

874 Oven Sample Processor



Manual

8.874.8002EN / v7 / 2025-12-09



Metrohm AG
CH-9100 Herisau
Switzerland
+41 71 353 85 85
info@metrohm.com
www.metrohm.com

874 Oven Sample Processor

Manual

Technical Communication
Metrohm AG
CH-9100 Herisau

This documentation is protected by copyright. All rights reserved.

This documentation is an original document.

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

Disclaimer

Deficiencies arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc., are expressly excluded from the warranty. Unauthorized modifications to the product (e.g., conversions or attachments) exclude any liability on the part of the manufacturer for resulting damage and its consequences. Instructions and notes in the Metrohm product documentation must be strictly followed. Otherwise, Metrohm's liability is excluded.

Table of contents

1	Introduction	1
1.1	Instrument description	1
1.1.1	Instrument versions	1
1.1.2	Device components	2
1.1.3	Intended use	2
1.2	About the documentation	3
1.2.1	Symbols and conventions	3
1.3	Displaying accessories	4
2	Safety	5
2.1	Safety instructions	5
2.1.1	General notes on safety	5
2.1.2	Electrical safety	5
2.1.3	Tubing and capillary connections	6
2.1.4	Personnel safety	6
2.1.5	Flammable solvents and chemicals	7
3	Overview of the instrument	8
4	Installation	11
4.1	Setting up the device	11
4.1.1	Packaging	11
4.1.2	Checks	11
4.1.3	Location	11
4.2	Connecting the instrument to the power grid	12
4.3	Mounting the sample holder	13
4.4	Mounting needles	14
4.5	Mounting the heating tubing	17
4.6	Mounting the drying flask	18
4.7	Mounting the dust filter	20
4.8	Mounting the air/nitrogen connector	20
4.9	Mounting the safety shield	22
4.10	Mounting the KF titration cell	23
4.11	Inserting the heating tube into the KF titration cell	24
4.12	Attaching a sample rack	27
4.13	Adjusting the guide rod	28
4.14	Connecting a computer	28

Table of figures

Figure 1	Front 874 Oven Sample Processor	8
Figure 2	874 Oven Sample Processor rear	9
Figure 3	Sample rack 6.2041.720	10
Figure 4	Mounting the sample holder	13
Figure 5	Mounting the needles	15
Figure 6	Mounting the tubing	16
Figure 7	Mounting the heating tubing	17
Figure 8	Preparing the drying flasks	18
Figure 9	Mounting the tubings	19
Figure 10	Mounting the dust filter	20
Figure 11	External gas connector	21
Figure 12	Mounting the safety shield	22
Figure 13	Coulometric KF titration cell	25
Figure 14	Volumetric KF titration cell	26
Figure 15	Attaching rack	27
Figure 16	Adjusting the guide rod	28
Figure 17	Connecting the computer	29
Figure 18	MSB connections	31
Figure 19	Connecting a dosing device	32
Figure 20	Connecting an MSB stirrer	33
Figure 21	Connecting the rod stirrer to the titration stand	33
Figure 22	Connecting the Remote Box	34
Figure 23	USB connectors	35
Figure 24	Connectors of the Remote Box	41
Figure 25	Pin assignment of remote socket and remote plug	41
Figure 26	Rotational speed depending on the stirring rate	43

1 Introduction

1.1 Instrument description

The 874 Oven Sample Processor is used wherever the heating of a sample and/or the thermal expulsion of moisture in solids or liquids is required. In combination with a coulometric or volumetric KF titrator, the 874 Oven Sample Processor is the ideal analysis system for water content determination in samples that contain disruptive components or from which moisture can be removed only with difficulty.

One of its decisive advantages is reducing sample preparation to a minimum. Thanks to the use of hermetically sealed sample vessels ("headspace vials"), samples can be filled directly on-site. The PTFE-coated septa guarantee a constant, unaltered water content, even after prolonged downtimes.

The sample heated in the oven module releases its moisture in the form of water vapor, which is conveyed into a measuring cell with the aid of a gas flow. An air pump is installed to generate the gas flow. An inlet valve is available for nitrogen or other inert gases. The moisture can be determined in the measuring cell either coulometrically or volumetrically using Karl Fischer titration.

The 874 Oven Sample Processor is operated and controlled via the **tiamo** computer software. This enables convenient programming of method runs, ranging from the simple to the complex. The integration of the 874 Oven Sample Processor together with other instruments, e.g. with a coulometer, within one user interface does not only allow for simple operation, but also for evaluation and storage of the measurement data from all of the connected instruments in a single database.

1.1.1 Instrument versions

The 874 Oven Sample Processor is available in two versions with different accessories.

- **Version 2.874.0010** with accessories for the use of standard vials (volume 6 mL).
- **Version 2.874.0020** without accessories for the use of standard vials. Appropriate accessories can be ordered for specific vessel sizes.

1.1.2 Device components

The 874 Oven Sample Processor has the following components:

- **Oven**
Oven module made of aluminum with software-operated temperature control for heating the sample vessel.
- **Fan**
Propeller fan for cooling the oven module.
- **Inlet valve**
Valve for switching over the source of the gas flow.
- **Air pump**
Pump for generating the gas flow.
- **Outlet heater**
Heating tubing for preventing the condensation of moisture.
- **Lift with rods**
Guidance device with needle adapter and tubing for the gas flow.
- **Turntable**
For the standard sample rack with a capacity of 36 sample vials (6 mL) or the special sample rack with a capacity of 25 sample vials (□ = 16 - 32 mm).

1.1.3 Intended use

The 874 Oven Sample Processor is designed for usage as an auxiliary device for automated sample preparation in analytical laboratories. Its main area of application is water content determination using Karl Fischer titration (coulometric or volumetric). The 874 Oven Sample Processor enables the application of thermal gas extraction technology.

This device is suitable for processing chemicals and flammable samples. Therefore, the use of the 874 Oven Sample Processor requires the user to have basic knowledge and experience in handling toxic and caustic substances. Knowledge regarding the application of fire prevention measures prescribed for laboratories is also mandatory.

1.2 About the documentation



CAUTION

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

1.2.1 Symbols and conventions

The following symbols and formatting may appear in this documentation:

(5-12)	Cross-reference to figure legend The first number refers to the figure number, the second to the device part in the figure.
1	Instruction step Perform the steps one after the other.
Method	Dialog text, parameter in the software
File ► New	Menu or menu item
[Continue]	Button or key
	WARNING This symbol draws attention to a possible life-threatening hazard or risk of injury.
	WARNING This symbol draws attention to a possible hazard due to electrical current.
	WARNING This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	WARNING This symbol draws attention to a possible biological hazard.
	WARNING Warning of optical radiation



CAUTION

This symbol draws attention to possible damage to devices or device parts.



NOTICE

This symbol highlights additional information and tips.

1.3 Displaying accessories

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

1 Searching for a product on the website

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

The search result is displayed.

2 Displaying product information

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

Detailed information regarding the product is displayed.

3 Displaying accessories and downloading the accessories list

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



NOTE

Metrohm recommends keeping the accessories list for reference purposes.

2 Safety

2.1 Safety instructions

2.1.1 General notes on safety



WARNING

Operate this device only according to the information contained in this documentation.

This device left the factory in a flawless state in terms of technical safety. The following instructions must be observed carefully to preserve this status and ensure non-hazardous operation of the device.

2.1.2 Electrical safety

Electrical safety when working with the device 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 device. The device could become damaged. There is a considerable risk of injury if live components are touched.

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

Supply voltage



WARNING

An incorrect supply voltage can damage the device.

Operate this device only with a supply voltage specified for it (refer to the rear of the device).

 WARNING

Electronic components are sensitive to electrostatic charges and can be destroyed by discharges.

Do not fail to pull the power cord out of the power socket before setting up or disconnecting electrical plug connections at the rear of the device.

 CAUTION

Leaks in tubing connections 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. Suitable tools can be used for disconnecting connections.

The leak-tightness of the connections must be checked regularly. If the device is used mainly in unattended operation, then weekly inspections are mandatory.

 WARNING

Wear protective glasses and working clothes suitable for laboratory work while operating the 874 Oven 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. Never remove the pre-installed safety shields.

The 874 Oven Sample Processor may not be operated without a safety shield!



WARNING

Personnel may not 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 jamming of a drive, the power plug must be pulled out of the socket immediately. Do not attempt to free jammed sample vessels or other parts while the instrument is switched on. Jamming can only be cleared when the instrument is in a de-energized state; this action is generally associated with a **considerable risk of injury**.



WARNING

The 874 Oven Sample Processor is **not** suitable for usage 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.

2.1.5 Flammable solvents and chemicals



WARNING

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

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

3 Overview of the instrument

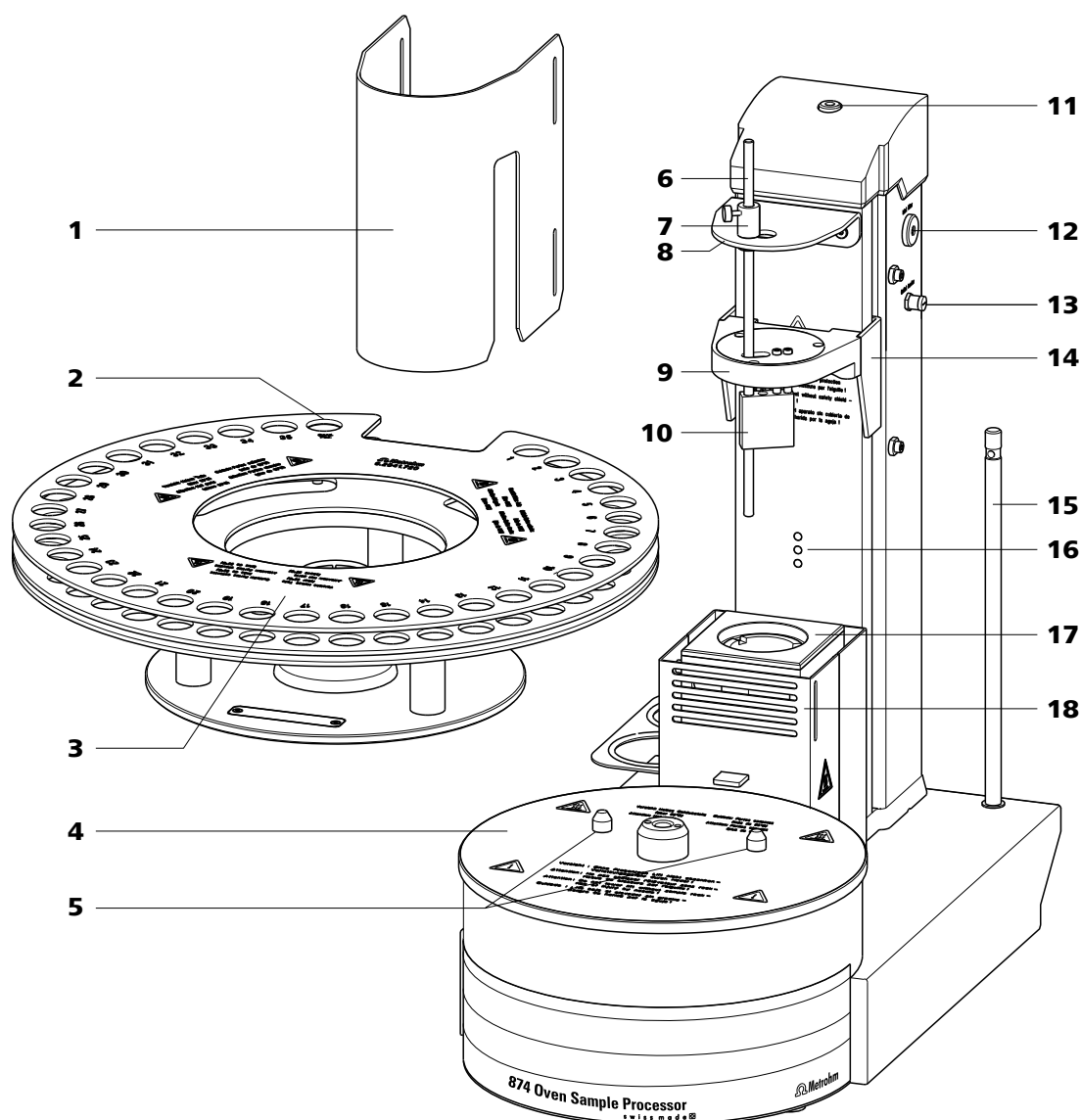


Figure 1 Front 874 Oven Sample Processor

1 Safety shield (6.2751.140)

2 Conditioning position
For the conditioning vessel.

3 Sample rack (6.2041.720)
For 36 sample vials (6 mL).

4 Turntable

5 Guide bolts
For the sample rack.

6 Guide rod
For stripping the sample vessel.

[illegible][illegible][illegible]

4 Installation

4.1 Setting up the device

4.1.1 Packaging

The product and accessories are supplied in protective special packaging. Keep this packaging to ensure safe transportation of the product. If a transport lock is present, keep this as well for future reuse.

4.1.2 Checks

Inspect the delivery immediately upon receipt:

- Check the delivery against the delivery note to ensure completeness.
- Check the product for damage.
- If the delivery is incomplete or damaged, contact your regional Metrohm representative.

4.1.3 Location

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

Place the instrument in a location of the laboratory which is suitable for operation and free of vibrations and which provides protection against corrosive atmosphere and contamination by chemicals.

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



4.3 Mounting the sample holder

The dimensions of the supplied sample holder are optimized for the use of **6.2419.007 6-mL sample vials** by Metrohm. This ensures the best possible transfer of heat between oven and sample.

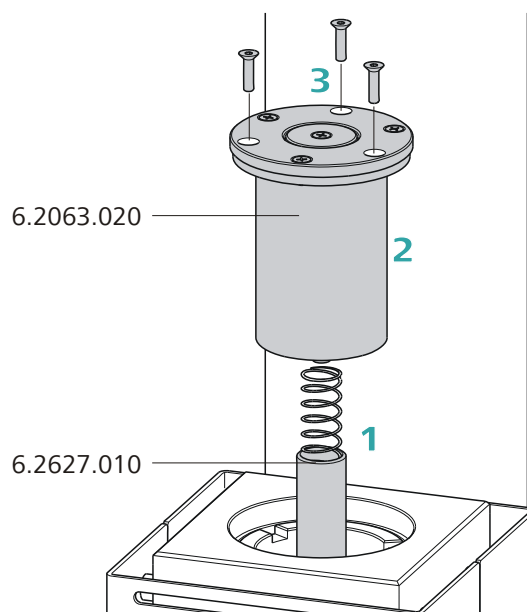


Figure 4 Mounting the sample holder



NOTE

The sample holder may not be inserted or removed unless it has cooled down.

Proceed as follows:

- 1** Insert the **6.2627.010 oven insert** with the spring in place into the oven from above and slide it all the way to the bottom.
- 2** Place the **sample holder 6.2063.020** into the oven from above.
- 3** Tighten the sample holder with the supplied hex screws. The required hex key is part of the accessories.



NOTE

If vessels with other dimensions are to be used, then individually modified sample holders can be ordered. **The precise vessel dimensions (including tolerances)** will be required when ordering. Non-standard sample vessels may only have dimensions within the following limit values:

- Diameter 10.0 - 32.0 mm
- Immersion depth 20.0 - 45.0 mm

4.4 Mounting needles

Two different types of needle holders are available for mounting needles. The length of the needle holder defines how deep the needle for the gas inlet enters the sample vessel. The **6.2049.040 needle holder** with a length of 58 mm ensures that the needle penetrates the liquid or powdery sample. The carrier gas flows through the sample and efficiently removes the contained moisture.

If there is a risk that the heated sample may block the needle, use the **6.2049.050 needle holder** with a length of 73 mm. In this case, the needle for the gas inlet enters the sample vessel slightly more than the outlet needle and it does not have any contact with the sample.

Needle holders with the dimensions required for situations calling for special sample vessels can be supplied by Metrohm upon request.

6.2816.070

3

6.2049.040/6.2049.050

1

2

6.2816.080

Mount the needles as follows:

- 1 Screw the needle holder (6.2049.040 or 6.2049.050) into the distributor on the guide head.
- 2 Screw the **6.2816.080 outlet needle** onto the Luer connector of the needle holder.
- 3 Carefully guide the **6.2816.070 needle for gas inlet** into the opening of the distributor from above and allow it to drop down.



Ensure that the white PTFE seal sits firmly on the needle.

- 4** Screw the **FEP tubing 6.1805.470** onto the opening of the distributor by hand. Screw the other end of the tube into the opening of the gas outlet on the upper side of the tower.

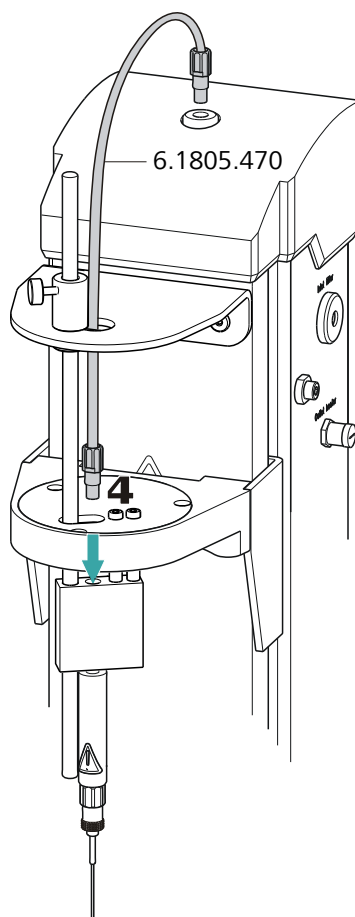
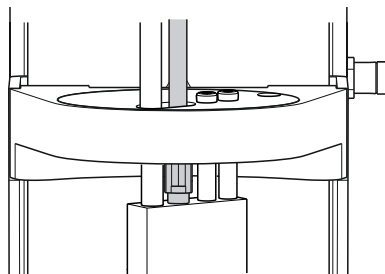


Figure 6 Mounting the tubing



4.5 Mounting the heating tubing

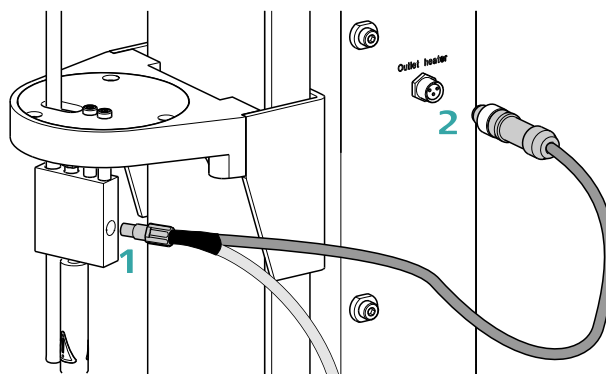


Figure 7 Mounting the heating tubing

Proceed as follows:

- 1 Screw the M6 connector of the **6.1830.030 heating tubing** into the lateral opening of the distributor on the guide head.
- 2 Connect the heating tubing cable to the **outlet heater** connector on the right-hand side of the tower.

Rotate the plug in such a way that the three contact pins correspond to the sequence of the corresponding socket openings. Press the plug towards the socket and rotate the front knurled screw clockwise.



NOTE

The heating jacket of the heating tubing is heated up to approx. 40 to 50 °C as soon as the instrument is switched on. This prevents condensation of moisture in the tubing when it is expelled from the sample and transferred to a KF titration cell with a carrier gas.



- 1 Insert the two drying flasks that have been prepared into the holders, see previous illustration.
- 2 Screw one **6.1805.050 FEP tubing** (18 cm length) to the gas outlet (left-hand side of the tower, labeled **to**). Screw the other tubing end on the front drying flask to the M6 connector **without** point marking (see right-hand arrow).
- 3 Screw one **6.1805.010 FEP tubing** (13 cm length) to the gas inlet (left-hand side of the tower, labeled **from**). Screw the other tubing end on the rear drying flask to the M6 connector **with** point marking (see left-hand arrow).
- 4 Screw the second **6.1805.010 FEP tubing** (13 cm length) tightly onto the remaining M6 connectors of the drying flasks.

The marking **Drying flask** on the left-hand side of the tower displays the diagram for the tubing.



Tighten the screw connections well by hand.



If gas is fed from a pressure line or a pressure vessel, then an upstream pressure reduction valve must be installed. The input pressure must be set with the valve closed and must not exceed 0.3 bar of overpressure.

4.9 Mounting the safety shield

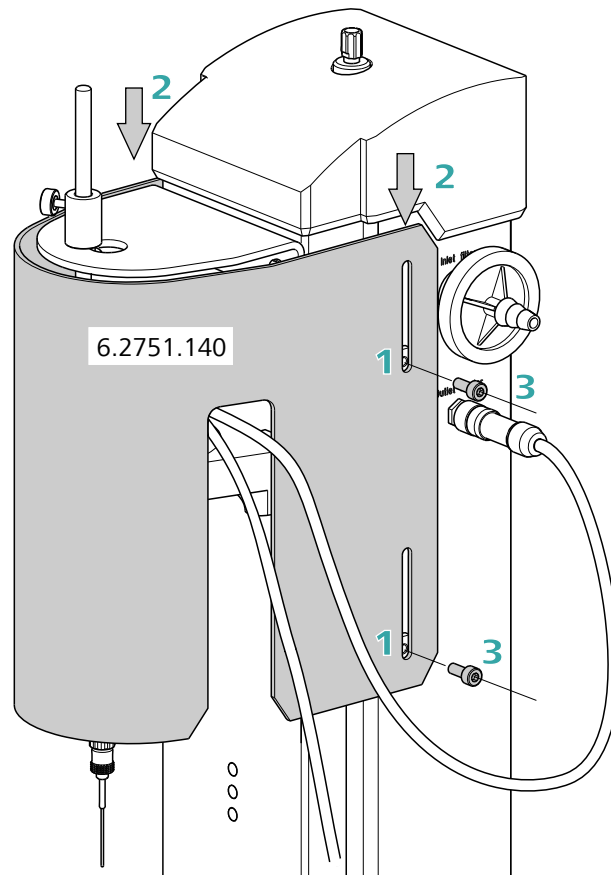


Figure 12 Mounting the safety shield



WARNING

The safety shield must be installed before the 874 Oven Sample Processor is used for the first time. The device may not be operated without a safety shield.

Proceed as follows:

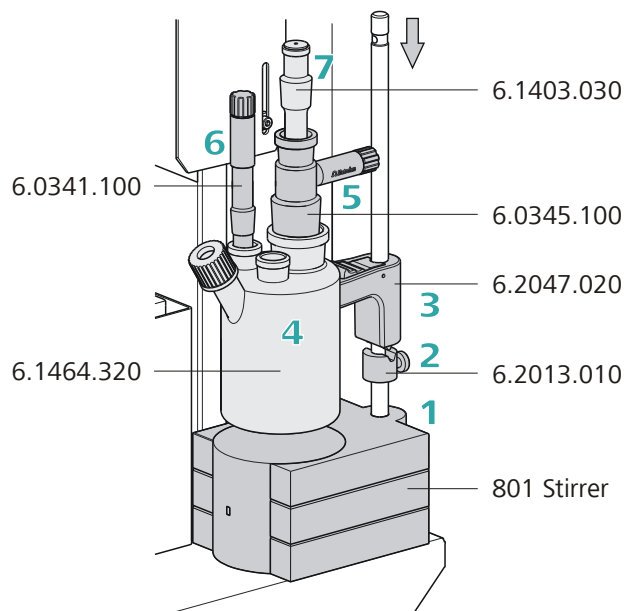
- 1 Undo the hex screws on the sides of the tower with the accompanying hex key.
- 2 Move the **6.2751.140 safety shield** into position, starting from the top. Observe the corresponding illustration.
- 3 Fix the safety shield in place with the hex screws.

**NOTE**

You can adjust the vertical position of the safety shield at any time by loosening the screws. Take care to ensure that it is not possible to reach into the working area of the needles while the instrument is in operation.

4.10 Mounting the KF titration cell

The following description is provided as an example for the mounting of a coulometric KF titration cell. The necessary accessory parts are, with the exception of the 6.2013.010 clamping ring, **not** included in the scope of delivery of the 874 Oven Sample Processor.



Proceed as follows:

- 1** Place the magnetic stirrer **801 Stirrer** from above onto the support rod at the right-hand side of the tower. Connect the cable to the coulometer.
- 2** Screw the **6.2013.010 clamping ring** tightly to the support rod, with the indent facing upward.
- 3** Fix the **6.2047.020 titration vessel holder** to the support rod. Operate the locking lever of the holder while doing so.

- 4** Fasten the **6.1464.320 coulometric KF titration cell** to the titration vessel holder. Hook the metal clip of the titration cell to the holder.

The height of the titration vessel holder can now be adjusted in such a way that the titration vessel hangs slightly above the magnetic stirrer. Use the clamping ring to fix the position of the holder. If the locking lever of the holder is now pressed, then the titration cell can be raised slightly and swiveled. The correct positioning of the titration cell continues to be maintained by the clamping ring.

- 5** Insert the **6.0345.100 generator electrode** (or 6.0344.100) into the titration cell and connect a **6.2104.120 electrode cable** to it.

- 6** Insert the **6.0341.100 indicator electrode** into the titration cell and connect a **6.2104.020 electrode cable** to it.

- 7** Fill a **6.1403.030 adsorber tube** with **6.2811.000/6.2811.010 molecular sieve**. Place a small piece of absorbent cotton underneath and above the molecular sieve to serve as a dust filter. Insert the filled adsorber tube into the titration cell.

- 8** Place a **6.1903.030 stirring bar** into the titration cell.

4.11 Inserting the heating tube into the KF titration cell

The 874 Oven Sample Processor can be used in combination with a KF coulometer or a volumetric KF titrator. The mounting of the tip of the heating tube is accomplished in different ways for the respective KF titration cells.

Coulometric KF titration cell

- Remove the protective cover from the tip of the heating tube and the E.3010.032 O-ring.
- Disassemble the accompanying **6.1446.170 heating tube stopper** into three parts.

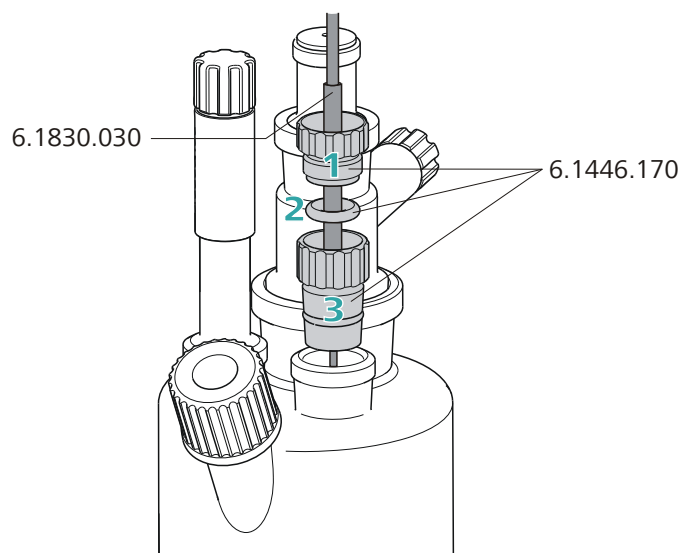


Figure 13 Coulometric KF titration cell

Proceed as follows:

- 1 Guide the upper part of the heating tube stopper over the tip of the **6.1830.030 heating tube** as shown in the illustration.
- 2 Guide the O-ring of the heating tube stopper over the heating tube.
- 3 Guide the lower part of the heating tube stopper over the heating tube and screw the three parts together (not too tightly).
- 4 Insert the stopper with the tip of the heating tube into one of the two SGJ openings of the KF titration cell
- 5 Shift the tip vertically in such a way that the outlet opening of the tubing is immersed as deeply as possible. The tip must not however be permitted to get in the way of the stirring bar in the KF titration cell. Afterwards give the heating tube stopper its final tightening.

Volumetric KF titration cell

- Remove the protective cover from the tip of the heating tube and the E.3010.032 O-ring. The latter you will still need.
- A **6.2730.020 septum stopper** is enclosed with every KF titrator made by Metrohm. Disassemble this septum stopper into three parts and remove the septum. It will not be required.

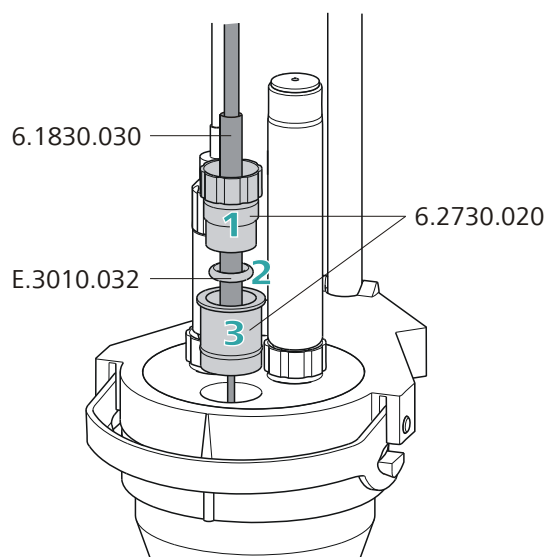


Figure 14 Volumetric KF titration cell

Proceed as follows:

- 1 Guide the upper part of the septum stopper over the tip of the **6.1830.030 heating tube** as shown in the illustration.
- 2 Guide the **E.3010.032** O-ring over the heating tube.

This O-ring is also part of the 6.1244.040 set of seals that is enclosed with each KF titrator. It cannot be reordered individually.
- 3 Guide the lower part of the septum stopper over the heating tube and screw the three parts together (not too tightly).
- 4 Insert the stopper with the tip of the heating tube into the front opening of the KF titration cell
- 5 Shift the height of the tip of the heating tube vertically in such a way that the outlet opening of the tubing is immersed as deeply as possible. The tip must not however be permitted to get in the way of the stirring bar in the KF titration cell. Afterwards give the septum stopper its final tightening.

4.12 Attaching a sample rack

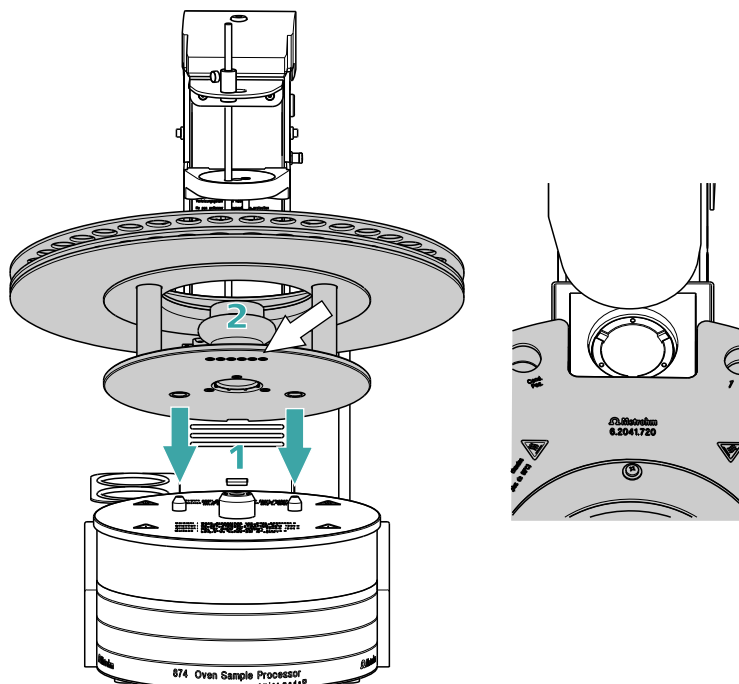


Figure 15 Attaching rack

The turntable of the 874 Oven Sample Processor must be in starting position before the sample rack can be removed or put it into place. To accomplish this, carry out the **[Rack Reset]** function in the manual control of the control software.

Put the rack into place as follows:

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



NOTE

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

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

The rack is moved into starting position. The magnet code of the rack is read out by the instrument during this process. The white arrow in Figure 15 indicates the position of the magnet holder. The six-digit magnet code is used to identify the rack type. The sample

positions and any special positions on the rack are defined along with the rack type.

4.13 Adjusting the guide rod

The needle is pulled out of the sample vial by the upward movement of the lift. The sample vial is not permitted to remain hanging on the needle during this procedure. The rod that is fixed to the guide head with a knurled screw is used for stripping the vial. The vertical positioning of the guide rod must be adjusted, depending on the height of the sample vial. The guide rod must not obstruct the sample vial when the rack is rotated.

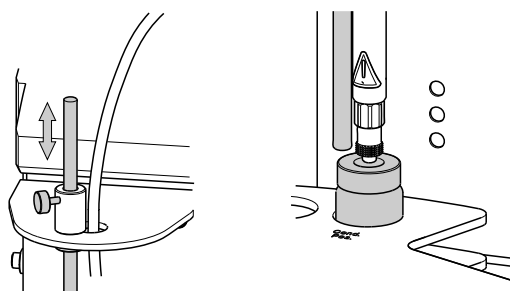


Figure 16 Adjusting the guide rod

Undo the red knurled screw on the guide head and adjust the height of the guide rod.

4.14 Connecting a computer

The 874 Oven Sample Processor requires a USB connection to a computer in order to be able to be controlled by a computer software. Using a 6.2151.000 controller cable, the instrument can be connected directly, either to a USB socket on a computer, to a connected USB hub or to a different Metrohm control instrument.

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

Cable connection and driver installation

A driver installation is required in order to ensure that the 874 Oven Sample Processor is recognized by the computer software. To accomplish this, you must comply with the procedures specified. The following steps are necessary:

1 Install the software

- Insert the computer software installation CD and carry out the installation program directions.

- Exit the program if you have started it after the installation.

2 Establishing the cable connections

- Connect all peripheral devices to the instrument, *see chapter 4.15, page 30*.
- Connect the instrument to the power grid if you have not already done this (*see chapter 4.2, page 12*).
- Connect the instrument to a USB connector (type A) of your computer (see manual of your computer). The 6.2151.000 cable is used for this purpose.

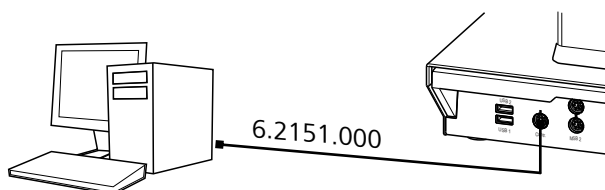


Figure 17 Connecting the computer

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

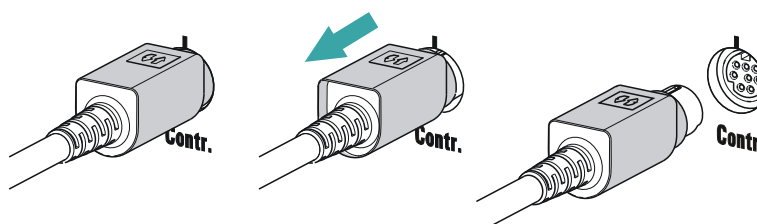
3 Follow the instructions of the installation wizard.

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



NOTE

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



Registering and configuring the instrument in the computer software

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

1 Setting up the instrument

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

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

4.15 Connecting MSB devices

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

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

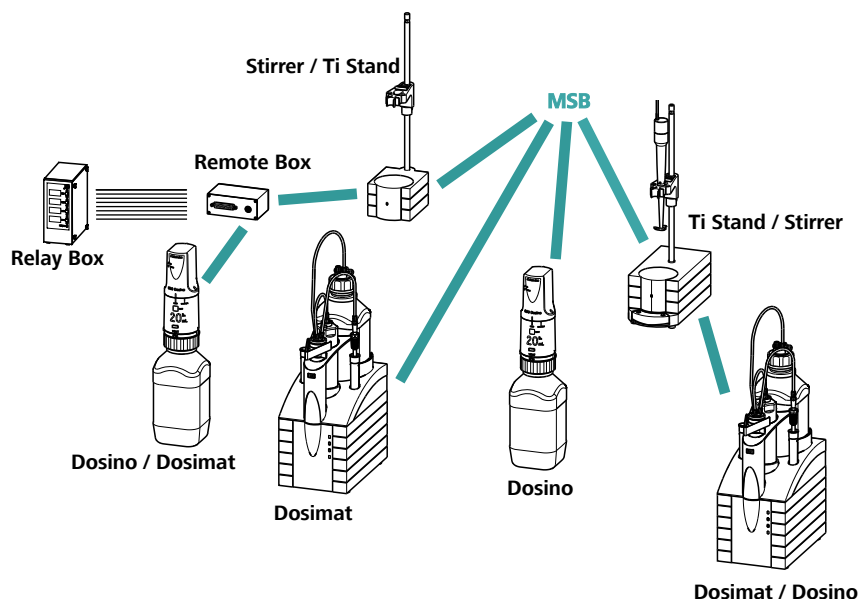


Figure 18 MSB connections

The control instrument determines which peripheral devices are supported.



NOTE

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

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



CAUTION

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

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

4.15.1 Connecting a dosing device

Three dosing devices can be connected to the instrument.

The types of dosing devices that are supported are:



WARNING

If a Dosino is connected to the 874 Oven Sample Processor, then the connection cable must be equipped with a T.2400.102 ferrite core. The ferrite core diminishes any interference voltages and thus ensures compliance with the strict EMC standards in accordance with the applicable technical standards, see EU declaration of conformity of the instrument.

Proceed as follows:

1 Mounting the ferrite core

2 Connecting a dosing device

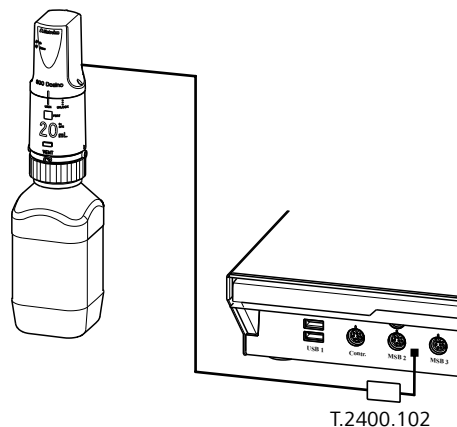


Figure 19 Connecting a dosing device

4.15.2 Connecting a stirrer or titration stand

You can use the following instruments:

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

- 801 Stirrer
- 803 Ti Stand

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

- 804 Ti Stand with rod stirrer 802 Stirrer

Connect a stirrer or a titration stand as follows:

1 Connecting the stirrer or titration stand

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

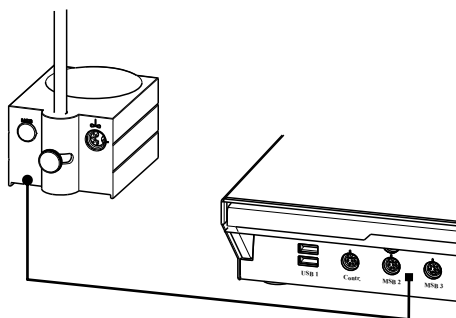


Figure 20 Connecting an MSB stirrer

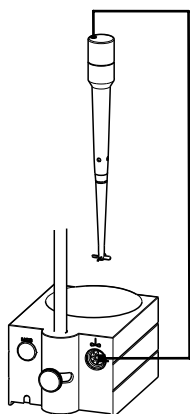


Figure 21 Connecting the rod stirrer to the titration stand

4.16 Connecting USB devices

Two USB connectors (type A sockets) are available for connecting instruments with an USB interface. The 874 Oven Sample Processor then functions as USB hub (distributor). If you wish to connect more than two USB devices, you can also use an additional, commercially available USB hub.



NOTE

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

4.16.1 Connecting a barcode reader

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

Connect the barcode reader as follows:

1 Connecting the cables

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

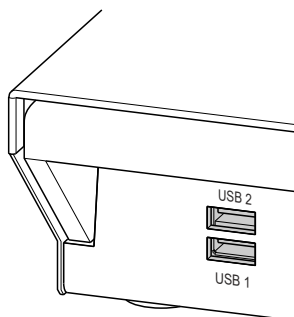


Figure 23 USB connectors

2 Configuring the barcode reader in the control software

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

Setting the barcode reader

The barcode reader requires certain basic settings. You can find instructions on how to program the barcode reader in the manual for the



barcode reader. Set the barcode reader into program mode and configure the following settings:

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

5 Processing a sample series

Moisture determinations according to the heating method require the conditioning of the entire tubing system and of the KF titration cell before a determination can be carried out. Because the sample vials and the septum seals may contain small amounts of moisture, three to five blank value determinations must be carried out with sealed, empty vessels. For conditioning, blank value and sample determinations, example methods for *tiamo*TM are to be found in the installation directory of the software.

Preparing

Weigh solid or liquid samples into sample vials and seal these securely with the septum crimping tongs. We recommend the use of the 6.2419.007 sample vial with the 6.1448.057 septum seals. The silicone septum of the aluminum cap is resistant to temperatures of up to 250 °C and has shown itself to be exceptionally reliable. In addition to the sample vials, you will also require for a sample series an empty, tightly sealed vial as a conditioning vessel, in addition to three to five vials (which are also empty and tightly sealed) as blank samples.

Place an empty, sealed vial as **conditioning vessel** at the **Cond. Pos.** position on the sample rack of the 874 Oven Sample Processor. The empty **blank samples** are placed on **Positions 1 to 3** (or 5) on the sample rack. Place the vials filled with samples on the following positions.

In the sample table of *tiamo*TM one line must be filled out with the associated method and sample data for each vial on the sample rack. Observe in this connection the explanations contained in the Application note for the individual methods. The vials must be processed in the correct sequence. It is for this reason that the sample table must be filled out as follows:

- **Line 1:** conditioning method
- **Lines 2 to 4 (6, resp.):** method for blank value determination
- **Lines 5 (7, resp.) to x:** method for water content determination

Observe the following during conditioning:

- In the KF titration cell, the shaft of the heating tube should not be immersed in the working medium.
- Align the tip of the heating tube against the vessel wall.
- Set the stirring rate to high. The carrier gas should emerge from the tip of the heating tube into the working medium as tiny bubbles and be spun there forcefully. It is advantageous for air bubbles to be stirred into the working medium and forcefully broken up in the process. The air in the KF titration cell must also be dried.

7 Troubleshooting

7.1 Problems and their solutions

Problem	Cause	Remedy
The drift is very high during conditioning.	<i>Molecular sieve of drying flasks and/or the titration cell exhausted.</i>	Replace the molecular sieve.
	<i>The titration cell is leaking.</i>	Check seals. If necessary, replace.
The titration time is too long.	<i>The sample is nonhomogeneous.</i>	Pulverize the sample or homogenize it before weighing in.
	<i>Moisture not fully expelled.</i>	Select more stringent switch-off criteria on the KF titrator: lower stop drift, higher switch-off delay time.
	<i>Tubing connections leaking.</i>	Inspect tubing and replace as necessary.
The results are spread widely.	<i>Molecular sieve of drying flasks exhausted.</i>	Replace the molecular sieve.
	<i>Condensate in the heating tubing.</i>	▪ Dry the tubing. ▪ Reduce the gas flow. ▪ Perhaps lower the oven temperature.
	<i>Gas flow too high.</i>	Reduce the gas flow.
	<i>The sample is nonhomogeneous</i>	Pulverize the sample or homogenize it before weighing in.
Selected gas flow is not achieved.	<i>The system is leaking.</i>	Check all tubing connections and drying flasks for leaks.
	<i>Pressure from external gas supply either too low or too high.</i>	Set the input pressure with the valve closed to not more than 0.3 bar of overpressure.
	<i>Pump defective.</i>	Contact a service engineer.

9 Appendix

9.1 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.

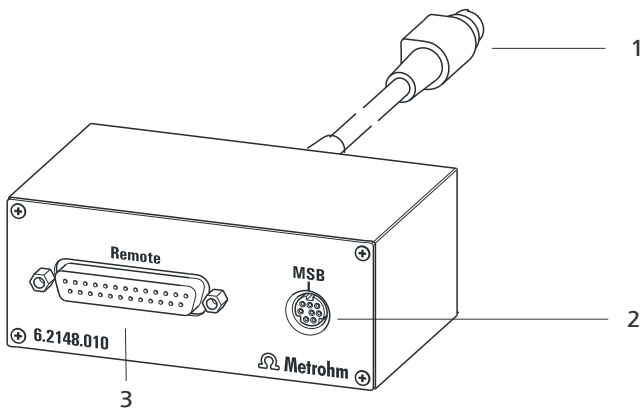


Figure 24 Connectors of the Remote Box

- | | |
|---|---|
| <p>1 Cables
For connecting to an MSB connector of the Sample Processor.</p> <p>3 Remote connector
For connecting instruments with a remote interface.</p> | <p>2 MSB connector
Metrohm Serial Bus. For connecting external dosing devices or stirrers.</p> |
|---|---|

9.1.1 Pin assignment of the remote interfaces

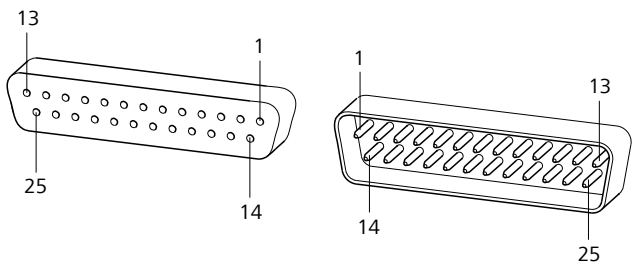
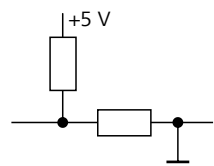


Figure 25 Pin assignment of remote socket and remote plug

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



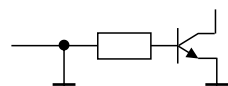
Inputs



approx. 50 kΩ Pull-up
 $t_p > 20\text{ ms}$
active = low, inactive = high

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

Outputs



Open Collector
 $t_p > 200\text{ ms}$
active = low, inactive = high
 $I_C = 20\text{ mA}$, $V_{CE0} = 40\text{ V}$
+5 V: maximum load = 20 mA

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

Table 1 Inputs and outputs of the remote interface

Assignment	Pin no.	Assignment	Pin no.
Input 0	21	Output 0	5
Input 1	9	Output 1	18
Input 2	22	Output 2	4
Input 3	10	Output 3	17
Input 4	23	Output 4	3
Input 5	11	Output 5	16
Input 6	24	Output 6	1
Input 7	12	Output 7	2
0 volts / GND	14	Output 8	6
+5 volt	15	Output 9	7
0 volts / GND	25	Output 10	8
		Output 11	13
		Output 12	19
		Output 13	20

9.2 Stirring rate

The stirring rate can be adjusted in steps from -15 to +15.

The approximate rotational speed for the internal magnetic stirrer (depends on the product version) can be calculated with the following formula:

$$\text{Rotational speed/min (r/min)} = 125 \cdot \text{Stirring rate}$$

Example:

Configured stirring rate: 8

Rotational speed in revolutions per minutes = $125 \cdot 8 = 1,000$

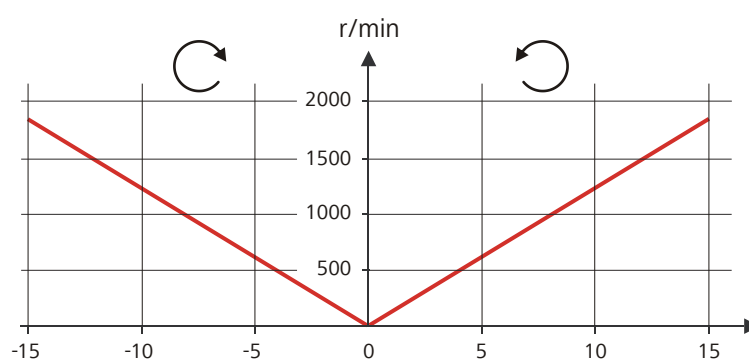


Figure 26 Rotational speed depending on the stirring rate

The information on the separately connectable 802 propeller stirrer can be found in the "802 Stirrer" manual.

10.4 Outlet heater

Socket connection $U = 16 \text{ V } (\pm 1 \text{ V})$
 $I \leq 0.8 \text{ A}$

Typical tubing temperature approx. $50 \text{ }^{\circ}\text{C}$

10.5 Interfaces

Controller connector USB upstream port (9-pin Mini DIN socket) for connecting a computer for controlling the 874 Oven Sample Processor.

MSB connectors Three 9-pin Mini DIN sockets for connecting dosing devices (Dosino/Dosimat), stirrers, etc.

USB connectors Two USB downstream ports (type A sockets), each 500 mA, for connecting Metrohm instruments or USB peripheral devices of other manufacturers.

10.6 Ambient conditions

Nominal function range $+5 \text{ }^{\circ}\text{C} - +45 \text{ }^{\circ}\text{C}$, at max. 80% humidity, non-condensing

Storage $+5 \text{ }^{\circ}\text{C}$ to $+45 \text{ }^{\circ}\text{C}$, at max. 80% humidity, non-condensing

Altitude / Pressure range Max. 2,000 m.a.s.l. / min. 700 mbar

Pollution degree 2

10.7 Energy supply

Nominal voltage range 100–120 / 220–240 V ($\pm 10\%$)
 The instrument must not be used at voltages that lie between the ranges.

Nominal frequency 50/60 Hz ($\pm 3\%$)

Power consumption 200 W

Protection 2 ATH

Overvoltage category II

Ambient temperature	+25 °C (±3 °C)
Relative humidity	≤ 60%
Supply voltage	230 V

<i>Width</i>	0.28 m
<i>Height</i>	0.55 m
<i>Depth</i>	0.49 m
<i>Weight (without accessories)</i>	15.50 kg
<i>Material (housing)</i>	Metal housing, surface-treated Oven covering: PTFE

Index

6.2151.000 controller cable	28
685 Dosimat plus	32
700 Dosino	32
800 Dosino	32
801 Stirrer	33
803 Ti Stand	33
804 Ti Stand	33
805 Dosimat	32

A

Adsorber tube	24
Air inlet	20

B

Barcode reader	
Connect	35

C

Clamping ring	23
Computer	
Connect	28
Connect	
Barcode reader	35
Computer	28
Dosing device	32
MSB devices	30
Power grid	12
Remote Box	34
Stirrer	33
Titration stand	33
USB devices	35
Connector	
Air/nitrogen	10
Controller	9
MSB	10
USB	9
Coulometric KF titration cell	23

D

Dosing device	
Connect	32
Driver software	
Install	28
Drying flask	18, 19
Dust filter	9, 20

E

Electrode	24
Electrostatic charge	6

Error message	
Gas flow	18
External gas connector	21

F

Ferrite core	
Mount	32
Filter tube	18

G

Generator electrode	24
Guide rod	28

H

Heating tube	24
Heating tubing	17

I

Indicator electrode	24
Inert gas	20
Inlet	
Air pump	9
Inlet filter	20
Installation	
Driver software	28
Instrument type	10

K

KF titration cell	23, 24
Coulometric	24
Volumetric	25

M

Magnetic stirrer	23
Maintenance	38
Metrohm Serial Bus MSB, see also	
"MSB"	30
Molecular sieve	18, 24
Mount	
Drying flask	18
Dust filter	20
Heating tubing	17
KF titration cell	23
Magnetic stirrer	23
Needle	14
Needle holder	14
Nitrogen connector	20
Oven insert	13
Safety shield	22
Tubing	19

Mounting

KF titration cell	24
Sample holder	13

MSB

Connect devices	30
-----------------------	----

N

Needle	14
Needle for gas inlet	15
Needle holder	15
Nitrogen connector	20

O

Outlet heater	17
Outlet needle	15
Oven insert	13

P

Pins	41
Power connection	10, 12

R

Remote	
Input	42
Interface	41
Output	42
Remote Box	
Connect	34
Pin assignment	41

S

Safety instructions	5
Safety shield	22
Sample holder	13
Sample vessel	14
Sample vial	13
Screw connections	19
Serial number	10
Service	5
Stirrer	
Connect	33
Stirring rate	43
Supply voltage	5
Support rod	23

T

Titration cell	23
Titration stand	
Connect	33
Transfer tubing	17

Index



Tubing 19

U

USB devices
 Connect 35

V

Vessel 14