864 Robotic Balance Sample Processor

Manual

8.864.8001EN

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Although all the information given in this documentation has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please send us your comments using the address given above.

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1 Introduction

1.1 Instrument description

The 864 Robotic Balance Sample Processor is a laboratory automation system with integrated pipetting and weighing equipment. It was designed for the fully automatic determination of TAN (Total Acid Number) and TBN (Total Base Number) in liquids, such as e.g. petrochemical products, cooling oils, etc.

The basis of the system is comprised of one Sample Processor with two towers as working stations and one multi-row sample rack which is designed for the weighing of the sample vessels. The sample rack can hold up to 20 liquid samples. One working station is equipped for the pipetting of the samples, the other is equipped with titration equipment. The weighing of the sample vessels is accomplished with an analytical balance which is provided with a special weighing equipment. Three 800 Dosinos are available as dosing drives. One 809 Titrando is used for the titrations. The rinsing and aspiration of liquids is accomplished with one 843 Pump Station in the version that has two peristaltic pump drives. The entire system is controlled by the ***tiamo***™ software, which contains one high-performance database for the determination data.

Mode of operation

Vessels filled with samples, as well as empty vessels and pipetting tips, are placed on the sample rack. The rack is rotated in an automatic sequence in such a way that one empty sample vessel on a weighing pan in the outermost row of the rack is pushed onto a weighing position. There it is tared.

The robotic arm on Tower 1 takes up one of the pipetting tips, which is kept in readiness on the innermost row of the rack. With the aid of a dosing drive, a defined volume of a liquid sample is aspirated into the pipetting tip. The content of the pipetting tip is expelled into the tared sample vessel on the weighing position. The balance sends the weight of the pipetted sample to the control software.

Rotation of the sample rack causes the weighed sample vessel to be transported to the second processing station. There the solvent is added, stirred and the actual determination is carried out. The sample solution is aspirated after the titration has been completed. Electrodes and tubing are rinsed by efficient spray nozzles. Optionally, the rinsing can take place in an external rinsing station, which should also remove even tenacious residues.

1.1.1 Instrument components

The 864 Robotic Balance Sample Processor has the following components:

- **Turntable**
  For the special sample rack with a capacity of 20 sample vessels (120 mL) with weighing pans and pipetting tip holder or other sample racks.
- **Two towers with lift**
  Tower 1 for sample preparation, tower 2 for the titration of the samples.
- **Two Swing Head drives**
  For controlling the two robotic arms.
- **Robotic arm with adapter**
  For picking up pipetting tips (10 mL).
- **Robotic arm with titration head**
  For the titration of the samples.
- **Two pump connectors per tower**
  For connecting external membrane or peristaltic pumps.
- **One stirrer connector per tower**
  For connecting a rod stirrer (802 Stirrer) or a magnetic stirrer (741 Stirrer).
- **Controller connection**
  For connecting a PC.
- **Two USB connectors**
  For connecting a printer, barcode reader or other control devices (Titrando, Dosing Interface etc.).
- **Three MSB connectors (Metrohm Serial Bus)**
  For connecting dosing devices (Dosimat with exchange unit or Dosino with dosing unit), stirrer or remote boxes.

1.1.2 Additional devices

Additionally used with the 864 Robotic Balance Sample Processor are:

- Three 800 Dosinos
- An 809 Titrando
- An 843 Pump Station (model version with peristaltic pumps with rinsing and aspiration equipment)
- A Precisa XR 205A analytical balance

1.1.3 Intended use

The 864 Robotic Balance Sample Processor is designed for the automatic analysis of larger-sized sample series in analytical laboratories. The functions of the automation system include the pipetting, weighing and titration of liquid samples. Its main area of application is the determination of the Total Acid Number and the the Total Base Number of oils and other

liquids. It is **not** suitable for usage in biochemical, biological or medical environments in its basic equipment version.

The present instrument is suitable for processing chemicals and flammable samples. The usage of the 864 Robotic Balance Sample Processor therefore requires that the user has basic knowledge and experience in the handling of toxic and caustic substances. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory.

1.2 About the documentation

Caution

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

1.2.1 Symbols and conventions

The following symbols and styles are used in this documentation:

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

	**Caution** This symbol draws attention to a possible damage of instruments or instrument parts.
	**Note** This symbol marks additional information and tips.

1.3 Safety instructions

1.3.1 General notes on safety

Warning

This instrument may only be operated in accordance with the specifications in this documentation.

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

1.3.2 Electrical safety

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

Warning

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

Warning

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

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

Mains voltage

Warning

An incorrect mains voltage can damage the instrument.

Only operate this instrument with a mains 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.

Always pull the mains cable out of the mains connection socket before connecting or disconnecting electrical appliances on the rear panel of the instrument.

1.3.3 Tubing and capillary connections

Caution

Leaks in tubing and capillary connections are a safety risk. Tighten all connections well by hand. Avoid applying excessive force to tubing connections. Damaged tubing ends lead to leakage. Appropriate tools can be used to loosen connections.

Check the connections regularly for leakage. If the instrument is used mainly in unattended operation, then weekly inspections are mandatory.

1.3.4 Personnel safety

Warning

Wear protective goggles and working clothes suitable for laboratory work while operating the 864 Robotic Balance 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 864 Robotic Balance 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 mains 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 864 Robotic Balance Sample Processor 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.

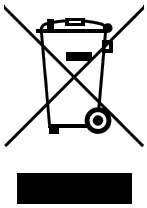
1.3.5 Flammable solvents and chemicals

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.
- Keep all sources of flame far from the workplace.
- Clean up spilled fluids and solids immediately.
- Follow the safety instructions of the chemical manufacturer.

1.3.6 Recycling and disposal



This product is covered by European Directive 2002/96/EC, WEEE – Waste from Electrical and Electronic Equipment.

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

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

2 Overview of the instrument

2.1 Front and rear

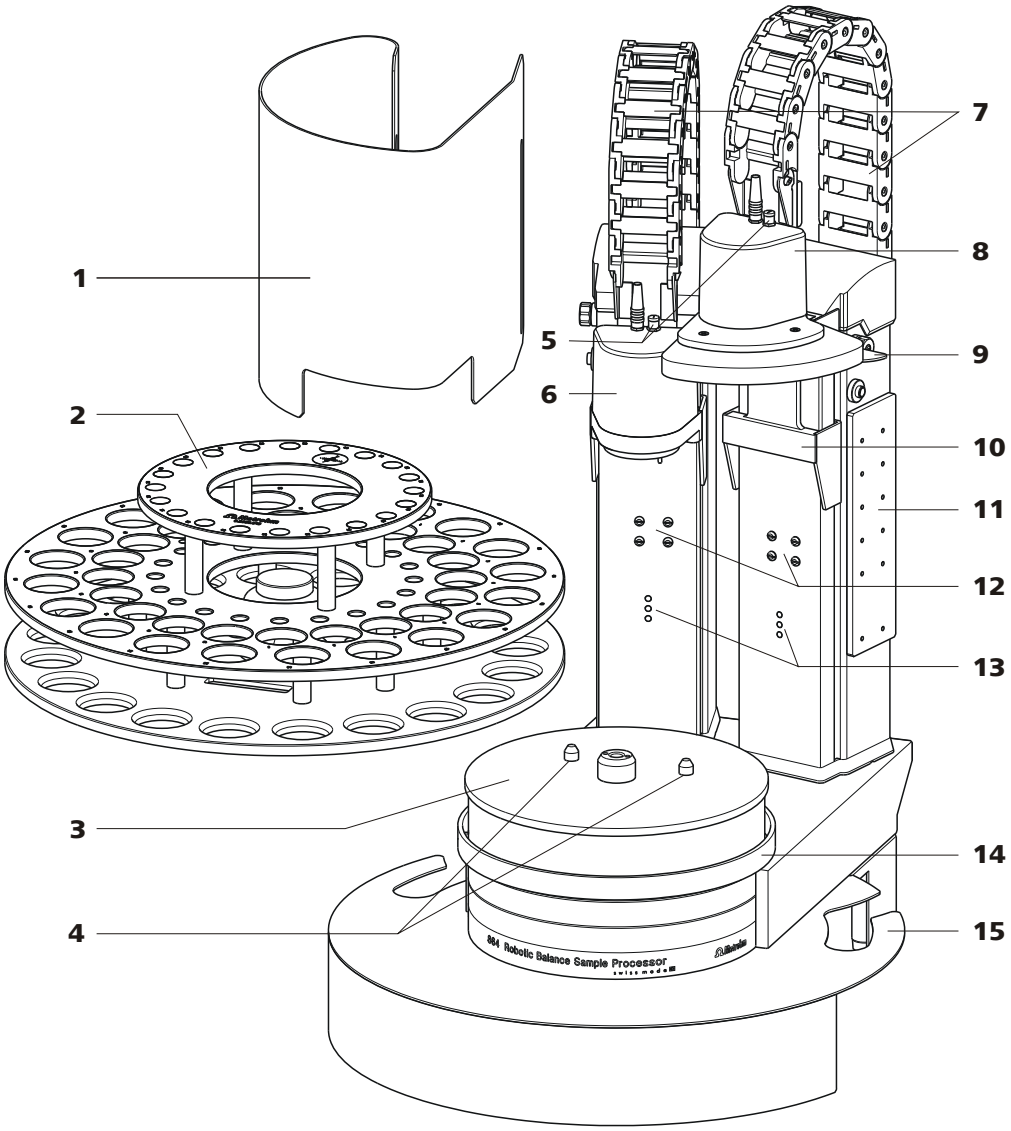


Figure 1 Front 864 Robotic Balance Sample Processor

1 Safety shield (6.2751.160) For the tower 2 (left).	**2 Sample rack (6.2068.010)**
3 Turntable	**4 Guide bolts** For the sample rack.

5 Connector for a robotic arm sensor
Only necessary when using a robotic arm with beaker sensor.

6 786 Swing Head (2.786.0040)
Drive for a 6.1462.XXX robotic arm.

7 Guide chain
For tubings and cables.

8 786 Swing Head (2.786.0140)
With reinforcement plate.

9 Robotic arm reinforcement (6.2058.040)

10 Lift 1 with tower extension (6.2058.010)

11 Fastening plate (6.2058.050)
For mounting the deflector.

12 Fastening screws for a retaining plate
Only necessary when using piercing needles.

13 Beaker sensor
For the recognition of a sample vessel.

14 Assembly rail
For mounting a rinsing station and other accessories.

15 Housing
With recesses for mounting a balance.

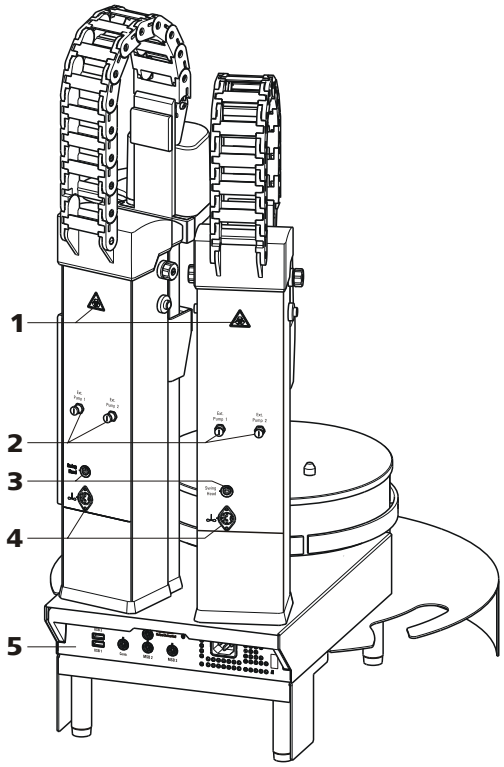


Figure 2 Rear 864 Robotic Balance Sample Processor

1 Warning symbols
(see Chapter 1.3.4, page 5)

2 Pump connectors
With threaded plug, for external pumps.

3 Swing Head connectors
For the robotic arm drive (786 Swing Head).

4 Stirrer connectors
For rod stirrer (802 Stirrer) and magnetic stirrer (741 Stirrer).

5 Rear panel with connectors

2.2 Rear panel

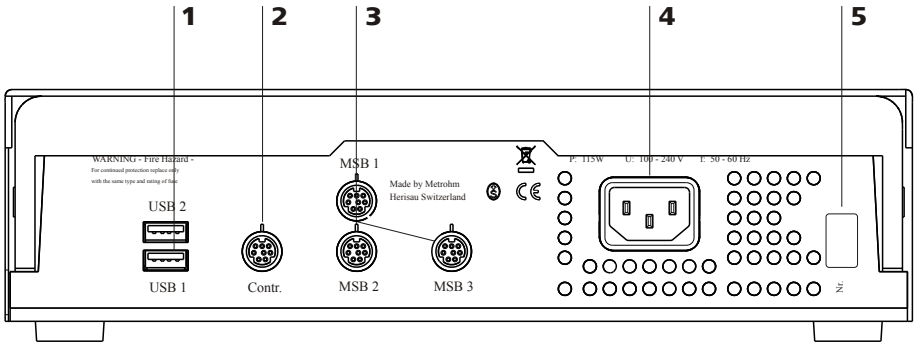


Figure 3 Connector strip

1 USB connectors

2 Controller connector
For the connection to the PC

3 MSB connector
For dosing devices, stirrers, etc.

4 Mains connection

5 Type plate
Contains specifications concerning mains voltage and serial number.

2.3 The Swing Head

The 786 Swing Head is an auxiliary drive for the Metrohm Sample Processor series, e.g. the 864 Robotic Balance Sample Processor. It is a high-precision motor drive that makes it possible to move to any point position on a sample rack. Even positions outside of the sample rack are reachable when a suitable robotic arm is used.

Two Swing Heads are already pre-installed on the 864 Robotic Balance Sample Processor.

Left-swinging or right-swinging models are available as different types of robotic arms. "Left-swinging" means swinging from the initial position (pointing towards the middle of the rack) outwards to the left.

The following diagram 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).

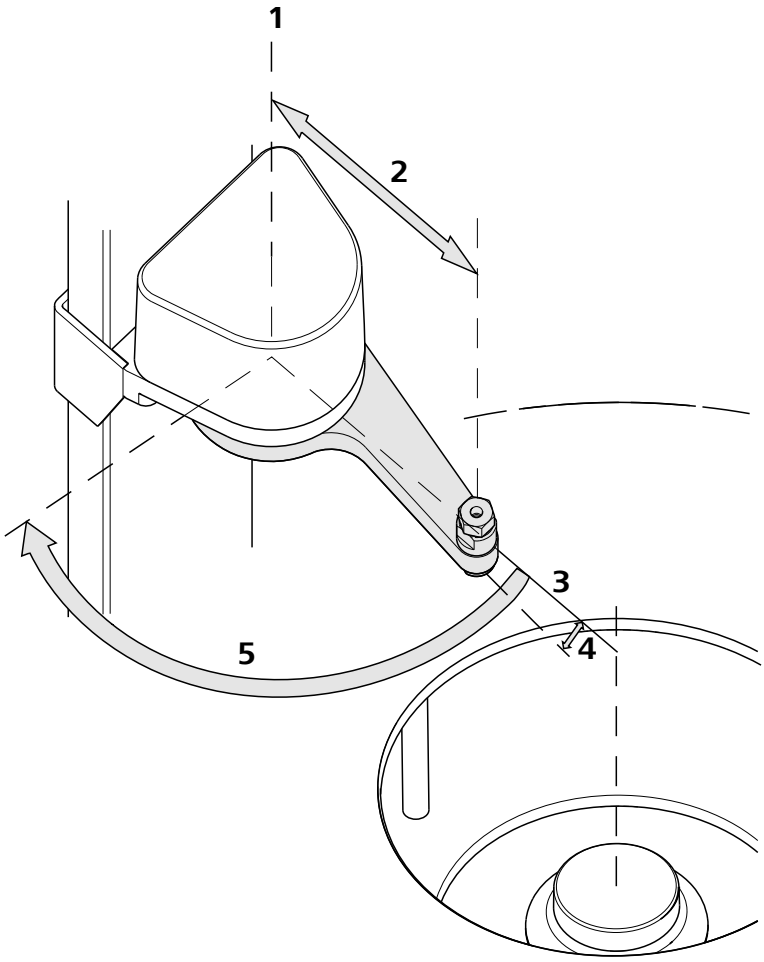


Figure 4 Swing Head - Configuration data

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** This runs from the swing axis to the midpoint of the sample rack and marks the initial position of the robotic arm.	**4** **Swing offset** This determines the 0° position of the robotic arm.
5 **Max. swing angle** 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.	

The configuration data of a robotic arm can be read on its underside or can be found on an accompanying sheet. Before mounting a robotic arm, the configuration data must be set in the control software.

If a Swing Head drive is mounted with a **6.2058.020 adapter** in order to use racks smaller than intended, then the **axial distance** must be modified in the configuration of the control software. The corresponding data can be found on the accompanying sheet of the 6.2058.020. The axial distance refers to the distance of the swing axis (see figure) and of the axis of rotation (middle point) of the sample rack.

2.4 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 864 Robotic Balance Sample Processor requires sample racks with up to a maximum of **48 cm diameter**.

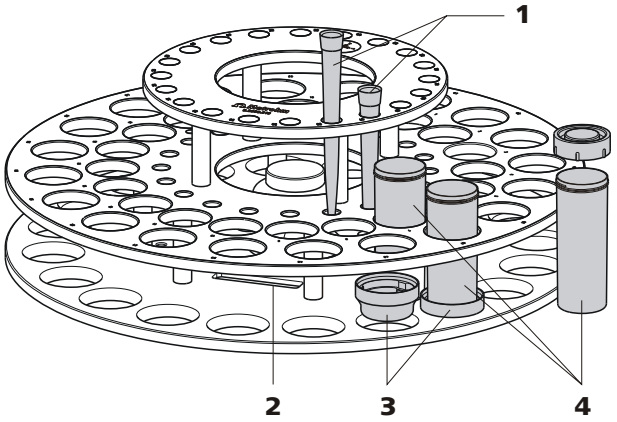


Figure 5 6.2068.010 Sample rack

1 **Pipetting tips 10 mL**	**2** **Magnet holder** Contains the rack code.
3 **Weighing pans** Made from PTFE/graphite.	**4** **Sample vessel 120 mL (6.1459.300)** Made of PP, with cover for sampling and transport.

Other user-defined 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 in place.

When replacing a rack, this should first be returned to starting position using the **Rack initialization** function (see "Manual Control" 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.

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

The instrument is supplied in highly protective special packaging together with the separately packed accessories. Keep this packaging, as only this ensures safe transportation of the instrument.

3.1.2 Checks

Immediately after receipt, check whether the shipment has arrived complete and without damage by comparing it with the delivery note.

3.1.3 Location

The instrument has been developed for operation indoors and may not be used in explosive environments.

Place the instrument in a location of the laboratory suitable for operation and free of vibrations, if possible protected from corrosive atmospheres and contamination by chemicals.

Air currents can disrupt the weighing sequences. Do not place the device in a draft or in the vicinity of an air-conditioning unit.

The instrument should be protected against excessive temperature fluctuations and direct sunlight.

3.2 Preparing the Sample Processor

3.2.1 Connecting a mains cable

Warning

This instrument must not be operated except with the mains voltage specified for it (see rear panel of the instrument).

Protect the connection sockets against moisture.

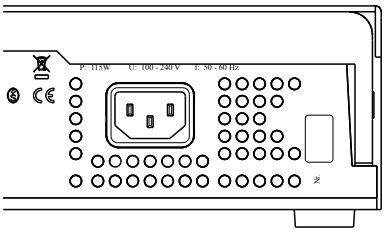


Figure 6 Connecting the mains cable

3.2.2 Connecting the Swing Head

Take care to ensure that the Swing Head is connected before the instrument is started up. Check the connection cable.

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

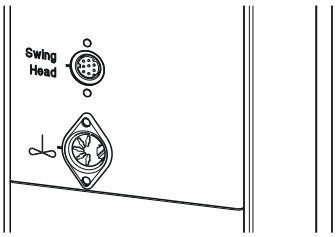


Figure 7 Connecting Swing Head

If the Swing Head is not connected, connect it as follows:

1 Plug in the cable

- Guide the connection cable of the Swing Head through the guide chain of the tower *(see Chapter 3.3, page 17)*.
- Plug the Mini DIN plug into the socket 'Swing Head'.

3.2.3 Mounting the deflector and collection container

When using pipetting tips, injection needles and disposable filters, these need to be stripped off the robotic arm again afterwards. For this purpose, a deflector and a collection container are mounted on the fastening plate on the right-hand side of the tower 1. Proceed as follows:

1 Mount the deflector

- Screw the 6.2058.070 deflector tightly to the fastening plate with the screws and washers supplied.
  We recommend selecting the highest position on the fastening plate. For positioning, the deflector can be shifted laterally as required.

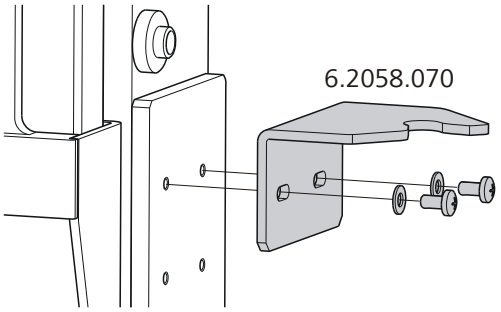


Figure 8 Mounting the deflector

2 Mount the holder

- Screw the 6.2057.150 holder for the collection container to the fastening plate tightly with the aid of the screws and washers supplied.
  We recommend selecting the lowest position on the fastening plate.

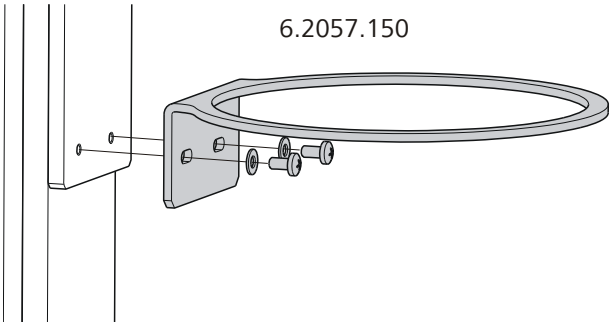


Figure 9 Mounting the holder for the collection container.

3 Mount the collection container

- Guide the 6.1625.010 collection container without cover into the holder.

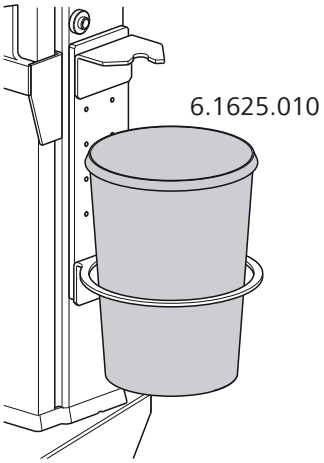


Figure 10 Mounting the collection container for the pipetting tips

Note

The collection container seal is designed as a safety seal. If you are processing highly toxic samples, you can hermetically seal off the vessel with the contaminated pipetting tips and thus forward them securely packaged for disposal. If the cover is pressed firmly onto the vessel, then it cannot be reopened unless considerable effort is applied!

3.3 Guide chain for cables and tubing

Tubings and cables can be placed into the guide chain.

You can open the individual chain links with a screwdriver as follows.

1 Open the guide chain

- Insert a screwdriver into the groove located on the side of a chain link.
- Loosen the clip with a forceful leverage movement.
- Pull the clip out of the chain by hand.
- Repeat the above actions for each chain link.

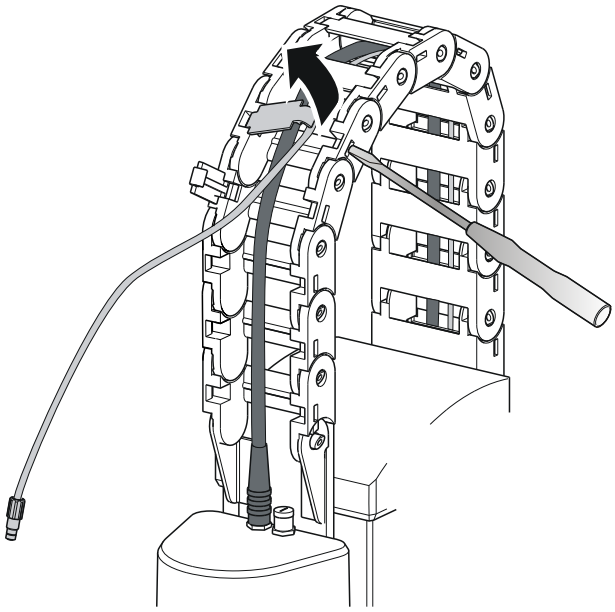


Figure 11 Guide chain - Opening chain links

2 Insert into the guide chain

- Place the required tubings or cables into the guide chain.

3 Close the guide chain

- Close the clip for each chain link again by hand and apply forceful pressure to snap them into place.

Caution

Take care to ensure when mounting tubing and cables that there is no traction on the drives while moving the lift or swiveling the robotic arm. This could lead to overloading of and possible damage to the drive.

Remove the clips of the two lowest chain links when you install the rinsing and aspiration tubing.

3.4 Connecting a computer

The 864 Robotic Balance Sample Processor requires a USB connection to a computer in order to be able to be controlled by a PC software. When a 6.2151.000 controller cable is used, 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.

Cable connection and driver installation

A driver installation is required in order to ensure that the 864 Robotic Balance Sample Processor is recognized by the PC software. To accomplish this, you must comply with the procedures specified. The following steps are necessary:

1 Installing the software

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

2 Establishing cable connections

- Connect all peripheral devices to the instrument *(see Chapter 3.21, page 59)*.
- Connect the 864 Robotic Balance Sample Processor to the mains supply if you have not already done this.
- Connect the instrument to your computer through a USB connector (Type A) (see Instructions for Use for your computer). The 6.2151.000 cable is used for this purpose.

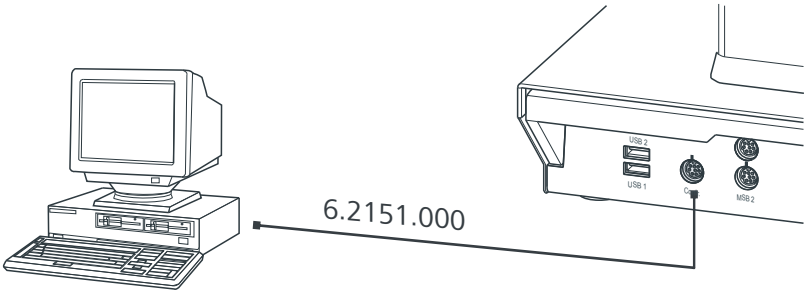


Figure 12 Connecting the computer

For Windows 2000: The instrument is recognized and the driver is installed automatically.

For Windows XP: The instrument is recognized and the installation assistant for the driver is started automatically. Select the option "Install software automatically" and click on **[Continue]**. Exit the assistant with **[Finish]**.

For Windows Vista: The instrument is recognized and the installation assistant for the driver is started automatically. Select the option "Find and install driver software". Agree to all subsequent requests. The installation assistant will be exited automatically.

Note

The plug on the instrument end of the 6.2151.000 controller cable is protected with an anti-pull device to prevent the cable from being pulled out accidentally. If you wish to pull out the plug, then you must first retract the outer plug sleeve marked with arrows.

Registering and configuring the instrument in the PC software

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

1 Setting up the instrument

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

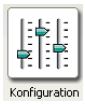
More detailed information concerning the configuration of the instument can be found in the documentation for the respective PC software.

3.5 Configuring instrument components

3.5.1 Configuring robotic arms

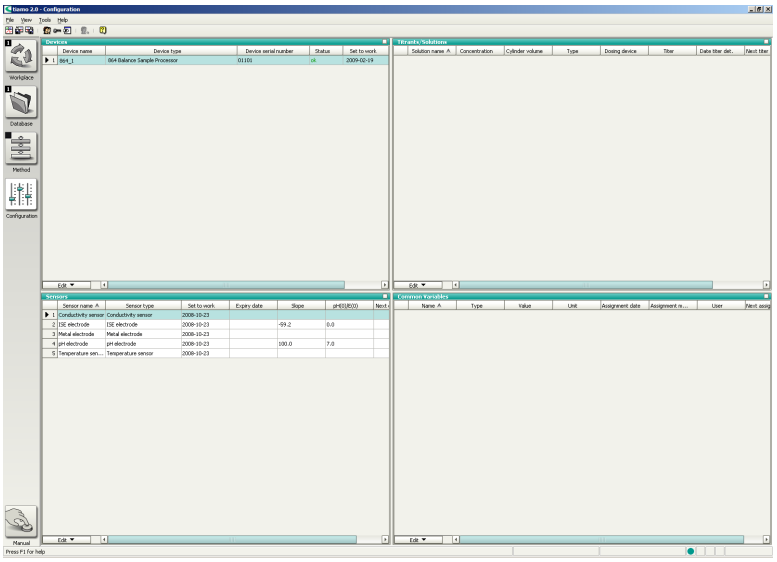
Before mounting the robotic arms their configuration data must be entered in the control software.

Tower 1



1 Open the robotic arm configuration

- Click the **Configuration** icon.



- Double-click the instrument name **864_1** in the **Devices** window.
- In the properties window of the 864 Robotic Balance Sample Processor under **Tower 1**, open the configuration of the **Swing Head**.

2 Enter the configuration data

- Enter the following data:
  - Swing offset **–8.6°**
  - Maximum swing range **122°**
  - Swing radius **149.8 mm**
  - Rotation offset **0.0°**
  - Swing direction **–**
- Close the configuration window with **[OK]**.

Tower 2

1 Open the robotic arm configuration

- In the properties window of the 864 Robotic Balance Sample Processor under **Tower 2**, open the configuration of the **Swing Head**.

2 Enter the configuration data

- Enter the following data:
  - Swing offset **–8.0°**
  - Maximum swing range **105°**
  - Swing radius **110 mm**
  - Rotation offset **0.0°**
  - Swing direction **+**

3.5.2 Configuring the towers

Various lift positions must be defined before methods are created for the 864 Robotic Balance Sample Processor.

On **Tower 1** settings are necessary for:

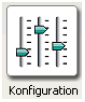
- Lift position for picking up a pipetting tip
- Lift position for aspirating and discharging sample liquid.
- Robotic arm and lift positions for deflecting the pipetting tips.

On **Tower 2** settings are necessary for:

- Lift position for titrating
- Lift position for rinsing the titration head on the rack
  or
- Robotic arm and lift position for rinsing the titration head in the washing station

Tower 1

Configure the positions for tower 1:



1 Open the tower configuration

- Click the **Configuration** icon.
- Double-click the instrument name **864_1** in the **Devices** window.
- Click the tab **Tower 1**.

2 Enter the configuration data

- Enter the following settings:
  - Max. stroke path **215 mm**
  - Swing position **136 mm**
  - External position 1, angle **127.9°**
  - External position 1, work position **136 mm**
  - External position 2, angle **138.2°**
  - External position 2, work position **129 mm**

Tower 2

Configure the positions for tower 2:

1 Open the tower configuration

- Click the tab **Tower 2**.

2 Enter the configuration data

- Enter the following settings:
  - Max. stroke path **171 mm**
  - Swing position **0 mm**
  - External position 1, angle **120.5°**
  - External position 1, work position **151 mm**

3.5.3 Configuring rack data

On the rack, reserved positions for rinsing beakers are necessary. These can be defined in the rack data.

Rack data

1 Open the dialog window

- Click the tab **Rack**.
- Click the button **Rack data**.
  The dialog window of the rack data is opened.

2 Define special beaker 1

- Click **Special beakers**.
- Select the first line for the **Special beaker 1** and press **[Edit]**.
- Enter the following data:
  - Rack position **57**
  - Work position Tower 2 **170 mm**
- Close the dialog window with **[OK]**.

3 Define special beaker 2

- Select the second line for the **Special beaker 2** and press **[Edit]**.
- Enter the following data:
  - Rack position **58**
  - Work position Tower 2 **170 mm**
- Close the dialog window with **[OK]**.

4 Define special beaker 3

- Select the third line for the **Special beaker 3** and press **[Edit]**.
- Enter the following data:
  - Rack position **59**
  - Work position Tower 2 **148 mm**
    At this height, only the membrane and not the diaphragm of the electrode should be immersed in the distilled water in the rinsing beaker. Correct the filling volume of the water if necessary.
- Close the dialog window with **[OK]**.

5 Define special beaker 4

- Select the fourth line for the **Special beaker 4** and press **[Edit]**.
- Enter the following data:
  - Rack position **60**
  - Work position Tower 2 **170 mm**
- Close the dialog window with **[OK]**.

3.5.4 Defining lift positions

During the method run certain lift positions are repeatedly moved to. These lift positions can be defined specifically for every single rack.

Lift configuration

1 Positions for lift 1

- In the dialog window of the rack data click the tab **Lift positions**.
- Under **Tower 1** enter the following data:
  - Work position **175 mm**
  - Rinse position **140 mm**
  - Shift position **0 mm**
  - Special position **197 mm**

2 Positions for lift 2

- Under **Tower 2** enter the following data:
  - Work position **170 mm**
- Close the dialog window with **[OK]**.

3 Save the settings

- Click the button **[Initialize rack]**.

All settings are saved and the rack is moved to the starting position.

3.6 Setting up the Swing Heads and robotic arms

3.6.1 Positioning the Swing Heads

In order to ensure that the robotic arms can be mounted as easily as possible, the Swing Head drives and/or the drive discs must be moved into a defined position.

1 Initialize the Sample Processor

- In ***tiamo***™ click the hand symbol for manual control (on the left-hand sidebar).
- Under the entry **Sample changer/864_1**, select the **Tower 1**.
- In the right-hand window click **Initialize rack**.

All instrument components are moved to the starting position.

2 Prepare the Swing Head

- Click the tab **Move**.
- Under **Robotic arm position** click the button **Arrow left** until the drive disc of the Swing Head on tower 1 does not move any more.

Now the robotic arms can be mounted.

3.6.2 Mounting the robotic arms

Mounting the pipetting robotic arm

Mount the bent **robotic arm 6.1462.240** on tower 1 as follows:

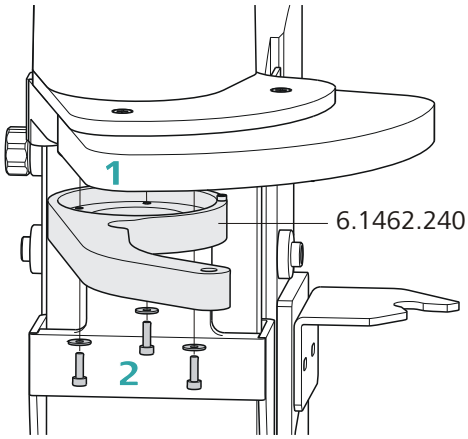


Figure 13 Mounting the bent robotic arm

1 Position the robotic arm

- Align the robotic arm parallel to the left-hand edge of the Swing Head reinforcement and graze it across the guide pins of the drive disc of the Swing Head from below.
  The correct position of the arm can be found in the previous illustration

Note

Take care to ensure that you do not twist the drive disc, thus causing pressure against the drive.

2 Fix the Swing Head

Screw the robotic arm to the Swing Head tightly with the screws and washers provided.

Mounting the adapter

Pipetting tips can be taken up with the bent robotic arm. The **6.1808.250 adapter** is used for this purpose. Mount it as follows:

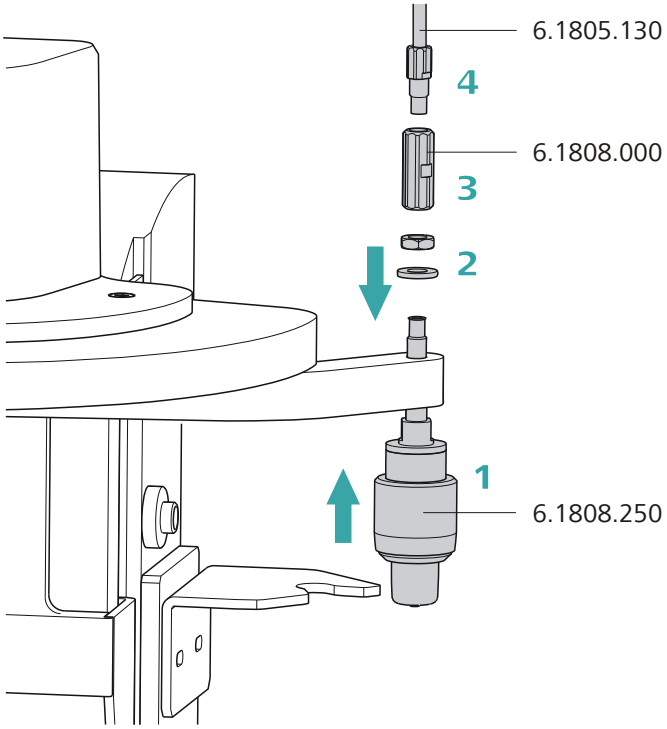


Figure 14 Mounting the pipetting tip adapter

1 Position the adapter

- Loosen the screw and the washer of the adapter and guide the adapter into the robotic arm head from below.

2 Fix the adapter

- Screw the adapter tightly with the screw and the washer. If needed, tighten carefully with a wrench.

3 Attach the tubing adapter

- Screw the 6.1808.000 tubing adapter (with 2x M6 inner thread, supplied with the 6.1808.250 adapter) tightly onto the adapter.

4 Connect the tubing

- Manually tighten the 6.1805.130 PTFE tubing (120 cm) to the tubing adapter and place it into the guide chain of the tower.

Mounting the robotic arm with the titration head

After initialization, the drive disc of the Swing Head is positioned as though the robotic arm were located in the outermost position.

Mount the **6.1462.260 robotic arm** to tower 2 as follows:

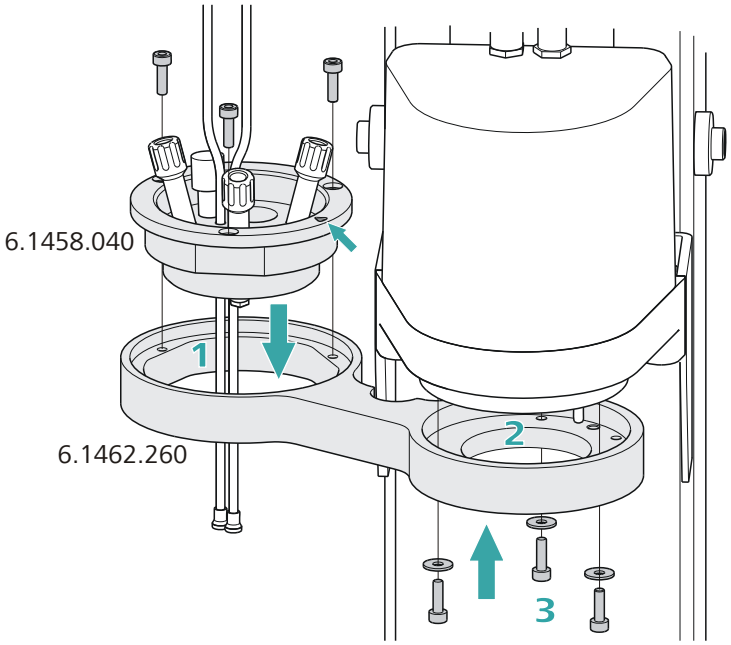


Figure 15 Mount the robotic arm with the titration head

1 Mount the titration head insert

- Place the 6.1458.040 titration head insert in the opening of the robotic arm and screw tight with the supplied screws.
  The arrow marking on the edge of the insert must be pointed towards the Swing Head.

2 Position the robotic arm

- Hold the robotic arm in such a way that the titration head faces left and slip it over the guide pins of the drive disc from below.
- While doing so, rotate the robotic arm outwards as far as possible, i.e. towards the tower - see previous figure.

Note

Take care to ensure that you do not twist the drive disc, thus causing pressure against the drive.

3 Fix the robotic arm

- Screw the robotic arm to the Swing Head tightly with the screws and washers provided.

3.7 Installing 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:

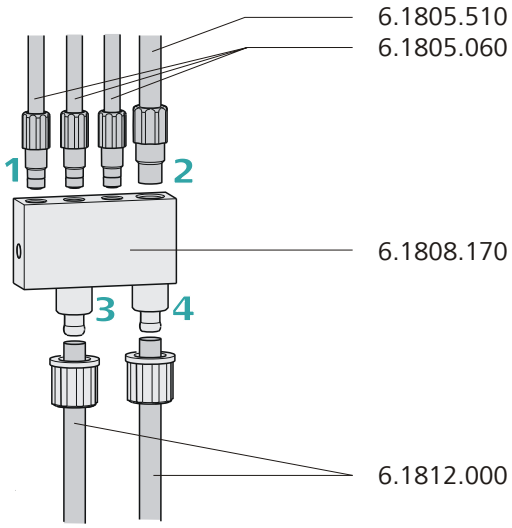


Figure 16 Mounting rinsing and aspiration tubings

1 Mount the rinsing tubings

- 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 3.3, page 17)*.
  These are the feed lines for the rinsing nozzles.

2 Mount the aspiration tubing

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

3 Mount 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**. 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** of the 843 Pump Station) and can be cut to the correct length.

Note

The opening of the tubing may need to be widened with a sharp object (e.g. with a Phillips screwdriver). A piece of sandpaper may be used to get a better grip on the tubing.

4 Mount 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** of the 843 Pump Station) and can be cut to the correct length.

Mounting the distributor

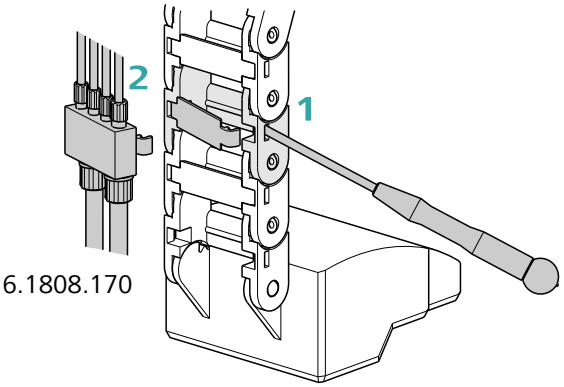


Figure 17 Mounting the distributor

Proceed as follows:

1 Remove a chain link

- Remove the clip of the third chain link of the guide chain. Pry out the clip with a screwdriver on both sides of the chain link, as shown in the preceding illustration.

2 Insert the distributor

- Apply strong pressure to insert the **6.1808.170 distributor** (with the tubing connected) into the open chain link.

3 Fix the rinsing tubings

- Place the rinsing tubings into the guide chain.

3.8 Installing the washing station

If a more intensive rinsing procedure is required, then a washing station (additional equipment 6.5622.000) can be used. This is **not included in the standard equipment**. In addition, a second 843 Pump Station is also required.

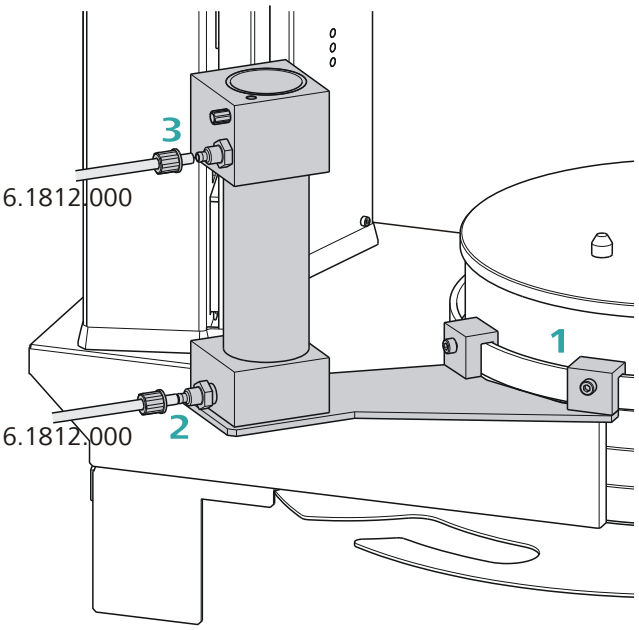


Figure 18 Mounting the washing station

In order to be able to mount the washing station, remove the sample rack and the drip pan. Afterwards, proceed as follows:

1 Mount the washing station

- Mount the washing station to the left next to tower 2 on the assembly rail and screw it tightly.

2 Mount the outlet

- Fasten a 6.1812.000 PTFE tubing to the lower tubing connector of the washing station.
  This is the outlet of the washing station.
- Shorten the tubing to a suitable length and connect it to the aspiration pump of the second 843 Pump Station.

3 Mount the feed line

- Fasten a 6.1812.000 PTFE tubing to the upper tubing connector of the washing station.
  This is the feed line for the rinsing liquid.

- Shorten the tubing to a suitable length and connect it to the rinsing pump of the second 843 Pump Station.

3.9 Installing and connecting the pump

The installation of the 843 Pump Station is described in its manual.

Use the black **6.1826.160 pump tubing** made of Viton® (trade name of the DuPont Co.) that is supplied along with the 864 Robotic Balance Sample Processor. It has excellent resistance against hydrocarbons. A different tubing material is to be used when other solvents are used. Clarify in such cases the resistance of the material against the solvent being used.

Connecting the pump

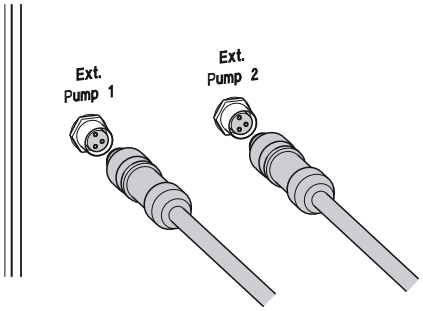


Figure 19 Connecting the pump

Connect the 843 Pump Sstation as follows:

1 **Connect the connection cable**

- Plug the two threaded plugs of the **6.2141.300 connection cable** into the connection sockets **Ext. pump 1** and **Ext. pump 2** on the rear of the tower 2.
  Correct alignment of the 3 contact pins must be observed.
- Tighten the knurled screw at the front end of the plug by hand in clockwise direction. This will secure the plug.

2 Connect the other end of the cable (9-pin D-Sub plug) to the socket **Remote 1** of the 843 Pump Station.

3.10 Equipping the titration head

Mounting the aspiration and rinsing tubings

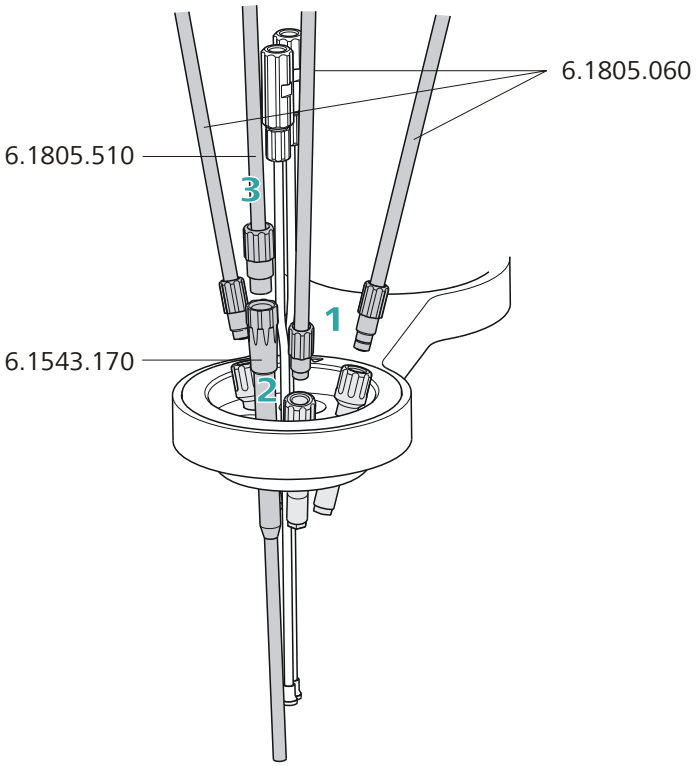


Figure 20 Installing the rinsing tubings and the aspiration tip

Proceed as follows:

1 Connect the rinsing nozzles

- Connect the three rinsing tubings that are already connected to the Tower 2 distributor to the rinsing nozzles already mounted on the titration head.

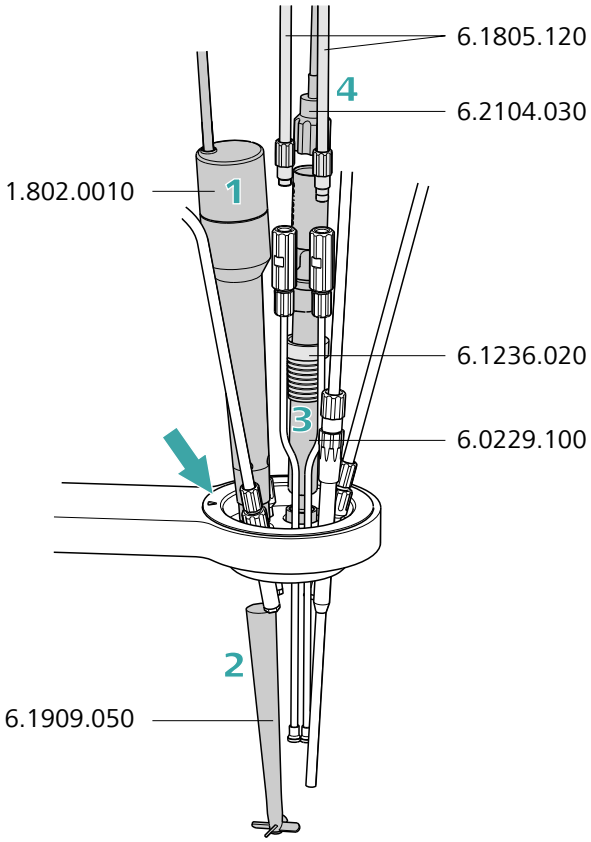
2 Insert the aspiration tip

- Insert the **6.1543.170 aspiration tip** into the opening left on the front of the titration head.

3 Connect 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



The equipment of the titration head is completed as follows:

1 Insert 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 chain.

2 Mount the stirring propeller

- Fasten the 6.1909.050 stirring propeller to the rod stirrer from below.

3 Insert the electrode

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

4 Connect the dosing tubings

- Connect the two **6.1805.120 dosing tubings** of the titrant and solvent 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.

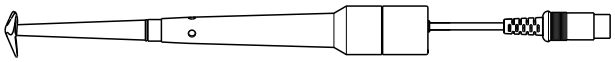


Figure 21 Rod stirrer 802 Stirrer

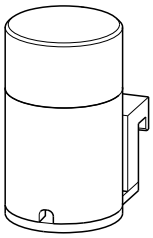


Figure 22 Magnetic stirrer 741 Stirrer

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.

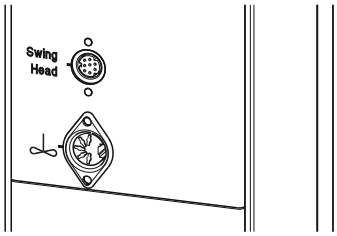


Figure 23 Connecting the tower stirrer

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 Setting up the dosing devices and the titrator

Supplied with the 864 Robotic Balance Sample Processor are three dosing drives and a titrator. They can be set up in a compact arrangement according to the following illustration.

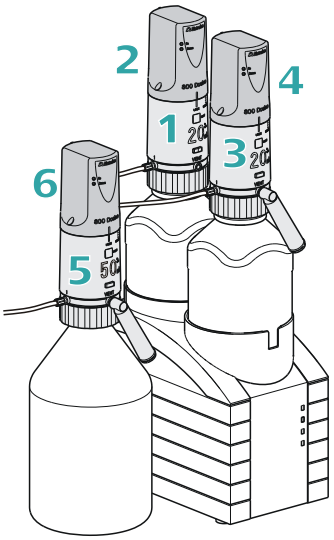


Figure 24 Setting up the dosing devices and the titrator

Setting up the dosing units and the Dosinos

Proceed as follows:

1 Install the dosing unit for pipetting

- Screw a **6.3032.220** 20 mL dosing unit onto an empty **6.1608.030** clear glass bottle (1 L, with GL45 thread).
- On **Port 1**, fasten the **6.1805.130 FEP tubing** (120 cm) which is connected to the pipetting tip adapter on **tower 1**, *(see "Mounting the adapter", page 26)*.

2 Mount the pipetting drive

- Attach an **800 Dosino** drive to the dosing unit.
- Connect the connection cable to the connector **MSB 1** of the Sample Processor.

This is the pipetting drive. The Dosino pumps air in order to aspirate the sample into the pipetting tip and then to expel this back out again.

3 Prepare the titrant

- Fasten a filling tubing and an adsorber tube (filled with wadding) on a **6.3032.220** 20 mL dosing unit.
- Screw a dosing unit on a bottle with **titrant**.
  A **6.1608.030** clear glass bottle (1 L, with GL45 thread) can be used.
- On **Port 1** of the dosing unit, fasten one of the **6.1805.130 FEP tubings** (100 cm), which are already mounted on the titration head, see previous chapter.

4 Mount the drive for the titrant

- Attach an **800 Dosino** drive to the dosing unit.
- Connect the connection cable to the connector **MSB 1** of the Titrando.

5 Prepare the solvent

- Fasten a filling tubing and an adsorber tube (filled with wadding) on a **6.3032.250** 50 mL dosing unit.
- Screw a dosing unit onto the **6.1608.070** clear glass bottle (2 L, with GL45 thread) filled with **solvent**.
- On **Port 1** of the dosing unit, fasten one of the **6.1805.130 FEP tubings** (100 cm), which are already mounted on the titration head, see previous chapter.

6 Mount the drive for the solvent

- Attach an **800 Dosino** drive to the dosing unit.
- Connect the connection cable to the connector **MSB 2** of the 864 Robotic Balance Sample Processor.

7 Connecting the electrode cable

- Connect the **6.2104.030 electrode cable** which is already connected to the electrode to the connector **Ind.** on the rear of the Titrando.

8 Connect the Titrando

- Connect a **6.2151.000 connection cable** to the Titrando (**Controller** connector).
- Connect the cable to a **USB** connector on the Sample Processor or on the PC.

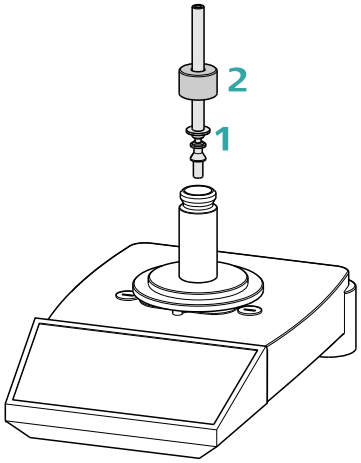
After that, the Titrando is recognized by the ***tiamo***™ software and can be added to the device table. The same applies for the dosing

units and their solutions. They can also be added to the solution table and be configured there.

3.13 Installing the balance and the ionizer

Preparing the balance

Various accessory parts are supplied with the balance and are necessary for the installation.



1 Mounting the weighing column

- Carefully introduce the weighing column into the balance from above.

2 Fixing the weighing column

- Guide the associated fixing ring over the column and screw it tightly.

Leveling and connecting the balance

The balance must be leveled prior to installation. The cable for the balance must be connected before the balance is brought into position.

Proceed as follows:

1 Leveling the balance

- Rotate the two foot screws of the balance until the air bubble in the spirit level (on the rear side of the balance) comes to rest in the inner circle of the spirit level.

2 Connect the cable

- Connect the mains cable and the RS 232 cable (with RJ-45 plug) to the rear side of the balance.
- Fasten the grounding cable to the rear side of the balance.
- Pull the cable through under the housing of the Sample Processor from the right and guide it to the rear.

Positioning the balance

The balance provided comes equipped with a clamping ring and a weighing plunger. The weighing plunger may not be attached at the time of the installation. Proceed as follows:

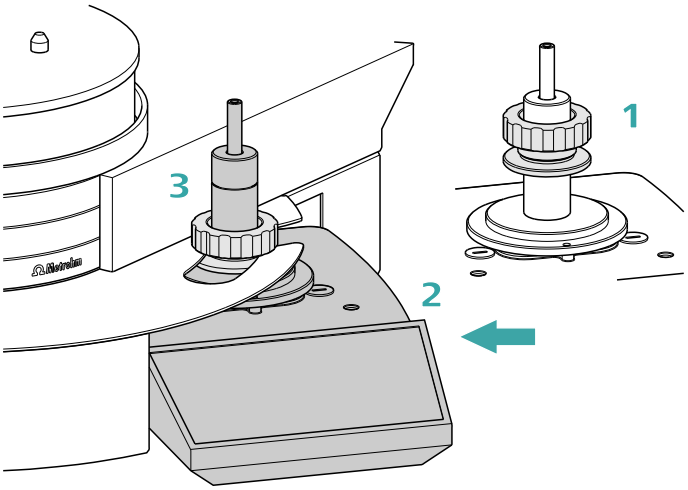


Figure 25 Installing the balance

1 Position the clamping ring

- Slightly loosen the clamping ring.
- Guide the clamping ring over the weighing column.

2 Position the balance

- Slide the balance from the right-hand side underneath the housing of the 864 Robotic Balance Sample Processor.
  The clamping ring must fit into the recess of the housing in such a way that the position of the balance can be readily fastened into place with the clamping ring.
  Do not tighten the clamping ring too firmly. The position of the balance needs to be finely aligned later on.

3 Connect the cables

- Connect the ground cable for the balance to the metal clip at the underside of the housing of the Sample Processor.
  The clip is located on the rear part of the bottom of the housing.
- Connect the RS-232 connection cable of the balance to the **COM1** connector of the PC.
- Connect the mains cable with the mains adapter of the mains supply.

Note

Afterwards, check once again to see if the balance is still leveled. For this, use the supplied **6.2831.000 inspection mirror**. This makes it possible to read off the spirit level of the balance, even if it is now located under the Sample Processor.

Setting the interface parameters

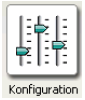
The parameters of the data transmission between balance and PC must match on both devices.

We recommend using the following parameters:

- Baud rate **9600**
- Data bit **8**
- Parity **None**
- Stop bit **1**
- Handshake **None**

1 Set the RS-232 parameters of the balance

Setting the parameters above is described in the manual of the balance.



2 Register the balance in tiamo

- In the ***tiamo***™ software, click the symbol **Configuration**.
- In the device table click **[Edit]** and select **New**
- Under **Balances**, select the balance type **Precisa** and click **[OK]**.
  The properties window of the balance is displayed.
- Enter the serial number of the balance.
  This is necessary to unambiguously identify the device.

3 Set the RS-232 parameters

- Click the tab **RS 232**.

- Under **COM Port**, select the connector on the PC the connection cable was connected to.
- Enter the values listed above as RS-232 parameters.
- Click **[Connect]**.
  The dialog window **Establish connection** is displayed.
- Press the **[Print]** key on the balance.
  The data sent by the balance is displayed.
- Close the dialog window with **[OK]**.
  The input fields in the properties window are now locked. This means that the connection between balance and PC has been established.
- Close the properties window with **[OK]**.

Installing the ionizing bar

In order to eliminate electrostatic loads while weighing, an ionizing bar must be installed as close to the balance as possible. Proceed as follows:

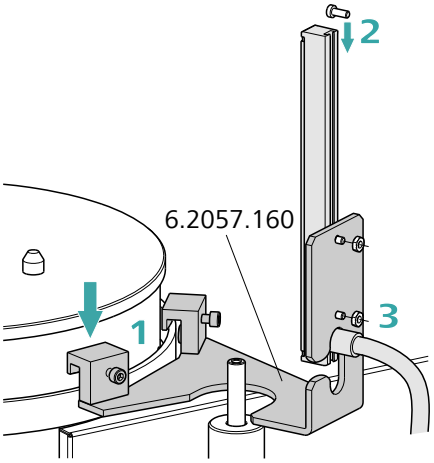


Figure 26 Installing the ionizing bar

1 Fasten the holder

- Fasten the 6.2057.160 holder on the assembly rail with the aid of a hexagon key.
  The position must be selected in such a way that the recess of the holder surrounds the weighing column.

2 Insert the screws

- Insert the two accompanying screws from above into the holding rail of the ionizing bar.

3 Fasten the ionizing bar

- Fasten the ionizing bar to the holder as shown in the preceding illustration and fix it in place with the two accompanying hexagon nuts.

4 Connect the cables

- Connect the cable of the ionizing bar to the control device.
- Connect the control device to the mains supply.

Note

The ionizer must be switched on **by hand** before a determination series.

3.14 Connections

The following figures show all necessary cable and tubing connections as an overview.

3.14.1 Tubing connections

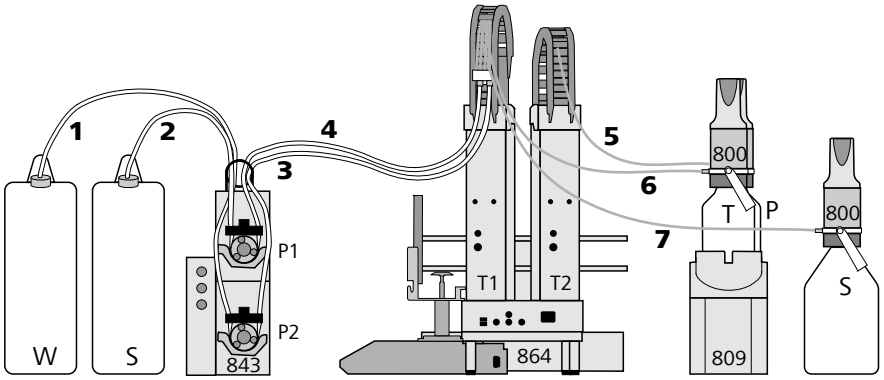


Figure 27 Tubing

1 Waste 6.1812.000 PTFE tubing. Waste canister W — 843 pump 2	**2 Solvent** 6.1812.000 PTFE tubing. Supply canister S — 843 pump 1
3 Aspiration tubing 6.1812.000 PTFE tubing. 843 pump 2 — 864 distributor, connector on the right	**4 Rinsing tubing** 6.1812.000 PTFE tubing. 843 pump 1 — 864 distributor, connector on the left

5	**Pipetting tubing** 6.1805.130 FEP tubing 800 Dosino (on empty bottle P) — 864 tower 1, pipetting tip adapter
6	**Titration tubing** 6.1805.120 FEP tubing 800 Dosino (titrant T) — 864 tower 2, titration tip
7	**Solvent feed line (Solvent)** 6.1805.120 FEP tubing 800 Dosino (solvent S) — 864 tower 2, dosing tip

3.14.2 Cable connections

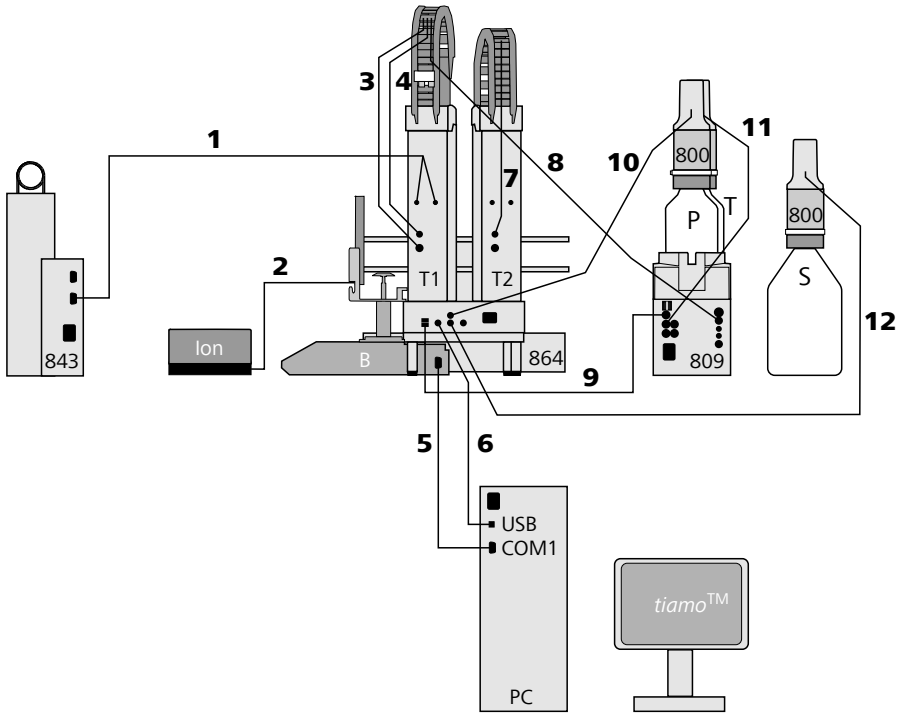


Figure 28 Cabling

1	**Pump connection** 6.2141.300 connection cable. 843 Pump Station (**Remote 2**) — 864: tower 2 (**pump 1** and **pump 2**)
2	**Ionizer connection** Ionizer (control device) — Ionizing bar The connection cable is supplied with the ionizer.
3	**Stirrer cable** Connection cable of the rod stirrer (802 Stirrer) Connector on tower 2 (**Stirrer**)
4	**Swing Head cable** Connection cable of the 786 Swing Head Connector on tower 2 (**Swing Head**).
5	**Balance connection** RS-232 serial connection cable. Supplied with the balance. Balance (**RS 232**) — PC (**COM1**)
6	**USB connection** 6.2151.000 controller cable (USB A-MiniDIN 8p) 864 (**Controller**) — PC (**USB**)

7	**Swing Head cable** Connection cable of the 786 Swing Head Connector on tower 1 (**Swing Head**)
8	**Sensor connection** Electrode cable (plug F2 m) Sensor (on tower 2) — Titrando (**Ind.**)
9	**USB connection** 6.2151.000 controller cable (USB A-MiniDIN 8p) 864 (**USB**) — Titrando (**Controller**)
10	**Dosino connection (pipetting drive P)** Dosino connection cable Connector on 864 (**MSB 1**)
11	**Dosino connection (titrant T)** Dosino connection cable Connector on Titrando (**MSB 1**)
12	**Dosino connection (solvent S)** Dosino connection cable Connection to the 864 Robotic Balance Sample Processor (**MSB 2**)

3.15 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 the **drip pan 6.2711.080** is recommended in order to avoid such incidents.

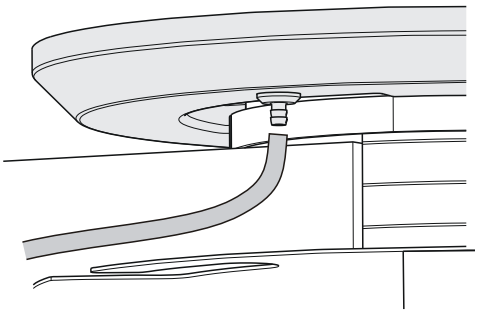


Figure 29 Mounting the tubing to the drip pan

First, fasten the tubing enclosed to the drainage nipple on the drip pan and then guide the free end of the tubing into a waste container.

Install the drip pan as follows:

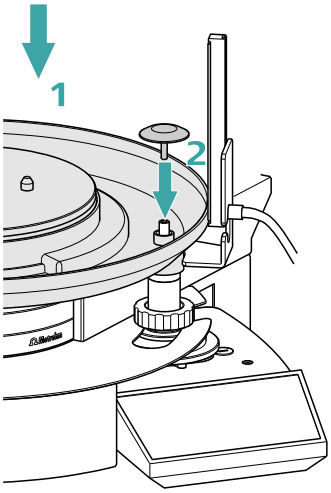


Figure 30 Installing the drip pan

1 Attach the drip pan

- Place the drip pan on the assembly rail of the turntable in such a way that the opening in the bottom of the pan can be guided over the weighing column of the balance, see illustration.

2 Attach the weighing plunger

- Provisionally screw the weighing plunger of the balance on the weighing column at the lowest possible position.

3.16 Attaching the sample rack

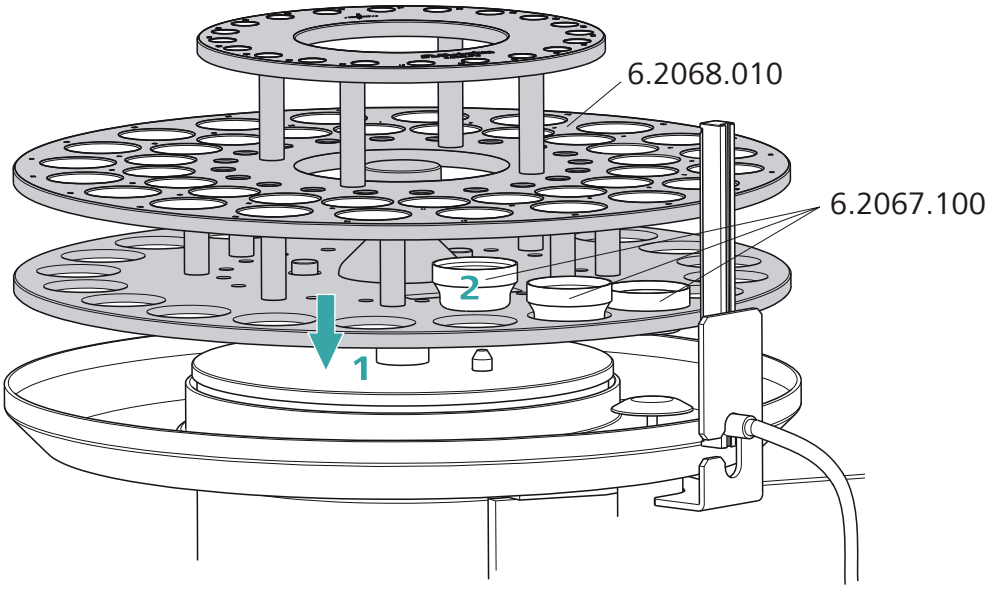


Figure 31 Attaching the sample rack

1 Attach the sample rack

- Attach the **6.2068.010** sample rack on the turntable.
  The guide bolts on the turntable must engage with the corresponding openings of the rack.

2 Attach the weighing pans

- Insert the supplied **6.2067.100 weighing pans** into all of the openings of the lowest plate of the rack.

3.17 Adjusting the rack and the robotic arm

For picking up pipetting tips the adapter must be precisely positioned on the robotic arm. In order to ensure this, it is necessary to align the sample rack and the robotic arm precisely in relation to one another. The control software ***tiamo***™ allows the user to enter an offset in both robotic arm and sample rack (rack table) configuration. This allows fine tuning to be performed.

The sample rack has a "positioning reticle". This is the adjusting position.

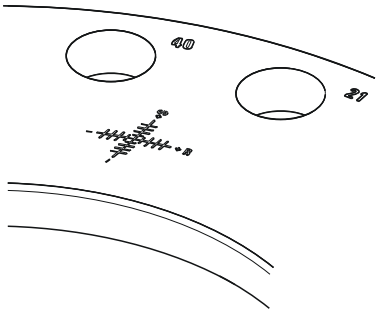


Figure 32 Positioning reticle on the sample rack

Defining the adjusting position

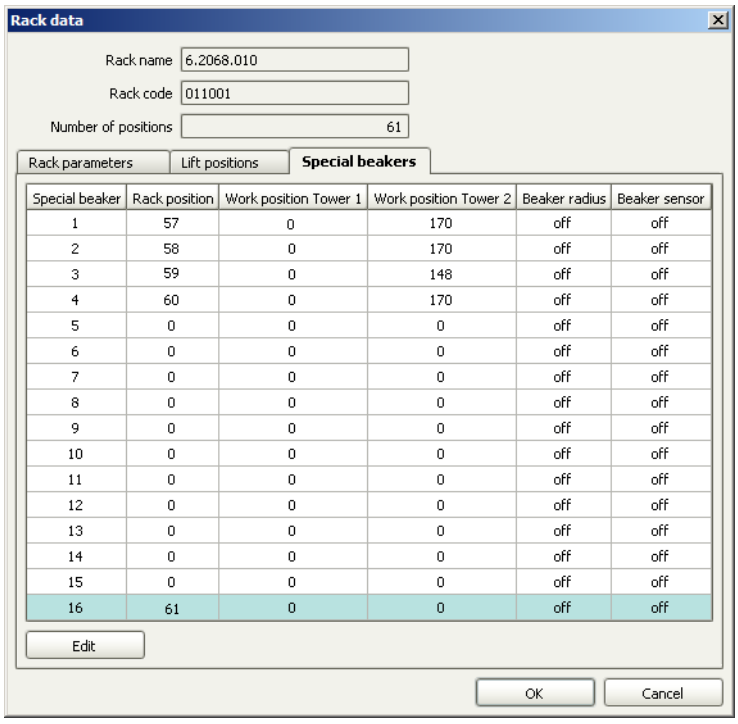
Proceed as follows:

1 Prepare

- Put the sample rack in place.
- Start ***tiamo***™.

2 Open the configuration

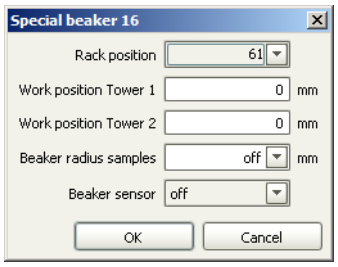
- Select the **Configuration** in ***tiamo***™.
- Double-click the device name **864_1**.
- Switch over to the **Rack** tab and click **[Rack data]** to open the rack parameter settings.
- Select the tab **Special beaker**.



The last position on the sample rack is conceived as **Adjusting position**.

3 Define the special beaker on the 6.2068.010 sample rack

- Select the lowest line (**Special beaker 16**) and click **[Edit]**.



- Under **Rack position**, select **61**.
- Close the dialog window with **[OK]**.
- Close the rack data table with **[OK]**.

Moving to the positioning reticle

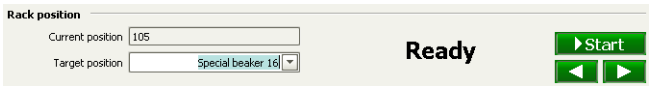
Proceed as follows:

1 Open the manual control

- In the **Manual control** in ***tiamo***™, click the tab **Move**.

2 Move to special beaker 16

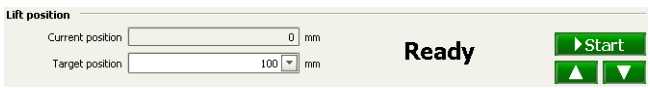
- Under **Rack position**, select the target position **Special beaker 16** and click **[Start]**.



It is also possible to specify the target position as absolute rack position. For the **6.2068.010** sample rack, the adjusting position is the no. **61**.

3 Move to the adjusting position

- Unscrew the FEP tubing from the adapter on the robotic arm.
- Insert the PEEK capillary supplied from above into the adapter. The capillary must protrude below from the adapter by around 0.5 cm (see following illustration)
- Under lift position enter **100 mm** as target position and click **[Start]**.



- Move the lift further downwards, millimeter by millimeter, until the robotic arm with the adapter is located precisely above the positioning reticle.

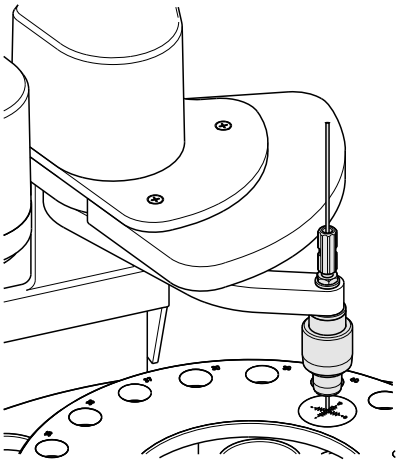
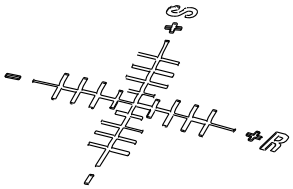


Figure 33 Adjusting the rack and the robotic arm

The positioning reticle

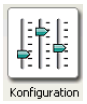


The positioning reticle shows the directions of movement for the rack (**R**) and the Swing Head (**S**). The scale lines stand for approximately 0.5° rotation angle or swing angle deviation.

Determine the deviation of the adapter tip from the middle of the positioning reticle. You can make the corresponding corrections in the ***tiamo***™ configuration afterwards.

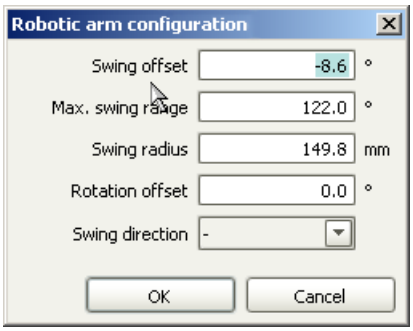
Correcting the swing offset

If there is a deviation on the **S line**, then proceed as follows:



1 Open the robotic arm configuration

- Select the **Configuration** in ***tiamo***™.
- Double-click the device name **864_1**.
- Click the tab **Tower 1**.
- Click **[Configuration]** to open the settings of the robotic arm.
- Confirm the safety prompt by clicking **[Yes]**.



2 Correct the offset

- Correct the value for the **Swing offset** according to the observed deviation from the positioning reticle.
  One tick mark corresponds to approximately 0.5°.
- Close the robotic arm configuration and the Sample Processor properties dialog each with **[OK]**.

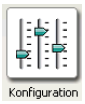
3 Check the position

- In the manual control, select the same rack position again and lower the lift down to the positioning reticle.

Now the adapter tip with the capillary should point to the middle of the positioning reticle. If this is not the case, then an additional correction must be made and the rack offset needs to be corrected.

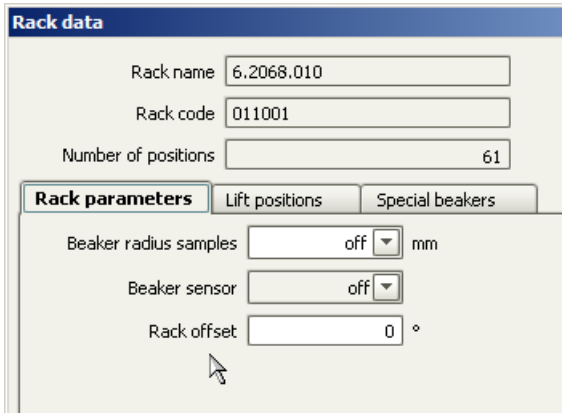
Correcting the rack offset

If there is a deviation on the **R Line**, proceed as follows:



1 Open the rack data

- Select the **Configuration** in ***tiamo***™.
- Double-click the device name **864_1**.
- Click the tab **Rack**.
- Click **[Rack data]** to open the settings of the rack parameters.



2 Correct the offset

- Correct the value for **Rack offset** according to the observed deviation from the positioning reticle.
  One tick mark corresponds to approximately 0.5°.
- Close the rack data configuration and the Sample Processor properties dialog, in each case with **[OK]**.

3 Check position

- In manual control, select the same rack position again and lower the lift down to the positioning reticle.

Now the adapter tip with the capillary should point to the middle of the positioning reticle. If this is not the case, then an additional correction must be made.

3.18 Adjusting the weighing equipment

The weighing equipment must be precisely adjusted in order to ensure a problem-free weighing of the sample vessels. To weigh a sample, the sample vessel is moved ahead of Tower 1, i.e. the rack is rotated until the sample vessel is standing on the weighing plunger with the weighing pan. The weighing plunger must lift off the sample vessel from the rack with the weighing pan. Both the vessel and the weighing pan must be free-standing and are not permitted to touch the rack during the weighing.

In order to ensure that the prerequisites outlined above are in effect, the horizontal position of the weighing plunger must be centered precisely to the sample position of the rack. The vertical position of the weighing plunger must be adjusted in such a way that the sample vessel is lifted off sufficiently.

1 Prepare

- Remove the sample rack.

- Unscrew the weighing plunger and dismantle the drip pan.
- Screw the weighing plunger back on again and attach the rack.
- Move to a free sample position on the outermost row of the rack (target position Tower 1) with the aid of the control software (***tiamo***™).
- Remove the weighing pan from the sample position that is moved to.

Centering the weighing column

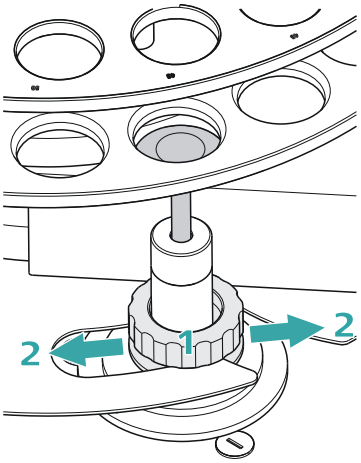


Figure 34 Centering the weighing column

Proceed as follows:

1 Loosen the clamping ring

- Loosen the clamping ring of the weighing column.

2 Position the balance

- Shift the position of the balance in such a way that the weighing plunger is located precisely in the middle of the opening of the sample rack.

3 Check the leveling

- Check the horizontal position of the balance with the 6.2831.000 inspection mirror and correct it as necessary. The spirit level for the optical inspection is located on the rear side of the scale, i.e. underneath the housing of the Sample Processor.

4 Fix

- Fix the clamping ring again.

Adjusting the weighing plunger

Now the height of the weighing plunger must be adjusted.

Proceed as follows:

1 Prepare

- Remove the sample rack.
- Remove the weighing plunger.
- Reattach the drip pan.
- Screw on the weighing plunger.
- Attach the sample rack.
- Attach the weighing pans and sample vessels in the outermost row of the rack.
- Disconnect the mains cable of the Sample Processor.

Now the sample rack can be rotated freely.

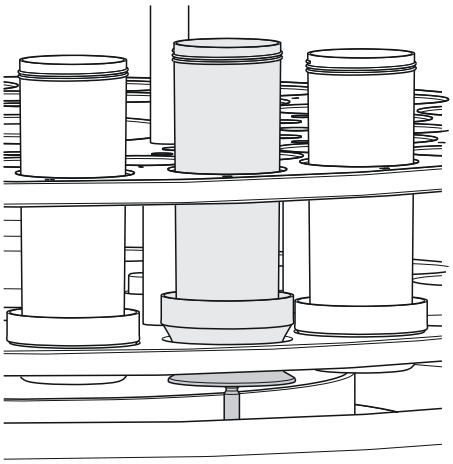


Figure 35 Weighing position

If the weighing pans must be moved over the weighing plunger, then it must be lifted off with the sample vessels by approximately 2 mm. If not, then the height of the weighing plunger must be adjusted, see next step.

2 Adjusting the weighing plunger

- Remove the sample rack.
- Screw the weighing plunger either higher or lower, depending on requirements.
- Reattach the rack.

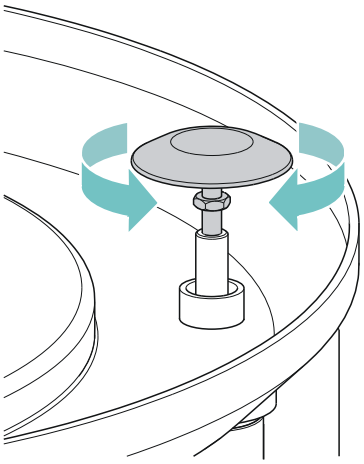


Figure 36 Adjusting the weighing plunger

3 Fix the weighing plunger in place

- Once the height of the weighing plunger has been adjusted correctly, raise the sample rack.
- Secure the position of the weighing plunger with the fixing nut. Tighten the nut with either a wrench or an adjustable wrench.

Note

The tightening of the fixing nut is important, because the weighing plunger could become loose as a result of the rotational movements of the rack and change its height. This could lead to weighing errors, the origins of which would not be readily recognizable.

Check the position of the weighing plunger at regular intervals.

4 Connect the mains cable

- Reconnect the mains cable of the Sample Processor.

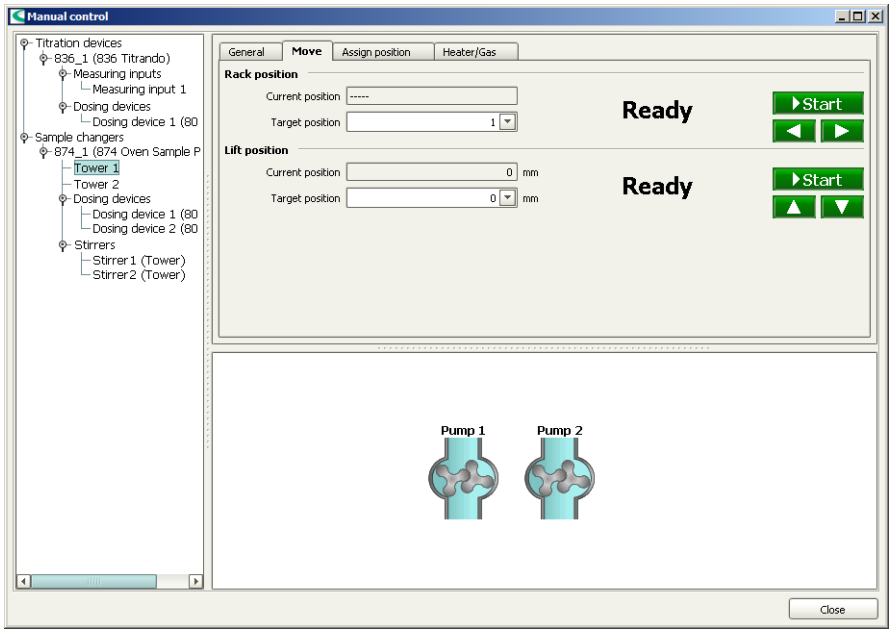
3.19 Adjusting the lift positions

Fine adjustment

Some lift positions must be adjusted precisely in order to ensure a perfect automation sequence. Use the manual control of the instrument for this purpose. The following section describes how you can approach the individual positions and adjust them as needed.

1 Open the manual control

- In the sidebar of ***tiamo***™, click the hand symbol.
- In the left-hand window, under **864_1 (864 Balance …**, click the item **Tower 1** and then select the **Move** tab.



Lift position for picking up pipetting tips

1 Move to position

- Under **Rack position**, enter **Target position 21** and click **[Start]**.
- Place a pipetting tip on the position moved to.

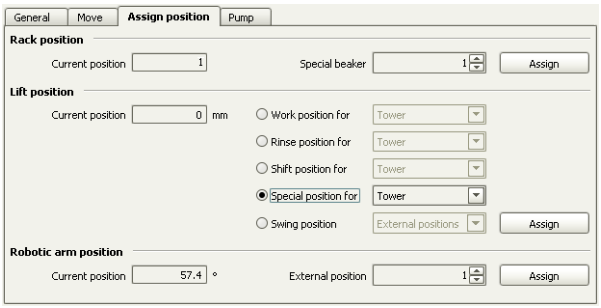
- Under **Target position**, select the entry **Special position** and click **[Start]**.
  The lift travels downward and is intended to take up the pipetting tip with the adapter. The adapter must press down forcefully onto the pipetting tip. If necessary, move the lift one millimeter at a time.
- Under **Lift position**, click the arrow button **[down]** or **[up]** in order to set a suitable position.

The pipetting tip must rest close against the adapter. The lift may not however be lowered too far, because otherwise the lift drive could become overloaded and suffer damage.

If the lift position has been corrected, the current lift position has to be set as new special position.

2 Assign the position

- Click the tab **Assign position**.



- Under **Lift position**, select the setting **Special position for tower** and click **[Assign]**.

3 Move the lift upwards

- Click the tab **Move**.
- Under **Lift position**, select the **Shift position** as **Target position** and click **[Start]**.

Lift positions for stripping pipetting tips

1 Move to the external position 1

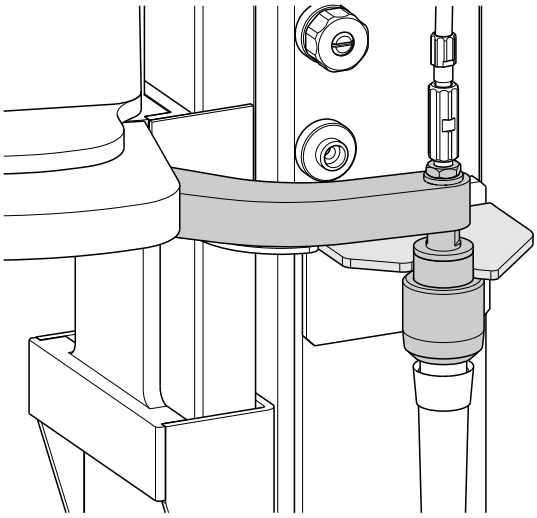
- Under **Robotic arm position**, select **External 1** as **Target position** and click **[Start]**.
- Under **Lift position**, select **Work position** as **Target position** and press **[Start]**.

The robotic arm with the pipetting tip is now located in front of the deflector. The thick sleeve of the adapter should be approx. 1 cm underneath the deflector.

2 Move to the external position 2

- Under **Robotic arm position**, select **External 2** as **Target position** and click **[Start]**.

The adapter of the robotic arm should now be located in the opening of the deflector, as shown in the following figure.



This is the position where the pipetting tip is to be stripped by moving the lift upwards. It is very important that the adapter perfectly fits into the opening of the deflector.

3 Correct the position

- Click the buttons **[Arrow left]** or **[Arrow right]** to optimize the position of the robotic arm.
- Click the buttons **[Arrow up]** or **[Arrow down]** to optimize the position of the robotic arm.

An additional option for optimization is the shifting of the deflector. The corresponding fixing screws on the tower must be loosened for this purpose.

The new positions must be saved after the position of the robotic arm has been optimized.

4 Assign the positions

- Click the tab **Assign position**.
- Under **Lift position**, select the **Work position for External 1** and click **[Assign]**.
- Under **Robotic arm position**, select **External position 2** and click **[Assign]**.

5 Strip the pipetting tip

- Switch to the **Move** tab.
- Under **Lift position**, select **Work position** as **Target position** and press **[Start]**.

The lift moves upwards. Thereby the pipetting tip is stripped. It drops into the collection container.

If the stripping of the pipetting tip does not work, then the individual positions must be adjusted once again.

Note

Have one method with a weighing and pipetting sequence run through. While doing so, check above all the perfect seating of the pipetting tip on the adapter and the stripping of the tip. The viscosity of the pipetted liquid plays a major role. Use a real sample for pipetting for that reason.

3.20 Mounting the safety shield

The 864 Robotic Balance Sample Processor may not be operated without a safety shield. Install it as follows:

1 Loosen the screws

- Unscrew the black nuts on both sides of tower 2.

2 Tighten the safety shield

- Pull the green 6.2751.160 safety shield over tower 2, starting from the top.
- Screw the safety shield tightly with the two nuts as shown in the following illustration.

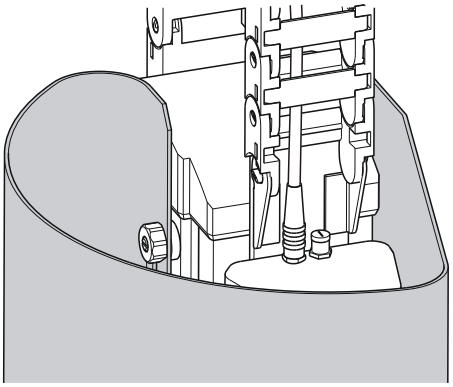


Figure 37 Mounting the safety shield

3.21 Connecting MSB devices

In order to connect MSB devices, e.g. stirrers or dosing devices, Metrohm instruments are equipped with up a maximum of four connectors at 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 illustration provides an overview of the devices that can be connected to an MSB socket, along with a number of different cabling variations.

The question of which peripheral devices are supported depends on the control instrument.

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.
- Type 700 Dosino and 685 Dosimat dosing devices cannot be connected together with other MSB instruments on a shared connector. These dosing devices must be connected separately.

Caution

Exit the control software before you plug MSB instruments in. The control instrument recognizes when it is switched on which instrument is connected at 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 length of the connection must not exceed a maximum of 15 m.

3.21.1 Connecting dosing devices

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

Warning

If a Dosino is connected to the 864 Robotic Balance Sample Processor, then the connection cable must be equipped with a ferrite core T.2400.102. The ferrite core reduces any interference voltages that may occur and thus ensures compliance with strict EMC standards pursuant to applicable technical norms, see Chapter "Technical Data".

Proceed as follows:

1 Mounting ferrite core

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

2 Connect a dosing device

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

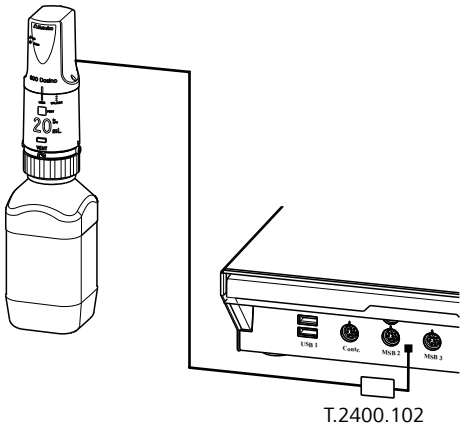


Figure 38 Connecting a dosing device

3.21.2 Connecting a stirrer or titration stand

You can use a magnetic stirrer 801 Stirrer or 803 Ti Stand (stirring "from below") or the 804 Ti Stand with a rod stirrer 802 Stirrer (stirring "from above").

Connect a stirrer or a titration stand as follows:

1 Connect a 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.
- If desired, connect the rod stirrer to the stirrer socket (with stirrer symbol) of the titration stand.
- Start the control software.

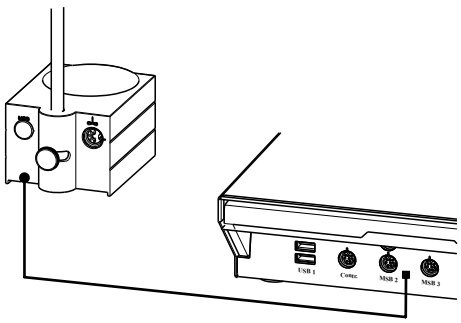


Figure 39 Connecting MSB stirrer

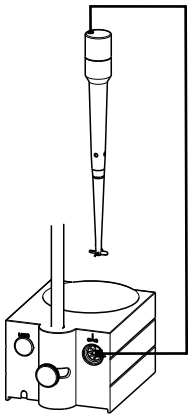


Figure 40 Rod Stirrer and titration stand

Note

If an MSB stirrer is connected to the **MSB1** socket, then the stirrer connector at Tower 1 cannot be used, because both sockets are controlled internally via MSB1. This also applies to the MSB2 socket and the stirrer connector on Tower 2 for 2-tower models of USB Sample Processors.

3.21.3 Connecting a remote box

Instruments that are controlled via remote lines and/or which send control signals via remote lines can be connected using 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 generally have a signal level of 5 volts.

Control signals are understood to be electrical line statuses or brief (> 200 ms) electrical pulses which display the operational state 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. No exchange of data is possible, however.

Proceed as follows:

1 Connect a 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.

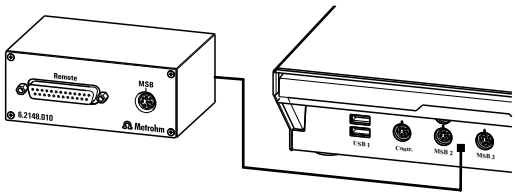


Figure 41 Connecting a remote box

You can, for example, connect an 849 Level Control Box (fill level monitor in a waste canister) or a 731 Relay Box (switch box for 230/110 volt alternating current sockets and low-voltage direct current outlets). The remote box also has an MSB socket at which a further MSB instrument, 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 Appendix *(see Chapter 6.1, page 69)*.

3.22 Connecting USB devices

Two USB connectors (Type A sockets) are available for connecting devices with USB interfaces. The 864 Robotic Balance Sample Processor functions then as a 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 a USB device is connected, the control instrument recognizes which device is connected. The control software automatically enters a connected USB device into the system configuration (Device manager).

3.22.1 Connecting a barcode reader

A barcode reader is used as an input aid for entering text and numbers. You can connect a barcode reader to a USB interface.

Connect a barcode reader as follows:

1 Connecting the cable

- Plug the USB plug (Type A) of the barcode reader into one of the USB sockets on the rear side of the instrument.

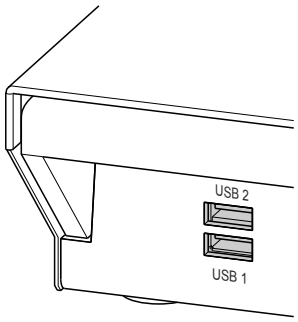


Figure 42 USB connectors

2 Configuring the barcode reader in the control software

- Configure the barcode reader in the configuration part of the control software as described in the online Software Help.

Settings of the barcode reader

The barcode reader requires certain basic settings. You will find directions in the Instructions for Use as to how you can program the barcode reader. Switch the barcode reader to programming mode and make the following settings:

1

- Select the keyboard layout for the desired country (USA, Germany, France, Spain, Switzerland (German)). This setting must match the setting in the control software.
- Make sure that the Ctrl characters (ASCII 00 to 31) are allowed to be sent.
- Adjust the settings so that the ASCII character 02 (STX or Ctrl B) is sent as the first character as "Preamble" or "Prefix Code".
- Adjust the settings so that the ASCII character 04 (EOT or Ctrl D) is sent as the last character as "Postamble" or "Record Suffix" or "Postfix Code".
- Exit programming mode.

4 Handling and maintenance

4.1 General

The 864 Robotic Balance Sample Processor requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the service life of the sturdy mechanics and electronics of the instrument.

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 mains plug should be protected from contamination.

4.2 Care

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

4.3 Quality Management and validation with Metrohm

Quality Management

Metrohm offers you comprehensive support in implementing quality management measures for instruments and software. Further information on this can be found in the brochure **«Quality Management with Metrohm»** available from your local Metrohm agent.

Validation

Please contact your local Metrohm agent for support in validating instruments and software. Here you can also obtain validation documentation to provide help for carrying out the **Installation Qualification** (IQ) and the **Operational Qualification** (OQ). IQ and OQ are also offered as a service by the Metrohm agents. In addition, various application bulletins are also available on the subject, which also contain **Standard Operating Procedures** (SOP) for testing analytical measuring instruments for reproducibility and correctness.

Maintenance

Electronic and mechanical functional groups in Metrohm instruments can and should be checked as part of regular maintenance by specialist personnel from Metrohm. Please ask your local Metrohm agent regarding the

precise terms and conditions involved in concluding a corresponding maintenance agreement.

Note

You can find information on the subjects of quality management, validation and maintenance as well as an overview of the documents currently available at *www.metrohm.com/com/* under **Support**.

5 Troubleshooting

5.1 Robotic arm

Problem	Cause	Remedy
The robotic arm moves all the way outward and buzzes.	*Sample Processor – The Swing Head is not correctly configured.*	In the control software under "Configuration" (or under "Device manager" for Touch Control), enter the correct value for the **Swing offset**.
	Sample Processor – Robotic arm is wrongly mounted.	Disconnect the mains 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	*Sample Processor – The Swing Head is not correctly configured.*	In the control software under "Configuration" (or under "Device manager" for Touch Control), enter the correct values for the **Swing radius**, **Swing offset** etc.
	Sample Processor – The axial distance is not correctly configured.	In the control software under "Configuration" (or under "Device manager" for Touch Control), enter the correct value for the **Axial distance**.
	Sample Processor – The wrong rack table is being used.	Initialize the rack using the function **Initialize rack** in the "Manual control".
	Swing Head – The Swing Head drive is defective.	Contact the Metrohm Service.

5.2 Balance

Problem	Cause	Remedy
The sample size is not or not correctly received.	*The parameters of the RS-232 interface are wrongly set.*	Correct the RS-232 parameters *(see page 39ff)*. They have to match with those of the balance.
	The connection cable is unsuitable.	Use the RS-232 cable of the balance manufacturer or ask for the corresponding cable from Metrohm.

Problem	Cause	Remedy
The results are spread widely.	*The weighings are not correct.*	▪ Readjust the weighing plunger *(see "Adjusting the weighing plunger", page 53)*. ▪ Correct the position of the balance *(see "Centering the weighing column", page 52)*. ▪ Adjust the leveling of the sample beakers in the weighing pans.

5.3 Pipetting tips

Problem	Cause	Remedy
The pipetting tip is dripping.	*The pipetting tip does not rest close on the adapter.*	Reset the lift position for picking up tips *(see page55)*.
	The screw connection of the adapter is not seated firmly.	Tighten all thread connections.
The pipetting tip is not stripped.	*The lift height for stripping tips is not correct.*	Reset the lift position for stripping tips *(see page56)*.
	The collection container is full.	Regularly empty the collection container.

6 Appendix

6.1 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.

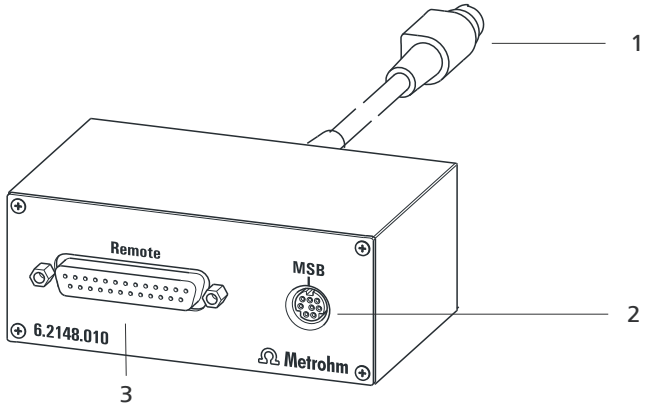


Figure 43 Connectors of the remote box

1 Cable
For connecting the Sample Processor.

2 MSB connector
Metrohm Serial Bus. For connecting external dosing devices or stirrers.

3 Remote connector
For connecting devices with a remote interface.

6.1.1 Pin assignment of the remote interface

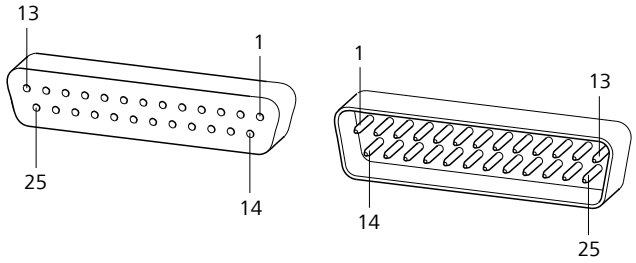
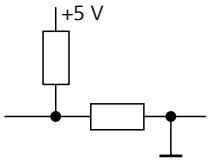


Figure 44 Pin assignment of the remote socket and plug

The above presentation of the pin assignment of a Metrohm remote interface applies not only for the remote box, but also for all Metrohm devices with 25-pin D-Sub remote connection.

Inputs



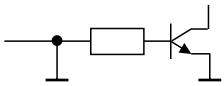
approx. 50 kΩ Pull-up

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_{CEO} = 40 V

+5 V: maximum load = 20 mA

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

Table 1 Inputs and outputs of the remote interface

Assigment	Pin No.	Assigment	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
Input 6	24	Output 6	1
Input 7	12	Output 7	2
0 volts / GND	14	Output 8	6
+5 volts	15	Output 9	7
0 volts / GND	25	Output 10	8
		Output 11	13
		Output 12	19
		Output 13	20

6.2 Stirring rate

The stirring rate can be adjusted in steps of –15 to +15.

The approximate rotational speed can be calculated with the following formula:

Rotational speed/min (r/min) = 125 · stirring rate

Example:

Stirring rate set: 8

Rotational speed in rpm = 125 · 8 = 1000

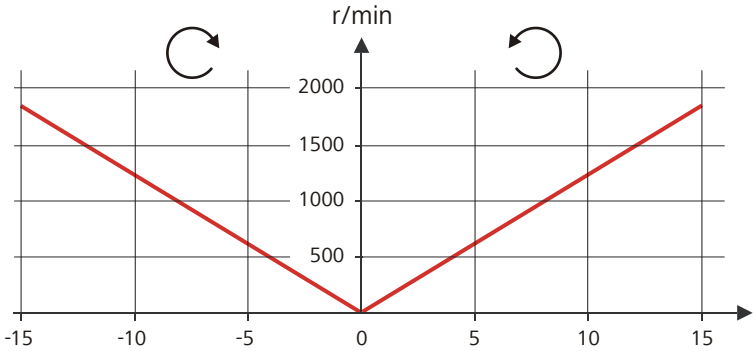


Figure 45 Rotational speed depending on stirring rate

7 Technical specifications

7.1 Lift and turntable

Stroke path	235 mm
Maximum lift load	approx. 30 N
Lift rate	adjustable, 5…25 mm/s
Shift rate	adjustable, 3...20 angle degrees/s

7.2 786 Swing Head

Maximum load	approx. 15 N
Swing rate	10...55 degrees/s
Beaker sensor connector	Socket with M8 thread

7.3 Interfaces and connectors

Controller connection	USB Upstream Port (9-pin Mini DIN socket) for connecting a computer for controlling of the instrument.
MSB connectors MSB1…MSB3	Three 9-pin Mini DIN sockets for connecting dosing devices (Dosino/ Dosimat), stirrers, etc.
USB connectors 1/2	Two USB Downstream Ports (Type A sockets), each 500 mA, for connecting Metrohm instruments or USB peripheral devices of other manufacturers.
Stirrer connector	DIN socket
Stirring rate	Rod stirrer 722/802: 180…3000 rpm Magnetic Stirrer 741: 180…2600 rpm adjustable in 15 steps each in both shift directions
Pump connectors	Two sockets with M8 thread for 772 Pump Unit, 823 Membrane Pump Unit or 843 Pump Station U= 16 ± 1 V, I=≤ 0.8 A
Swing Head connector	9-pin Mini DIN socket

7.4 Mains connection

Voltage	100…240 V
Frequency	50…60 Hz
Power consumption	115 W
Fuse	2.0 ATH

7.5 Safety specifications

Design and testing	According to EN/IEC/UL 61010-1, EN/IEC 61010-2-081, CSA-C22.2 No. 61010-1, protection class I
Safety instructions	This document contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

7.6 Electromagnetic compatibility (EMC)

Emission

Standards fulfilled

- EN/IEC 61326-1
- EN/IEC 61000-6-3
- EN 55022 / CISPR 22
- EN/IEC 61000-3-2

Immunity

Standards fulfilled

- EN/IEC 61326-1
- EN/IEC 61000-6-2
- EN/IEC 61000-4-2
- EN/IEC 61000-4-3
- EN/IEC 61000-4-4
- EN/IEC 61000-4-5
- EN/IEC 61000-4-6
- EN/IEC 61000-4-8
- EN/IEC 61000-4-11
- EN/IEC 61000-4-14
- NAMUR

7.7 Ambient temperature

Nominal function range	5…45 °C Humidity < 80 %
Storage	–20…60 °C
Transport	–40…60 °C

7.8 Reference conditions

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

7.9 Dimensions

Width	0.49 m
Height	0.88 m
Depth	0.61 m
Weight (without accessories)	1.864.0130: 23.95 kg
Material	
Housing	Metal housing, surface-treated

8 Conformity and warranty

8.1 Conformity

8.1.1 Declaration of Conformity

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

864 Robotic Balance Sample Processor

Sample changer with pipetting and weighing abilities for the automation of sample preparation and analytical determinations in quality control laboratories.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility

Emission:	EN/IEC 61326-1: 2002, EN/IEC 61000-6-3: 2001, EN 55022 / CISPR 22:2006, EN/IEC 61000-3-2: 2000
Immunity:	EN/IEC 61326-1: 2002, EN/IEC 61000-6-1: 2001, EN/IEC 61000-4-2: 2001, EN/IEC 61000-4-3: 2002, EN/IEC 61000-4-4: 2004, EN/IEC 61000-4-5: 2001, EN/IEC 61000-4-6: 2001, EN/IEC 61000-4-8: 2001, EN/IEC 61000-4-11: 2004, EN/IEC 61000-4-14: 2004, NAMUR: 2004

Safety specifications

EN/IEC 61010-1: 2001, UL 61010-1: 2004,
CSA-C22.2 No. 61010-1: 2004, EN/IEC 61010-2-081: 2003, protection class I

CE

This instrument meets the requirements of the CE mark as contained in the EU directives 2006/95/EC (LVD), 2004/108/EC (EMC). It fulfils the following specifications:

EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

EN 61010-2-081	Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

Manufacturer Metrohm Ltd., CH-9101 Herisau/Switzerland

Metrohm Ltd. is holder of the SQS-certificate ISO 9001:2000 Quality management system for development, production and sales of instruments and accessories for ion analysis.

Herisau, 10 January, 2008

D. Strohm

Vice President, Head of R & D

A. Dellenbach

Head of Quality Management

8.2 Quality Management Principles

Metrohm Ltd. holds the ISO 9001:2000 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

The implementation of the ISO 9001:2000 quality management system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

Instrument development

The organization of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i.e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organization is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Operational Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

8.3 Warranty (guarantee)

Metrohm guarantees that the deliveries and services it provides are free from material, design or manufacturing errors. The warranty period is 36 months from the day of delivery; for day and night operation it is 18 months. The warranty remains valid on condition that the service is provided by an authorized Metrohm service organization.

Glass breakage is excluded from the warranty for electrodes and other glassware. The warranty for the accuracy corresponds to the technical specifications given in this manual. For components from third parties that make up a considerable part of our instrument, the manufacturer's warranty provisions apply. Warranty claims cannot be pursued if the Customer has not complied with the obligations to make payment on time.

During the warranty period Metrohm undertakes, at its own choice, to either repair at its own premises, free of charge, any instruments that can be shown to be faulty or to replace them. Transport costs are to the Customer's account.

Faults arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc. are expressly excluded from the warranty.

9 Accessories

Note

Subject to change without notice.

9.1 Scope of delivery

864 Balance Sample Processor 2.864.1130

Qty.	Order no.	Description
3	1.800.0010	**800 Dosino** Drive with write/read hardware for intelligent dosing units. With fixed cable.
1	1.802.0010	**802 Rod stirrer** Rod stirrer without propeller stirrer.
1	1.809.0010	**809 Titrando** High-end titrator for up to four 800 Dosino dosing systems. With four MSB connections, one galvanically separate measuring interface, USB connection.
1	1.843.0120	**843 Pump Station (Peristaltik)** The 843 Pump Station (peristaltic) has two built-in peristaltic pumps. These can be controlled directly via the interface using remote signals or manually by pressing a button.
1	1.864.0130	**864 Robotic Balance Sample Processor TAN/TBN** Sample Processor for the preparation and analysing of petrochemical products that need to be weighed in, diluted and titrated.

Qty.	Order no.	Description
1	6.0229.100	**Solvotrode**

Space-saving electrode for titration in non-aqueous media

Shaft material:	Glass
Shaft material (completion):	PCTFE
Measuring range:	0 ... 14
Measuring unit:	pH
Min. immersion depth (mm):	30
Electrode plug-in head:	Metrohm plug-in head G
Reference electrolyte type:	LiCl/EtOH sat.

Qty.	Order no.	Description
2	6.1236.020	**Sleeve with SGJ 14/12 mm**

Sleeve with SGJ 14/12 mm and O-ring.

Material:	PP

Qty.	Order no.	Description
1	6.1458.040	**Macro Titration Head, 3 x SGJ14**

Macro titration head insert for the Robotic Swing Arms.

Material:	PTFE

Qty.	Order no.	Description
2	6.1459.300	**Sample beaker / 120 mL / 100 pieces**

Sample beaker with screw cap for sampling, 100 pieces.

Material:	PP
Height (mm):	113
Outer diameter (mm):	40
Volume (mL):	120

Qty.	Order no.	Description	
1	6.1462.240	**Transfer head for 786 Swing Head, bent and right swinging** Transfer head, bent and right swinging, for 786 Swing Head. In combination with the 6.1808.220 Adapter the transfer head can be used on multi-row racks to pick up tools with luer connection. Material: PVC	
1	6.1462.260	**Robotic arm with holder for titration head, left swinging, external** Titration head holder to 786 Swing Head with possibility to swing to external positions Material: PVC	
1	6.1543.170	**Aspiration tip / M8 thread** Aspiration tip to Sample Processors Material: PTFE Length (mm): 198	

Qty.	Order no.	Description
1	6.1546.030	**Extractor rod** For PTFE piston of dosing unit

Qty.	Order no.	Description
1	6.1562.240	**Pipetting tips 1-10 mL (200 pieces)** Eppendorf tips for the usage with 864 Robotic Balance Sample Processor Material: PP

Qty.	Order no.	Description
1	6.1608.030	**Round glass bottle / 1000 mL / GL 45** Material: Clear glass Height (mm): 223 Volume (mL): 1000

Qty.	Order no.	Description
2	6.1608.070	**Eluent bottle / 2 L / GL 45** Material: Clear glass Height (mm): 262 Volume (mL): 2000

Qty.	Order no.	Description
2	6.1621.000	**Container 10 L**

As rinsing or waste container in automated systems.

Material:	PE
Width (mm):	265
Height (mm):	400
Volume (mL):	10000

Qty.	Order no.	Description
2	6.1621.100	**Cap for 10-L container**

Cap for 10-L container. For easy and safe transportation of filled containers.

Material:	PE
Material remark:	Cap for 10-L canister
Height (mm):	19
Outer diameter (mm):	26.7

Qty.	Order no.	Description
1	6.1625.010	**Collection container for Soliprep**

Container for safe collection of used tools in automated systems

Material:	PP

Qty.	Order no.	Description
3	6.1805.060	**FEP tubing / M6 / 60 cm**

With light and kink protection

Material:	FEP
Inner diameter (mm):	2
Length (mm):	600

Qty.	Order no.	Description
2	6.1805.120	**FEP tubing / M6 / 100 cm**

With light and kink protection

Material:	FEP
Inner diameter (mm):	2
Length (mm):	1000

Qty.	Order no.	Description
1	6.1805.130	**FEP tubing / M6 / 120 cm**

With light and kink protection

Material:	FEP
Inner diameter (mm):	2
Length (mm):	1200

Qty.	Order no.	Description
1	6.1805.510	**PTFE tubing / M8 / 60 cm**

With kink protection

Material:	PTFE
Inner diameter (mm):	3
Length (mm):	600

Qty.	Order no.	Description
1	6.1808.170	**Distributor for pump tubings to Sample Processors**

Distributor for Sample Processors for rinsing and aspirating using pumps.

Qty.	Order no.	Description
1	6.1808.250	**Pipette adapter 1-10 mL for transfer head**

Adapter with outside thread M6 and Eppendorf conus to use with transfer head 6.1462.240 for usage of 10 mL Eppendorf tips

Material: PEEK
Material 2: PVDF

Qty.	Order no.	Description
2	6.1812.000	**PTFE tubing 4/6 mm, 4m**

Material: PTFE
Outer diameter (mm): 6
Inner diameter (mm): 4

Qty.	Order no.	Description
4	6.1820.050	**Screw connector**

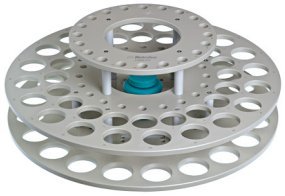
For 6.1826.100 pump tubing, for peristaltic pumps

Qty.	Order no.	Description
2	6.1826.160	**Pump tubing Viton**

For peristaltic pumps

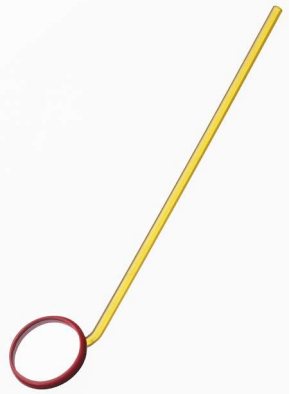
Material remark: Viton
Outer diameter (mm): 6.4
Length (m): 1

Qty.	Order no.	Description
2	6.1828.000	**PVDF connection nipple** For 6.1621.000 container Material: PVDF
1	6.1909.050	**Stirrer propeller for 120 mL beaker** Propeller for 802 Stirrer when this latter is used with sample racks for 120-mL beakers (6.1459.300) Material: ETFE Length (mm): 111
1	6.2057.150	**Holder for collection container** Holder for mounting collection container Material: Aluminum
1	6.2057.160	**Holder for ionization rod for 864 Robotic Balance Sample Processor** Material: Metal
1	6.2058.070	**Deflector for adapter 61808260** The deflector is mounted with the fastening plate 6.2058.050 at the side of the Sample Processor tower and allows the automatic pulling off the used pipetting tips into the collection container 6.1625.010. Material: Metal

Qty.	Order no.	Description	
20	6.2067.100	**Scale pan for sample rack 6.2068.010** The scale pan is designed for the 120 mL PP beaker (6.1459.300) and is placed into the sample rack of the 864 Balance Sample Processor. Material: PTFE Material 2: graphite	
1	6.2068.010	**Sample rack 20 x 120 mL for 864 Balance Sample Processor** Sample rack for 864 Balance Sample Processor with 20 x 120 mL PP beakers (6.1459.300) for weighing and analysing of the samples, 20 pipetting tips (6.1562.240), 20 x scale pans (6.2067.100) and 20 additional 120 mL PP beakers for samples. Material: PP Outer diameter (mm): 480 Hole diameter (mm): 42	
1	6.2104.030	**Electrode Cable 2 m / F** For connecting electrodes with Metrohm plug-in head G to Metrohm instruments (socket F). Length (m): 2	
1	6.2141.300	**Remote cable 843-Sample Processor** Remote cable for the direct connection between the 843 Pump Station and the pump connectors of the Sample Processors	
2	6.2151.000	**Cable USB A – Mini-DIN 8 pins** Controller cable Length (m): 1.8	

Qty.	Order no.	Description	
1	**6.2312.010**	**Electrolyte LiCl 2 mol/L in Ethanol (250 mL)** Electrolyte solution (non-aqueous), 2 mol/L LiCl in ethanol(bridge electrolyte for titrations in non-aqueous solutions and reference electrolyte for 6.0229.100 Solvotrode) Volume (mL): 250	
1	**6.2320.000**	**TEABr 0.4 mol/L in ethylene glycol (250 mL)** Electrolyte solution TEABr (tetraethylammonium bromide in ethylene glycol), c(TEABr) = 0.4 mol/L Volume (mL): 250	
1	**6.2621.030**	**Hexagon key 4 mm** Length (mm): 73	
1	**6.2621.070**	**Hexagon key 5 mm** Length (mm): 80	

Qty.	Order no.	Description	
1	6.2621.120	**Hexagon key 1.5 mm**	
1	6.2621.140	**Hexagon key 2.5 mm**	
1	6.2711.080	**Drip pan for 864 Robotic Balance Sample Processor** The drip pan guards Robotic Balance Sample Processor and balance from contamination / corrosion by chemicals. Material: PVC	
1	6.2751.160	**Splash protection for 864 Robotic Balance Sample Processor, left** The splash protection for the left working station of the Robotic Balance Sample Processor has an open area for the usage with sample rack 6.2068.010. Material: Plexiglas (PMMA)	

Qty.	Order no.	Description	
1	6.2831.000	**Checking mirror** For position determination	
2	6.3032.220	**Dosing Unit 20 mL** Dosing unit with integrated data chip with 20 mL glass cylinder and light protection, mountable on reagent bottle with ISO/DIN GL45 thread. FEP tubing connection, antidiffusion buret tip. Volume (mL): 20	
1	6.3032.250	**Dosing unit 50 mL** Dosing unit with integrated data chip with 50 mL glass cylinder and light protection, mountable on reagent bottle with ISO/DIN GL45 thread. FEP tubing connection, antidiffusion buret tip. Volume (mL): 50	
1	6.6056.202	**Tiamo 2.0 Full CD: 1 Lizenz** Program for controlling complex titration systems. Graphical method editor with numerous templates Layout Manager for display adjustment Professional database with recalculation Export to LIMS, NuGenesis, Cyberlab etc. Powerful report generator Complies with FDA 21 CFR Part 11 Parallel titration 1 License Dialog language English, German, simplified Chinese, traditional Chinese, Korean, Russian, Polish or Italian	
1	A.702.0006	**Metrodoc CD-Rom** Software release 6	
4	T.240.0102	**Ferrite cores** Anti-interference adapters	
10	Y.107.9010	**Cable clips**	
1	6.2122.0x0	**Mains cable with C13 line socket IEC-60320-C13**	

Qty.	Order no.	Description
		Cable plug according to customer requirements. Switzerland: Type SEV 12 6.2122.020 Germany, …: Type CEE(7), VII 6.2122.040 USA, …: Type NEMA/ASA 6.2122.070
1	**8.864.8001EN**	**864 Robotic Balance Sample Processor Manual**

9.2 Optional accessories

Qty.	Order no.	Description	
1	**2.135.0205**	**Balance for 864 Robotic Balance Sample Processor, 115V** The balance (Precisa) has a special construction for the usage below the sample rack 6.2068.010 of the 864 Robotic Balance Sample Processor. The power supply is for 115V.	
1	**2.135.0206**	**Balance for 864 Robotic Balance Sample Processor, 230V** The balance (Precisa) has a special construction for the usage below the sample rack 6.2068.010 of the 864 Robotic Balance Sample Processor. The power supply is for 230V.	
1	**2.136.0305**	**Ionizer for 864 Robotic Balance Sample Processor, 115V** Ionizer (HAUG) for 864 Robotic Balance Sample Processor with power supply for 115V.	

Qty.	Order no.	Description	
1	2.136.0306	**Ionizer for 864 Robotic Balance Sample Processor, 230V** Ionizer (HAUG) for 864 Robotic Balance Sample Processor with power supply for 230V.	
1	2.843.0130	**843 Pump Station (peristaltic) - rinse/aspirate** The 843 Pump Station (peristaltic) has two built-in peristaltic pumps. These can be controlled directly from the 869 Compact Sample Changer via remote signals. The Rinse / Aspirate version is provided with all the accessories needed for automatically emptying the titration beaker and rinsing the titration equipment.	
1	6.5622.000	**Equipment for second pump for 864 Robotic Balance Sample Processor** Accessories set for the connection of a second 843 Pump Station with external washing station to 864 Robotic Balance Sample Processor	
1	6.9013.000	**Ionisation rod for ionizer** The ionisation rod is mounted with the holder (6.2057.160) to the 864 Robotic Balance Sample Processor.	

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