

856 Conductivity Module



Manual
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Manual

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<http://documents.metrohm.com>.

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1 Introduction

1.1 Conductivity Module system

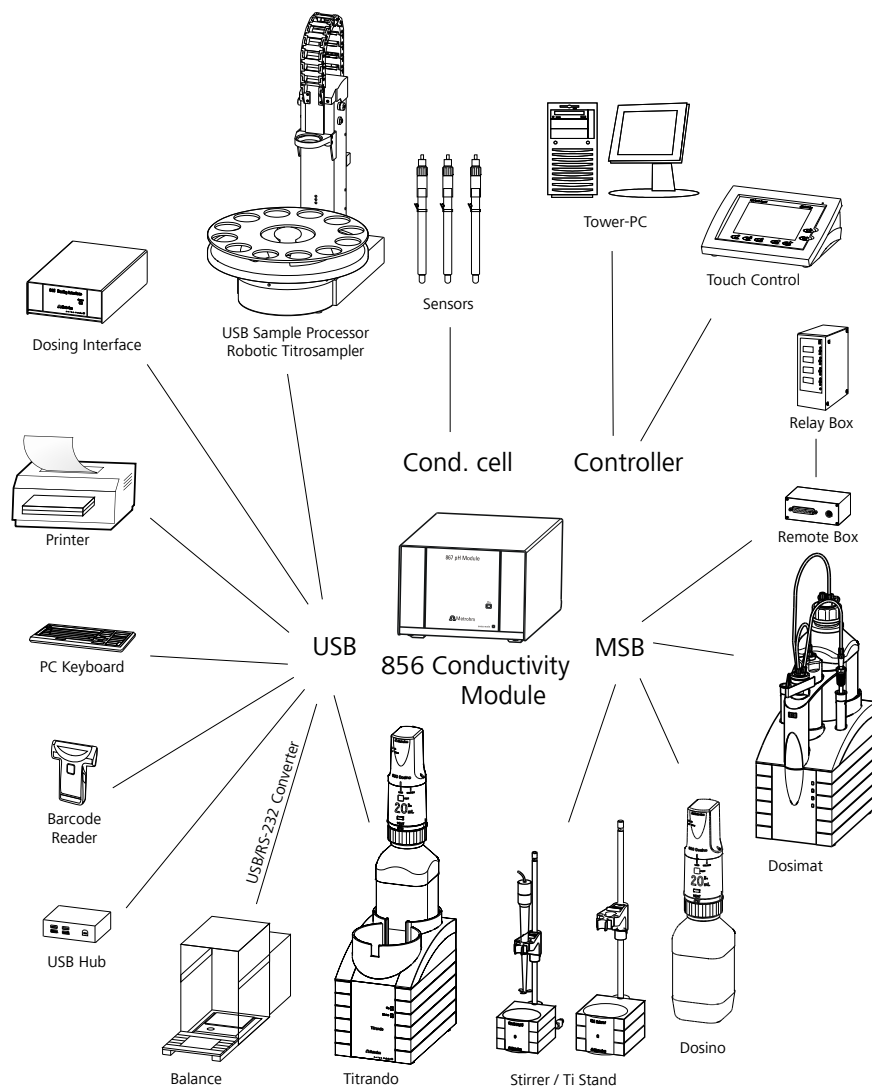


Figure 1 856 Conductivity Module system



1.2 Instrument description

Conductivity measurements can be performed with the 856 Conductivity Module.

The 856 Conductivity Module has the following characteristics:

- **Operation**
A touch-screen Touch Control or a high-performance PC software is used for operation.
- **Dosing**
Dosinos or Dosimats can be used for dosing.
- **MSB connectors**
Four MSB connectors (Metrohm Serial Bus) for connecting dosing devices (Dosimat with exchange unit or Dosino with dosing unit), stirrers, titration stands and Remote Boxes.
- **USB connectors**
Two USB connectors, with which devices such as printers, PC keyboards, barcode readers or additional control instruments (USB Sample Processor, Titrandu, Dosing Interface, etc.) can be connected.
- **Measuring interface**
One measuring input for a conductivity measuring cell with integrated temperature sensor.

1.3 Measuring modes and commands

The following measuring modes and commands are supported:

- **MEAS**
The following measuring modes can be selected for measurements:
 - **Cond** (conductivity measurement)
 - **T** (temperature measurement)
- **CAL**
Calibration.
 - **Cond** (determination of the cell constant of a conductivity measuring cell)
- **Dosing commands**
The following commands for dosing can be selected:
 - **PREP** (rinsing the cylinder and tubings of an exchange unit or dosing unit)
 - **EMPTY** (emptying the cylinder and tubings of a dosing unit)
 - **ADD** (dosing a specified volume)
 - **LQH** (carrying out complex dosing tasks with a Dosino)

1.4 About the documentation



CAUTION

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

1.4.1 Symbols and conventions

The following symbols and formatting may appear in this documentation:

(5-12)

Cross-reference to figure legend

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

1

Instruction step

Carry out these steps in the sequence shown.

Method

Dialog text, parameter in the software

File ▶ New

Menu or menu item

[Next]

Button or key



WARNING

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.



CAUTION

This symbol draws attention to possible damage to instruments or instrument parts.

**NOTE**

This symbol highlights additional information and tips.

1.5 Safety instructions

1.5.1 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.

1.5.2 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.

Do not fail to pull the mains cable out of the mains connection socket before you set up or disconnect electrical plug connections at the rear of the instrument.

1.5.3 Working with liquids



CAUTION

Periodically check all system connections for leaks. Observe the relevant regulations in respect to working with flammable and/or toxic fluids and their disposal.

1.5.4 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.

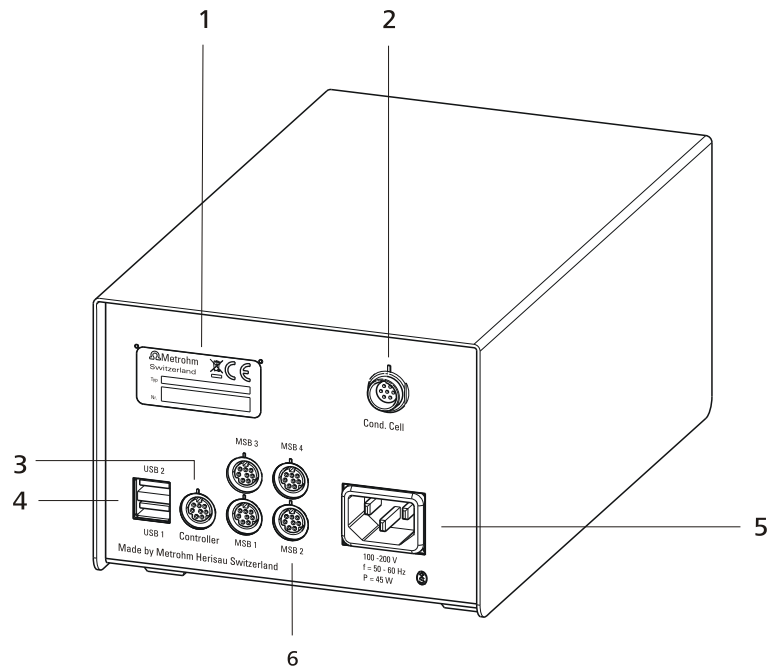


Figure 3 Rear 856 Conductivity Module

1 Type plate

Contains specifications concerning supply voltage, instrument type and serial number.

2 Conductivity measuring cell connector (Cond. Cell)

For connecting a 5-ring conductivity measuring cell with integrated temperature sensor. Other Metrohm conductivity measuring cells can be connected through the 6.2103.160 adapter box.

3 Connector (Controller)

For connecting a Touch Control or a PC with installed PC software. Mini DIN, 9-pin.

4 USB connector (USB 1 and USB 2)

USB ports (type A) for connecting printer, keyboard, barcode reader, additional Titrandos, USB Sample Processor, etc.

5 Power socket

6 MSB connector (MSB 1 to MSB 4)

Metrohm Serial Bus. For connecting external dosing devices, stirrers or Remote Boxes. Mini DIN, 9-pin.



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 which is suitable for operation, free of vibrations, protected from corrosive atmosphere, and contamination by chemicals.

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

3.2 Connecting a controller

3.2.1 Operation

Two different versions are available for operating the 856 Conductivity Module:

- A Touch Control with touch-sensitive screen. It forms a "stand-alone instrument" together with the 856 Conductivity Module.
- A computer enables operation of the 856 Conductivity Module with the help of a PC software, e.g. *tiamo*.



CAUTION

Take care to ensure that the power supply cable is pulled out of the power socket before either setting up or disconnecting connections between the instruments.

3.2.1.1 Connecting a Touch Control



NOTE

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

Connect the Touch Control as follows:

- 1 ■ Insert the plug of the Touch Control connection cable into the **Controller** socket.

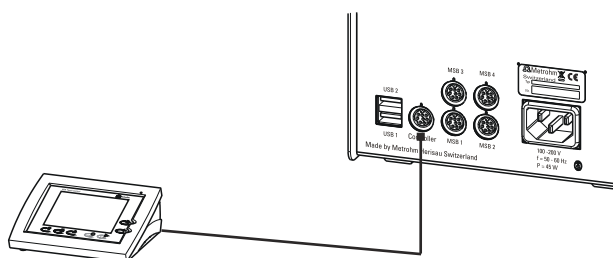


Figure 4 Connecting the Touch Control

- 2 ■ Connect the MSB devices (*see Chapter 3.3, page 12*).
 - Connect the USB devices (*see Chapter 3.4, page 16*).
- 3 ■ Connect the Conductivity Module to the power supply.
- 4 ■ Switch on the Touch Control.

The Touch Control power supply is supplied through the Conductivity Module. Automatic system tests are performed on both instruments at the time of activation. The **On** LED on the front of the Conductivity Module lights up when the system test has been completed and the instrument is ready for operation.

**CAUTION**

The Touch Control must be shut down properly by deactivation with the power switch on the rear of the instrument before the power supply is interrupted. If this is not done, then there is a danger of data loss. Because of the fact that the power supply for the Touch Control is provided through the Conductivity Module, you must never disconnect the Conductivity Module from the power supply (e.g. by deactivating with a connector strip) before you have deactivated the Touch Control.

If you would prefer not to position the Touch Control directly next to the Conductivity Module, then you can lengthen the connection with the 6.2151.010 cable. The maximum connection length permitted is 5 m.

3.2.1.2 Connecting a computer

The 856 Conductivity Module requires a USB connection to a computer in order to be able to be controlled by a PC 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 device.

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 856 Conductivity Module 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 the cable connections

- Connect all peripheral devices to the instrument, *see Chapter 3.3, page 12* and *see Chapter 3.4, page 16*.
- Connect the instrument to the power supply if you have not already done this.
The "On" LED on the 856 Conductivity Module is not yet illuminated!
- 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.



1 Setting up the instrument

- Start the PC 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 PC software.

3.3 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.

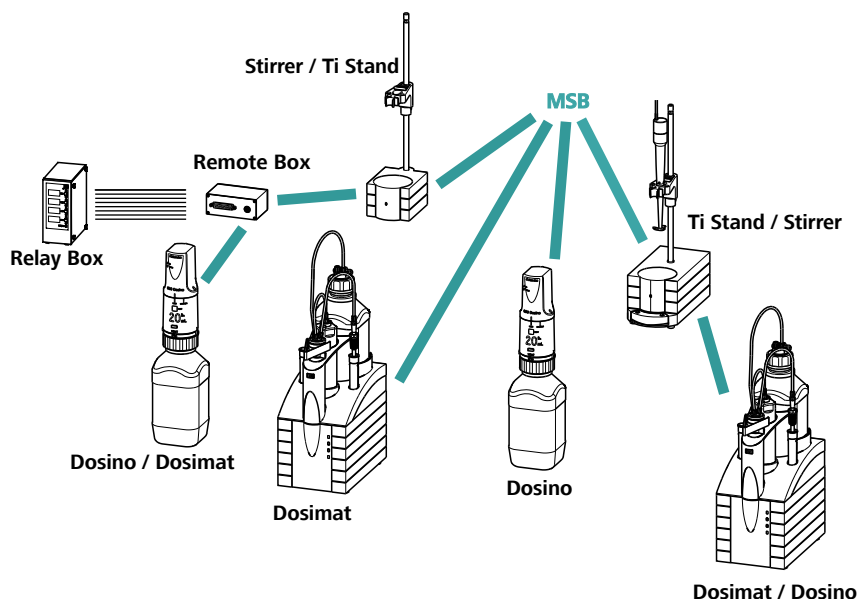


Figure 6 MSB connections

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

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

3.3.1 Connecting a dosing device

Four dosing devices can be connected to the instrument (**MSB 1 to MSB 4**).

The types of dosing devices that are supported are:

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

Proceed as follows:

1 Connecting a dosing device

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

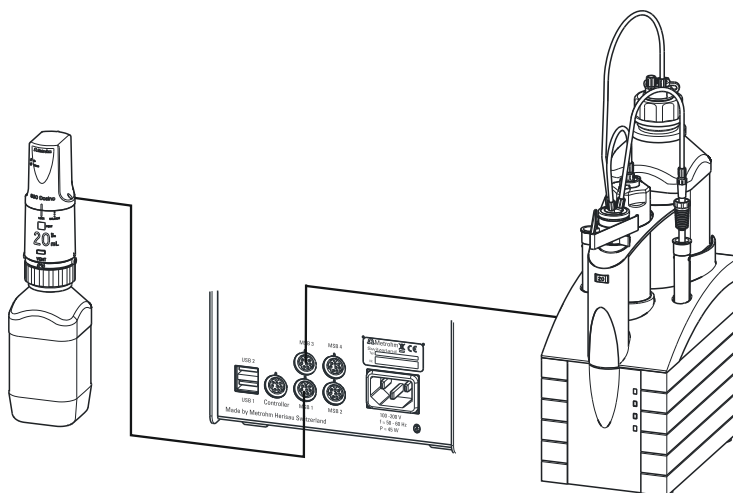


Figure 7 Connecting a dosing device

3.3.2 Connecting a stirrer or titration stand

You can use the following instruments:

- With built-in magnetic stirrer (stirring "from below"):
 - 801 Stirrer
 - 803 Ti Stand
- Without built-in magnetic stirrer (stirring "from above"):
 - 804 Ti Stand with propeller 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 propeller stirrer to the stirrer connector (socket with stirrer symbol) of the titration stand.
- Start the control software.

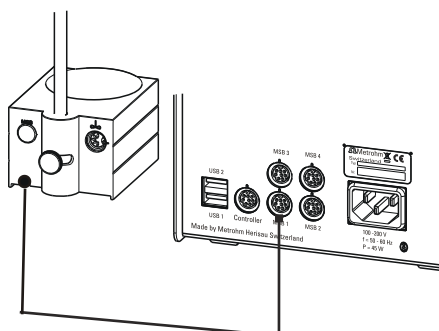


Figure 8 Connecting an MSB stirrer

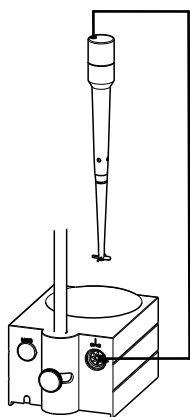


Figure 9 Connecting the propeller stirrer to the titration stand

3.3.3 Connecting a Remote Box

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

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

Proceed as follows:

1 Connecting the Remote Box

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

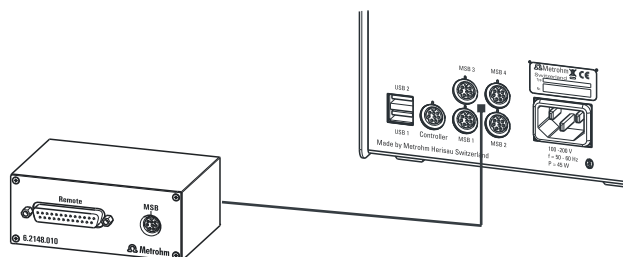


Figure 10 Connecting the Remote Box



You can, for example, connect an 849 Level Control (fill level monitoring in a 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 device, e.g. a dosing device or a stirrer, can be connected.

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

3.4 Connecting USB devices

3.4.1 General

The 856 Conductivity Module has two USB connectors (type A sockets) for peripheral devices with USB interfaces. The 856 Conductivity Module functions as a USB hub (distributor) no matter how it is operated. If you wish to connect more than two devices to the USB, you can also use an additional, commercially available USB hub.



CAUTION



CAUTION

If you operate the 856 Conductivity Module with the aid of the Touch Control, take care to ensure that the Touch Control is switched off when you set up or disconnect connections between the various instruments. If you use a PC software to control the 856 Conductivity Module, you should exit the program before you set up or disconnect the USB connections.

3.4.2 Connecting a USB hub

If you wish to connect more than two devices to the USB connector of the 856 Conductivity Module, you can also use an additional commercially available USB hub (distributor). If you operate the 856 Conductivity Module with the help of the Touch Control, then you should use a USB hub with its own power supply.

Connect the USB hub as follows:

- 1 Switch off the Touch Control and/or exit the PC software.

2 With the aid of the 6.2151.020 cable, connect the USB connector of the 856 Conductivity Module (type A) with the USB connector of the hub (type B, see manual for the hub).

3 Switch on the Touch Control.

The USB hub is recognized automatically.

3.4.3 Connecting a printer

Printers that are connected to the 856 Conductivity Module with Touch Control must meet the following requirements:

- Printer languages: HP-PCL (PCL 3 to 5, PCL 3GUI), Canon BJL Commands or Epson ESC P/2
- Printer resolution: 300 dots/inch or 360 dots/inch (Epson)
- Paper size: A4 or Letter, single-sheet feed.

Connect the printer as follows:

1 Switch off the Touch Control.

2 With the aid of the 6.2151.020 cable, connect the USB connector of the 856 Conductivity Module (type A) with the USB connector of the printer (type B, see manual for the printer).

3 Switch on the printer first, then the Touch Control.

4 Configure the printer in the device manager of the Touch Control (see Touch Control manual).

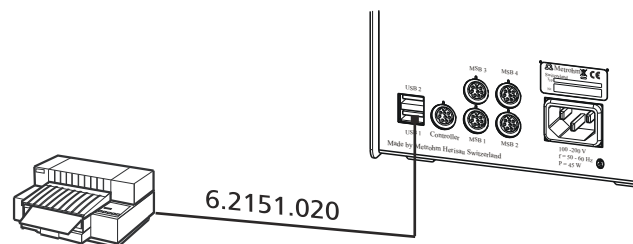


Figure 11 Connecting a printer

3.4.4 Connecting a balance

- Operation with a PC software:
 - Connect the balance directly to the serial connector (COM) of the computer. This is usually 9-pin and marked with the symbol **IOIOI**.



- Operation with Touch Control:
 - You will need the 6.2148.050 USB/RS-232 adapter to connect a balance.

The following table offers an overview of the balances that you can use together with the 856 Conductivity Module and of which cable you will need for connection to the RS-232 interface:

Balance	Cable
AND ER, FR, FX with RS-232 interface (OP-03)	6.2125.020 + 6.2125.010
Mettler AB, AG, PR (LC-RS9)	In the scope of delivery for the balance
Mettler AM, PM, PE with interface option 016 or Mettler AJ, PJ with interface option 018	6.2146.020 + 6.2125.010 Also from Mettler: ME 47473 adapter and either ME 42500 hand switch or ME 46278 foot switch
Mettler AT	6.2146.020 + 6.2125.010 Also from Mettler: ME 42500 hand switch or ME 46278 foot switch
Mettler AX, MX, UMX, PG, AB-S, PB-S, XP, XS	6.2134.120
Mettler AE with interface option 011 or 012	6.2125.020 + 6.2125.010 Also from Mettler: ME 42500 hand switch or ME 46278 foot switch
Ohaus Voyager, Explorer, Analytical Plus	Cable AS017-09 from Ohaus
Precisa balances with RS-232-C interface	6.2125.080 + 6.2125.010
Sartorius MP8, MC, LA, Genius, Cubis	6.2134.060
Shimadzu BX, BW	6.2125.080 + 6.2125.010

Operation with Touch Control

Connect the balance as follows:

- 1 Plug in the USB plug of the USB/RS-232 adapter at the USB connector of the 856 Conductivity Module.
- 2 Connect the RS-232 interface of the USB/RS-232 adapter with the RS-232 interface of the balance (see table for cable).
- 3 Switch on the Touch Control.
- 4 Switch on the balance.
- 5 Activate the RS-232 interface of the balance if necessary.
- 6 Configure the RS-232 interface of the USB/RS-232 adapter in the device manager of the Touch Control (see Touch Control manual).

3.4.5 Connecting a PC keyboard (only for operation with Touch Control)

The PC keyboard is used as an aid for text and numerical input.

Connect the PC keyboard as follows:

- 1 Insert the USB plug of the keyboard into one of the USB sockets of the 856 Conductivity Module.

- 2 Switch on the Touch Control.

The keyboard is recognized automatically and entered in the device manager.

- 3 Configure the keyboard in the device manager of the Touch Control (see Touch Control manual).

3.4.6 Connecting a barcode reader

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



Operation with Touch Control

Connect the barcode reader as follows:

- 1** Insert the USB plug of the barcode reader into one of the USB sockets of the 856 Conductivity Module.
- 2** Switch on the Touch Control.
The barcode reader is recognized automatically and entered in the device manager.
- 3** Configure the barcode reader in the device manager of the Touch Control (see Touch Control manual).

Settings on the barcode reader:

Program the barcode reader as follows (see also the manual for the barcode reader):

- 1** Switch the barcode reader to programming mode.
- 2** Specify the desired layout for the keyboard (USA, Germany, France, Spain, German-speaking Switzerland).
This setting must match the setting in the device manager (see the Touch Control manual).
- 3** Make sure that the barcode reader is set in such a way that Ctrl characters (ASCII 00 to 31) can be sent.
- 4** Program the barcode reader in such a way that the ASCII character 02 (STX or Ctrl B) is sent as the first character. This first character is normally referred to as the "Preamble" or "Prefix Code".
- 5** Program the barcode reader in such a way that the ASCII character 04 (EOT or Ctrl D) is sent as the last character. This last character is normally referred to as the "Postamble", "Record Suffix" or "Postfix Code".
- 6** Exit the programming mode.

3.5 Connecting sensors

The measuring interface contains the following measuring inputs:

- **Cond. Cell** for a conductivity measuring cell with integrated temperature sensor

3.5.1 Connecting a conductivity measuring cell

Various conductivity measuring cells can be connected to the 856 Conductivity Module. The 5-ring conductivity measuring cell with integrated temperature sensor can be connected directly to the **Cond. Cell** measuring input. You will need the 6.2103.160 adapter box for older Metrohm conductivity measuring cells, with or without temperature sensor.

The selection of the conductivity measuring cell depends on the measuring range.

Connect the conductivity measuring cell as follows:

- 1 Insert the plug of the conductivity measuring cell into the **Cond. Cell** socket of the 856 Conductivity Module.

Take care to ensure that the marking on the plug matches the marking on the Conductivity Module as shown in the figure.

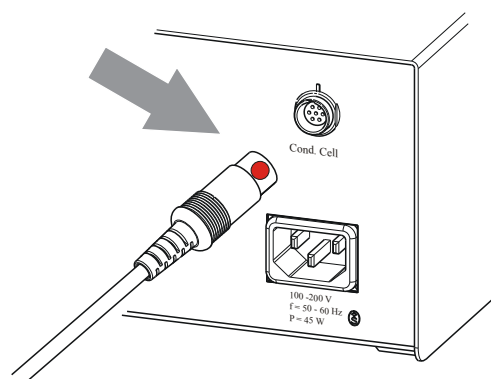


Figure 12 Connecting a conductivity measuring cell

Connecting older models

Connect older models of the conductivity measuring cell as follows:

- 1 Connect the adapter box to the **Cond. Cell** socket of the 856 Conductivity Module.

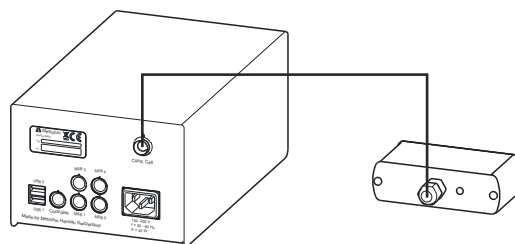


Figure 13 Connecting the adapter box

- 2 Plug the black plugs of the conductivity measuring cell into the black **Cond. Cell** sockets and the red plugs into the red **Pt 1000** sockets on the front of the adapter box.

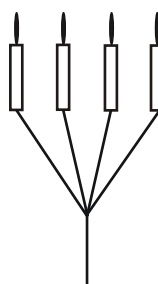
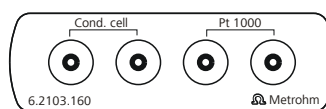


Figure 14 Connecting the conductivity measuring cell to the adapter box

During conductivity measurements, take care to ensure that

- the measuring cell is positioned in such a way that the upper side openings are completely immersed in the liquid.
- no air bubbles adhere to the Pt rings or Pt platelets. Air bubbles present inside the measuring cell can be removed by swinging back and forth and by tapping.
- the conductivity measuring cell is not so deeply submerged in the solution that it becomes damaged when the stirring bar is used to mix the solution.
- the magnetic stirrer is switched off during the measurement.

4 Operation and maintenance

4.1 General notes

4.1.1 Care

The 856 Conductivity Module requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the lifetime of the otherwise sturdy mechanics and electronics.

Spilled chemicals and solvents should be removed immediately. Above all, the plug connections on the rear of the instrument (in particular the power socket) should be protected from contamination.



CAUTION

Although this is largely prevented by design measures, the power plug should be unplugged immediately if aggressive media have found their way into the interior of the instrument to prevent serious damage to the instrument electronics. In such cases, Metrohm Service must be informed.

4.1.2 Maintenance by Metrohm Service

Maintenance of the 856 Conductivity Module is best carried out as part of annual service, which is performed by specialist personnel from Metrohm. A shorter maintenance interval may be necessary if you frequently work with caustic and corrosive chemicals.

Metrohm Service offers every form of technical advice for maintenance and service of all Metrohm instruments.



4.2 Quality Management and qualification 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 "**Metrohm Quality Management**" available from your local Metrohm representative.

Qualification

Please contact your local Metrohm representative for support in qualification of instruments and software. The **Installation Qualification (IQ)** and **Operational Qualification (OQ)** are offered by Metrohm representatives as a service. They are carried out by trained employees using standardized qualification documents and in accordance with the currently applicable requirements of the regulated industry. Further information on this can be found in the brochure "**Analytical Instrument Qualification – Confidence in quality with IQ/OQ**".

Maintenance

The electronic and mechanical functional groups of Metrohm instruments can and should be checked by specialist personnel from Metrohm as part of a regular preventive maintenance schedule. Please ask your local Metrohm representative regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement. Further information on this can be found in the brochure "**Metrohm Care Contracts – Protect your investment the smart way**" available from your local Metrohm representative.

5 Troubleshooting

5.1 General

Problem	Cause	Remedy
Unstable measuring signal - value near zero.	<i>The plug is plugged in incorrectly.</i>	The plug must be plugged in according to the manual (dot to line).
Measured values differ strongly from one another.	<i>The cuvette is missing.</i>	Screw the cuvette on to the 5-ring conductivity measuring cell. Measure only with cuvette!
The measurement signal is influenced by the movement of the 5-ring conductivity measuring cell and/or its position in the measuring vessel.	<i>The cuvette is missing.</i>	Screw the cuvette on to the 5-ring conductivity measuring cell. Measure only with cuvette!



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 Conductivity Module.

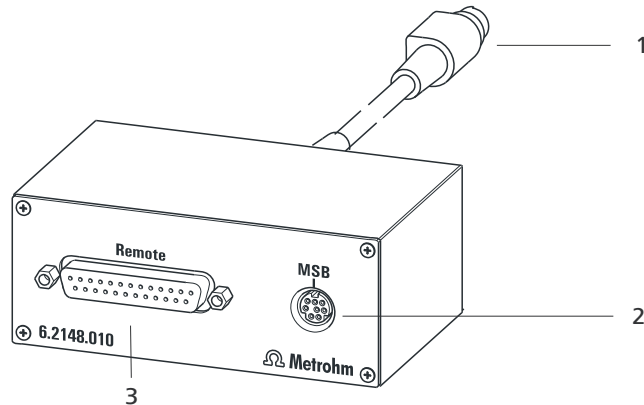


Figure 15 Connectors of the Remote Box

1 Cable

For connecting to the Conductivity Module.

2 MSB connector

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

3 Remote connector

For connecting instruments with a remote interface.

6.1.1 Pin assignment of the remote interface

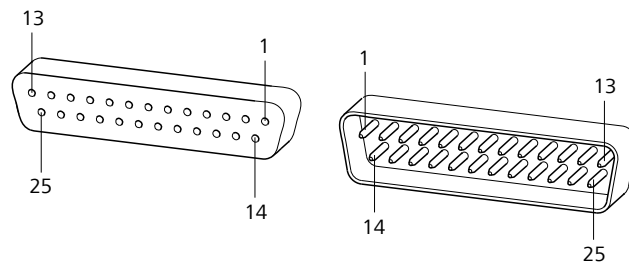
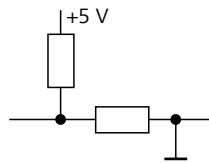


Figure 16 Pin assignment of remote socket and remote plug

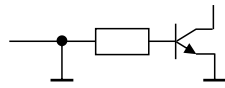
The above figure of the pin assignment applies for all Metrohm instruments with 25-pin D-Sub remote connector.

Inputs

approx. 50 k Ω Pull-up

$t_p > 20$ ms

active = low, inactive = high

Outputs

Open Collector

$t_p > 200$ ms

active = low, inactive = high

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

+5 V: maximum load = 20 mA

The following tables offer information concerning the assignment of the individual pins and their function:

Table 1 Inputs and outputs of the remote interface

Assignment	Pin No.	Function*
Input 0	21	Start
Input 1	9	Stop
Input 2	22	
Input 3	10	Quit
Input 4	23	–
Input 5	11	
Input 6	24	
Input 7	12	
Output 0	5	Ready
Output 1	18	Conditioning OK
Output 2	4	Determination
Output 3	17	EOD
Output 4	3	
Output 5	16	Error
Output 6	1	
Output 7	2	Warning



Assignment	Pin No.	Function*
Output 8	6	
Output 9	7	
Output 10	8	
Output 11	13	
Output 12	19	
Output 13	20	
0 volts / GND	14	
+5 volts	15	
0 volts / GND	25	

* Signal activated only for operation with Touch Control.

Table 2 Explanation of the individual functions

Function	Explanation
Start	The current method is started at the time of activation. $t_{\text{pulse}} > 100 \text{ ms}$
Stop	The current method is canceled (Stop) at the time of activation. $t_{\text{pulse}} > 100 \text{ ms}$
Quit	The current command in the determination run will be canceled at the time of activation. $t_{\text{pulse}} > 100 \text{ ms}$
Ready	The instrument is ready to receive a start signal.
Conditioning OK	The line is set when Conditioning with SET titration and KFT titration is at OK. The line remains set until the determination is started with [START] .
Determination	The instrument performs a data-generating determination.
EOD	End of Determination. Pulse ($t_{\text{pulse}} = 200 \text{ ms}$) after a determination or after a buffer/standard solution during calibration using a Sample Processor.
Error	The line is set for error message display.



Function	Explanation
Warning	The line is set for warning message display.



7 Technical specifications

7.1 Measuring interface

The 856 Conductivity Module has one measuring interface with one measuring input.

The measuring cycle is 100 ms for all measuring modes.

7.1.1 Conductivity

One measuring input (**Cond. Cell**) for a 5-ring conductivity measuring cell with integrated temperature sensor.

<i>Measuring range</i>	0 - 500 mS
<i>Resolution</i>	4 significant places
<i>Measuring accuracy</i>	Range 1 - 5 μ S: $\pm 1\%$; ± 1 digit Range 5 - 50 μ S: $\pm 0.5\%$; ± 1 digit Range 50 - 500 μ S: $\pm 0.5\%$; ± 1 digit Range 0.5 - 5 mS: $\pm 0.5\%$; ± 1 digit Range 5 - 50 mS: $\pm 0.5\%$; ± 1 digit Range 50 - 500 mS: $\pm 1\%$; ± 1 digit

7.1.2 Temperature

One measuring input (**Cond. Cell**) for a 5-ring conductivity measuring cell with integrated Pt1000 temperature sensor.

<i>Measuring range</i>	-40 - +150 °C
<i>Resolution</i>	0.1 °C
<i>Measuring accuracy</i>	± 0.2 °C (typically ± 0.1 °C; ± 1 digit; without sensor error, under reference conditions)

7.2 Power connection

<i>Supply voltage</i>	100 - 240 V
<i>Frequency</i>	50 - 60 Hz
<i>Power consumption</i>	45 W
<i>Fuse</i>	2 x 1.6 ATH

7.3 Safety specifications

<i>Design and testing</i>	<ul style="list-style-type: none"> ▪ EN/IEC 61010-1 ▪ UL 61010-1 ▪ CSA-C22.2 No. 61010-1 ▪ Protection class I
<i>Safety instructions</i>	The documentation contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

7.4 Electromagnetic compatibility (EMC)

<i>Emission</i>	<p>Standards fulfilled:</p> <ul style="list-style-type: none"> ▪ EN/IEC 61326-1 ▪ EN/IEC 61000-6-3 ▪ EN/IEC 61000-6-4 ▪ EN 55022 / CISPR 22
<i>Immunity</i>	<p>Standards fulfilled:</p> <ul style="list-style-type: none"> ▪ EN/IEC 61326-1 ▪ EN/IEC 61000-6-2 ▪ EN/IEC 61000-4-2 ▪ EN/IEC 61000-4-3 ▪ EN/IEC 61000-4-4 ▪ EN/IEC 61000-4-5 ▪ EN/IEC 61000-4-6 ▪ EN/IEC 61000-4-11 ▪ EN/IEC 61000-4-14 ▪ NAMUR



7.5 Ambient temperature

<i>Nominal function range</i>	+5 - +45 °C (at a maximum of 85% humidity)
<i>Storage</i>	-20 - +60 °C
<i>Transport</i>	-40 - +60 °C

7.6 Reference conditions

<i>Ambient temperature</i>	+25 °C (± 3 °C)
<i>Relative humidity</i>	≤ 60%
<i>Instrument status</i>	Instrument in operation at least 30 min
<i>Validity of the data</i>	After adjustment

7.7 Dimensions

<i>Width</i>	142 mm
<i>Height</i>	108 mm
<i>Depth</i>	230 mm
<i>Weight</i>	2,760 g
<i>Material</i>	Steel sheet

7.8 Interfaces

USB connectors

<i>USB ports</i>	2 USB downstream ports (type A sockets), 500 mA each, for connecting peripheral devices such as printers, keyboards, barcode readers or RS-232/USB boxes (Metrohm order no. 6.2148.020).
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Connector "Controller"

<i>Controller port</i>	USB upstream port with auxiliary power supply (Mini DIN socket) for connecting Touch Control or computer for controlling the 856 Conductivity Module.
<i>Touch Control</i>	With integrated Touch Control cable.
<i>Computer</i>	With 6.2151.000 cable.

**MSB connectors (Metrohm Serial Bus)**

<i>Dosing device</i>	Connector for a maximum of four external dosing devices, models Dosimat or Dosino (MSB 1 to MSB 4).
<i>Stirrer</i>	Connector for a maximum of four stirrers. Stirrer control: switching on/off manually or coordinated with the titration sequence. Speed in 15 steps and shift direction can be selected.
<i>Remote Box</i>	Connector for a maximum of four Remote Boxes. Remote Boxes can be used to actuate and monitor external devices.

The same warranty periods that are specified for a corresponding new part apply to parts that are replaced or repaired within the above-mentioned warranty periods. However, replacement or repair of a part does not extend the warranty period of the entire system.

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.

Metrohm also offers a 120-month spare parts availability guarantee and a 60-month PC software support warranty, calculated from the date on which the product is withdrawn from the market. The content of this warranty is the ability of the customer to obtain functioning spare parts or appropriate software support at market prices during the time of the warranty period. This does not apply for software products sold under the Metrohm NIRSystems brand.

If Metrohm AG is unable to meet this obligation due to circumstances beyond the control of Metrohm AG, then the ordering party shall be offered alternative solutions at preferential conditions.

9 Accessories

Up-to-date information on the scope of delivery and optional accessories for your instrument can be found on the Internet.





NOTE

When you receive your new instrument, we recommend downloading the accessories list from the Internet, printing it out and keeping it together with the manual for reference purposes.

Instruments currently sold

If you do not know the article number of your instrument, proceed as follows:

Downloading the accessories list

- 1 Go to the Metrohm website <http://www.metrohm.com/com>.
- 2 Click on .
The **Search** webpage will be displayed.
- 3 Enter a search term relating to the instrument into the search field and click on **Find**.
The search results will be displayed.
- 4 In the search results, select the **Devices** tab (if it is not already selected) and then click on the Metrohm article number of the required instrument (e.g. 2.852.0050).
The page with information pertaining to the searched article is displayed.
- 5 Select the **Parts** tab.
The complete list of accessories with the scope of delivery and the optional accessories will be displayed.
- 6 Click on .

The **Partslists** webpage will be displayed.

7 Select the desired output language.

8 With the article number entered, click on the command **Generate PDF**.

The PDF file with the accessories data will be created in the language selected.

Direct access for all instruments

If you are unable to find your instrument using the search as described above, this may be due to the instrument not being sold anymore. Using the article number, you can download accessories lists for all instruments as follows:

Downloading the accessories list

1 Type <http://partslists.metrohm.com> into your Internet browser.

The **Partslists** webpage will be displayed.

2 Select the desired output language.

3 Enter the article number and click on the **Generate PDF** command.

The PDF file with the accessories data will be created in the language selected.



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