

814 USB Sample Processor



Manual

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Manual

Technical Communication
Metrohm AG
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1 Introduction

1.1 The 814 USB Sample Processor in the Titrando system

The 814 USB Sample Processor is a component of the modular Titrando system. Operation is carried out either by a Touch Control with a touch-sensitive screen ("stand-alone titrator") or by a computer with a corresponding software.

A Titrando system can contain numerous, various kinds of instruments. The following figure provides an overview of the peripheral devices you can connect to the 814 USB Sample Processor.

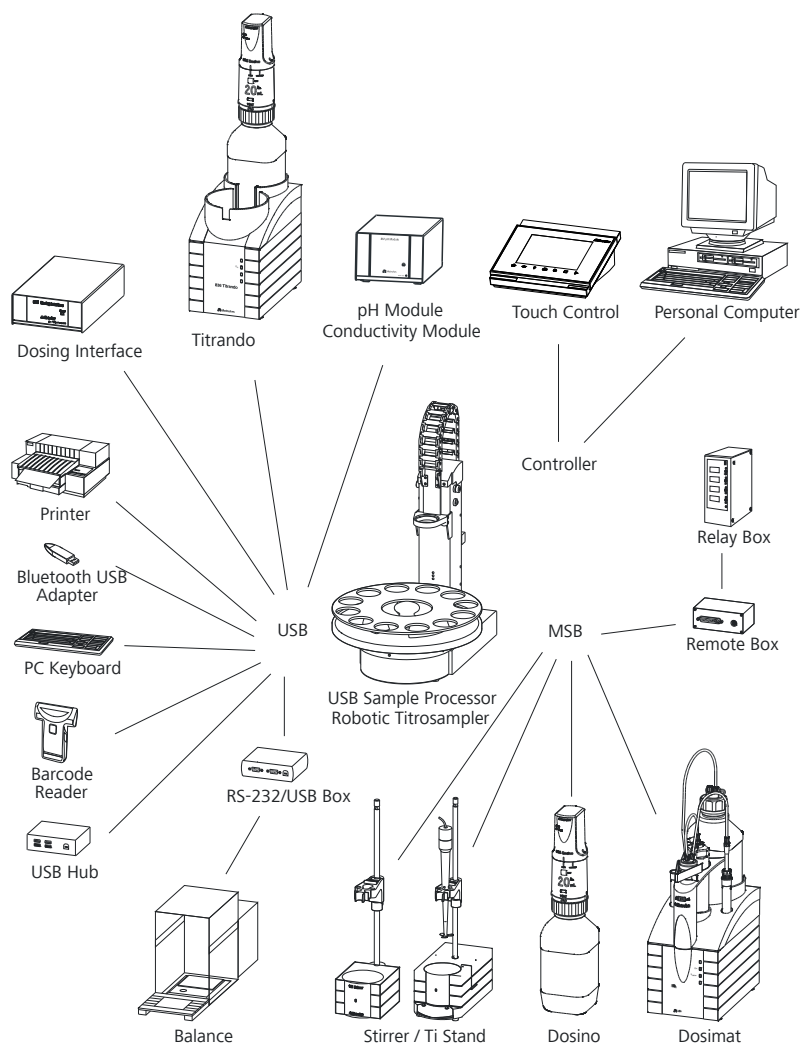


Figure 1 The Titrando system



Up to three control instruments (Titrande, Dosing Interface, USB Sample Processor, etc.) can be controlled via USB connection during operation with the 900 Touch Control. If the tiamo software is used, then there is no limit to the number of control instruments that can be used to extend the system.

Updating the device software is described in the manual for the Touch Control or in the online help for the tiamo software.

1.2 Device description

The 814 USB Sample Processor is a versatile device. It has been designed exclusively for usage in factories, as long as ambient conditions (*see chapter 7.5, page 43*) are fulfilled, and laboratories and thereby covers a wide range of applications.

Thanks to the integration of high-performance USB interfaces, it can be incorporated seamlessly into a Metrohm Titrande system. The versatile communications options of the Titrande system (Remote Box, LIMS connection, etc.) can thus all be used. Thanks to these abilities, the 814 USB Sample Processor is predetermined for all kinds of automation tasks in a modern laboratory, especially for highly integrated laboratory data systems.

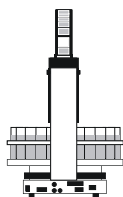
The user interface of the Touch Control or the **tiamo** software guarantees comfortable operation and programming of the 814 USB Sample Processor. In this way, the comprehensive range of commands and the various configuration possibilities can be used conveniently and efficiently. The integration into the Titrande system also guarantees a 100% compliance of the complete automation system with the FDA regulations (Food and Drug Administration), especially with the directive 21 CFR part 11, electronic records and signatures.

There are exchangeable standard sample racks available for many vessel sizes. Freely selectable special beaker positions can be defined for e.g. rinsing or conditioning beakers on every rack.

Customer-specific special racks for individual requirements can be fabricated upon request.

1.2.1 Device versions

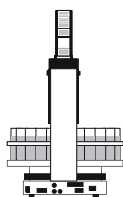
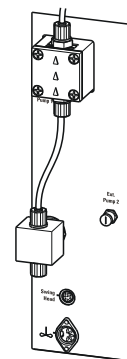
The 814 USB Sample Processor is available in the following versions with different components.



2.814.0010

1-tower version

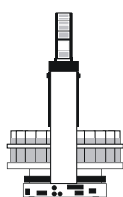
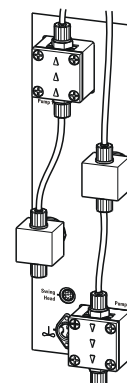
- 1 membrane pompe and 1 valve
- 1 connector for an external pump
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices, Remote Box or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



2.814.0020

1-tower version

- 2 membrane pumps and 2 valves
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices, Remote Box or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer

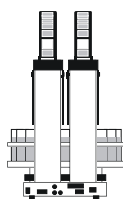


2.814.0030

1-tower version

- 2 connectors for external pumps
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer

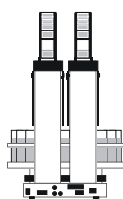
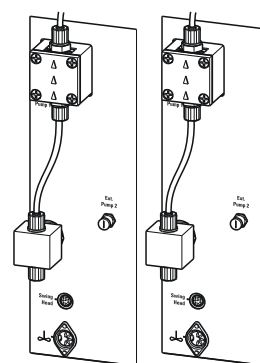




2.814.0110

2-Tower version

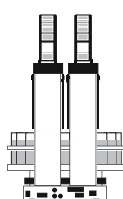
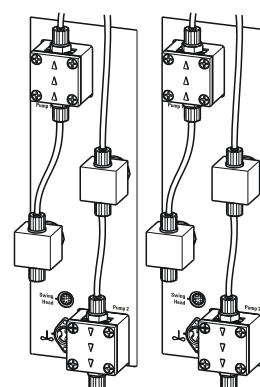
- 2 membrane pumps and 2 valves
- 2 connectors for external pumps
- 2 stirrer connectors (tower stirrer)
- 2 connectors for Swing Heads
- 3 MSB connectors for dosing devices or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



2.814.0120

2-Tower version

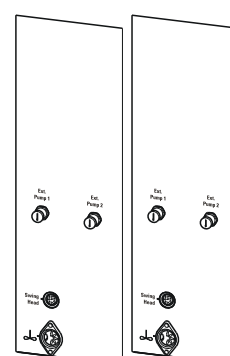
- 4 membrane pumps and 4 valves
- 2 stirrer connectors (tower stirrer)
- 2 connectors for Swing Heads
- 3 MSB connectors for dosing devices or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



2.814.0130

2-Tower version

- 4 connectors for external pumps
- 2 stirrer connectors (tower stirrer)
- 2 connectors for Swing Heads
- 3 MSB connectors for dosing devices or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



1.2.2 Device components

The 814 USB Sample Processor has the following components:

- **Turntable**
For sample racks with a diameter of up to 42 cm.
- **One or two towers with lift**
With titration head holder. Each lift can subsequently be extended by a Swing Head and a robotic arm.

- **One, two or no membrane pump per tower**
Instead of an integrated pump, an external pump connector is available depending on the device version.
- **One stirrer connector per tower**
For connecting a rod stirrer (802 Stirrer) or a magnetic stirrer (741 Stirrer).
- **Two USB connectors**
For connecting a printer, barcode reader or other control instruments (Titrande, Dosing Interface etc.).
- **Three MSB connectors (Metrohm Serial Bus)**
For connecting dosing devices (Dosimat with exchange unit or Dosino with dosing unit), stirrers or Remote Boxes.

1.2.3 Intended use

The 814 USB Sample Processor is designed for usage as an automation system in analytical laboratories or in factories that fulfill the specified ambient conditions (*see chapter 7.5, page 43*). It is **not** suitable for usage in biochemical, biological or medical environments in its basic equipment version.

This device is suitable for processing chemicals and flammable samples. Usage of the 814 USB Sample Processor therefore requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge regarding the application of fire prevention measures prescribed for laboratories is also mandatory.

1.3 About the documentation



CAUTION

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

1.3.1 Symbols and conventions

The following symbols and formatting may appear in this documentation:

(5-12)








Cross-reference to figure legend

The first number refers to the figure number, the second to the instrument part in the figure.

1

Instruction step

Perform the steps one after the other.

| | |
|---|---|
| Method | Dialog text, parameter in the software |
| File ► New | Menu or menu item |
| [Continue] | Button or key |
|  | WARNING This symbol draws attention to a possible life-threatening hazard or risk of injury. |
|  | WARNING This symbol draws attention to a possible hazard due to electrical current. |
|  | WARNING This symbol draws attention to a possible hazard due to heat or hot instrument parts. |
|  | WARNING This symbol draws attention to a possible biological hazard. |
|  | WARNING Warning of optical radiation |
|  | CAUTION This symbol draws attention to possible damage to instruments or instrument parts. |
|  | NOTICE This symbol highlights additional information and tips. |

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 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.

1.4.4 Personnel safety



WARNING

Wear protective goggles and working clothes suitable for laboratory work while operating the 814 USB Sample Processor. 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 814 USB Sample Processor 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 power 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 814 USB Sample Processor 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.

1.4.5 Flammable solvents and chemicals

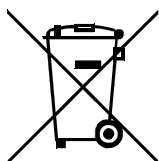


WARNING

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

- Set up the instrument in a well-ventilated location (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.

1.4.6 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.

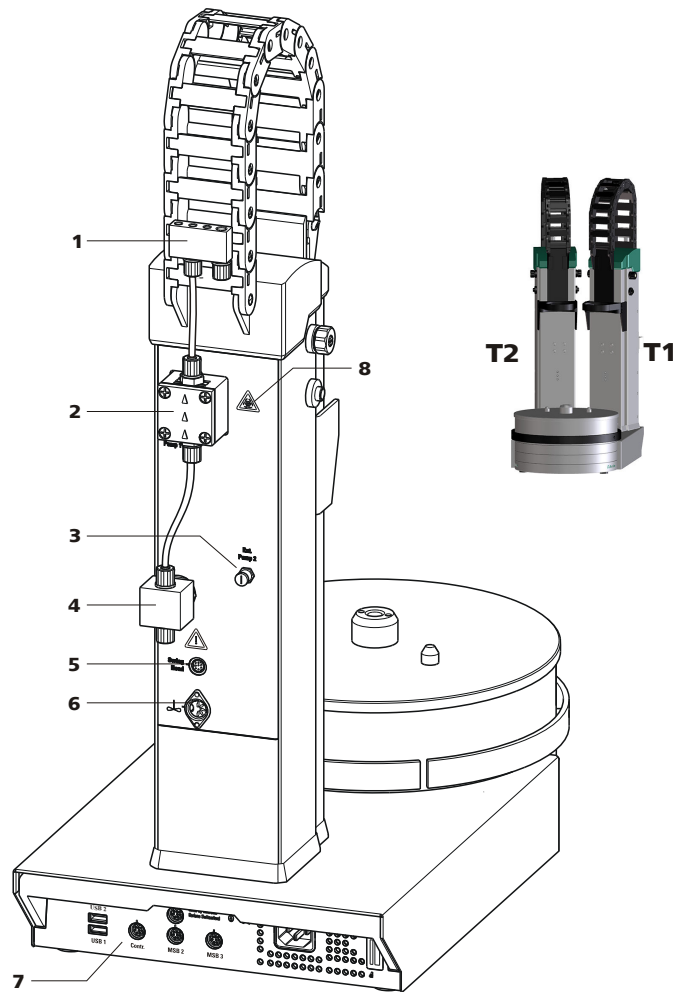


Figure 3 Rear 814 USB Sample Processor

| | |
|--|--|
| <p>1 Distributor For rinsing equipment.</p> | <p>2 Membrane pump Pump 1.</p> |
| <p>3 Pump connection Pump 2. For the external pump.</p> | <p>4 Pump valve</p> |
| <p>5 Swing Head connector Mini DIN socket (9-pin).</p> | <p>6 Stirrer connector DIN socket. For rod stirrer (802 Stirrer) or magnetic stirrer (741 Stirrer).</p> |
| <p>7 Rear panel with connectors</p> | <p>8 Warning symbol (see chapter 1.4.4, page 8)</p> |
| <p>T1 Tower 1 With a 2-tower model.</p> | <p>T2 Tower 2 With a 2-tower model.</p> |



2.2 Back panel

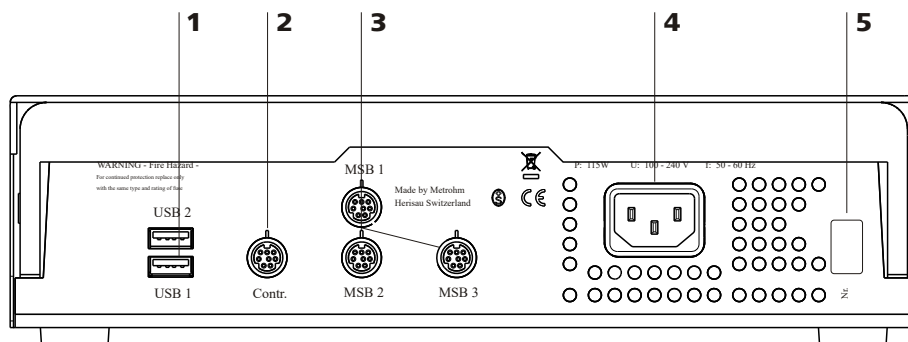


Figure 4 Connector strip

| | |
|---|---|
| <p>1 USB connector (USB 1 and USB 2)</p> | <p>2 Connector (Controller) For the connection to the PC or Touch Control.</p> |
| <p>3 MSB connector (MSB 1 to MSB 3) For stirrers, dosing devices, Remote Box.</p> | <p>4 Power socket</p> |
| <p>5 Type plate Contains specifications concerning supply voltage and serial number.</p> | |

2.3 Sample racks

A sample rack is a turntable that acts as a receptacle for sample vessels. Various types of sample racks are available for different numbers and types of sample vessels.

The 814 USB Sample Processor requires sample racks with up to a maximum of **42 cm diameter**.

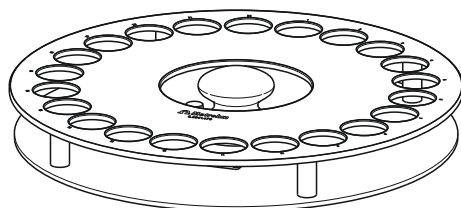


Figure 5 Sample rack 6.2041.470

Other user-defined sample racks can be supplied upon request and the required rack data can be loaded and configured in the control software. Any arrangement of rack positions is possible.

Magnet codes

Every single sample rack can be unambiguously identified by means of a magnet code. The Sample Processor can thus recognize automatically which rack is attached.

When replacing a sample rack, this should first be returned to starting position using the **[Reset rack]** function (see "Manual Operation" in the control software).

This will enable an unambiguous recognition of the rack and thus the correct positioning of the beaker. A positioning table is assigned to each rack type in which each rack position is defined.

Connecting the power cord

Accessories

Power cord with the following specifications:

- Length: max. 2 m
- Number of cores: 3, with protective conductor
- Instrument plug: IEC 60320 type C13
- Conductor cross-section 3x min. 1.0 mm² / 18 AWG
- Power plug:
 - according to customer requirement (6.2122.XX0)
 - min. 10 A



NOTE

Do not use a not permitted power cord!

1 Plugging in the power cord

- Plug the power cord into the instrument's power socket.
- Connect the power cord to the power grid.

3.3 Connecting a computer

The 814 USB Sample Processor requires a USB connection to a computer in order to be able to be controlled by a computer software. Using a 6.2151.000 controller cable, the instrument can be connected directly, either to a USB socket on a computer, to a connected USB hub or to a different Metrohm control instrument.

You need administrator rights for the installation of driver software and control software on your computer.

Cable connection and driver installation

A driver installation is required in order to ensure that the 814 USB Sample Processor is recognized by the computer software. To accomplish this, you must comply with the procedures specified. The following steps are necessary:

1 Install the software

- Insert the computer software installation CD and carry out the installation program directions.
- Exit the program if you have started it after the installation.

2 Establishing the cable connections

- Connect the instrument to the power grid if you have not already done this (see chapter 3.2.1, page 14).
- Connect the instrument to a USB connector (type A) of your computer (see manual of your computer). The 6.2151.000 cable is used for this purpose.

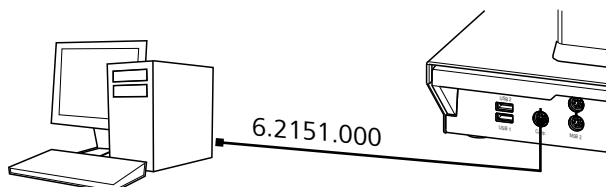


Figure 6 Connecting the computer

The instrument is recognized. Depending on the version of the Windows operating system used, the driver installation proceeds differently afterwards. Either the necessary driver software is installed automatically or an installation wizard is started.

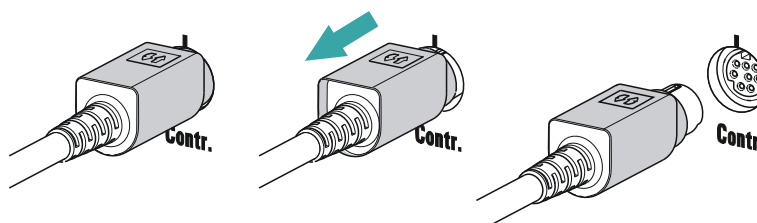
3 Follow the instructions of the installation wizard.

If problems should occur during installation, contact your company's IT support team.



NOTE

The plug on the instrument end of the 6.2151.000 controller cable is protected against accidental disconnection by means of a pull-out protection feature. If you wish to pull out the plug, you first need to pull back the outer plug sleeve marked with arrows.



Registering and configuring the instrument in the computer software

The instrument must be registered in the configuration of your computer software. Once that has been done, you can then configure it according to your requirements. Proceed as follows:

1 Setting up the instrument

- Start the computer software.
The instrument is automatically recognized. The configuration dialog for the instrument is displayed.
- Make configuration settings for the instrument and its connectors.

More detailed information concerning the configuration of the instrument can be found in the documentation for the respective computer software.

3.4 Installing the rinsing and aspiration equipment

Various tubings are necessary for rinsing the electrode and the dosing tips as well as for aspirating the sample solution after the titration. First, mount the tubings on the distributor.

Mounting the rinsing and aspiration tubings

Install the tubings as follows:

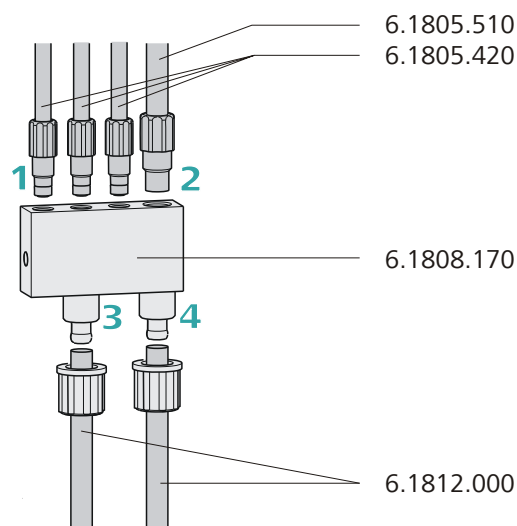


Figure 7 Mounting the rinsing and aspiration tubings

1 Mounting the rinsing tubing

- Manually tighten the three **6.1805.420 FEP tubings** (48 cm) in the M6 bore holes of the distributor. Place the tubings into the guide chain (see chapter 3.5, page 20). These are the feed lines for the spray nozzles.

2 Mounting the aspiration tubing

- Manually tighten the **6.1805.510 FEP aspiration tubing** (60 cm) in the M8 bore hole of the distributor.



3 Mounting the feed line for the rinsing liquid

- Remove the union nut of the left-hand connector of the distributor and guide it over the end of a **6.1812.000 PTFE tubing**. You may have to widen the tubing end in order to be able to better mount the tubing, see note below. Pull the end of the tubing over the connection nipple of the distributor and fasten in place with the union nut.
The tubing leads to the rinsing pump (**Pump 1**) and can be cut to the correct length.



NOTE

The opening of the tubing may need to be widened with a pointed object (e.g. with a Phillips screwdriver).

A piece of sandpaper may be used to get a better grip on the tubing.

Do not widen the tubing end before having slid the union nut onto the tubing.

4 Mounting the outlet tubing

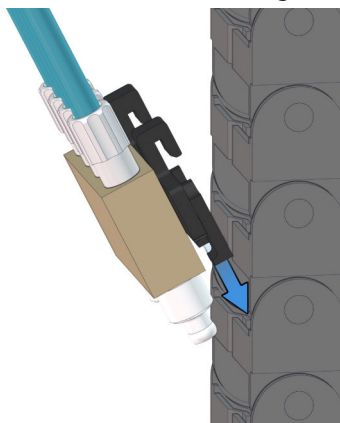
- Remove the union nut of the right-hand connector of the distributor and guide it over the end of the **6.1812.000 PTFE tubing**. Pull the end of the tubing over the connection nipple of the distributor and fasten in place with the union nut.
The tubing leads to the aspiration pump (**Pump 2**) and can be cut to the correct length.

Mounting the distributor

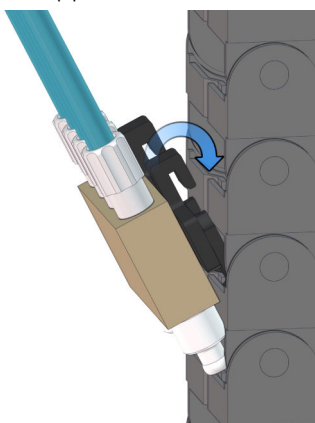
Proceed as follows to install the 6.1808.170 distributor on the guide chain:

1 Attaching the distributor

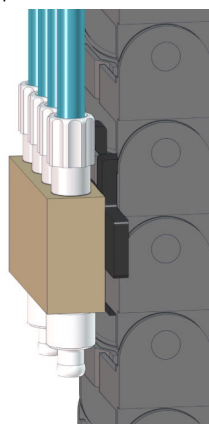
- Insert the bottom part of the distributor holder between two clips of the chain links. The tubing can remain connected.



- Insert the upper hook of the holder in the upper clip.



- Let the bottom part of the holder snap in the bottom clip.





2 Fixing the rinsing tubings

- Place the rinsing tubings into the guide chain (*see chapter 3.5, page 20*).

3.5 Placing tubing and cables in the guide chain

Tubing and cables can be placed in the guide chain.

The guide chain contains a firmly installed clip on each chain link.



CAUTION

When mounting tubing and cables, make sure that there is no traction on the drives while moving the lift or swinging the robotic arm. Traction on the drive can overload and damage the drive.

If a robotic arm is used, we recommend placing the tubing and cables only above the third chain link in the guide chain to prevent traction on the drives.

Do **not** or only partially place rigid tubings, as for example aspiration tubings made of PTFE, into the guide chain.



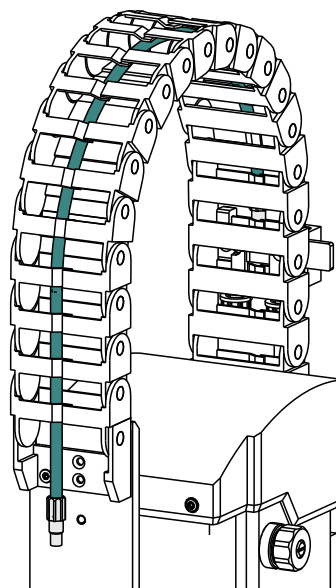
NOTE

Make sure that tubing and cables do not kink.

Inserting and removing the tubing and cables requires no tools.

1 Placing tubing and cables

- Press one side of the clip downwards and place tubing or cables in the guide chain.



2 Removing tubing and cables

- Press one side of the clip downwards and remove tubing or cables from the guide chain.

3.6 Installing the titration head

Mounting the titration head

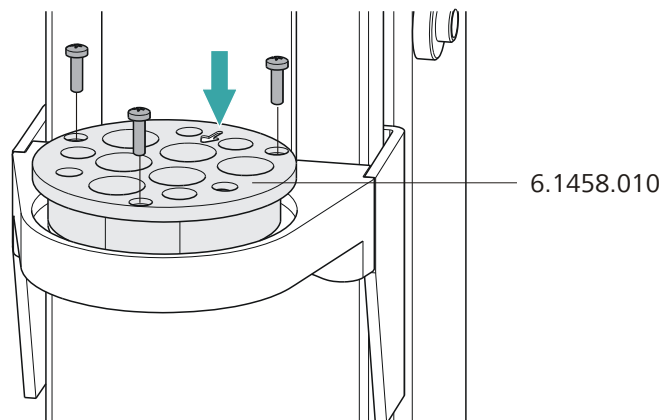


Figure 8 Mounting the titration head

- 1 Place the **titration head** (e.g. 6.1458.010) into the opening of the titration head holder and screw tight with the enclosed screws.

Note the orientation of the titration head. The arrow on the titration head marks the opening for the rod stirrer and has to point to the front, see figure.

Installing accessories for the titration

The following figure shows the installation of the accessories in case rinsing and aspirating of sample beakers with the aid of integrated and external pumps is used. Proceed as follows:

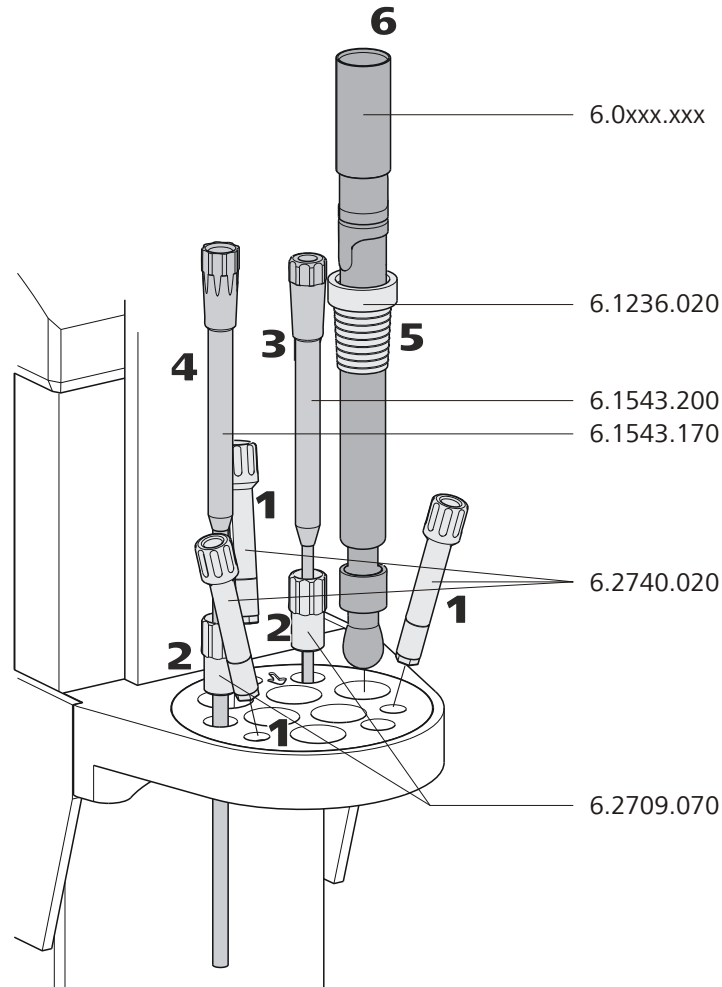


Figure 9 Installing accessories for the titration

- 1** Insert three **spray nozzles** (6.2740.020) or **rinsing nozzles** (6.2740.030) into the oblique bore holes of the titration head, see figure.
- 2** Insert two **6.2709.070 guide sleeves** into the titration head, see figure.
- 3** Insert a **6.1543.200 titration tip** (with antidiffusion valve) into a guide sleeve.

- 4 Insert a **6.1543.170 aspiration tip** into a guide sleeve.
- 5 Slide a **6.1236.020 SGJ sleeve** with standard ground-joint onto the electrode to be used. Insert the electrode into the titration head, see figure.
- 6 Connect an **electrode cable** to the electrode.

Connecting the tubings

In the following, the fastening of the necessary tubings is described in case rinsing and aspirating of sample beakers with the aid of integrated or external pumps is used.

In the following, the fastening of the necessary tubings is described in case rinsing and aspirating of sample beakers with the aid of an integrated and an external pump is used. Proceed as follows:

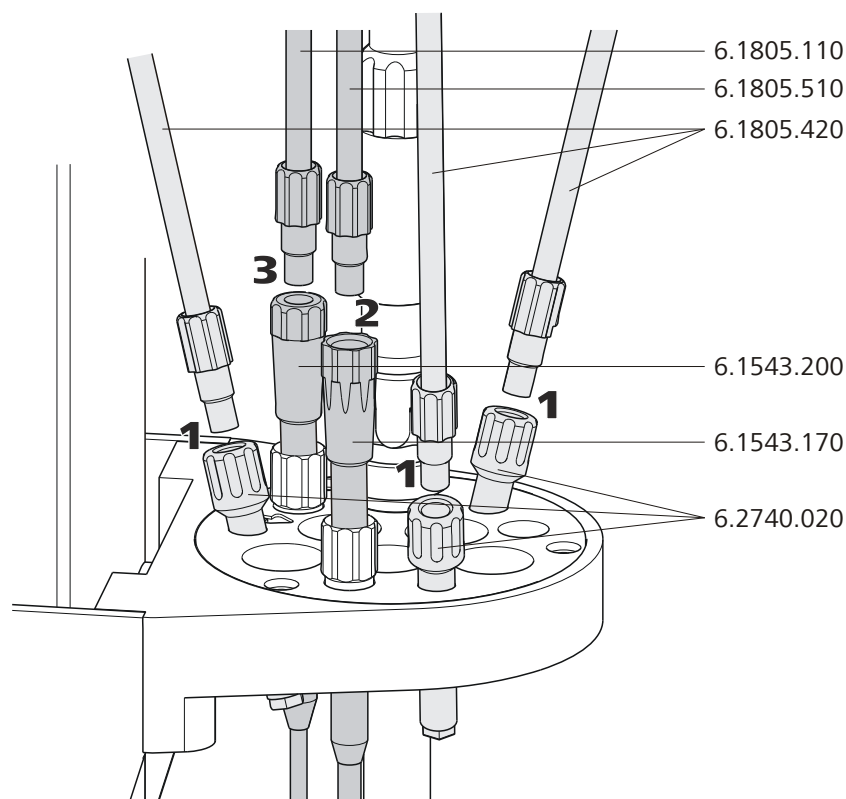


Figure 10 Connecting the tubings

- 1 Tighten the **6.1805.420 rinsing tubings** which have been fastened to the distributor on the rear of the tower to the **spray or rinsing nozzles** (6.2740.020 or 6.2740.030).



- 2 Tighten the **6.1805.510 aspiration tubing** (with M8 screw nipple) which has been fastened to the distributor on the rear of the tower to the **6.1543.170 aspiration tip**.
- 3 Tighten a **6.1805.120 FEP tubing** to the **6.1543.200 titration tip**. Connect the other end of the tubing to the exchange or dosing unit of the titrator.

Connecting a stirrer to a tower

A DIN socket for connecting a rod stirrer (**802 Stirrer**) or a magnetic stirrer (**741 Stirrer**) is located on the rear of the tower.

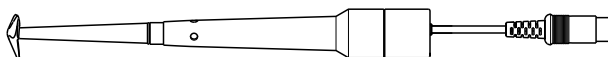


Figure 11 Rod stirrer 802 Stirrer

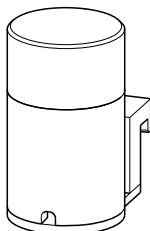


Figure 12 Magnetic stirrer 741 Stirrer

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

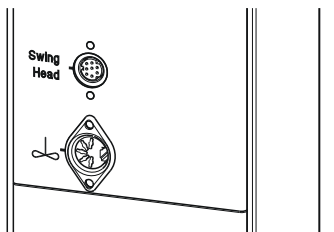


Figure 13 Connecting a stirrer to the tower



NOTE

If an MSB stirrer is connected to the **MSB1** or **MSB2** socket, then the stirrer connector on tower 1 or tower 2 cannot be used, because the tower stirrers are also internally controlled via MSB1 or MSB2.

Inserting the rod stirrer

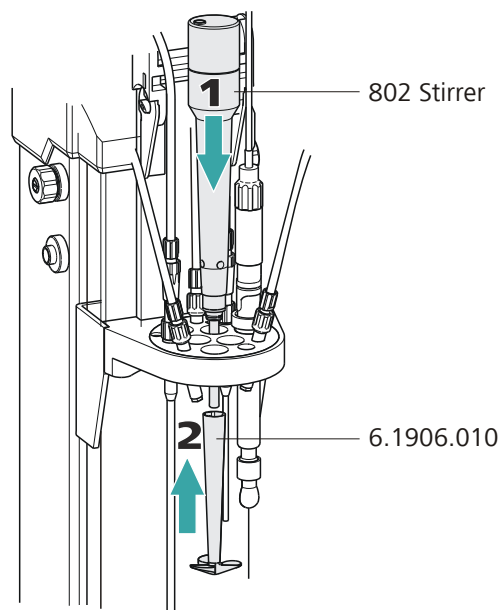
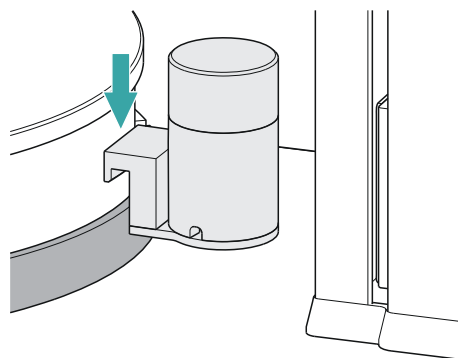


Figure 14 Inserting the rod stirrer

- 1** Insert a **802 Stirrer** rod stirrer from above into the opening marked with an arrow.
- 2** Place a **stirring propeller (e.g. 6.1906.010)** from below over the drive shaft of the rod stirrer and press firmly.

Installing the 741 Stirrer

A magnetic stirrer (**741 Stirrer**) can be used as an alternative to a rod stirrer.



- 1** Hang the magnetic stirrer to the assembly rail between the tower and the turntable.

The magnetic stirrer can be moved sideways as needed.

3.7 Connecting an external pump

If no integrated pump or a Sample Processor model version without pumps is used, up to two external pumps per tower can be connected.

The 843 Pump Station (as model version with membrane pumps or with peristaltic pumps) has two pump drives and is connected to **two** sockets of the Sample Processor via the **6.2141.300 connecting cable** (double cable with two plugs). The **772 Pump Unit** (peristaltic pump) and the **823 Membrane Pump Unit** (membrane pump) have a firmly mounted connection cable with a single plug.

Connecting a pump

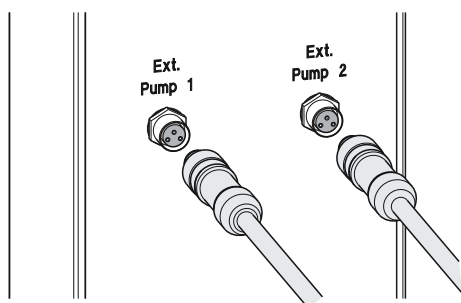
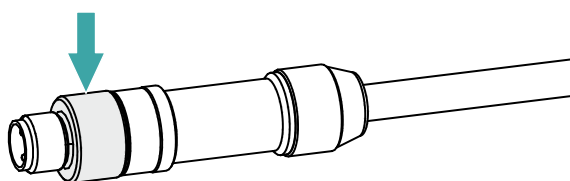


Figure 15 Connecting a pump

Connect an external pump as follows:

- 1
 - Plug the threaded plug of the connection cable into one of the connection sockets **Ext. Pump 1** or **Ext. Pump 2** on the rear of a tower of the Sample Processor. Pay attention to the orientation of the three contact pins.
 - Tighten the knurled screw at the front end of the plug by hand in clockwise direction.



This secures the plug.

- 2 In case of an 843 Pump Station, connect the other end of the cable (9-pin D-Sub plug) to the socket **Remote 1** of the pump.

3.8 Connecting MSB devices

In order to connect MSB devices, e.g. stirrers or dosing devices, Metrohm instruments are equipped with up to a maximum of four connectors on what is referred to as the *Metrohm Serial Bus* (MSB). Various kinds of peripheral devices can be connected in sequence (in series, as a "Daisy Chain") at a single MSB connector (8-pin Mini DIN socket) and controlled simultaneously by the respective control instrument. In addition to the connection cable, stirrers and the Remote Box are each equipped with their own MSB socket for this purpose.

The following figure provides an overview of the instruments that can be connected to an MSB socket, along with a number of different cabling variations.

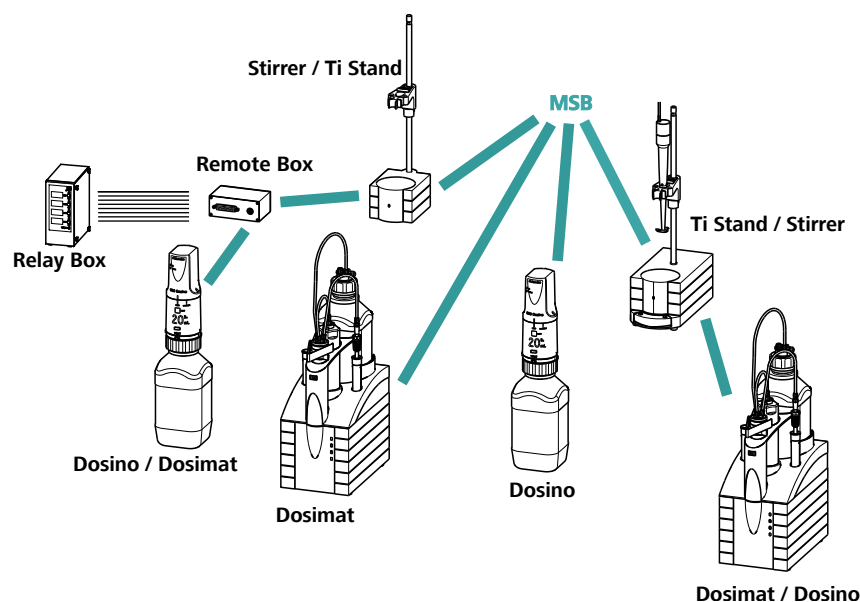


Figure 16 MSB connections

The control instrument determines which peripheral devices are supported.



NOTE

When connecting MSB devices together, the following must be observed:

- Only one device of the same type can be used at a single MSB connector at one time.
- Dosing devices of the 700 Dosino and 685 Dosimat plus type cannot be connected together with other MSB devices on a shared connector. These dosing devices must be connected separately.



CAUTION

Exit the control software before you plug in MSB devices. When it is switched on, the control instrument automatically recognizes which device is connected to which MSB connector. The operating unit or the control software enters the connected MSB devices into the system configuration (device manager).

MSB connections can be extended with the 6.2151.010 cable. The maximum connection length permitted is 15 m.

3.8.1 Connecting a dosing device

Three dosing devices can be connected to the instrument.

The types of dosing devices that are supported are:

- 800 Dosino
- 700 Dosino
- 805 Dosimat
- 685 Dosimat plus



WARNING

If a Dosino is connected to the 814 USB Sample Processor, then the connection cable must be equipped with a T.2400.102 ferrite core. The ferrite core diminishes any interference voltages and thus ensures compliance with the strict EMC standards in accordance with the applicable technical standards, see EU declaration of conformity of the instrument.

Proceed as follows:

1 Mounting the ferrite core

- Fasten a T.2400.102 ferrite core to the Dosino connection cable close to the plug.

2 Connecting a dosing device

- Exit the control software.
- Connect the connection cable of the dosing device to one of the sockets marked with **MSB** on the rear of the control device.
- Start the control software.

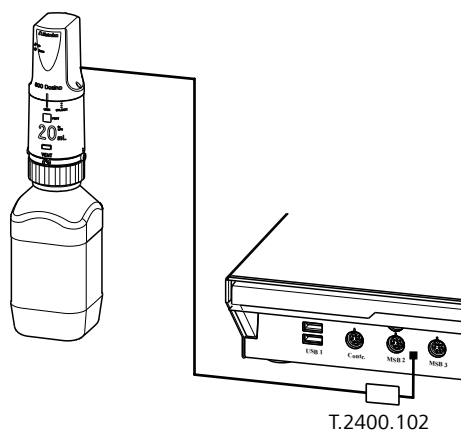


Figure 17 Connecting a dosing device

3.8.2 Connecting a stirrer or titration stand

You can use the following instruments:

These devices have a built-in magnetic stirrer (stirring "from below"):

- 801 Stirrer
- 803 Ti Stand

This device has no built-in magnetic stirrer (stirring "from above"):

- 804 Ti Stand with rod stirrer 802 Stirrer

Connect a stirrer or a titration stand as follows:

1 Connecting the stirrer or titration stand

- Exit the control software.
- Connect the connection cable of the magnetic stirrer or of the titration stand to one of the sockets marked with **MSB** on the rear of the control instrument.
- 804 Ti Stand only: Connect the rod stirrer to the stirrer connector (socket with stirrer symbol) of the titration stand.
- Start the control software.

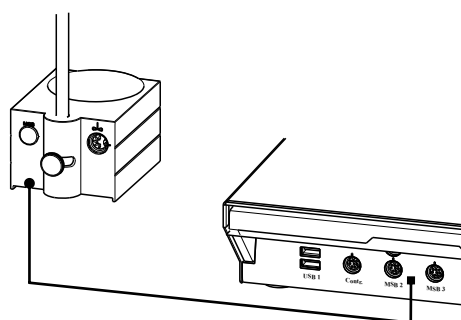


Figure 18 Connecting an MSB stirrer

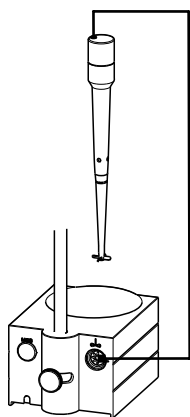


Figure 19 Connecting the rod stirrer to the titration stand

3.8.3 Connecting a Remote Box

Instruments that are controlled via remote lines and/or that send control signals via remote lines can be connected via the 6.2148.010 Remote Box. In addition to Metrohm, other instrument manufacturers also use similar connectors that make it possible to connect different instruments together. These interfaces are also frequently given the designations "TTL Logic", "I/O Control" or "Relay Control" and they generally have a signal level of 5 volts.

Control signals are understood to be electrical line statuses or electrical pulses (> 200 ms) which display the operating status of an instrument or which trigger or report an event. Sequences on a variety of instruments can thus be coordinated in a single complex automation system. However, no exchange of data is possible.

Proceed as follows:

1 Connecting the Remote Box

- Exit the control software.
- Connect the Remote Box connection cable to one of the sockets marked with **MSB** on the rear of the control instrument.
- Start the control software.

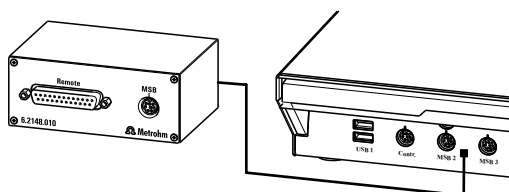


Figure 20 Connecting the Remote Box

You can connect the following instruments to the remote connector, among others:

- 849 Level Control (fill level monitoring in a canister)

- 731 Relay Box (switch box for 230/110 volt alternating current sockets and low-voltage direct current outlets)
- 843 Pump Station (for complex sample preparations or for rinsing external titration vessels)

The Remote Box also has an MSB socket at which a further MSB device, e.g. a dosing device or a stirrer, can be connected.

You will find precise information concerning the pin assignment of the interface on the Remote Box in the *appendix*.

3.9 Connecting USB devices

Two USB connectors (type A sockets) are available for connecting instruments with an USB interface. The 814 USB Sample Processor then functions as USB hub (distributor). If you wish to connect more than two USB devices, you can also use an additional, commercially available USB hub.



NOTE

When connecting an USB device, the control instrument automatically recognizes which device is connected. The control software enters a connected USB device automatically into the system configuration (device manager).

3.9.1 Connecting a barcode reader

A barcode reader is used as an aid for text and numerical input. You can connect a barcode reader with USB interface.

Connect the barcode reader as follows:

1 Connecting the cables

- Insert the USB plug (type A) of the barcode reader into one of the USB sockets on the rear of the instrument.

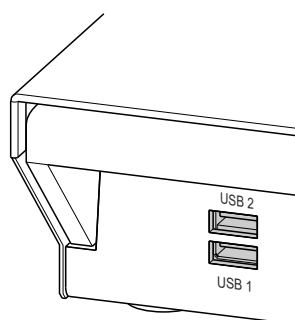


Figure 21 USB connectors

2 Configuring the barcode reader in the control software

- Configure the barcode reader in the configuration of the control software, as described in the online help of the software.

Setting the barcode reader

The barcode reader requires certain basic settings. You can find instructions on how to program the barcode reader in the manual for the barcode reader. Set the barcode reader into program mode and configure the following settings:

- 1
 - Specify the keyboard layout for the desired country (USA, Germany, France, Spain, German-speaking Switzerland). This setting must match the setting in the control software.
 - Make sure that the Ctrl characters (ASCII 00 to 31) can be sent.
 - Set the "Preamble" (introduction) or "Prefix Code" for the ASCII character 02 (STX or Ctrl B) to be sent as the first character.
 - Set the "Postamble", "Record Suffix" or "Postfix Code" for the ASCII character 04 (EOT or Ctrl D) to be sent as the last character.
 - Close programming mode.

3.10 Mounting the drip pan

Serious damage to the instrument or a danger to the user can occur if chemicals or liquid samples are spilled.

The use of a suitable **drip pan** (6.2711.0X0) is recommended in order to avoid such incidents.

Mounting the drip pan

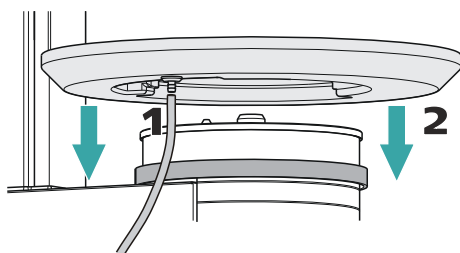


Figure 22 Installing the drip pan

Install the drip pan as follows:

- 1 Fasten the enclosed tubing to the drainage nipple on the drip pan and then guide the free end of the tubing into a waste container.

- 2 Place the drip pan on the assembly rail of the turntable as shown in the figure.

3.11 Attaching a sample rack

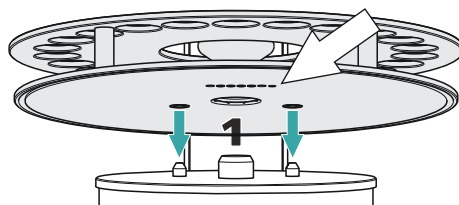


Figure 23 Attaching rack

Put the rack into place as follows:

- 1 Carefully center the rack on the turntable. The guide bolts on the turntable must engage with the openings in the bottom of the rack.



NOTE

Hold the rack in such a way that the printed Metrohm logo is legible horizontally.

- 2 Carry out the **[Rack reset]** or **[Initialize rack]** function in the manual control of the control software.

The rack is moved into starting position. The magnet code of the rack is read out by the instrument during this process. The white arrow in Figure indicates the position of the magnet holder. The six-digit magnet code is used to identify the rack type. The sample positions and any special positions on the rack are defined along with the rack type.

3.12 Mounting the safety shield



WARNING

It is imperative that the safety shield be installed before the first time the 814 USB Sample Processor is used. The device may not be operated without a safety shield.

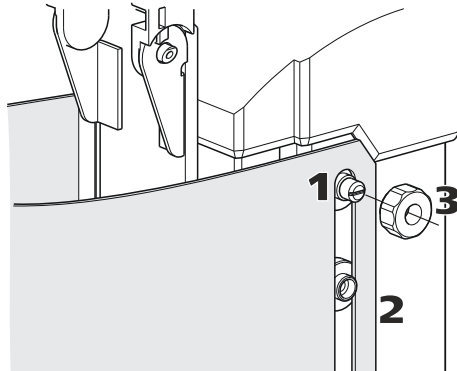


Figure 24 Mounting the safety shield

Proceed as follows.

- 1 Loosen the knurled screws on both sides of the tower.
- 2 Move the **safety shield** into position, starting from the top. Observe the corresponding illustration at the top.
- 3 Fix the safety shield in place with the knurled screws.



NOTE

You can adjust the vertical position of the safety shield at any time by loosening the screws.

The optimum vertical position meets the following criteria:

- The rack can rotate freely.
- Nobody can access the working area of the lift while the instrument is in operation.

4 Operation and maintenance

4.1 General notes

The 814 USB Sample Processor requires appropriate care. Excess contamination of the instrument may result in malfunctions and a reduction in the service life of the sturdy mechanical and electronic components.

Severe contamination can also have an influence on the measured results. Regular cleaning of exposed parts can prevent this to a large extent.

Spilled chemicals and solvents must be removed immediately. In particular, the power plug should be protected from contamination.

4.2 Care

- Check all tubing connections regularly for leaks.
- Rinse the tubing connections from time to time. The tubing must be replaced after prolonged usage.



5 Troubleshooting

5.1 Sample Processor

| Problem | Cause | Remedy |
|--|--|--|
| The instrument is not recognized. | <i>Sample Processor – No USB connection.</i> | <ol style="list-style-type: none"> 1. Correctly plug in the USB connecting cable on both ends. 2. Restart the control software or switch the Touch Control off and on again. |
| | <i>Sample Processor – Power supply of the instrument is missing.</i> | <ol style="list-style-type: none"> 1. Plug in the power cord on the instrument. 2. Restart the control software or switch the Touch Control off and on again. |

5.2 Robotic arm

| Problem | Cause | Remedy |
|---|---|--|
| The robotic arm moves all the way outward and buzzes. | <i>Sample Processor – The Swing Head is not correctly configured.</i> | In the control software under "Configuration" (or under "Device manager" for Touch Control), enter the correct value for the Swing offset . |
| | <i>Sample Processor – Robotic arm is mounted incorrectly.</i> | Disconnect the power plug and dismount the robotic arm. Check the configuration of the robotic arm and mount it correctly if necessary (left-swinging ↔ right-swinging). |
| The Swing Head either misses the rack positions totally or is inaccurate | <i>Sample Processor – The Swing Head is not correctly configured.</i> | Enter the correct values for the Swing radius , Swing offset etc. in the control software under "Configuration" (or under "Device manager" for Touch Control). |
| | <i>Sample Processor – The axial distance is not correctly configured.</i> | Enter the correct value for the Axial distance in the control software under "Configuration" (or under "Device manager" for Touch Control). |
| | <i>Sample Processor – The wrong rack table is being used.</i> | Initialize the rack using the function Initialize rack in the "Manual control". |

| Problem | Cause | Remedy |
|----------------|--|--------------------------|
| | <i>Swing Head – The Swing Head drive is defective.</i> | Contact Metrohm Service. |

5.3 Pump

| Problem | Cause | Remedy |
|-----------------------------|---|--|
| The pump is leaking. | <i>Sample Processor – A tubing connection is leaking.</i> | Check the tubing connections especially between the distributor and the pump and seal tightly. |
| | <i>Canister – There is too much pressure on the pump valve.</i> | <ul style="list-style-type: none"> ▪ Make sure that the canisters are not placed on a higher level than the pump. ▪ Check the fill level of the canisters. ▪ Make sure that the canisters are not completely sealed (overpressure). |

6 Appendix

6.1 Beaker sensor

Every tower of a Sample Processor is equipped with a beaker sensor detecting the availability of a sample vessel in front of the tower. An infrared sensor identifies devices of various materials if they are located in a correct position in front of the tower. In the rack configuration of the control instrument or the control software, **Tower** must be selected for the setting 'Beaker sensor'. This beaker test is carried out whenever a rack position is approached in a method run.

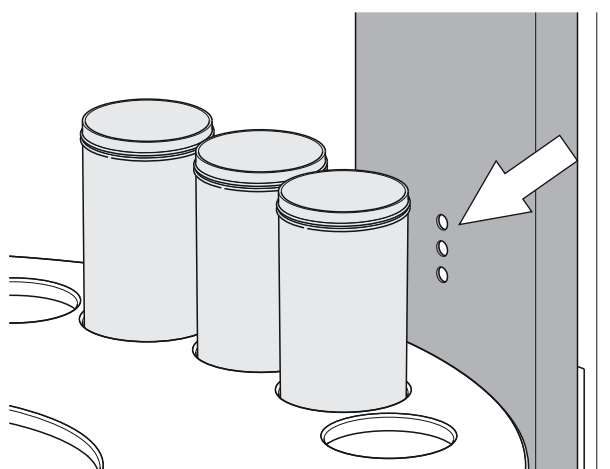


Figure 25 Beaker sensor on the tower

The beaker sensor on the tower can only be used with single-row sample racks.

6.2 Rinsing nozzles

Using rinsing nozzles is very effective in order to rinse sample vessels (with sensors and buret tips) efficiently. Rinsing nozzles are available in two model versions:

- **6.2740.020 spray nozzle**
For the fine-spraying of the rinsing solution. The nozzle has a small ball at the opening. The distribution (but also the backpressure) of the rinsing liquid is clearly higher than the one of a rinsing nozzle.
- **6.2740.030 rinsing nozzle** (optionally available)
The rinsing liquid is applied as a fine jet for optimal removal of layers on electrodes and on titration accessories.

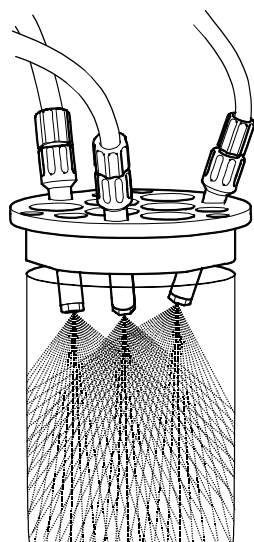


Figure 26 Spray nozzles - Mode of operation

The height of the nozzles can be adjusted in the titration head in order to reach an optimal rinsing effect.

6.3 Remote interface

The 6.2148.010 Remote Box allows devices to be controlled which cannot be connected directly to the MSB interface of the Sample Processor.

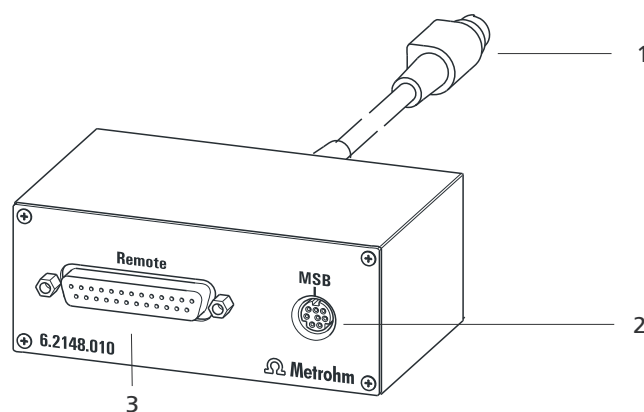


Figure 27 Connectors of the Remote Box

1 Cables

For connecting to an MSB connector of the Sample Processor.

2 MSB connector

Metrohm Serial Bus. For connecting external dosing devices or stirrers.

3 Remote connector

For connecting instruments with a remote interface.

6.3.1 Pin assignment of the remote interfaces

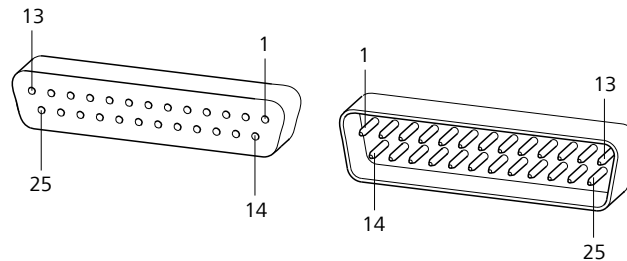
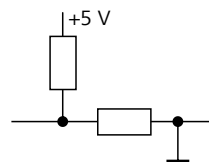


Figure 28 Pin assignment of remote socket and remote plug

The above figure of the pin assignment of a Metrohm remote interface does not only apply for the Remote Box, but also for all Metrohm devices with 25-pin D-Sub remote connectors.

Inputs



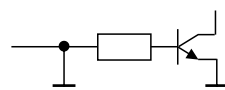
approx. 50 k Ω Pull-up

$t_p > 20$ ms

active = low, inactive = high

The input lines can be scanned with the **SCAN** command.

Outputs



Open Collector

$t_p > 200$ ms

active = low, inactive = high

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

+5 V: maximum load = 20 mA

The output lines can be set with the **CTRL** command.

Table 1 Inputs and outputs of the remote interface

| Assignment | Pin no. | Assignment | Pin no. |
|------------|---------|------------|---------|
| Input 0 | 21 | Output 0 | 5 |
| Input 1 | 9 | Output 1 | 18 |
| Input 2 | 22 | Output 2 | 4 |
| Input 3 | 10 | Output 3 | 17 |
| Input 4 | 23 | Output 4 | 3 |
| Input 5 | 11 | Output 5 | 16 |

| Assignment | Pin no. | Assignment | Pin no. |
|-------------------|----------------|-------------------|----------------|
| Input 6 | 24 | Output 6 | 1 |
| Input 7 | 12 | Output 7 | 2 |
| 0 volts / GND | 14 | Output 8 | 6 |
| +5 volt | 15 | Output 9 | 7 |
| 0 volts / GND | 25 | Output 10 | 8 |
| | | Output 11 | 13 |
| | | Output 12 | 19 |
| | | Output 13 | 20 |



7 Technical specifications

7.1 Lift and turntable

| | |
|--------------------------|------------------------------------|
| <i>Stroke path</i> | 235 mm |
| <i>Maximum lift load</i> | approx. 30 N / 3 kg |
| <i>Lift rate</i> | adjustable, 5 - 25 mm/s |
| <i>Turntable speed</i> | adjustable, 3...20 angle degrees/s |

7.2 Membrane pump(s) with valve

| | |
|------------------|-------------------|
| <i>Flow rate</i> | > 450 mL/min |
| | Pressure head 2 m |

7.3 Interfaces and connectors

| | |
|-----------------------------------|---|
| <i>Controller connector</i> | USB upstream port (9-pin Mini DIN socket) for connecting a computer for controlling the device. |
| <i>MSB connectors MSB1 - MSB3</i> | Three 9-pin Mini DIN sockets for connecting dosing devices (Dosino/Dosimat), stirrers, etc. |
| <i>USB connectors 1/2</i> | Two USB downstream ports (type A sockets), each 500 mA, for connecting Metrohm instruments or USB peripheral devices of other manufacturers. |
| <i>Stirrer connector</i> | DIN socket |
| <i>Stirring rate</i> | 722/802 rod stirrer: 180–3000 rpm 741 magnetic stirrer: 180–2600 rpm adjustable in 15 steps each in both directions of rotation |
| <i>Pump connectors</i> | Two sockets with M8 thread for 772 Pump Unit, 823 Membrane Pump Unit or 843 Pump Station $U = 16 \pm 1 \text{ V}$, $I = \leq 0.8 \text{ A}$ |
| <i>Swing Head connector</i> | 9-pin Mini DIN socket |

7.4 Power connection

| | |
|--------------------------|------------------------|
| <i>Voltage</i> | 100–240 VAC \pm 10 % |
| <i>Frequency</i> | 50–60 Hz \pm 3% |
| <i>Power consumption</i> | 115 W |
| <i>Fuse</i> | 2.0 ATH |

7.5 Ambient conditions

| | |
|----------------------------------|--|
| <i>Nominal function range</i> | +5 to +45 °C At max. 80% humidity, non-condensing |
| <i>Storage</i> | +5 to +45 °C At max. 80% humidity, non-condensing |
| <i>Altitude / Pressure range</i> | Max. 2,000 m.a.s.l. / min. 800 mbar |
| <i>Overvoltage category</i> | II |
| <i>Pollution degree</i> | 2 |

7.6 Reference conditions

| | |
|----------------------------|---------------------|
| <i>Ambient temperature</i> | 25 °C (\pm 3 °C) |
| <i>Relative humidity</i> | \leq 60% |

7.7 Dimensions

| | |
|-------------------------------------|--|
| <i>Width</i> | 0.28 m |
| <i>Height</i> | 0.73 m |
| <i>Depth</i> | 0.50 m |
| <i>Weight (without accessories)</i> | 1.814.0010: 14.52 kg 1.814.0020: 15.42 kg 1.814.0030: 13.82 kg 1.814.0110: 18.87 kg 1.814.0120: 19.93 kg 1.814.0130: 16.82 kg |

7.7 Dimensions



Material


Housing

Metal housing, surface-treated

8 Displaying accessories

Up-to-date information on the scope of delivery and on optional accessories can be found on the Metrohm website.

1 Searching for a product on the website

- Go to <https://www.metrohm.com>.
- Click on .
- Enter the article number of the product (e.g. **2.1001.0010**) into the search field and press **[Enter]**.

The search result is displayed.

2 Displaying product information

- To display the products matching the search term, click on **Product models**.
- Click on the desired product.

Detailed information regarding the product is displayed.

3 Displaying accessories and downloading the accessories list

- To display the accessories, scroll down to **Accessories and more**.
 - The **scope of delivery** is displayed.
 - Click on **[Optional parts]** for the optional accessories.
- To download the accessories list, click on **[Download accessories PDF]** under **Accessories and more**.



NOTE

Metrohm recommends keeping the accessories list for reference purposes.

