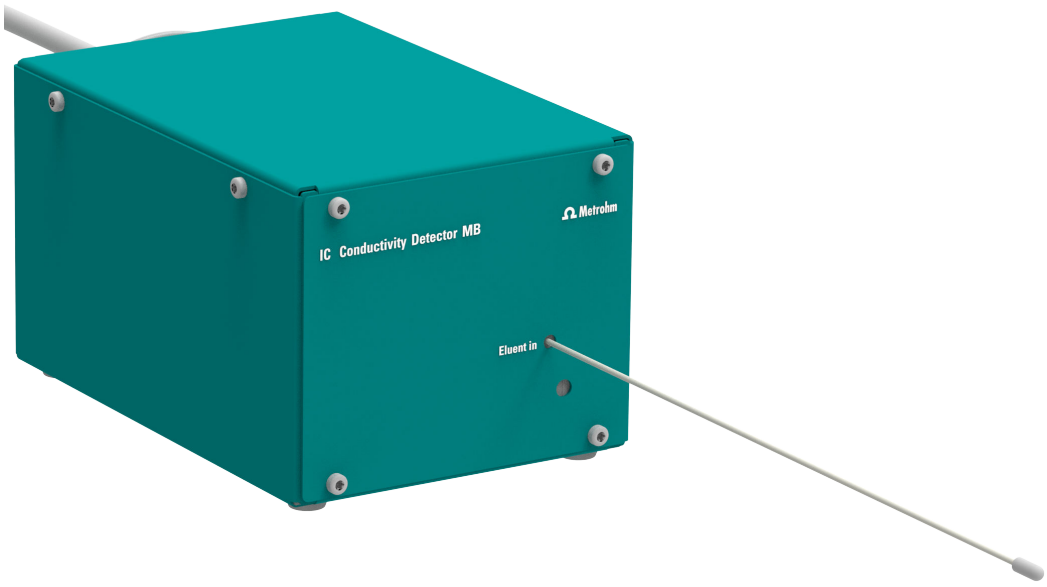
IC Professional Detector



IC Conductivity Detector MB

Manual

8.850.8065EN / 2022-11-15

Metrohm

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2.850.9020

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Technical Communication
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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.

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1 Introduction

1.1 Instrument description

The **IC Conductivity Detector MB** is an intelligent conductivity detector. It is intended for use with the following instruments:

- 940 Professional IC Vario
- 930 Compact IC Flex

The IC Conductivity Detector MB continuously measures the conductivity of the liquid passing through and indicates these signals in digital form (DSP – Digital Signal Processing). The conductivity detector exhibits outstanding thermal stability and thus guarantees reproducible measuring conditions.

The IC Conductivity Detector MB can only be used together with the IC instrument. The **MagIC Net** software detects the IC Conductivity Detector MB automatically and checks its functional readiness. It controls and monitors all instruments connected together, evaluates the measured data and manages it in a database. The operation of MagIC Net is described in the online help and the tutorial for MagIC Net.

1.2 Overview of the instrument

1.2.1 Front

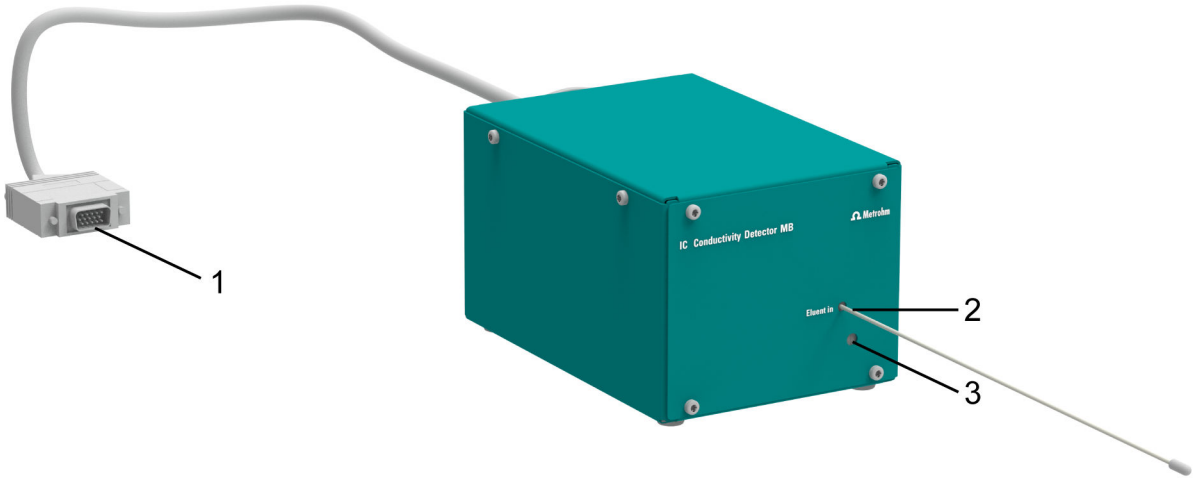


Figure 1 Front

1 **Detector cable** With installed plug.	**2** **Opening for temperature sensor**
3 **Detector inlet capillary** Permanently installed.	

1.2.2 Rear

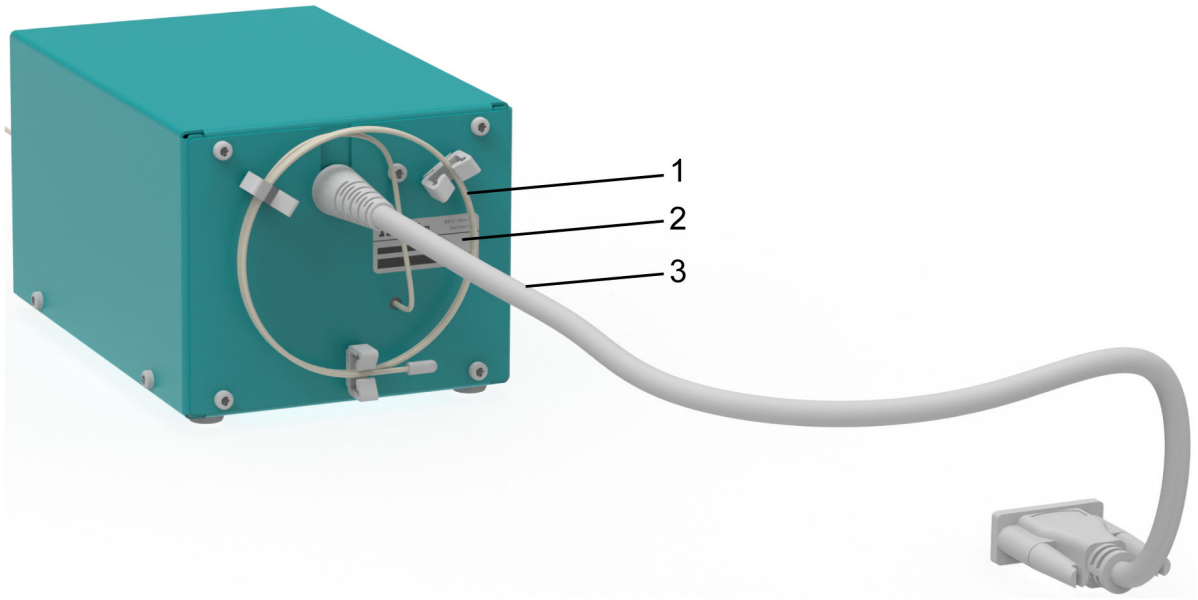


Figure 2 Rear

1 **Detector outlet capillary** Permanently installed.	**2** **Type label** With serial number.
3 **Detector cable** With installed plug.	

1.3 Accessories and additional information

Additional information is available on the Metrohm website (*https://www.metrohm.com*):

- Product family
- Product versions
- Accessories
- Documents about the product

Downloading the accessories list

NOTICE

The accessories list is a part of the product documentation. Download the accessories list and store it as a reference.

1. Use the search function to search for the product.
2. Open the desired product version.
3. Download the accessories list.

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 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.

2 Safety

2.1 Intended use

The IC Conductivity Detector MB can only be used together with an IC instrument. It is used for the precise measurement of the conductivity during the ion chromatographic determination of cations and anions.

Like the associated IC instrument, the IC Conductivity Detector MB is also suitable for processing chemicals and flammable samples. Therefore, the use of the IC Conductivity Detector MB 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.

2.2 Responsibility of the operator

The operator must ensure that basic regulations on occupational safety and accident prevention in chemical laboratories are observed. The operator has the following responsibilities:

- Instruct personnel in the safe handling of the product.
- Train personnel in the use of the product according to the user documentation (e.g. install, operate, clean, eliminate faults).
- Train staff on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g. protective glasses, gloves).
- Provide suitable tools and equipment to carry out the work safely.

The product may be used only when it is in perfect condition. The following measures are required to ensure the safe operation of the product:

- Check the condition of the product before use.
- Remedy defects and malfunctions immediately.
- Maintain and clean the product regularly.

2.3 Requirements for operating personnel

Only qualified personnel may operate the product. Qualified personnel are persons who meet the following requirements:

- Basic regulations on occupational safety and accident prevention for chemical laboratories are known and complied with.
- Knowledge of handling hazardous chemicals is present. Personnel have the ability to recognize and avoid potential dangers.
- Knowledge regarding the application of fire prevention measures for laboratories is available.
- Safety-relevant information is communicated and understood. The personnel can operate the product safely.
- The user documentation has been read and understood. The personnel operate the product according to the instructions in the user documentation.

2.4 Safety instructions

2.4.1 General notes on safety

WARNING

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

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

2.4.2 Electrical safety

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.

Protection against electrostatic charges

WARNING

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

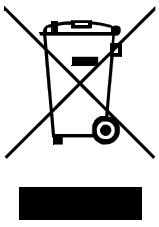
Do not fail to pull the power cord out of the power socket before you set up or disconnect electrical plug connections at the rear of the instrument.

2.4.3 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.

2.4.4 Recycling and disposal



This product is covered by European Directive 2012/19/EU, WEEE – Waste Electrical and Electronic Equipment.

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

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

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

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

3.1.2 Check

Immediately upon receiving the shipment, check it against the delivery note to ensure that it is complete and undamaged.

3.1.3 Location

The IC Conductivity Detector MB is designed for usage in the detector chamber of the IC instruments. For the location, the same conditions apply as for the IC instrument.

3.2 Inserting the detector

The IC Conductivity Detector MB is inserted into the instruments from the rear.

Figure 3 shows how the detector is inserted into an IC instrument in 6 simple steps. The detector is inserted in the same way for all Metrohm ion chromatographs.

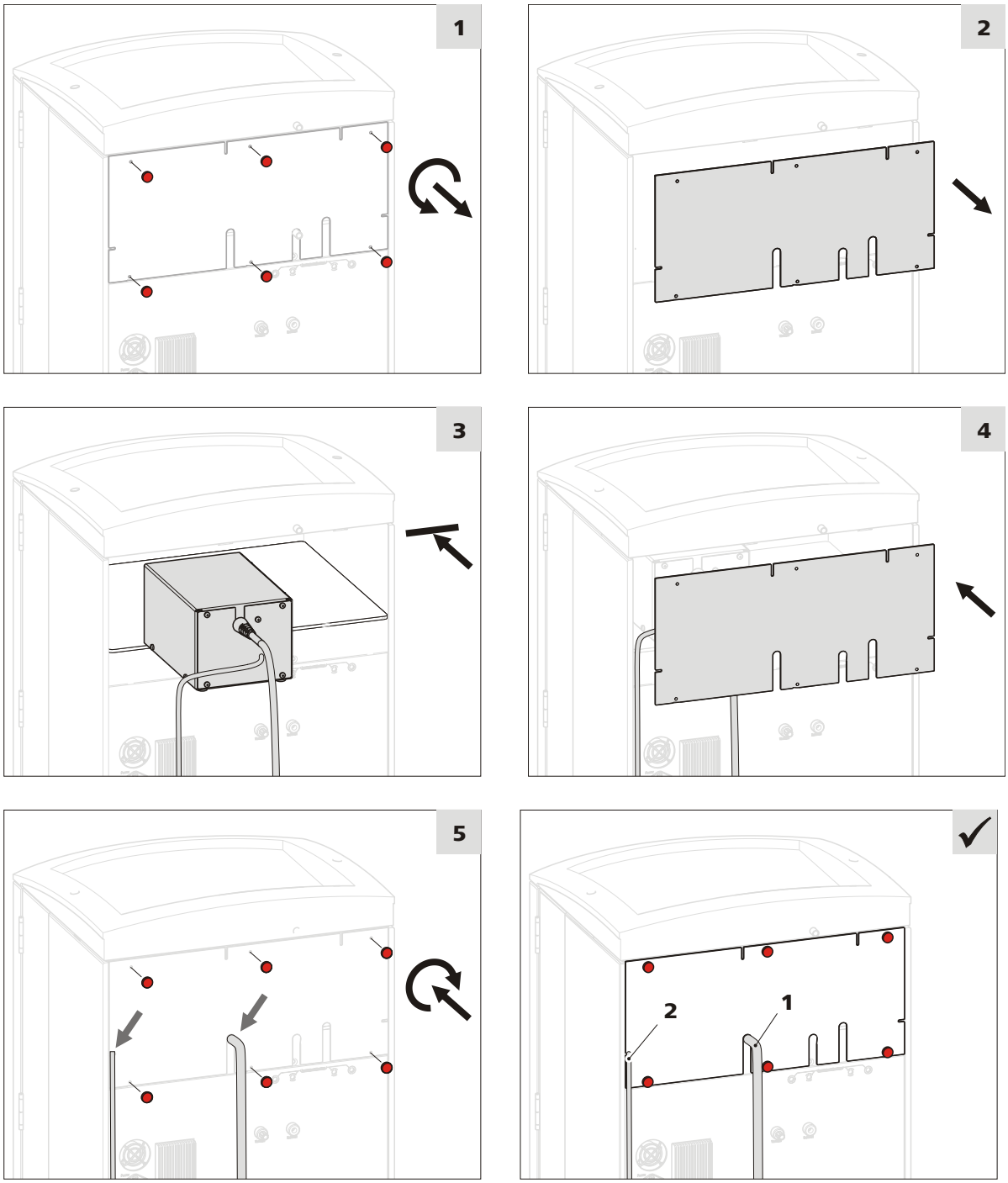


Figure 3 Insert the detector

1 Detector connection cable	**2 Detector outlet capillary**

NOTICE

Up to two detectors can be placed and connected in instruments of the 940 Professional IC Vario line of instruments.

1 detector can be placed and connected in the instruments of the 930 Compact IC Flex line of instruments.

Inserting the detector in the instrument

1 Removing the knurled screws

- Unscrew the knurled screws on the back panel.

2 Removing the back panel

- Remove the back panel.

3 Positioning the detector

- Put the detector through the opening and position it on the support surface in the instrument intended for this purpose and slide it forward as far as it will go.

4 Replacing the back panel

- Insert the detector cable in a cable gland on the back panel.
- Insert the detector outlet capillary in a suitable capillary feed-through.
- Replace the back panel.

The detector cable *(3-**1**)* and the detector outlet capillary *(3-**2**)* should freely hang out of the cable gland or capillary feed-through.

5 Tightening the knurled screws

- Tighten the knurled screws.

3.3 Connecting the detector

Connecting the detector cable and detector outlet capillary

CAUTION

The instrument **must** be switched off when connecting a detector.

1 Connecting the detector

- Connect the detector connection cable *(3-**1**)* at the *Detector 1* detector connection socket.

NOTICE

Recommendation: In AnCat systems with 2 detectors: anions to *Detector 1*, cations to *Detector 2*.

2 Connecting the detector outlet capillary

- Guide the detector outlet capillary *(3-**2**)* into a sufficiently large waste container and fasten it there.

NOTICE

The detector outlet capillary must be free of blockages (the measuring cell is tested to 10 MPa = 100 bar backpressure).

NOTICE

Do not shorten the detector outlet capillary!

Shortening the detector outlet capillary reduces the backpressure. This can lead to outgassing of air in the detector cell. This increases the noise.

3.4 Connecting the detector inlet capillary

The detector inlet capillary is connected differently, depending on the equipment of the IC instruments:

- For instruments without suppression, directly on the separation column *(see "Connecting the detector inlet capillary to the separation column", page 12)*.
- For instruments with chemical suppression, on the MSM or on the MSM-HC *(see "Connecting the detector inlet capillary to MSM / MSM HC", page 12)*.
- For instruments with sequential suppression, on the MCS *(see "Connecting the detector input capillary to the MCS", page 13)*.

Connecting the detector inlet capillary to the separation column

1 Connecting the detector inlet

- Use a pressure screw *(4-**2**)* 6.2744.070 to fasten the detector inlet capillary *(4-**1**)* directly to the column outlet *(4-**3**)*.

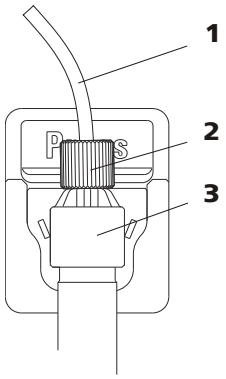


Figure 4 Connection detector–separation column

1 Detector inlet capillary	**2 PEEK pressure screw, short 6.2744.070**
3 Separation column	

Connecting the detector inlet capillary to MSM / MSM HC

1 Connecting the detector inlet

- Connect the detector inlet capillary *(5-**1**)* and the capillary of the MSM / MSM-HC *(5-**2**)* labeled *out* to each other using a coupling 6.2744.040 *(5-**3**)* and two short pressure screws 6.2744.070 *(5-**4**)*.

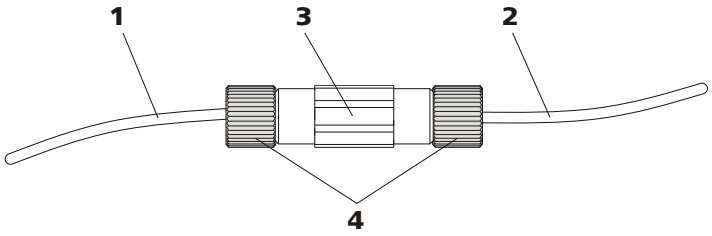


Figure 5 Connector detector–MSM

1 Detector inlet capillary	**2 MSM / MSM-HC outlet capillary** Labeled *out*.
3 Coupling 6.2744.040	**4 Pressure screws, short 6.2744.070**

Connecting the detector input capillary to the MCS

1 Connecting the detector inlet

- Fasten the detector inlet capillary *(6-**1**)* to the output of the MCS *(6-**3**)* using a long pressure screw 6.2744.090 *(6-**2**)*.

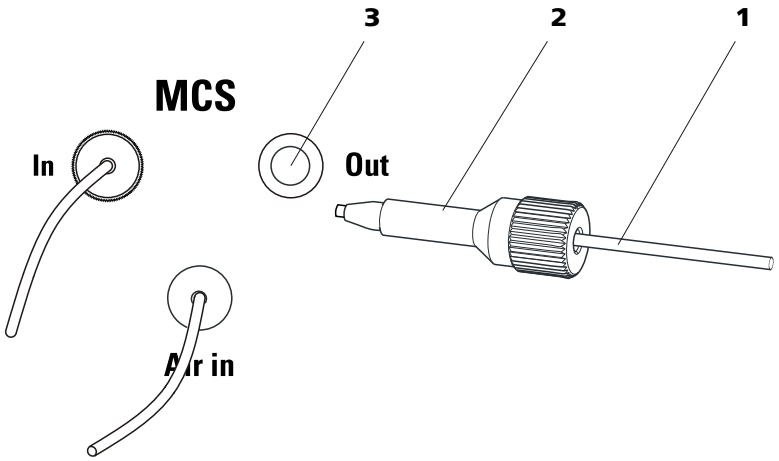


Figure 6 Connection detector–MCS

1 Detector inlet capillary	**2 Pressure screw, long 6.2744.090**
3 MCS outlet	

3.5 Connecting the instrument to the power grid

WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the instrument while the power cord is still connected.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- Unplug the power plug immediately if you suspect that moisture has gotten inside the instrument.
- Only personnel who have been issued Metrohm qualifications may perform service and repair work on electrical and electronic parts.

Connecting the power cord

Accessories

Power cord with the following specifications:

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

NOTICE

Do not use a not permitted power cord!

1 Plugging in the power cord

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

4 Start-up

The IC Conductivity Detector MB is put into operation together with the IC instrument in which it has been inserted to. Additional information can be found in the *Start-up* chapter in the manual for the IC instrument.

5 Operation and maintenance

5.1 Maintenance

The status of the detector cell can be determined from the cell constant. The detector is supplied with a cell constant determination.

NOTICE

Metrohm recommends having the cell constant re-determined annually by the regional Metrohm service representative.

CAUTION

The conductivity detector must not be opened!

The conductivity detector is maintenance-free to a large extent. In rare cases, a blockage may occur. In this case, check the capillaries and rinse the detector as follows.

WARNING

When rinsing the detector without column, the pressure must not exceed **10 MPa**. In order to ensure this, the maximum pressure of the high pressure pump must be set to **10 MPa** in MagIC Net.

If the conductivity detector is blocked, first check whether the blockage is caused by the capillary ends being pressed too tightly. In this case, shorten the detector input capillary *(1-**3**)* or the detector outlet capillary *(2-**1**)* by several millimeters.

If this does not help, the conductivity detector can be rinsed against the normal flow direction. To do this, connect the high-pressure pump to the detector outlet capillary *(2-**1**)* and rinse - **the pressure must not exceed 10 MPa**.

6 Troubleshooting

6.1 Problems and their solutions

Problem	Cause	Remedy
The pressure in the system markedly increases.	*The conductivity detector is blocked.*	*(see chapter 5, page 16)* ▪ Shorten the capillary ends by a few millimeters. ▪ Rinse the detector opposite the normal flow direction.
Conductivity detector is not recognized in the software	*No connection.*	▪ Check the connector of the detector cable. ▪ Switch the instrument off and on again (after 15 seconds).

7 Technical specifications

7.1 Ambient conditions

Operation	
Nominal function range	+5 to +45 °C at max. 80% relative humidity, non-condensing
Sea level	Max. 4,000 m.a.s.l.
Storage	+5 to +45 °C

7.2 Conductivity measuring system

Type	▪ Microprocessor-controlled Digital Signal Processing (DSP technology) ▪ Intelligent detector with 6 reference chromatograms
Measuring range	0–15000 µS/cm without range switching
Noise	< 0.1 nS at 1 µS/cm
Linearity deviations	▪ < 0.1% for conductivity values higher than 16 µS/cm ▪ < 1% for conductivity values lower than 16 µS/cm
Drift	< 0.2 nS/cm per hour
Measuring rate	10 measurements per second for optimum results without filtering
Resolution	0.0047 nS/cm
Baseline	Noise < 0.2 nS/cm typical for sequential suppression
Conductivity detector	
Cell volume	0.3 µL
Cell constant	▪ Individual calibration data saved in the detector ▪ Adjustable in the range: 13.0–21.0 /cm
Electrodes	Ring-shaped electrodes made of stainless steel X2CrNiMo17-12-2 (316 L), compatible with MSA
Materials in contact with eluent	Chemically inert PCTFE
Maximum operating pressure	10.0 MPa (100 bar)
Cell temperature	20–50 °C in increments of 5 °C

Temperature stability	< 0.001 °C
Temperature compensation	0–5%/K adjustable, default 2.3%/K
Heating time	< 30 minutes (40 °C)

7.3 Interfaces

Detector cable	D-sub 15-pin, high-density

7.4 Energy supply

Power supply via detector cable	5 V, 6.5 V, 42 V

7.5 Reference conditions

Ambient temperature	25 °C (±3 °C)
Instrument status	> 40 min in operation

7.6 Dimensions

Width	108 mm
Height	93 mm
Depth	158 mm
Weight (without accessories)	1.858.9010: 2.3 kg
Material	
Housing	Steel, coated

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