

815 Robotic USB Sample Processor XL



Manual

8.815.8003EN/2023-09-01



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Technical Communication
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1 Introduction

1.1 The 815 Robotic USB Sample Processor XL in the Titrando system

The 815 Robotic USB Sample Processor XL 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 815 Robotic USB Sample Processor XL.

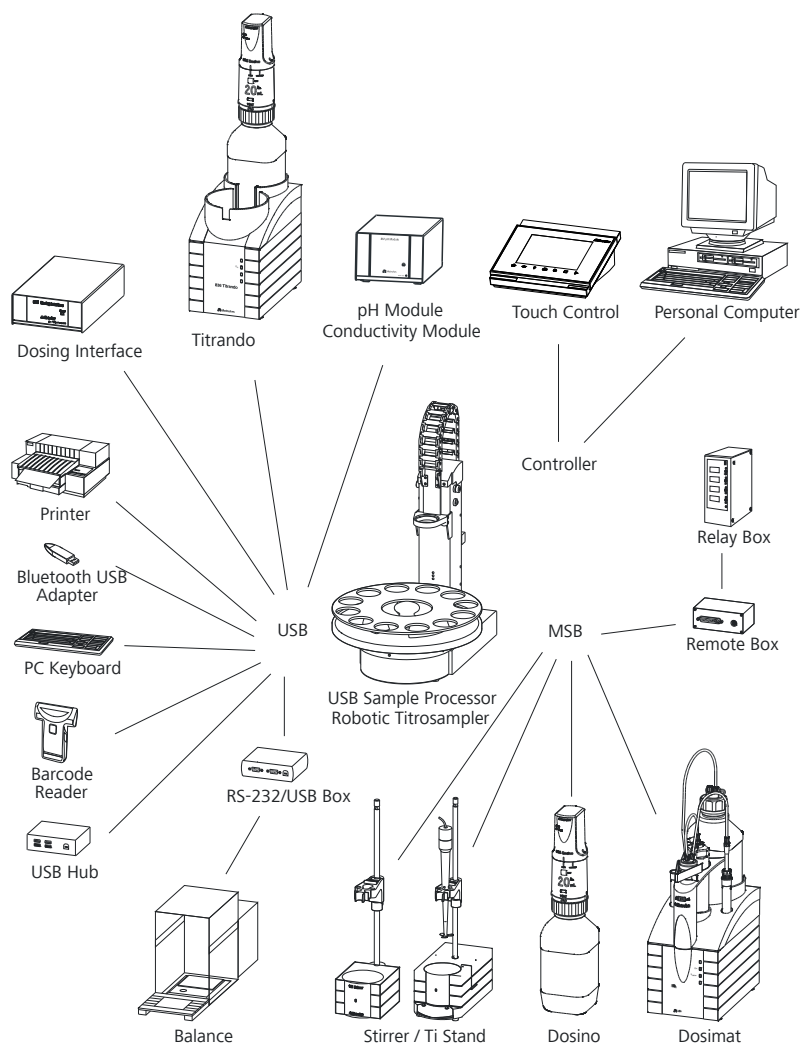
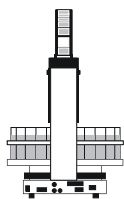


Figure 1 The Titrando system

1.2.1 Device versions

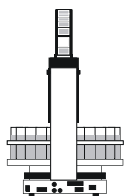
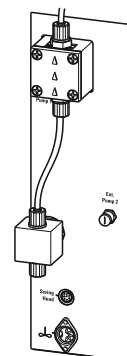
The 815 Robotic USB Sample Processor XL is available in the following versions with different components.



2.815.0010

1-tower version

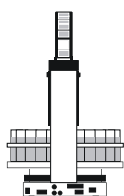
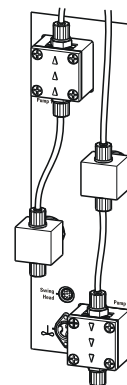
- 1 membrane pumpe and 1 valve
- 1 connector for an external pump
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices, Remote Box or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



2.815.0020

1-tower version

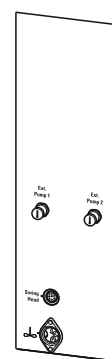
- 2 membrane pumps and 2 valves
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices, Remote Box or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer

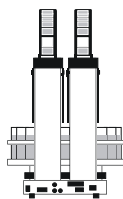


2.815.0030

1-tower version

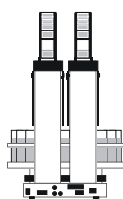
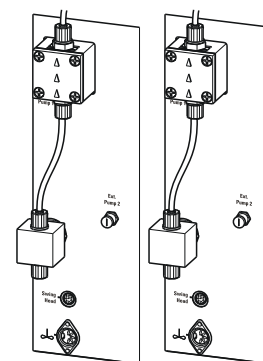
- 2 connectors for external pumps
- 1 stirrer connector (tower stirrer)
- 1 connector for a Swing Head
- 3 MSB connectors for dosing devices or stirrers
- 2 USB connectors
- 1 connector "Controller" for Touch Control or computer



**2.815.0110**

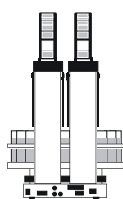
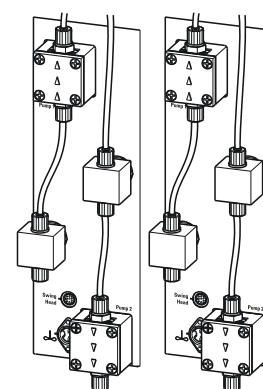
2-Tower version

- 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

**2.815.0120**

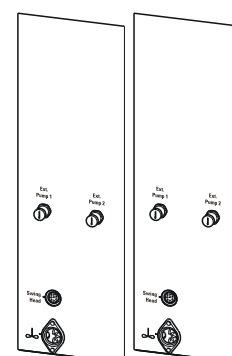
2-Tower version

- 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

**2.815.0130**

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 815 Robotic USB Sample Processor XL has the following components:

- **Turntable**
For sample racks with a diameter of up to 48 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 815 Robotic USB Sample Processor XL 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 59*). 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 815 Robotic USB Sample Processor XL 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.



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 815 Robotic USB Sample Processor XL is **not** suitable for utilization in biochemical, biological or medical environments in its basic equipment version.

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

1.4.5 Flammable solvents and chemicals

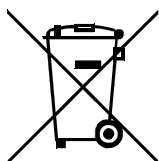


WARNING

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.

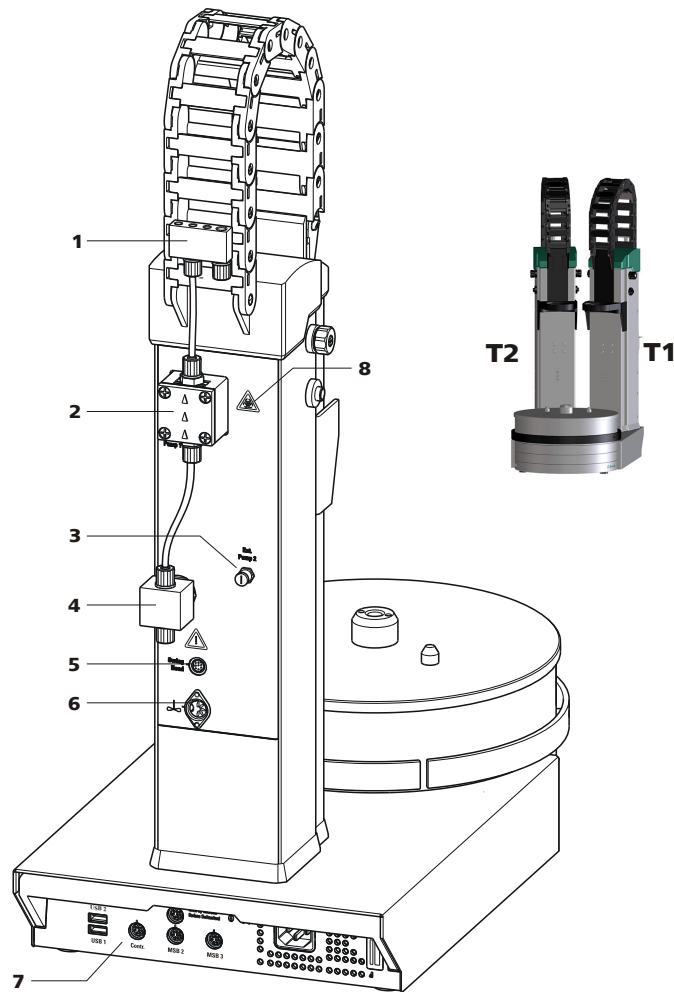


Figure 3 Rear 815 Robotic USB Sample Processor XL

<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

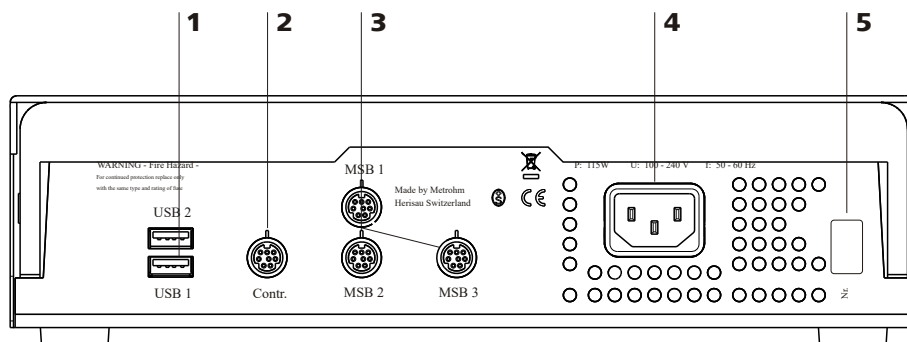


Figure 4 Connector strip

<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 815 Robotic USB Sample Processor XL requires sample racks with up to a maximum of **48 cm diameter**.

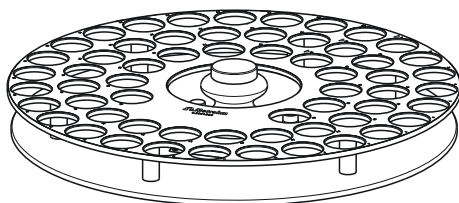


Figure 5 Sample rack 6.2041.840

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 815 Robotic USB Sample Processor XL 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 815 Robotic USB Sample Processor XL 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 all peripheral devices to the instrument, *see chapter 3.13, page 36*.
- 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.

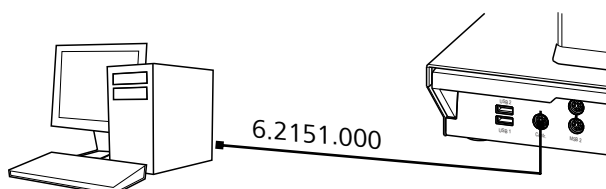


Figure 6 Connecting the computer

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.

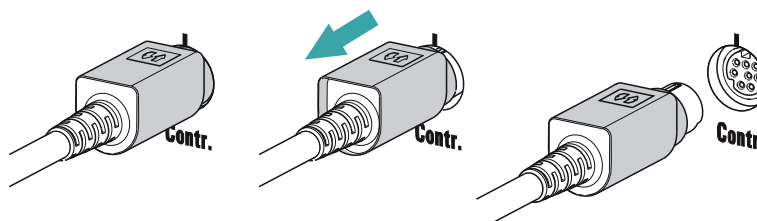
3 Follow the instructions of the installation wizard.

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

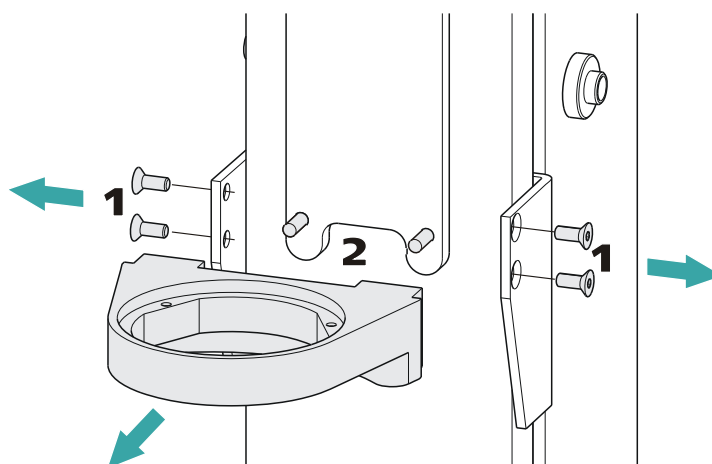
- Start the computer software.
The instrument is automatically recognized. The configuration dialog for the instrument is displayed.
- Make configuration settings for the instrument and its connectors.

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

3.4 Mounting the Swing Head to the Sample Processor

3.4.1 Mounting the Swing Head

Dismounting the titration head holder



1 Loosen the screws of the holder on both sides.

2 Unscrew and remove the holder from the holder plate of the guide chain.

Use the supplied hex key. Set the screws aside for later use.

Connecting the Swing Head

The connection socket (Mini DIN) for the Swing Head drive is located on the rear of the tower above the stirrer connector.

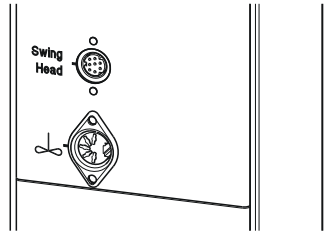


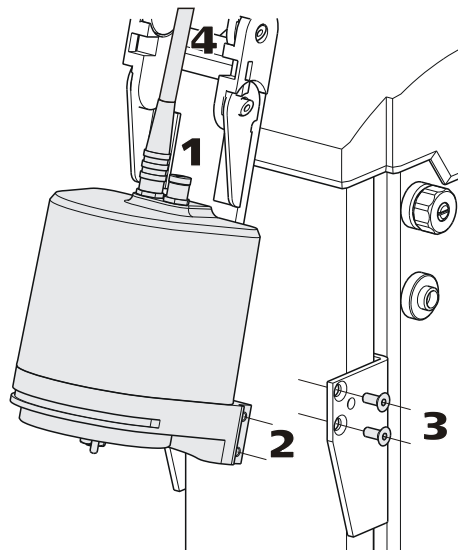
Figure 7 Connecting the Swing Head

Connect the Swing Head as follows:

1 Plugging in the cable

- Guide the connection cable of the Swing Head through the guide chain of the tower (see chapter 3.9, page 30).
- Plug the Mini DIN plug into the socket 'Swing Head'.

Mounting the Swing Head



- 1 Tighten the Swing Head to the holder plate of the guide chain with two V.024.4012 countersunk screws.
- 2 Clamp the Swing Head between the guide jaws.
- 3 Tighten the Swing Head to the guide jaws with the screws previously removed.
- 4 Place the connection cable into the guide chain (see chapter 3.9, page 30).

Mounting the Swing Head with tower extension

For certain applications, it may be necessary to mount the 815 Robotic USB Sample Processor XL at a higher position. A **6.2058.010 tower extension** can be mounted on the lift for this purpose.

First, dismount the titration head holder (*see chapter 3.4.1, page 17*). Proceed afterwards as follows:

- 1** Fasten the tower extension to the lift guide of the Sample Processor in accordance with the following illustration and fix it in place with the screws provided.

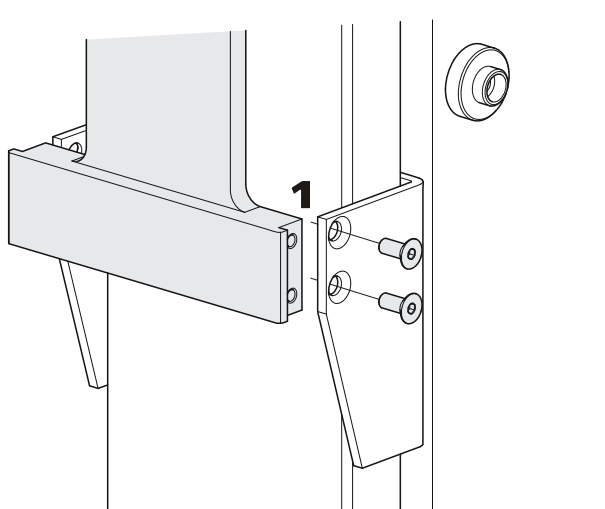


Figure 8 Mounting the tower extension

- 2** Tighten the Swing Head to the holder plate of the guide chain with two V.024.4012 countersunk screws.

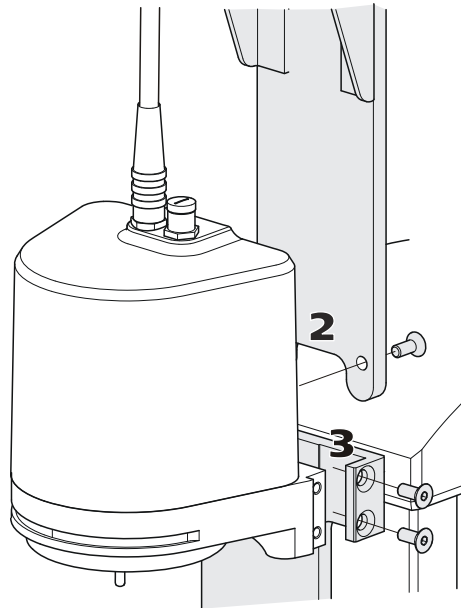


Figure 9 Mounting the Swing Head to the tower extension

- 3 Tighten the Swing Head to the upper end of the tower extension.

3.4.2 Mounting the robotic arm reinforcement

In cases in which it is necessary to take up or strip off a filter or a pipetting tip on the robotic arm, you must mount a **6.2058.090 robotic arm reinforcement**. The reinforcement provides the robotic arm with stable resistance when picking up or stripping the tools used and prevents it from bending.

The reinforcement has to be attached before mounting a robotic arm. Proceed as follows:

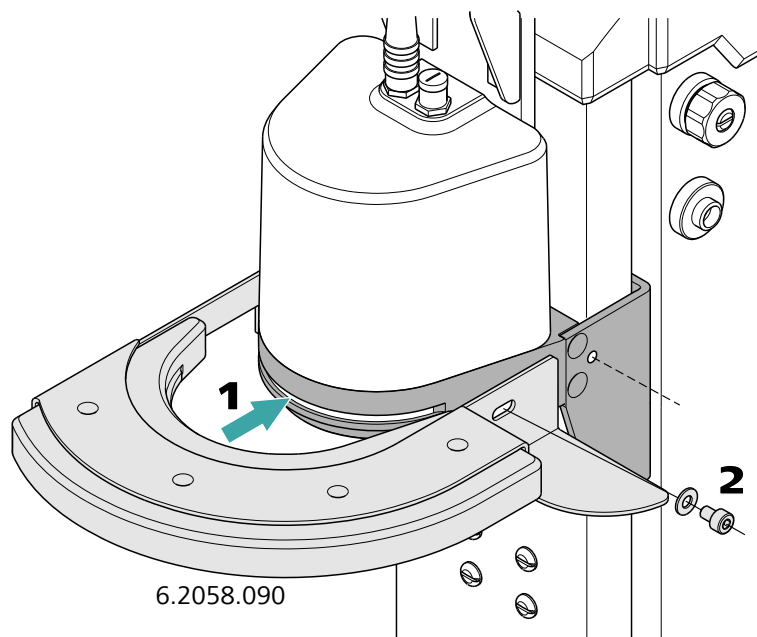


Figure 10 Mounting the 6.2058.090 robotic arm reinforcement

- 1** Slide the reinforcement from the front over the holder plate of the Swing Head.
- 2** Tighten the reinforcement to the lift guide with the screws provided.

3.5 Configuring the robotic arm

A variety of differently constructed robotic arms is available for enabling a wide range of applications. They differ from one another in their geometric sizes, e.g. swing radius or maximum permissible swing range. The configuration data must be entered in the Sample Processor or in the control software **prior to the assembly of the robotic arm**. The data required is engraved on the underside of the robotic arm. Examples of the most common robotic arms are shown in the illustration below.

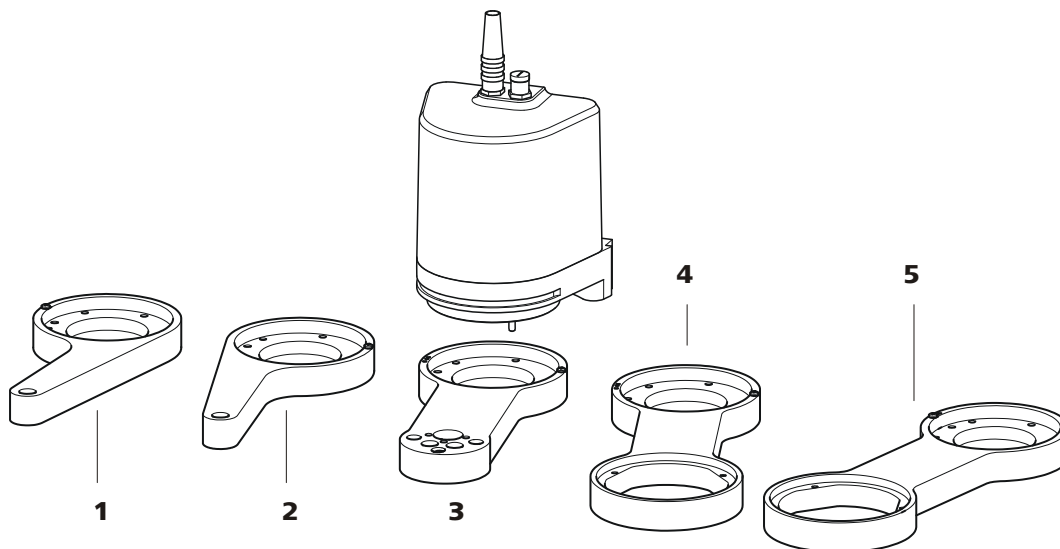


Figure 11 Robotic arms - standard model versions:

<p>1 Transfer robotic arm (6.1462.030) For sample transfer, left-swinging.</p>	<p>2 Transfer robotic arm (6.1462.040) For sample transfer, right-swinging.</p>
<p>3 Titration robotic arm (6.1462.050) With titration head, left-/right-swinging *).</p>	<p>4 Macro robotic arm (6.1462.060) With holder for a 6.1458.XXX titration head insert, left-swinging.</p>
<p>5 Macro robotic arm (6.1462.070) With holder for a 6.1458.XXX titration head insert, right-swinging.</p>	

*) can be mounted in two ways



NOTE

A detailed list of the available robotic arms, along with the necessary configuration data, can be found in *Chapter Robotic arms and overflow buret, page 52ff.*

The following figure illustrates the most important configuration data that needs to be set in the control software to ensure correct usage of a robotic arm (left-swinging, here).

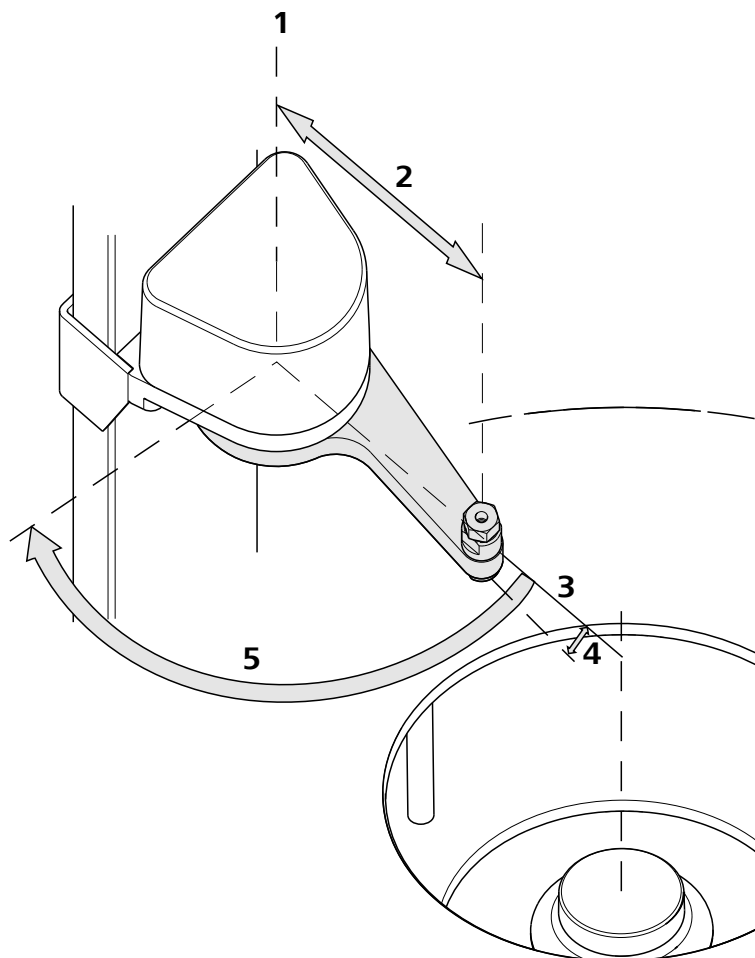


Figure 12 Configuration data of the robotic arms

1 Swing axis

This runs through the middle of the Swing Head drive.

2 Swing radius

This is determined by the length of the robotic arm. The radius runs from the axis of rotation to the midpoint of the tip of the robotic arm.

3 Source axis

It runs from the swing axis to the center of the sample rack and marks the initial position of the robotic arm.

4 Robotic arm offset

It determines the 0° position of the robotic arm.

5 Maximum swing range

This stands for the swing range that the robotic arm can reach. The range runs from the source axis to the maximum possible robotic arm position.

Swing direction

Left-swinging (**swing direction +**) or right-swinging (**swing direction -**) model versions are available as different types of robotic arms. Left-swing-

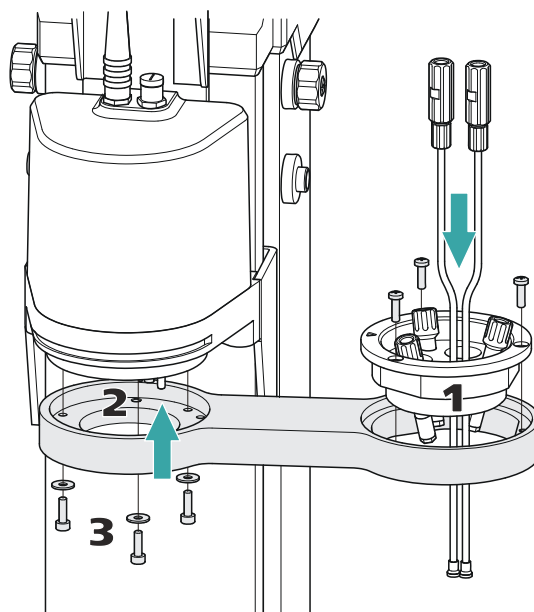


Figure 14 Mounting the robotic arm

Mount the robotic arm as follows:

- 1 Place the **6.1458.040 titration head insert** in the opening of the robotic arm. The marking on the edge must be closer to the Swing Head. Tighten the titration head insert with the provided screws.
- 2 Hold the robotic arm in such a way that the opening faces to the right. While doing so, rotate the robotic arm outwards as far as possible, i.e. towards the tower - see above. Slip the robotic arm from below over the guide bolts of the drive disk of the Swing Head.



NOTE

Take care not to twist the drive disk and thereby put strain on the drive.

- 3 Tighten the robotic arm to the Swing Head with the screws and washers supplied.

No separate LIFT command is required in such cases.



NOTE

The work position of the lift must be configured in such a way that the robotic arm is in place on the sample vessel. The robotic arm must bend very slightly while doing so, so that the Piezo sensor will generate a signal.

3.8 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:

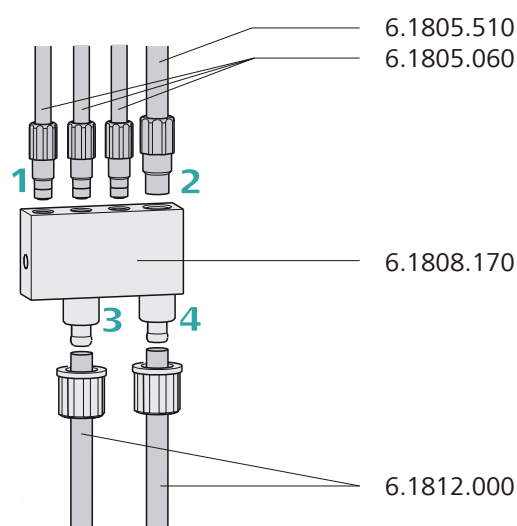


Figure 16 Mounting the rinsing and aspiration tubings

1 Mounting the rinsing tubing

- Manually tighten the three **6.1805.060 FEP tubings** (60 cm) in the M6 bore holes of the distributor. Place the tubings into the guide chain (see chapter 3.9, page 30). 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

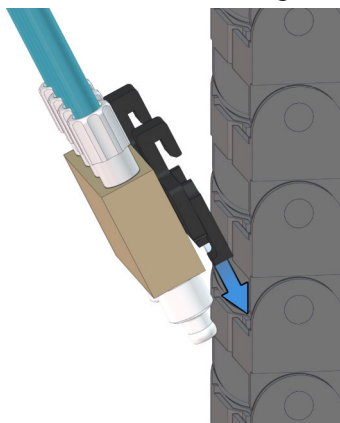
- Remove the union nut of the right-hand connector of the distributor and guide it over the end of the **6.1812.000 PTFE tubing**. Pull the end of the tubing over the connection nipple of the distributor and fasten in place with the union nut.
The tubing leads to the aspiration pump (**Pump 2**) and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

Mounting the distributor

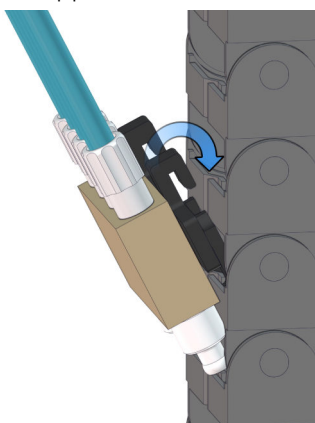
Proceed as follows to install the 6.1808.170 distributor on the guide chain:

1 Attaching the distributor

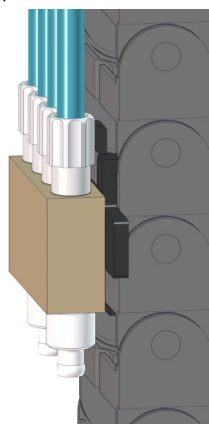
- Insert the bottom part of the distributor holder between two clips of the chain links. The tubing can remain connected.



- 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 3.9, page 30*).

3.9 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.



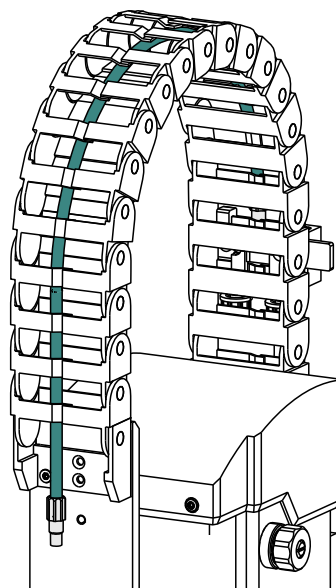
NOTE

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.

3.10 Equipping the titration head

Mounting the rinsing and aspiration tubings

Example of a 6.1462.070 robotic arm with 6.1458.040 titration head.

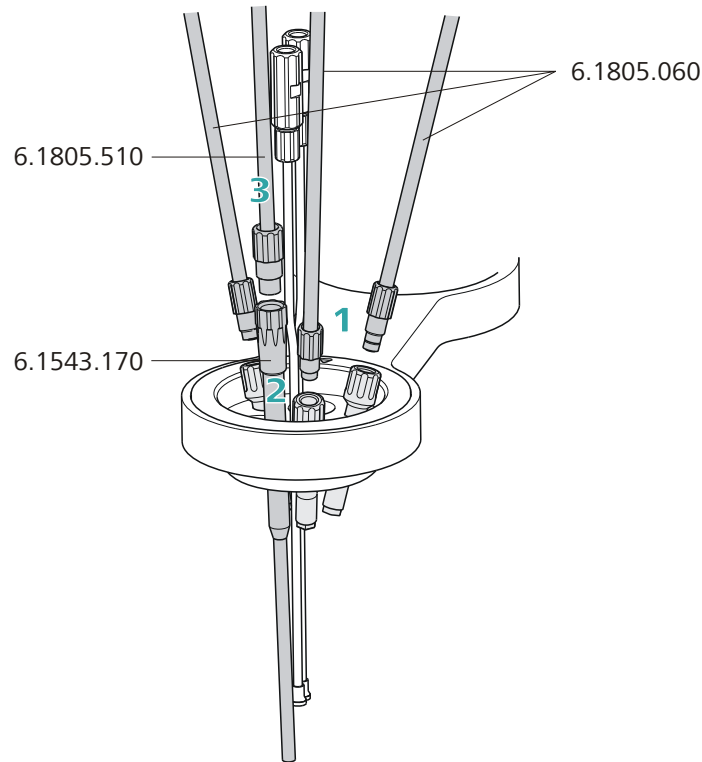


Figure 17 Installing the rinsing tubings and the aspiration tip

Proceed as follows:

1 Connecting the rinsing nozzles

- Connect the three rinsing tubings that are already connected to the distributor on the tower to the preinstalled rinsing nozzles on the titration head.

2 Inserting the aspiration tip

- Insert the **6.1543.170 aspiration tip** into the left-side opening on the front of the titration head (only with 6.1458.040 titration head)

3 Connecting the aspiration tubing

- Connect the 6.1805.510 aspiration tubing already connected to the distributor with the aspiration tip.

Inserting the stirrer and the electrode, connecting the dosing tubings

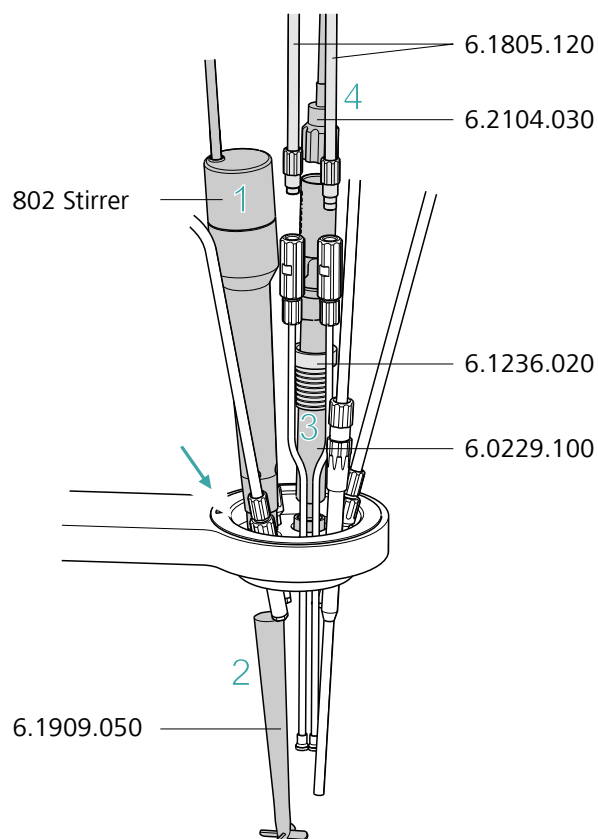


Figure 18 Installing stirrer and electrode

The equipment of the titration head is completed as follows:

1 Inserting the rod stirrer

- Insert the rod stirrer (**802 Stirrer**) into the rear opening of the titration head (at the arrow).
- Insert the cable into the guide rail.

2 Mounting the stirring propeller

- Fasten the 6.1909.0XX stirring propeller to the rod stirrer from below.

3 Inserting the electrode

- Insert the electrode (e.g., a **6.0229.100 Solvotrode**) with a **6.1236.020 SGJ sleeve** into the titration head.



4 Connecting the dosing tubings

- Connect two dosing tubings (e.g., 6.1805.120) to the pre-mounted dosing tips on the titration head.

3.11 Connecting the tower stirrer

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

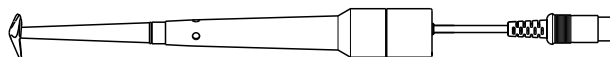


Figure 19 Rod stirrer 802 Stirrer

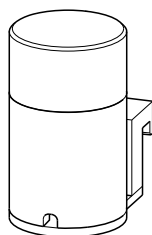


Figure 20 Magnetic stirrer 741 Stirrer

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.

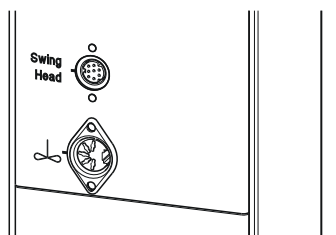


Figure 21 Connecting the tower stirrer



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 internally controlled as well via MSB1 or MSB2.

3.12 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

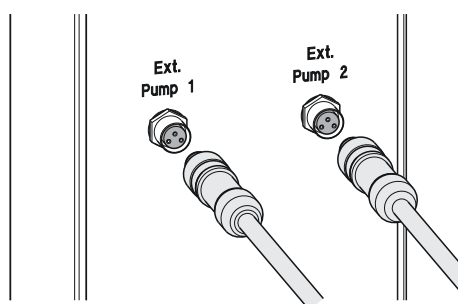
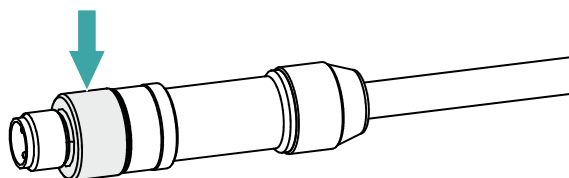


Figure 22 Connecting a pump

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.

3.13 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.

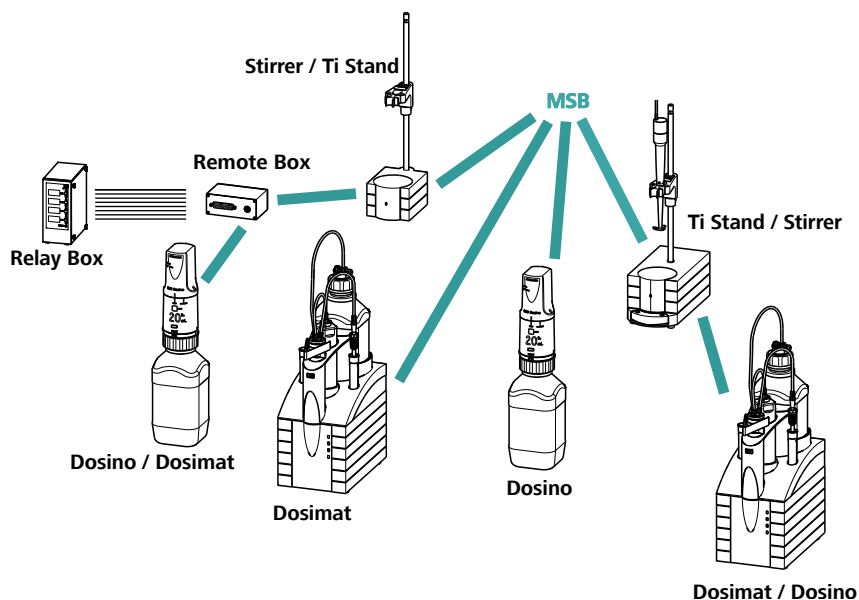


Figure 23 MSB connections

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.

3.13.1 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 815 Robotic USB Sample Processor XL, 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.

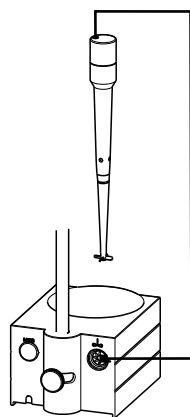


Figure 26 Connecting the rod stirrer to the titration stand

3.13.3 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.

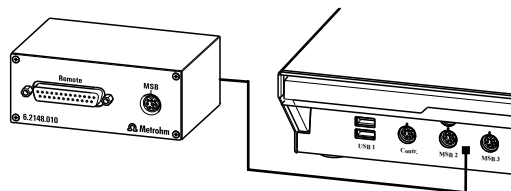


Figure 27 Connecting the Remote Box

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

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

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.

3.15 Mounting the base plate

If it is needed by an application that a determination is not carried out on the sample rack but in an external measuring cell, a stand plate can be mounted. It can be placed on the left or on the right of a tower of the 815 Robotic USB Sample Processor XL. Any accessories parts can be placed on the support rod of the stand plate.



Mounting the base plate

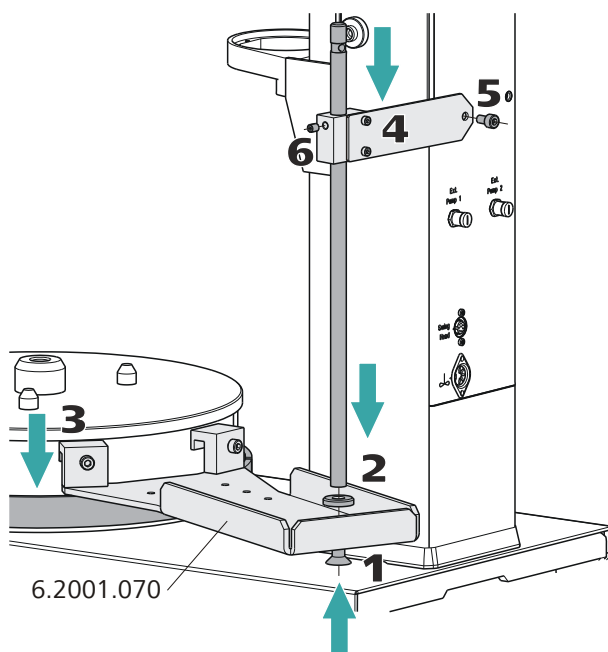


Figure 29 Mounting the base plate

Proceed as follows:

- 1 Insert the enclosed countersunk screw from below into the opening on the very back of the base plate.
- 2 Place the washer (flat side upwards) over the countersunk screw and tighten the support rod with the countersunk screw. The necessary hexagon key is enclosed with the 815 Robotic USB Sample Processor XL.
- 3 Hang the base plate to the assembly rail of the turntable with the holding clamps. Slide the whole stand plate as near to the tower as possible. Fix the holding clamps with a hexagon key to the assembly rail.



NOTE

Before the stand plate is fixed to the tower, e.g. a magnetic stirrer or a measuring cell can be mounted on the support rod.

- 4 Guide the bracing from above over the support rod.

- 5 Loosen the screw for fastening the bracing on the rear panel of the tower (see figure) and fix the bracing with the enclosed hexagon screw.
- 6 Fix the bracing to the support rod with a hexagon key, see figure.

3.16 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

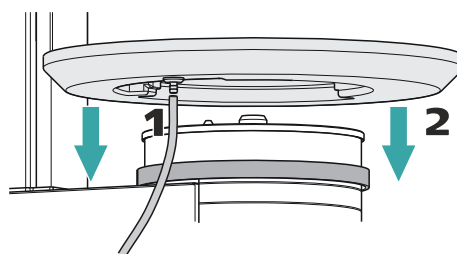


Figure 30 Installing the drip pan

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.

3.17 Attaching a sample rack

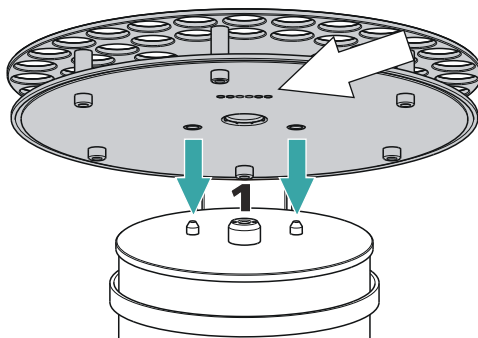


Figure 31 Attaching rack

Put the rack into place as follows:

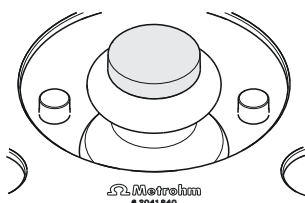
- 1 Carefully center the rack on the turntable. The guide bolts on the turntable must engage with the openings in the bottom of the rack.



NOTE

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

- 2 Screw the fixing screw in the handle tight by rotating it clockwise.



- 3 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 31* 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.

3.18 Mounting the safety shield



WARNING

It is imperative that the safety shield be installed before the first time the 815 Robotic USB Sample Processor XL is used. The device may not be operated without a safety shield.

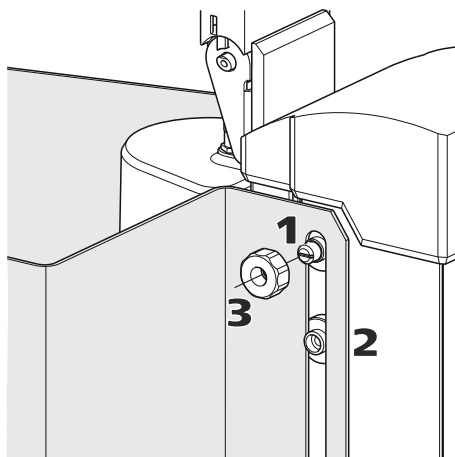


Figure 32 Mounting the safety shield

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 815 Robotic USB Sample Processor XL 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.

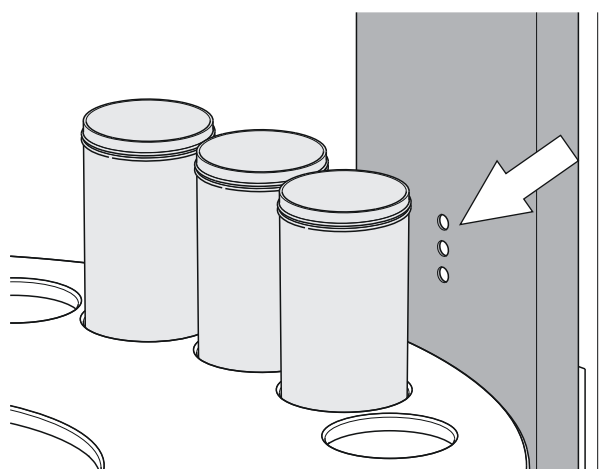


Figure 33 Beaker sensor on the tower

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.

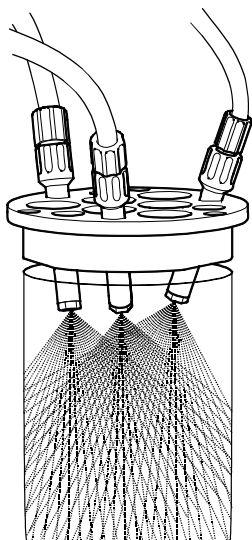


Figure 34 Spray nozzles - Mode of operation

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.

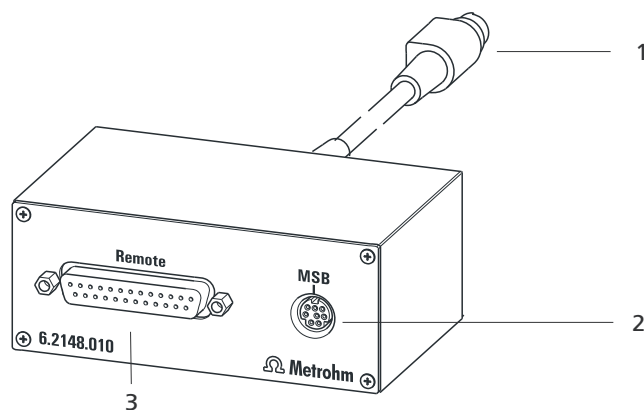


Figure 35 Connectors of the Remote Box

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

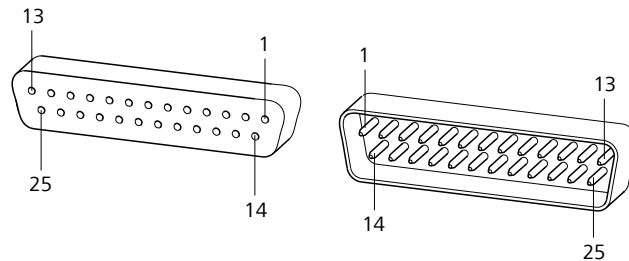
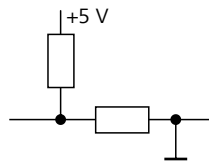


Figure 36 Pin assignment of remote socket and remote plug

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



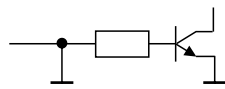
approx. 50 k Ω Pull-up

$t_p > 20$ 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

6.4 Robotic arms and overflow buret

6.4.1 Robotic arms for titration

Table 2 Configuration data of the titration robotic arms

Type	6.1462.050	6.1462.060	6.1462.070
	 6.1462.050	 6.1462.060	 6.1462.070
Swing direction	 +/-	 +	 -
Robotic arm offset	0°	-8°	-8°
Maximum swing range	84°	73°	73°
Swing radius	110 mm	127 mm	127 mm

6.1462.050

Robotic arm with titration head, left or right-swinging

For titration in 75 mL sample vessels and larger.

The arm can be equipped with two microelectrodes, one rod stirrer and three spray nozzles. Two buret tips with antidiffusion valve and one aspiration tip with connectors for M6 tubing are already retracted into the arm.

Material: PP

6.1462.060

Robotic arm with holder for a titration head, left-swinging

The arm can be modified to create the desired titration robotic arm by means of the installation of a titration head 6.1458.xxx.

Material: PP

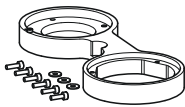

6.1462.070

Robotic arm with holder for a titration head, right-swinging

The arm can be modified to create the desired titration robotic arm by means of the installation of a titration head 6.1458.xxx.

Material: PP

Table 3 Configuration data for 6.1462.260

Type	6.1462.260
	 6.1462.260
Swing direction	 +
Robotic arm offset	-8°
Maximum swing range	105°
Swing radius	110 mm

6.1462.260

Robotic arm with holder for a titration head, left-swinging, external

The arm can be modified to create the desired titration robotic arm by means of the installation of a titration head 6.1458.xxx. The cutout permits movement to external positions near the rack, e.g. an external rinsing station.

Material: PVC

6.1462.170




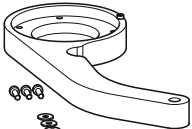




Robotic arm with holder for a titration head and beaker sensor, right-swinging

The arm can be modified to create the desired titration robotic arm by means of the installation of a titration head 6.1458.xxx.

Material: PP

6.4.3 Robotic arms for sample preparation

Table 5 Configuration data of the robotic arms for sample preparation

Type	6.1462.030	6.1462.040	6.1462.090	6.1462.240
				
	6.1462.030	6.1462.040	6.1462.090	6.1462.240
Swing direction				
	+	-	-	-
Robotic arm offset	8°	8°	8°	-8.6°
Maximum swing range	117°	117°	117°	122°
Swing radius	112 mm	112 mm	112 mm	149.8 mm

6.1462.030

Robotic arm with transfer head, left-swinging

Robotic arm for fully automated pipetting or dilution of liquid samples with Sample Processor systems.

Material: PP

6.1462.040

Robotic arm with transfer head, right-swinging

Robotic arm for fully automated pipetting or dilution of liquid samples with Sample Processor systems.

Material: PP

6.1462.090

Robotic arm with Luer lock adapter, right-swinging

For the connection of hollow needles with Luer lock connection. Suitable for the transfer of samples from sealed vials with septum cap.

Material: PP

6.1462.240

Robotic arm with transfer head, bent, right-swinging

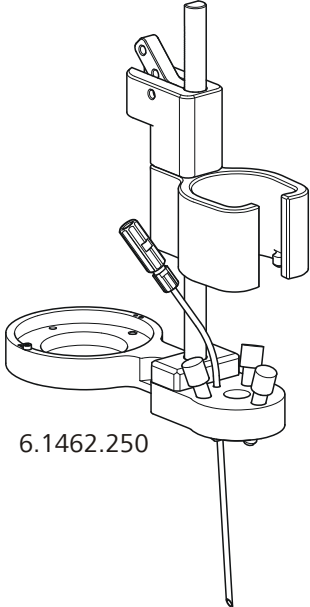
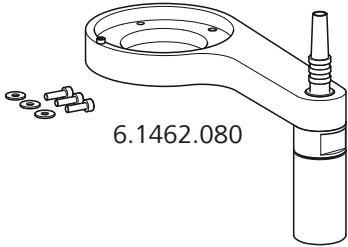


The transfer head can, when equipped with 6.1808.220 adapter, be used as a holder for various tools with Luer connection on multirow racks.

Material: PP

6.4.4 Robotic arms for special applications

Table 6 Configuration data of the special robotic arms

Type	6.1462.250	6.1462.080
	 <p>6.1462.250</p>	 <p>6.1462.080</p>
Swing direction	←	←
	+	+
Robotic arm offset	0°	8°
Maximum swing range	115.5°	117°
Swing radius	110 mm	112 mm

6.1462.250

Robotic arm as holder for Polytron PT 1300 D, left-swinging

The robotic arm makes it possible to use the Polytron PT 1300 D for sample preparation on multi-row sample racks. It contains one retracted buret tip for adding solvents and three spray nozzles for cleaning.

Material: PP

6.1462.080


Robotic arm Dis-Cover, left-swinging

Robotic arm for placing and removing sample vessel covers (75 mL and 250 mL, covers 6.2037.050 and 6.2037.060) on the sample rack of a Robotic Sample Processor.

Material: PP

6.4.5 Overflow buret

Table 7 Configuration data of the overflow buret

Type	6.9958.007
	
Swing direction	→
	–
Robotic arm offset	–8°
Maximum swing range	103°
Swing radius	115 mm

6.9958.007

Overflow buret

Overflow buret for rapid and automatic measuring of 100 mL of sample and for sample transfer into an external titration vessel.



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>	0.53 m
<i>Weight (without accessories)</i>	1.815.0010: 14.52 kg 1.815.0020: 15.42 kg 1.815.0030: 13.82 kg 1.815.0110: 18.87 kg 1.815.0120: 19.93 kg 1.815.0130: 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.



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