| *Width* | 160 mm |
| *Height* | 70 mm |
| *Depth* | 200 mm |
| *Weight* | 1.68 kg (without accessories) |
| *Material* | Housing: steel sheet, stove-enameled |

# 8 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. **Variable Produktnummer**) 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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