

IC Equipment



Thin-Layer cell

Manual
8.110.8020EN



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6.5337.200

Manual

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1 Introduction

1.1 Description

The Thin-Layer cell is used for amperometric detection with the Amperometric Detector. The Thin-Layer cell especially qualifies for applications with double detector mode, e. g. if an amperometric detection is followed by another detection technique.

In the Thin-Layer cell, the sample flows in a thin layer between the auxiliary electrode and the working electrode and is analyzed with amperometric methods.

1.2 About the documentation



Caution

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

1.2.1 Content and scope

Content of this manual

This manual describes:

- The insertion of the working electrode in the Thin-Layer cell.
- The insertion of the reference electrode in the Thin-Layer cell.
- The connection of the capillaries and the electrode cables.
- All maintenance work that can be carried out by the user.
- The technical specifications of the Thin-Layer cell.
- The supplied and the optional accessories.

Further information







Detailed information concerning the insertion of the measuring cell into the detector can be found in the manuals for the amperometric detector.

Information on the utilization, care and maintenance of the working electrodes and reference electrodes can be found in the leaflets which are enclosed with the electrodes.



1.2.2 Symbols and conventions

The following symbols and formatting may appear in this documentation:

<i>(5-12)</i>	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 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 Overview

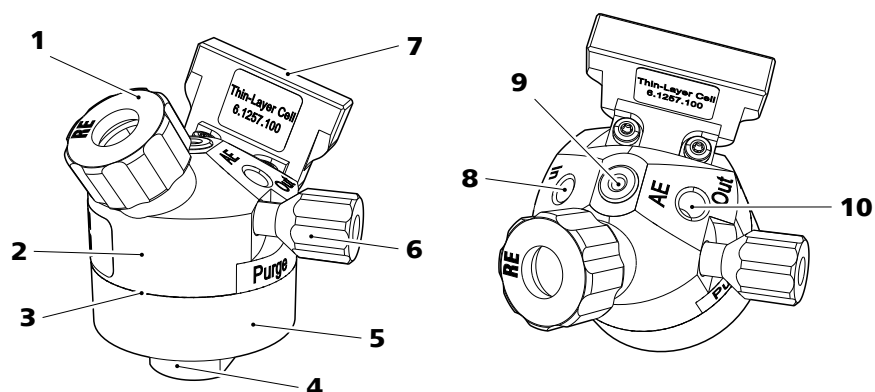


Figure 1 Thin-Layer cell – Parts and connectors

<p>1 Fastening screw For fixing the reference electrode in place. Labeled with RE.</p>	<p>2 Measuring part With built-in auxiliary electrode.</p>
<p>3 Spacer</p>	<p>4 Pressure screw For fixing the working electrode (WE) in place.</p>
<p>5 Base part</p>	<p>6 Stopper For sealing the deaeration opening.</p>
<p>7 Chip With intelligence. For inserting the measuring cell into the detector.</p>	<p>8 Eluent input Labeled with In.</p>
<p>9 Electrode cable connection socket For the auxiliary electrode cable. Labeled with AE.</p>	<p>10 Eluent output Labeled with Out.</p>



3 Installation



Caution

Never switch on the measuring cell..

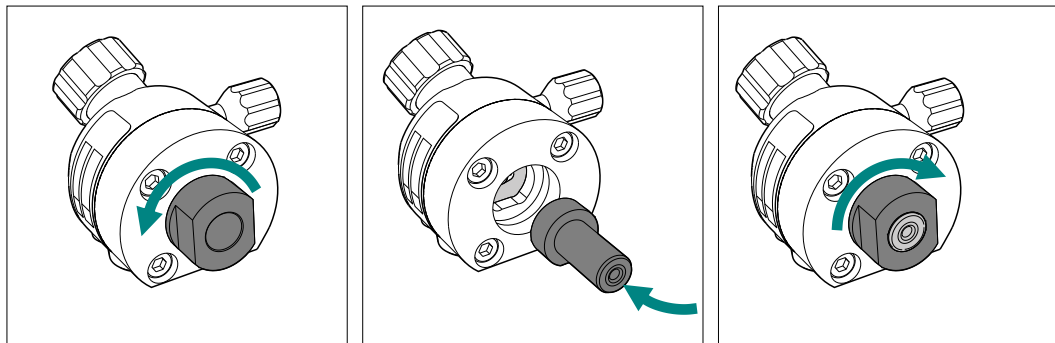
- ... if it is not simultaneously being rinsed by a conductive eluent; or
- ... if the electrode cables are not completely connected.

3.1 Inserting the working electrode

The measuring cell is supplied without electrodes. The working electrode must be ordered separately.

Insert the working electrode as follows:

Inserting the working electrode



- 1** Unscrew the pressure screw on the base part of the cell and remove it.
- 2** Insert the working electrode in the opening. The working electrode is formed in such a way that it can be inserted into the measuring cell in only one position.
- 3** Slide the pressure screw over the working electrode and screw it tightly.

3.2 Inserting the reference electrode

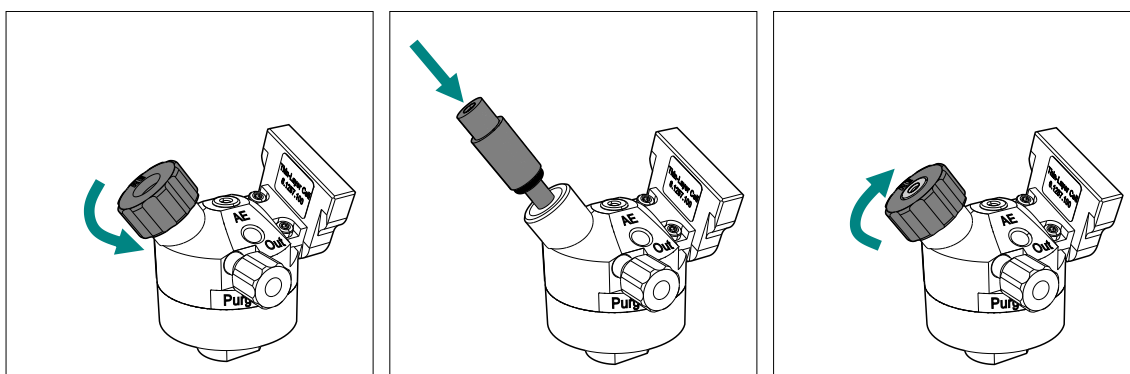
The measuring cell is supplied without electrodes. Reference electrodes must be ordered separately.

Insert the reference electrode as follows:

Inserting the reference electrode

The reference electrode itself and one sealing ring are contained in the packaging for the reference electrode.

- 1 Slide the sealing ring over the reference electrode.



- 2 Unscrew the fastening screw on the RE connector and remove it.
- 3 Insert the reference electrode into the opening with the flat side facing downward.
- 4 Retighten the fastening screw.

Special case: Ag/AgCl reference electrode

The Ag/AgCl reference electrode (6.1257.720) is, in contrast to the other reference electrodes, permanently connected to the reference electrode cable.

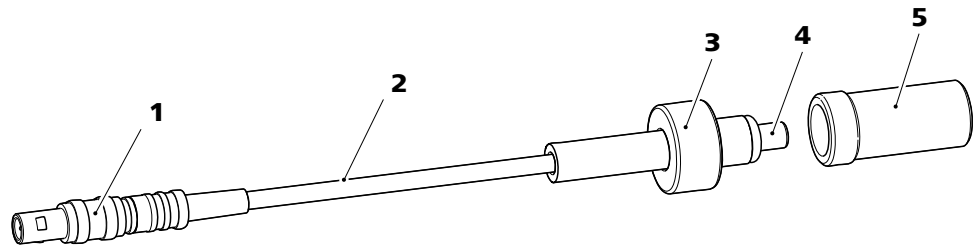


Figure 2 Ag/AgCl reference electrode (6.1257.720)

1 Plug

For sealing the storage vessel.

3 Sealing screw

For sealing the storage vessel.

5 Storage vessel

For storing the Ag/AgCl reference electrode.

2 Reference electrode cable

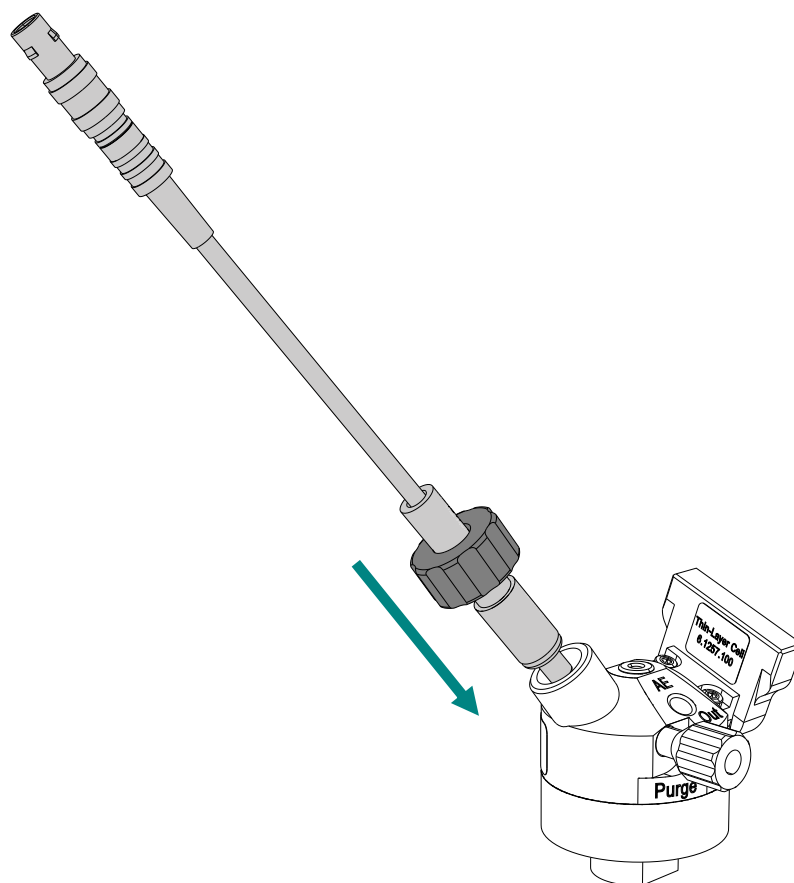
Permanently mounted on the reference electrode.

4 Reference electrode

Insert the reference electrode as follows:

Inserting the Ag/AgCl reference electrode

- 1 Take the Ag/AgCl reference electrode out of the storage vessel. Pull the sealing screw of the storage vessel over the plug and reseal the storage vessel with it.



- 2** Unscrew the fastening screw from the reference electrode holder. Push the fastening screw over the cable of the Ag/AgCl reference electrode.
- 3** Check whether the sealing ring is seated on the reference electrode and insert the reference electrode into the reference electrode holder.
- 4** Tighten the reference electrode to the reference electrode holder with the fastening screw.

Further information regarding the correct handling of the Ag/AgCl reference electrode can be found in the leaflet for the Ag/AgCl reference electrode.



3.3 Connecting the detector capillaries

The amperometric detector has a preheating capillary in its interior that ensures that the eluent flows through the measuring cell at a constant temperature.

Connecting the preheating capillary is optional. If the ambient conditions are optimal or if the eluent in the column is heated, then the measuring results can be sufficiently accurate, even without the use of the preheating capillary.



Caution

The preheating capillary may not be used with readily flammable liquids!

In the event of a leak, the fluid might evaporate and ignite in the heating area.

If the preheating capillary is used, proceed as follows:

Connecting capillaries to the measuring cell

1 Connect the preheating capillary



Note

This preheating capillary must be tested with the IC instrument the first time the detector is put into operation, see Chapter "Start-up" in the manual for the detector.

- Use a pressure screw (6.2744.014) to connect the detector input capillary to the connector **Eluent in** on the detector.
- Use a pressure screw (6.2744.014) to fasten a piece of the PEEK capillary (6.1831.010) to the **Eluent to cell** connector on the detector.

2 Connect the cell input

Use a pressure screw (6.2744.014) to fasten the other end of the PEEK capillary (6.1831.010) to the **In** connector on the measuring cell.

3 Connect the cell output

Use a pressure screw (6.2744.014) to fasten a 1–1.5 m long piece of the PEEK capillary (6.1831.010) to the **Out** connector on the measuring cell.



Note

This capillary must be tested with the IC instrument the first time the detector is put into operation, see Chapter "*Start-up*" in the manual for the detector.

If the preheating capillary is not used, proceed as follows:

Connecting capillaries to the measuring cell

1 Connect the cell input

Use a pressure screw (6.2744.014) to fasten the detector input capillary to the **In** connector on the measuring cell.

2 Connect the cell output

Use a pressure screw (6.2744.014) to fasten a 1–1.5 m long piece of the PEEK capillary (6.1831.010) to the **Out** connector on the measuring cell.



Note

This capillary must be tested with the IC instrument the first time the detector is put into operation, see Chapter "*Start-up*" in the manual for the detector.



3.4 Connecting the electrode connection cables



Caution

The electrode cables may not be plugged or unplugged unless the measuring cell is switched off in the software.



Note

The sockets and the plugs of the cables must be clean and dry.

Connecting the electrode connection cables to the detector

Prerequisites:

- The measuring cell is switched off.

- 1** Plug in the straight plug of the working electrode connection cable (red sleeve) into the **WE** socket of the detector.
- 2** Plug in the straight plug of the reference electrode connection cable (black sleeve) into the **RE** socket of the detector.
- 3** Plug in the straight plug of the auxiliary electrode connection cable (blue sleeve) into the **AE** socket of the detector.

Connecting the electrode connection cables to the measuring cell

Prerequisites:

- The working electrode and the reference electrode are inserted into the measuring cell.
- 1** Plug in the angled plug of the working electrode connection cable (labeled with **WE**) into the working electrode socket.
 - 2** Plug in the angled plug of the reference electrode connection cable (labeled with **RE**) into the reference electrode socket.



4 Start-up

The measuring cell must be put into operation together with the amperometric detector. Additional information in this regard can be found in the manual for the detector.

5 Operation and maintenance

5.1 Operation

The measuring cell is operated together with the detector and the entire IC system with the MagIC Net™ software.

Additional information for operation with MagIC Net™ can be found in the "*Tutorial for MagIC Net™*" or in the MagIC Net™ online help.

5.2 Maintenance

The measuring cell must be taken out of the detector for the following maintenance tasks.



Caution

The electrode cables may not be unplugged unless the measuring cell is switched off in the software!

Taking the measuring cell out of the detector

- 1 In the software, switch off the measuring cell.
- 2 Disconnect all three electrode cables.
- 3 On the measuring cell holder, push the **Press** switch and remove the measuring cell from the holder.

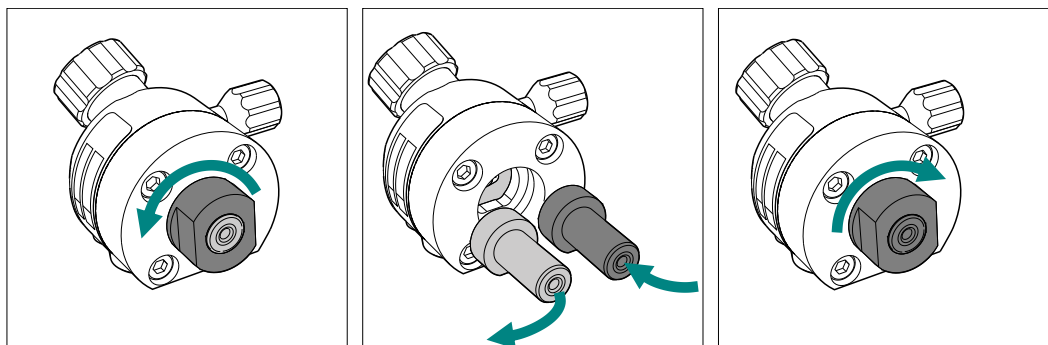
5.2.1 Replacing the working electrode

Replacing the working electrode

Prerequisites:

- The measuring cell is switched off.
- The measuring cell has been removed from the detector.
- The electrode cables are unplugged.

No tool is required for replacing the working electrode.



- 1 Unscrew the pressure screw (1-4) on the base part of the cell and remove it.
- 2 Take out the working electrode.
- 3 Insert the new working electrode. The working electrode is formed in such a way that it can be inserted into the measuring cell in only one position.
- 4 Slide the pressure screw over the working electrode and screw it tightly.

5.2.2 Replacing the reference electrode



Note

These instructions apply analogously to the Ag/AgCl reference electrode.

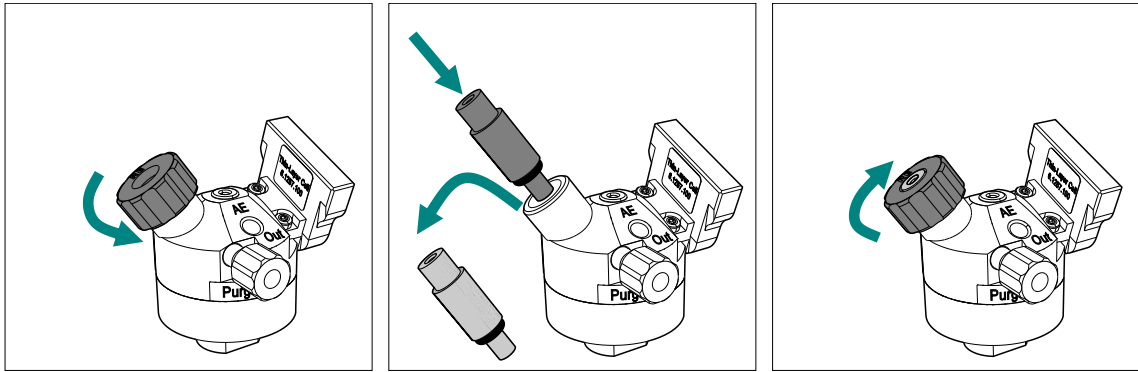
Inserting the reference electrode

Prerequisites:

- The measuring cell is switched off.
- The measuring cell has been removed from the detector.
- The electrode cables are unplugged.

No tool is required for replacing the reference electrode.

- 1 Slide the supplied sealing ring over the new reference electrode.



- 2 Unscrew the fastening screw for the reference electrode and remove it.
- 3 Take out the reference electrode.
- 4 Insert the new reference electrode.
- 5 Retighten the fastening screw.



Note

Important: After an Ag/AgCl reference electrode has been taken out!

The Ag/AgCl reference electrode may not be allowed to dry out. Follow the directions for storage contained in the leaflet for the Ag/AgCl reference electrode.

5.2.3 Replacing the spacer

Depending on the application, the measuring cell can be operated with a variety of different spacers. The different spacers are available as accessories (see Chapter 7, page 21).

The measuring cell must be disassembled in order to replace the spacer. Proceed as follows to disassemble the measuring cell:

Disassembling the measuring cell

Prerequisites:

- The measuring cell is switched off.
- The measuring cell has been removed from the detector.
- The electrode cables have been removed.



To disassemble the measuring cell, you need a 2.5 mm hexagon key.

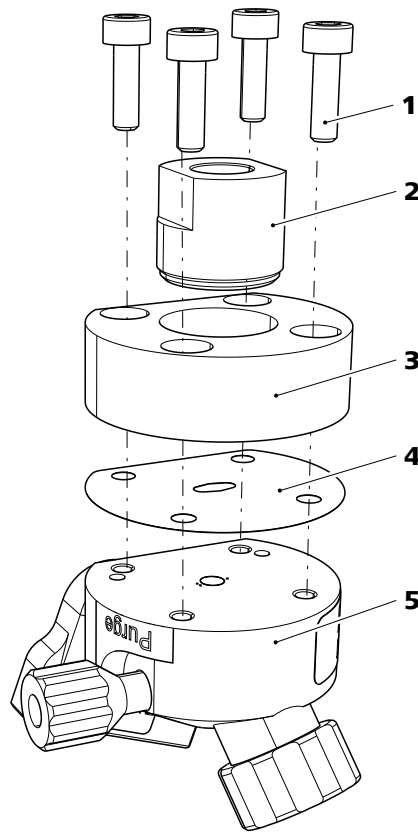


Figure 3 Disassembling the measuring cell

1	Fastening screw (4x)	2	Pressure screw For fastening the working electrode.
3	Base part	4	Spacer 6.1257.820 or 6.1257.840
5	Measuring part With auxiliary electrode.		

- 1** Remove the reference electrode.
- 2** Remove the working electrode.
- 3** Unscrew the four screws on the base part of the measuring cell with the hexagon key and remove them.
- 4** Remove the base part.
- 5** Remove the spacer.

Replace the spacer as follows:

Replacing the spacer

Prerequisites:

- The measuring cell is disassembled.
- The new spacer is dry, clean and lint-free.

You will need a 2.5 hexagon key and a pair of tweezers to replace the spacer.

Wear latex gloves when replacing the spacer.

1 Positioning the spacer

- Hold the measuring part in your hand as shown in *Figure 3, page 16*.
- Use tweezers to place the new spacer on the measuring part. The straight side of the spacer must lie on the straight edge of the measuring part and the four small holes in the spacer must be aligned precisely to the boreholes. Use your fingertips to hold the spacer in correct position.

2 Attaching the base part

- Insert the four screws into the boreholes on the base part.
- Carefully place the base part of the measuring cell: The straight edge of the base part must lie on the straight edge of the measuring part and the four screws must fit precisely in the four boreholes.

Take care to ensure that the boreholes on the base part, the spacer and the measuring part are aligned precisely with one another.

3 Tightening the screws

Tighten the four screws evenly in cross-over sequence with the hexagon key.

5.2.4 Cleaning the measuring cell

The auxiliary electrode can be readily cleaned when the working electrode has been removed from the cell.

Cleaning the auxiliary electrode

Prerequisites:

- The electrode cables are unplugged.
- The reference electrode has been removed from the measuring cell.



- The working electrode has been removed from the measuring cell.

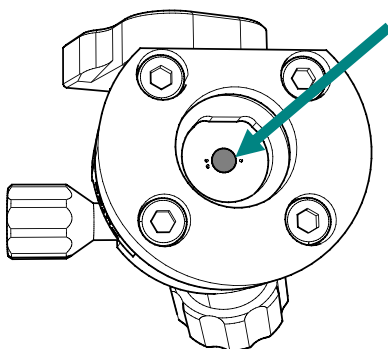
1

**Note**

When cleaning the auxiliary electrode, the edges of the spacer may get damaged.

The spacer must then be replaced.

- Moisten a cotton swab with 2 mol/L of nitric acid.
- Use this to carefully wipe the auxiliary electrode.
The edges of the spacer may be damaged when wiping the auxiliary electrode.
If the auxiliary electrode is tenaciously stained, we recommend that the spacer be removed prior to cleaning the auxiliary electrode (*see Chapter 5.2.3, page 15*).



- 2 Rinse off the measuring cell (except for the working electrode and the reference electrode) under running water and dry with a lint-free cloth.

**Note**

When you rinse off the measuring part, take care to ensure that the chip in the cell holder does not get wet.

Cleaning the working electrode

- 1 Clean the working electrode in accordance with the directions contained in the leaflet for the working electrode or polish it if necessary.
- 2 Reinsert the working electrode (*see Chapter 3.1, page 4*).



Inserting the reference electrode

- 1 Reinsert the reference electrode (*see Chapter 3.2, page 5*).






6 Technical specifications




<i>Structure</i>	Flow cell with working, reference and auxiliary electrode.
<i>Material</i>	Cell body made of PEEK.
<i>Cell volume</i>	Is dependent on the thickness of the spacer:
<i>50 μm Spacer</i>	< 0.35 μL
<i>25 μm Spacer</i>	< 0.18 μL
<i>Maximum operating pressure</i>	0.8 MPa (200 psi)
<i>Cell recognition</i>	Intelligent cell with automatic identification and monitoring.
<i>Auxiliary electrode</i>	
<i>Type</i>	installed
<i>Material</i>	Stainless steel
<i>Reference electrode</i>	
<i>Type</i>	replaceable
<i>Material</i>	<ul style="list-style-type: none">■ Palladium solid phase electrode■ Ag/AgCl gel electrode

7 Accessories

7.1 IC equipment Thin-Layer cell: without electrodes

Qty.	Order no.	Description	
	6.1257.100	Thin-Layer cell	
1	6.1257.820	Spacer 50 µm to Thin-Layer cell Spacer 50 µm for the amperometric Thin-Layer cell, 3 pieces.	
1	6.1257.840	Spacer 25 µm to Thin-Layer cell Spacer 25 µm for the amperometric Thin-Layer cell, 3 pieces.	
1	6.1831.010	PEEK capillary 0.25 mm i.d. / 3 m For all IC components. Material: PEEK Outer diameter (mm): 1/16 Inner diameter (mm): 0.25 Length (m): 3	



Qty.	Order no.	Description	
1	6.2621.140	Hexagon key 2.5 mm	
1	6.2744.014	Pressure screw 2x With UNF 10/32 connector. For the connection of PEEK capillaries. Material: PEEK Length (mm): 26	
1	6.2802.000	Polishing set for solid-state electrodes Polishing set wit 1 polishing cloth and about 2 g aluminum oxide powder (grain size 0.3 µm).	

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