

# 917 Coulometer



**Tutorial**  
8.917.8001EN





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## **Tutorial**

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# 1 Introduction

## 1.1 Structure of the tutorial

This tutorial describes the installation and the first steps with the 917 Coulometer. You will be guided step-by-step through the most important dialog pages by using a water content determination with a water standard. In addition, you will find information regarding titrations with extended functions and for user administration.

## 1.2 Additional information

General information regarding coulometric Karl Fischer titration can be found in the monograph "Water Determination by Karl Fischer Titration" at [www.metrohm.com](http://www.metrohm.com) (8.026.5011 DE; 8.026.5013 EN).

## 1.3 Symbols and conventions

The following symbols and formatting may appear in this documentation:

(5-12)	<b>Cross-reference to figure legend</b> The first number refers to the figure number, the second to the instrument part in the figure.
<b>1</b>	<b>Instruction step</b> Carry out these steps in the sequence shown.
<b>Method</b>	<b>Dialog text, parameter</b> in the software
<b>File ► New</b>	Menu or menu item
<b>[Next]</b>	<b>Button or key</b>
	<b>WARNING</b> This symbol draws attention to a possible life-threatening hazard or risk of injury.
	<b>WARNING</b> This symbol draws attention to a possible hazard due to electrical current.
	<b>WARNING</b> 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.

---

## 2 Installation

### 2.1 Setting up and connecting the instrument

#### Connecting the power supply unit

The 917 Coulometer has an external power supply unit for a 24 V power supply (DC). This is connected to the power socket of the Coulometer.



#### WARNING

An incorrect supply voltage can damage the instrument.

Operate the instrument only with the supply voltage specified for it. Use the supplied power supply unit exclusively.

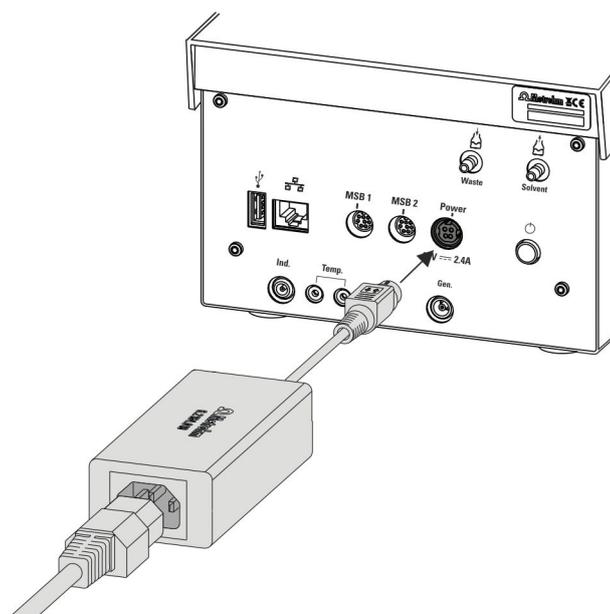


Figure 1 Connecting the power supply unit

Proceed as follows:

- 1 Connect the plug of the external power supply unit with the power socket of the Coulometer (see figure 1, page 3).

**NOTICE**

The plug of the power supply unit 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 first need to pull back the outer plug sleeve marked with arrows.

- 2 Connect the power cord with the external power supply unit of the Coulometer and with the power grid.

**CAUTION**

Switch off the Coulometer correctly by pressing the power switch before you disconnect the electricity supply. If this is not done, then there is a danger of data loss.

**Connecting a balance**

As a rule, balances are equipped with a serial RS-232 interface. To connect a balance, you require a USB/RS-232 adapter (6.2148.050).

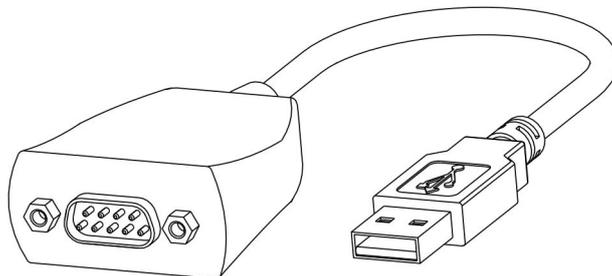


Figure 2 USB/RS-232 adapter

The USB/RS-232 adapter can be connected to the 917 Coulometer directly or by means of a USB hub.

Connect the 9-pin plug of the respective balance connecting cable to the RS-232 connector. Consult the manual for the balance to select the correct connecting cable.

The parameters for the RS-232 interface must match those on the instrument and those on the balance. For this purpose, check the manual for the balance.

The following table offers an overview of the balances that you can use together with the 917 Coulometer and of which cable you will need for connection to the RS-232 interface:

Balance	Cables
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

### Connecting the barcode reader

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



### Connecting printers or other USB devices

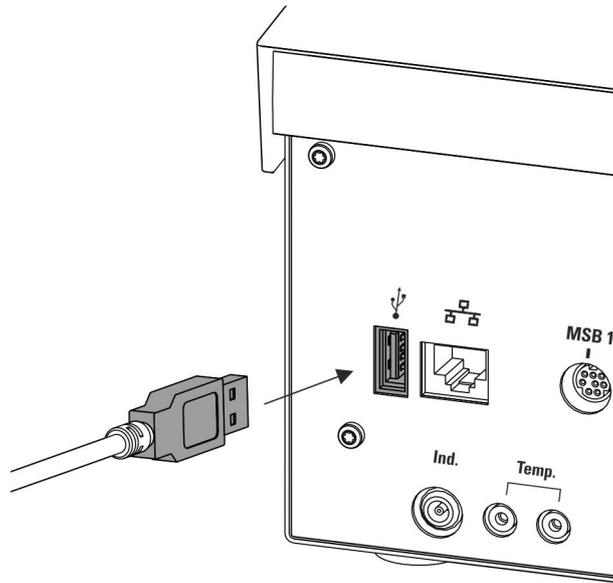


Figure 3 Connecting the USB cable

A printer can be connected to the USB connector (Type A) (with a 6.2151.020 connecting cable), as can a USB keyboard, a barcode reader or a USB flash drive (for storing and loading methods, etc.).

If several USB devices are to be connected, then it is recommended that a USB hub (available from specialty stores) be used. The USB hub then functions as a distributor to which several USB devices can be connected.

## 2.2 Setting up the titration cell for coulometry

### 2.2.1 Inserting the titration cell

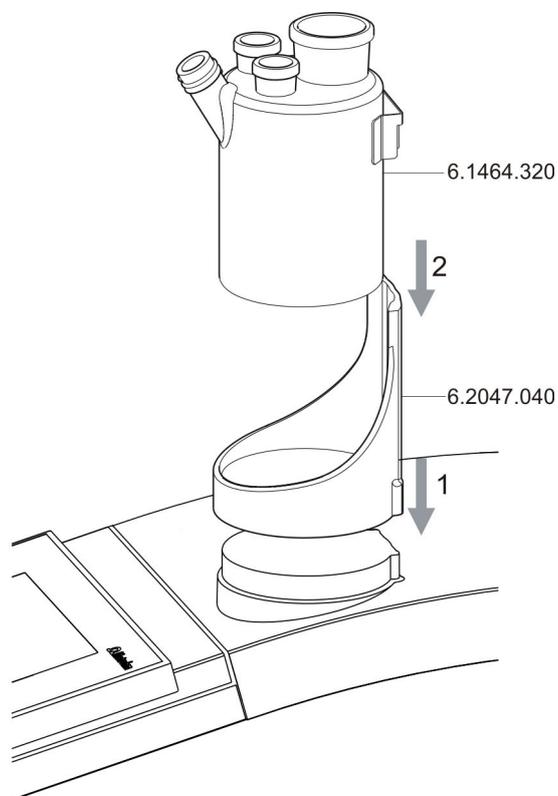


Figure 4 Inserting the titration cell

Set up the titration cell on the magnetic stirrer as follows:

- 1 Attach the 6.2047.040 titration vessel holder to the magnetic stirrer.
- 2 Insert the 6.1464.320 titration cell into the titration vessel holder.

### 2.2.2 Preparing the titration cell

#### Filling the adsorber tube

Before setting up the titration cell, the 6.1403.030 adsorber tube must be filled with the 6.2811.000 molecular sieve. Proceed as follows:

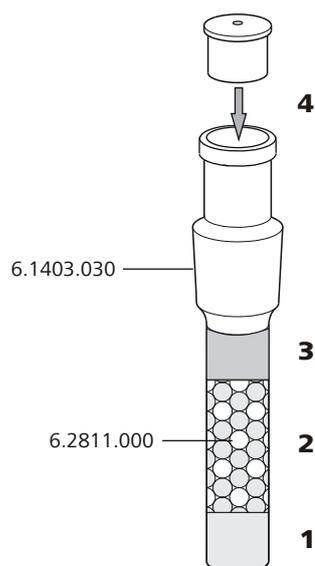


Figure 5 Filling the adsorber tube

- 1** Insert a small cotton plug into the bottom of the adsorber tube. Do not pack the cotton too tightly.
- 2** Fill the adsorber tube to  $\frac{3}{4}$  with molecular sieve granulate.
- 3** Place a small cotton plug on the molecular sieve. Do not pack the cotton too tightly.
- 4** Seal the adsorber tube with the appropriate cover.



#### NOTICE

Note that the molecular sieve must be replaced at regular intervals. Each time you refill the adsorber tube with the molecular sieve, you can, for example, write the date directly on the adsorber tube.

## Equipping the titration cell

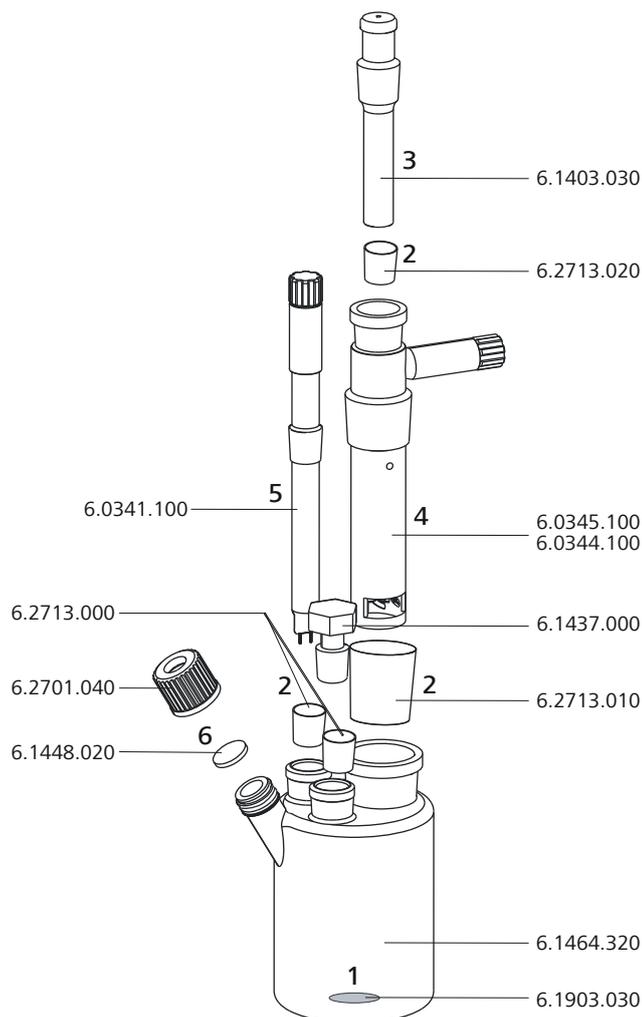


Figure 6 Equipping the titration cell

Equip the titration cell as follows:

- 1** Place the 6.1903.030 stirring bar in the titration cell.
- 2** Cut the 6.2713.0x0 ground-joint sleeves to the correct length and attach them to the ground joints of the inserts (electrodes, adsorber tube, etc.).

Please take care to ensure that the edges of the ground-joint sleeves are cut to size cleanly and that there are no fringes. The ground-joint sleeves must not protrude at the lower edge of the ground-joint opening.

- 3** Insert the 6.1403.030 adsorber tube into the generator electrode.



- 4** Insert the 6.0345.100 generator electrode without diaphragm or the 6.0344.100 generator electrode with diaphragm together with the adsorber tube into the large ground-joint opening at the rear.
- 5** Insert the 6.0341.100 indicator electrode into the left ground-joint opening.
- 6** Place the 6.1448.020 septum on the front opening of the titration cell and screw it shut with the 6.2701.040 screw cap.  
Tighten the screw cap only enough so that sealing is ensured. The septum must not bend.

#### **Filling the titration cell (generator electrode without diaphragm)**

Proceed as follows when using a generator electrode without a diaphragm:

- 1** Fill approximately 100 mL of reagent into the titration cell with the aid of the 6.2738.000 funnel.
- 2** Close the remaining ground-joint opening on the right with the 6.1437.000 ground-joint stopper (with ground-joint sleeve attached).

#### **Filling the titration cell (generator electrode with diaphragm)**

Proceed as follows when using a generator electrode with a diaphragm:

- 1** Fill approximately 5 mL of catholyte into the generator electrode.
- 2** Fill approximately 100 mL of anolyte into the titration cell with the aid of the 6.2738.000 funnel. The level of the anolyte should be roughly 1 - 2 mm above the level of the catholyte.
- 3** Close the remaining ground-joint opening on the right with the 6.1437.000 ground-joint stopper (with ground-joint sleeve attached).

### 2.2.3 Mounting the addition and aspiration tube

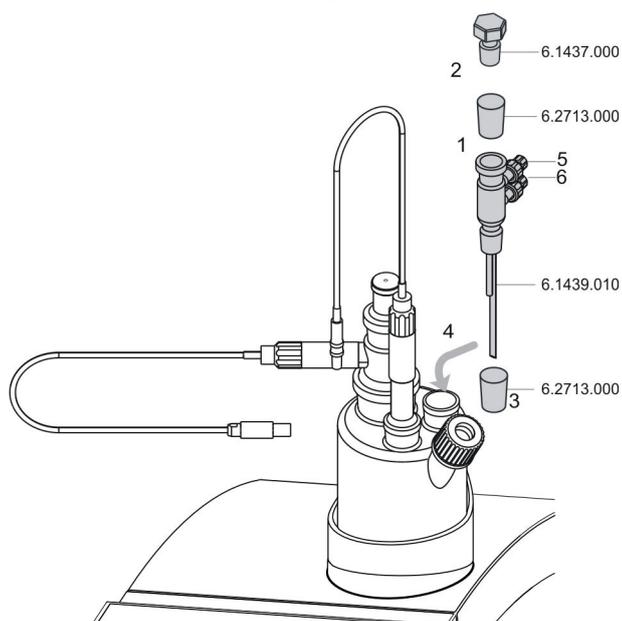


Figure 7 Mounting the addition and aspiration tube

Insert the addition and aspiration tube as follows into the titration cell:

- 1** Attach the 6.2713.000 ground-joint sleeve that has been cut to size to the ground joint of the 6.1437.000 stopper.
- 2** Insert the stopper into the 6.1439.010 addition and aspiration tube.
- 3** Attach the 6.2713.000 ground-joint sleeve that has been cut to size to the ground joint of the addition and aspiration tube.
- 4** Insert this assembly into the ground-joint opening.
- 5** Connect the tubing for the reagent addition at the upper connector of the addition and aspiration tube (5).
- 6** Connect the tubing for the aspiration of the titration cell at the lower connector of the addition and aspiration tube (6).

Details regarding how to connect the addition tubing and the aspiration tubing can be found in the chapter "Setting up the aspiration and reagent bottle" (see chapter 2.3, page 20).

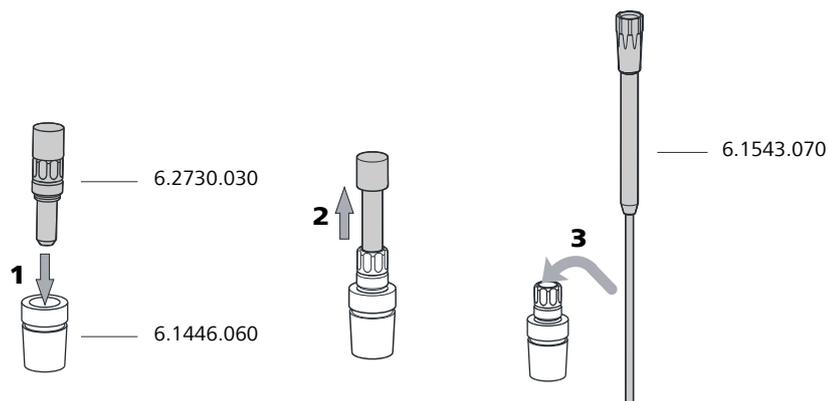


### 2.2.4 Titration cell with aspiration equipment (utilization with Dosino)

A Dosino allows the automatic replacement of reagents.

For aspiration, the 6.5617.000 aspiration equipment is used, along with a complete dosing unit and a 50 mL glass cylinder. For aspirating greasy samples when only the sample and not the whole reagent is to be aspirated, we recommend using a dosing unit with a 20 mL cylinder. For highly viscous samples, a dosing unit with a 10 mL cylinder is more suitable.

#### Mounting the aspiration tip



Insert the aspiration tip into the titration cell as follows:

- 1** Screw the 6.2730.030 nipple with stopper and O-ring onto the 6.1446.060 stopper.
- 2** Pull out the stopper.
- 3** Slide the 6.1543.070 aspiration tip through the stopper.

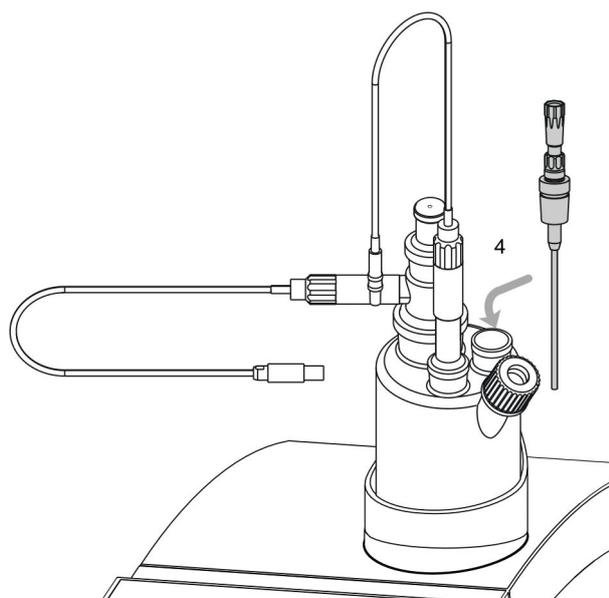


Figure 8 Titration cell with aspiration apparatus

- 4 Place the stopper with the attached aspiration tip into the ground-joint opening with the ground-joint sleeve.

Insert the aspiration tip into the titration cell until it almost touches the vessel base.



#### NOTICE

##### Collision with stirring bar

The aspiration tip must not collide with the stirring bar.

## 2.2.5 Using the titration cell with a Karl Fischer oven

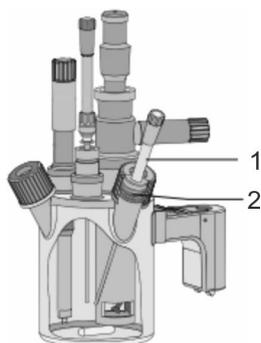
When samples release their water only slowly or only at higher temperatures, the oven method is used. The sample is heated in a KF oven (e.g., 860 KF *Thermoprep*) and the water that is released is transferred to the titration cell with a carrier gas.

### 2.2.5.1 Equipping the titration cell with an oven

The 6.1465.320 titration cell with additional lateral opening is used. The titration cell must be equipped beforehand (see chapter 2.2.2, page 7).



### 1 Sealing the gas inlet



#### 1 Gas inlet

#### 2 Seal A.254.0102

- Remove the septum and replace with A.254.0102 seal.
- Insert the gas inlet from the side through the screw cap and the seal and tighten with the screw cap.

## 2.2.6 Using the titration cell with a sample changer

If a large number of samples have to be processed, the determination of the water content can be automated with the aid of a sample changer with oven module (e.g., *885 Compact Oven SC*).

### 2.2.6.1 Remote connection

The 885 Compact Oven Sample Changer can be used as a control unit for an automation system with a 917 Coulometer.

The 917 Coulometer must be connected with the 885 Compact Oven Sample Changer by Remote Box (6.2148.010) and by Remote 885 - RM Box (6.2141.340) cable.

The cable transfers start and stop signals of the 885 Compact Oven Sample Changer to the connected 917 Coulometer, and (in the opposite direction) status signals of the coulometer (Cond OK, EOD) to the 885 Compact Oven Sample Changer.

### 2.2.6.2 "885 Compact Oven SC – 917 Coulometer" system

Standard combination for water content determinations with a 917 Coulometer.

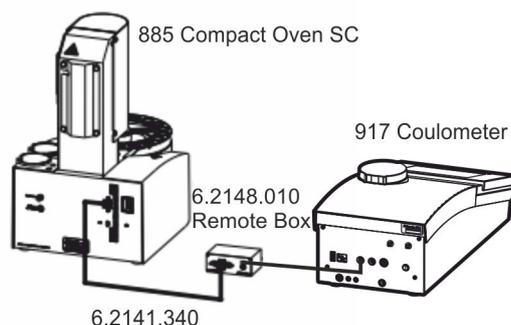


Figure 9 Remote connection 885 Compact Oven SC – Remote Box – 917 Coulometer

The 917 Coulometer is operated in KFC mode. The sample series is started on the 885 Compact Oven Sample Changer.

## 2.2.7 Connecting sensors

The measuring interface contains the following measuring inputs:

- **Gen.** for a generator electrode
- **Ind.** for a double Pt electrode
- **Temp.** for a temperature sensor of the Pt1000 or NTC type



### CAUTION

Under all circumstances, avoid mixing up the electrode cable from the indicator electrode with the one from the generator electrode. Mark the screw heads of the cables accordingly.

### 2.2.7.1 Connecting generator electrodes

#### Screwing the electrode cable to the generator electrode

- 1 Unscrew the protective cap from the generator electrode.

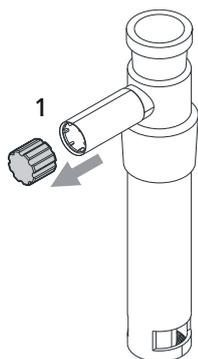


Figure 10 Unscrewing the protective cap from the generator electrode

- 2 Tighten the 6.2104.120 electrode cable to the generator electrode.

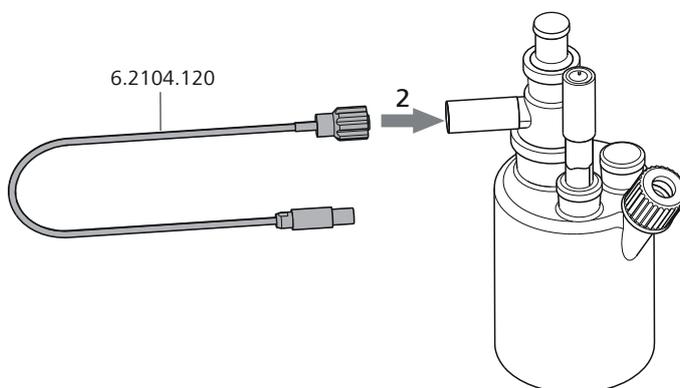


Figure 11 Screwing the electrode cable to the generator electrode

**Connecting the electrode cable to the coulometer**

- 1 Plug the electrode plug into the **Gen.** socket of the coulometer.



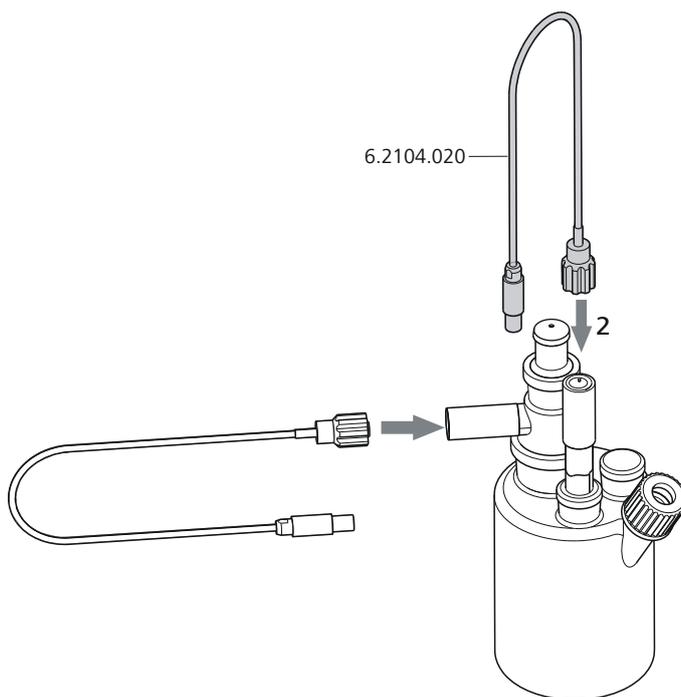


Figure 14 Screwing the electrode cable to the indicator electrode

### Connecting the electrode cable to the coulometer

- 1 Plug the electrode plug into the **Ind.** socket of the coulometer.

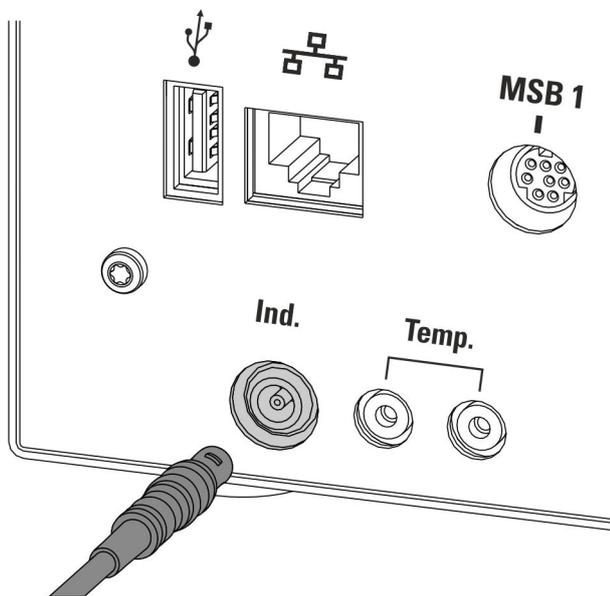


Figure 15 Connecting an indicator electrode

**NOTICE**

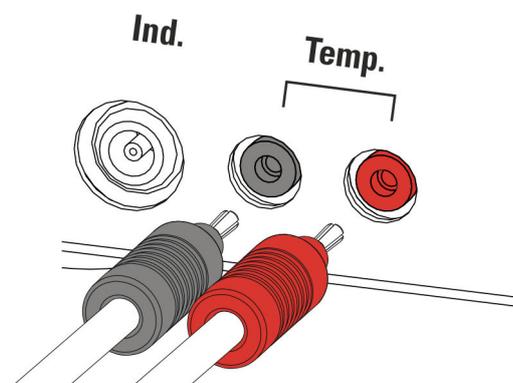
The electrode cable is protected against accidental disconnection of the cable by means of a pull-out protection. If you wish to pull out the plug again, you first need to pull back the outer plug sleeve.

**2.2.7.3 Connecting a temperature sensor**

A temperature sensor of the Pt1000 or NTC type can be connected to the **Temp.** connector.

Connect the temperature sensor as follows:

- 1 Insert the plugs of the temperature sensor into the **Temp.** sockets of the coulometer.

**NOTICE**

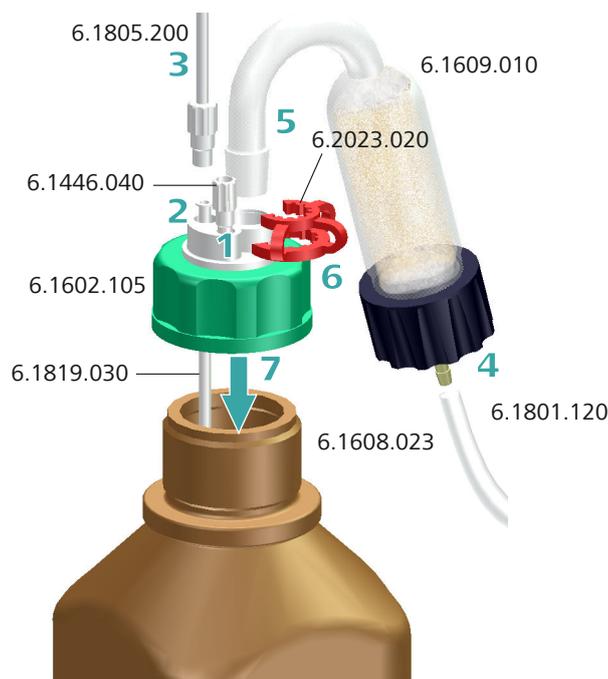
Always insert the red plug into the red socket. This is the only way that shielding against electrical interference can be ensured.



### Setting up reagent bottles

The reagent is pumped out of the supply bottle by overpressure and into the titration cell. All of the bottle cap connectors must be leak-proof for this reason.

Metrohm offers suitable thread adapters for bottles with other threads than GL 45.



To equip the reagent bottle, proceed step-by-step as follows:

- 1** Place a 6.1446.040 threaded stopper in the M6 connector (smallest opening) of a 6.1602.105 bottle cap and screw it tightly.
- 2** Insert the long 6.1819.030 PTFE cannula into the M8 connector (second-smallest opening) of the bottle cap.



#### NOTICE

The length of the cannula must be adjusted to the size of the bottle beforehand.

- 3** Insert a 6.1805.200 PTFE tubing into the M8 connector of the bottle cap and screw it tightly.

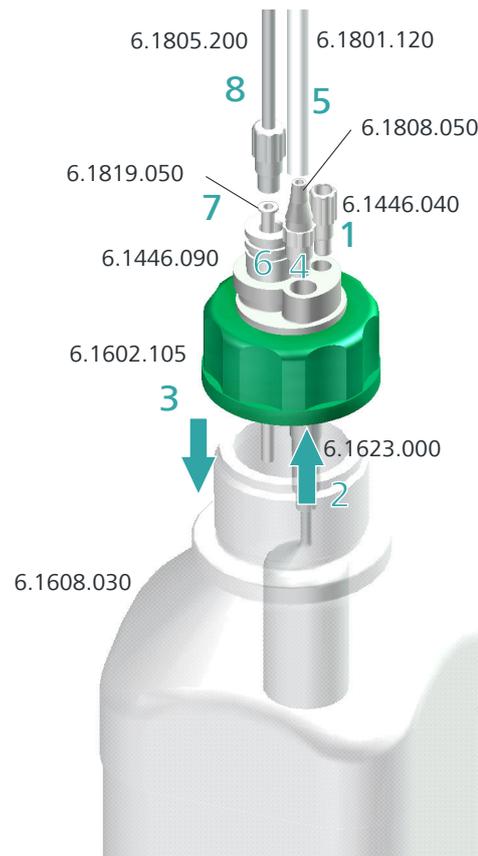


- 4** Cut off a piece (approx. 1 m) of the 6.1801.120 PVC tubing and connect to the 6.1609.010 adsorber tube filled with molecular sieve.  
Additional details can be found in the chapter "Filling the adsorber tube" (*see chapter 2.2.2, page 7*).
- 5** Place the adsorber tube with the SGJ 14 standard ground-joint on the bottle cap.
- 6** Secure the SGJ 14 standard ground-joint of the adsorber tube with the 6.2023.020 SGJ clip.
- 7** Place the completely equipped 6.1602.105 bottle cap on a reagent bottle from your chemicals manufacturer and screw it tightly.

### **Setting up the aspiration bottle**

The aspiration bottle is used as a waste container and must be sealed against leaks.

Metrohm offers suitable thread adapters for bottles with other threads than GL 45.



To equip the aspiration bottle, proceed step-by-step as follows:

- 1** Place a 6.1446.040 threaded stopper in the M6 connector (smallest opening) of a 6.1602.105 bottle cap and screw it tightly.
- 2** Introduce the 6.1623.000 overflow protection into the M8 connector from below (second-smallest opening) of the bottle cap.
- 3** Place the bottle cap on the 6.1608.030 clear glass bottle (or on a different bottle with GL 45 thread) and screw it tightly.
- 4** Place the 6.1808.050 tubing olive in the M8 connector of the bottle cap and screw it tightly.
- 5** Plug the remaining piece of the 6.1801.120 PVC tubing onto the tubing olive.
- 6** Insert the 6.1446.090 stopper into the remaining opening on the bottle cap.



- 7 Introduce the short 6.1819.050 PTFE cannula into the opening of the stopper.
- 8 Insert a 6.1805.200 PTFE tubing with M8 connector into the opening of the stopper and screw it tightly.

## 2.4 Connecting a pump

### Connecting tubings to the pump

The pump connectors of the 917 Coulometer are located on the rear of the instrument.

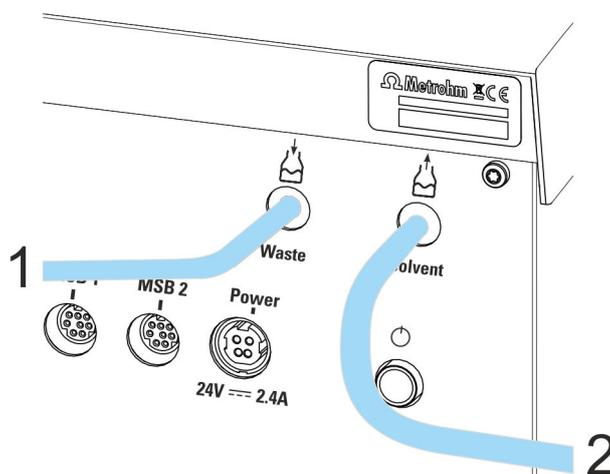


Figure 16 Connecting the PVC tubings

Take care to ensure that you connect the tubings to the pump correctly. Proceed as follows:

- 1 Fasten the 6.1801.120 PVC tubing from the aspiration bottle (clear glass) securely to the **Waste** connector (left-hand connector).
- 2 Fasten the 6.1801.120 PVC tubing from the reagent bottle (amber glass with adsorber tube) securely to the **Solvent** connector (right-hand connector).



## 3 Switching the instrument on and off and selecting the dialog language

### 3.1 Switching the instrument on and off

#### Switching on the instrument



#### CAUTION

Peripheral devices (e.g., printers) must be connected and switched on before you switch on the 917 Coulometer.



#### NOTICE

English is set as the default dialog language when the instrument is switched on for the first time.

Information about changing the dialog language can be found in the following section.

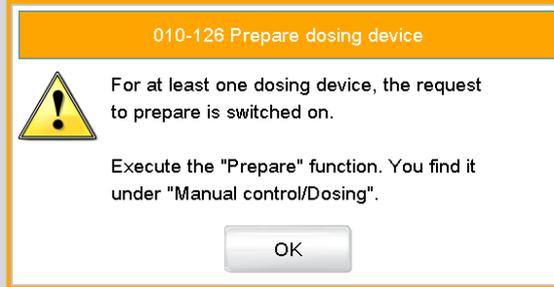
Proceed as follows:

- 1 ■ Press the power switch on the left-hand side of the back panel of the 917 Coulometer.  
The 917 Coulometer is initialized. A system test is performed. This process takes some time.



**NOTICE**

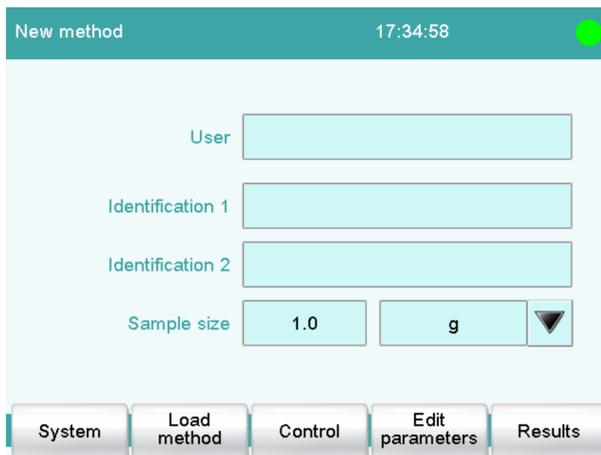
If a buret unit is connected, then a request appears to carry out the **Prepare** function:



All tubings and the cylinder are rinsed with the **Prepare** function. The preparing of the buret unit is described in the *Preparing buret unit* section later in the document.

- Confirm the message with **[OK]**.

The main dialog is displayed:



**Switching off the instrument**



**CAUTION**

The 917 Coulometer must be switched off by pressing the power switch on the rear of the instrument before the electricity supply is interrupted. If this is not done, then there is a danger of data loss.

Proceed as follows:

- 1 Press the power switch on the left-hand side of the back panel of the 917 Coulometer.

The current data is saved and the system is shut down. This process takes just a short time. At the same time, all other instruments connected to the 917 Coulometer via a USB cable are also being switched off.

## 3.2 Selecting the dialog language

The user interface is available in several languages. English is set as the default dialog language at the time of shipment.

Proceed as follows to select the dialog language:

### 1 Opening the system settings

- In the main dialog, tap on **[System]**.
- Tap on **[System settings]**.

The **System / System settings** dialog is displayed.

### 2 Selecting the dialog language

- Tap on the **Dialog language** list box and select the desired language.

### 3 Saving the settings

- Tap on the fixed keys [**↩**] or [**🏠**].

The main dialog is displayed in the respective dialog language.



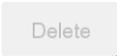
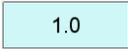
Table 1 Fixed keys which are always available

	<b>[Home]</b> always opens the main dialog.
	<b>[Back]</b> saves the entry and opens the next-higher dialog page.
	<b>[Help]</b> opens the online help for the dialog displayed.
	<b>[Print]</b> opens the printing dialog.
	<b>[Manual]</b> opens the manual control.
	<b>[Stop]</b> cancels the running determination.
	<b>[Start]</b> starts a determination.

The file name of the loaded method, the time and the system status are displayed in the main dialog in the **Title bar**.

In the other dialogs, the title bar shows the headings of the next upper level and of the displayed dialog. This is an aid for orientation during navigation through the user dialog.

Table 2 Screen elements

	<b>Buttons</b> open a new dialog when they are tapped.
	
	<b>Inactive buttons</b> with gray lettering indicate that the respective function is not available at the moment.
	<b>Input fields</b> open an input dialog when tapped.
	Tapping on the <b>selection symbol</b> opens a selection list.
	A <b>check box</b> can also be activated or deactivated by tapping on it.



### 4.4 Entering text and numbers

In the editing dialog for text or numerical input, enter the individual characters by tapping in the input field. The following functions are available:

#### Text editor



Table 4 Editing functions

<b>[OK]</b>	The modification is applied and the editing dialog is exited.
<b>[Cancel]</b>	The editing dialog is exited without applying the modification.
<b>[Delete entry]</b>	The content of the input field is deleted completely.
<b>[&lt;X]</b>	The character in front of the cursor is deleted.
<b>[⇐]</b>	The cursor within the input field is shifted to the left by one character.
<b>[⇒]</b>	The cursor within the input field is shifted to the right by one character.
<b>[a...z]</b>	The lower-case letters are displayed. The label changes to <b>[A...Z]</b> . The upper-case letters are displayed again by tapping.
<b>[0...9]</b>	Numbers and mathematical characters are displayed.
<b>[Special characters]</b>	Special characters are displayed. You can use the button <b>[More]</b> to navigate through all available characters.



### Number editor

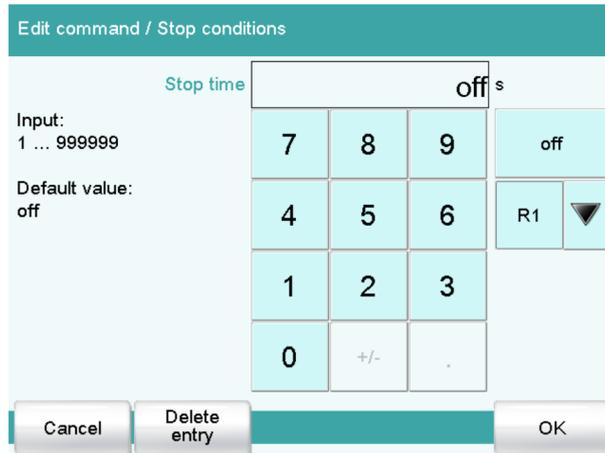


Table 5 Editing functions

<b>[OK]</b>	The modification is applied and the editing dialog is exited.
<b>[Cancel]</b>	The editing dialog is exited without applying the modification.
<b>[Delete entry]</b>	The content of the input field is deleted completely.
<b>[off]</b>	If not only numbers but also special values (e.g., <b>off</b> ) can be entered, then the corresponding buttons will be shown to the right of the numerical keypad.
<b>[R1]</b>	For many parameters, a result previously defined in the method can also be entered in place of a number. You can select the result variable by touching <b>[R1]</b> .



#### NOTICE

A commercially available USB keyboard can be connected to make text and numerical input easier.

## 5 Setup and configuration

### 5.1 Preparing instruments and material

What you will need:

- A 917 Coulometer, including accompanying accessories
- An analytical balance
- A water standard with a water content, e.g., of 1 mg/g
- A USB printer with connecting cable, in case you wish to print out reports.

### 5.2 Configuring reagent data

The coulometric reagents used can be administered and monitored. The following conditions for the monitoring of a reagent can be defined:

- Number of determinations
- Working life
- Reagent capacity
- Drift

If a monitored parameter reaches the set limit, then the reagent replacement can be carried out manually or automatically.

The reagents are configured under **System ▶ Reagents**.

Proceed as follows to configure the reagents:

#### Configuring reagents

- 1 Open the list of reagents.
  - In the main dialog, select the **[System]** button.
  - Tap on **[Reagents]**.
  - Select **[New]** and enter a name for the reagent.
  - Tap on **[Reagent mon.]** and set the limit of the monitored parameter.
  - Select the **[Reagent replacement]** button and specify **[manual]** or **[auto]**.

**NOTICE**

A suitable method (aspirating used reagent, adding fresh reagent) must be available for automatic reagent replacement. This will be started automatically when the set limit has been reached.

**NOTICE**

Note that the catholyte solution must be replaced manually when a generator electrode with diaphragm is used for automatic reagent replacement.

- 2 Use the **[Home]** button to return to the main dialog.

**NOTICE**

In the method used for the water content determination for the sample, the reagent monitoring of the reagent used must be activated under **[Cell]**.

## 5.3 Configuring a printer

If you wish to print out results and titration curves, then you must configure the printer in the device manager.

Proceed as follows:

- 1 **Opening the printer dialog**
  - In the main dialog, tap on **[System]**.
  - Tap on **[Device manager]**.

## 2 Entering the printer data

- Select **Printer** and tap on **[Edit]**.

The screenshot shows a dialog box titled "Device manager / Edit". Below the title bar, it says "Device type: Printer". There are four input fields: "Device name" with the value "Printer", "Comment" (empty), "Printer" with a dropdown menu set to "off", and "Connector" with a dropdown menu set to "USB". At the bottom of the dialog, there are three buttons: "PDF settings", "Network printer", and "More options".

- Tap on the selection symbol next to the input field **Printer** and select a printer type.
- Once you have connected a USB printer, tap on the selection symbol next to the input field **Connector** and select **USB**.
- If you would like to use a printer in your company network, tap on the selection symbol next to the input field **Connector** and select **Ethernet**.

- ## 3
- Return to the main dialog with the [  ] fixed key.



### NOTICE

You can also compile reports as PDF files and store them on a USB flash drive or on a shared data directory in your company network.



Parameters / Sequence		
Current method: New method		
01	WAIT	Wait
02	REQUEST	Data request
03	KFC	Karl Fischer coulometry
04	CALC	Calculation
05	REPORT	Report
06	...	

Save method    Method options    Insert command    Delete command    Edit command

## 2 Selecting a Karl Fischer command

Sequence / Edit command	
01 KFC	Karl Fischer coulometry
Control parameters	Sensor
Titration parameters	Stirrer
Stop conditions	
Conditioning	
Cell	

- Highlight the line **KFC**.
- Tap on **[Edit command]**.  
A selection of parameters (e.g. start conditions) and instruments (e.g. dosing devices, see next step) appears, which can be selected and adjusted individually.

## 3 Adjusting the calculation

- Select **CALC**.
- Tap on **[Edit command]**.
- Tap on **[New]**.  
A selection of templates appears.
- Select e.g., the template **KFC content (ppm)**.
- Tap on **[Load template]**.
- Confirm the subsequent note with **[Next]**.
- Under **[Result options]**, ensure that the selection **SMN1** is set for the parameter **Variable for mean value**.  
This ensures that the mean value of the results is calculated.



#### NOTICE

---

The calculation is carried out continuously, i.e. the calculation is updated after every determination that is carried out until the defined number of determinations has been reached.

- Under **[More options]**, define parameters, e.g., **Save result in result table**.  
See the detailed manual for precise information.
- Return with the [**↔**] fixed key to the command sequence of the method run.

#### 4 Adjusting the report options

In the default settings, **Result report** and **Curve** are defined in the report options.

Adjust these parameters as needed and supplement them with additional reports.

See the detailed manual for precise information.



#### NOTICE

---

If you have not connected a printer, delete the command **REPORT**. If this is not done, then an error message will appear at the start of the determination.

#### 5 Adjusting additional method parameters

If necessary, adjust parameters in the **KFC** command such as the pause or the extraction time.

See the detailed manual for precise information.

#### 6 Activating the statistics

- In the main dialog, tap on **[Edit parameters]**.

- Tap on **[Method options]**.

Here you can define the statistics function for this method. You can specify the number of determinations for which the respective statistical calculations are to be carried out.

These settings apply for all determinations which are carried out with this method.

- Tap on the check box **Statistics**.
- Enter a value under **Number of determinations**.

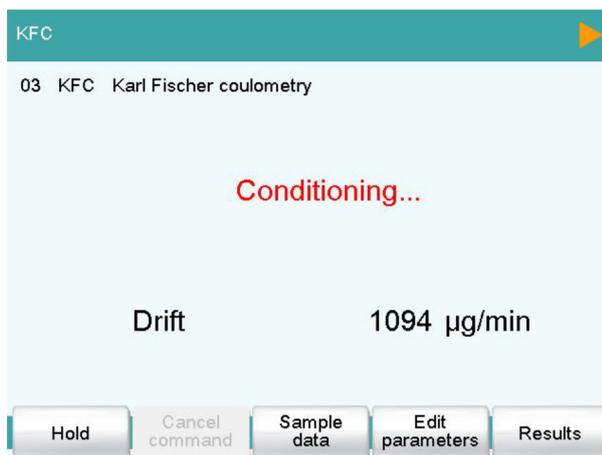


#### NOTICE

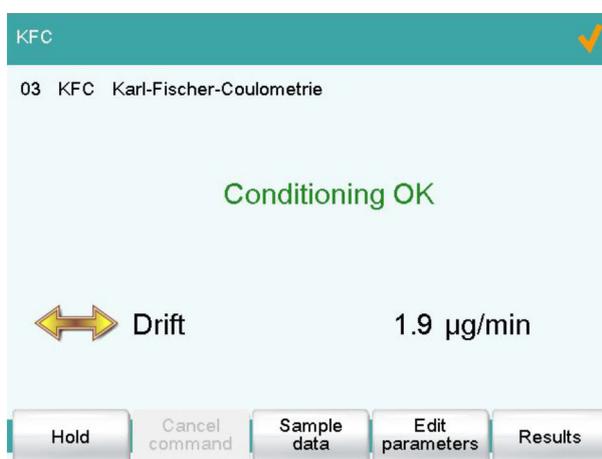
Under **[Save automat.]**, you can also save the determination as a determination file (MDTM file) and as a PC/LIMS report (TXT or UTF8 file) (see chapter 7.1, page 45).

- Tap on the fixed key [].





The water seeping in is titrated off continuously (basic drift).



### Entering sample data in the main dialog

#### 1 Entering sample identification and sample size

- Tap on the input field **Identification 1**.
- Enter a designation for the sample (e.g., type of sample or an analysis number).
- Tap on the input field **Identification 2**.
- Enter a further designation for the sample (e.g., batch number or sampling date).

### Adding sample

- 1 Prepare the sample for adding into the titration cell.



**NOTICE**

The sample size can also be adopted directly from a connected balance.

- The titration curve is shown live.  
After the completion of the titration, the results dialog is displayed. If a printer is connected, then the report defined in the method will be printed out.  
Conditioning is restarted automatically in the background.

- 3 Carry out the two remaining water content determinations in the same way.

If the statistics function is activated, you can have the statistics data displayed after the titration. Proceed as follows:

**1 Opening the statistics page**

- In the main dialog, tap on **[Results]**.
- Tap on **[Statistics]**.

The mean value of the result is displayed in the statistical overview.

**2 Displaying statistics data**

Tap on **[Details]**.

Statistics / Details		
Result name: KFC content (ppm)		SMN1
Mean value	1000 ppm	n=03
s abs	2.5 ppm	
s rel	0.25 %	
No.	Sample size	Result
1	0.9496 g	1003 ppm
2	1.7160 g	998 ppm
3	1.5813 g	1000 ppm

Sample data      Determ. on/off      Result on/off

In the upper part of the display you will see the mean value of the result as well as the absolute and the relative standard deviation. The single results of the titrations are listed in a table.



If you would like to exclude a titration from the statistical calculation, you can select it and then tap on **[Result on/off]** or **[Determ. on/off]**. The recalculation of the statistics data will be performed immediately.

If you would like to add other titrations to the statistics, you can do this in the statistical overview.

## 7 Performing titration with supplementary functions

### 7.1 Saving the determination and the PC/LIMS report

You can have the determination data (measuring point list, results etc.) of a titration which has been carried out saved automatically. This makes it possible to reprocess or print out this data later. You can save the determinations to a USB storage medium or to a drive in a computer network.

If you would like to manage the determination data in a database on a PC, then you can save it in a report called PC/LIMS report or transfer it directly to a PC through a serial connection.

PC/LIMS reports can be saved either as TXT file (in accordance with ISO 8859-1) or UTF8 file.

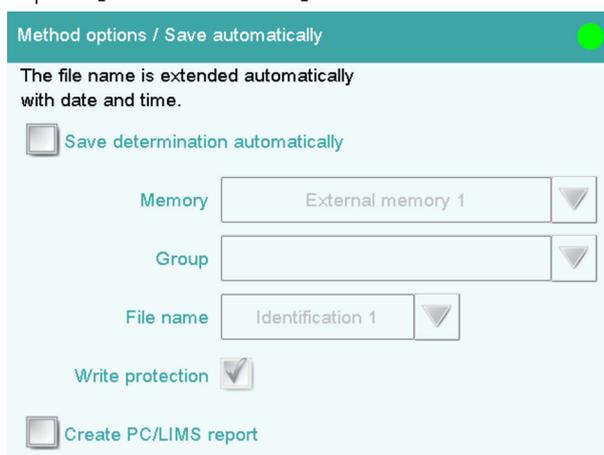
The **tiBase** database software from Metrohm is available to you for administering the determination data on the PC.

#### Defining the automatic saving

Proceed as follows:

##### 1 Opening the method options

- In the main dialog, tap on **[Edit parameters]**.
- Tap on **[Method options]**.
- Tap on **[Save automat.]**.



Method options / Save automatically

The file name is extended automatically with date and time.

Save determination automatically

Memory External memory 1

Group

File name Identification 1

Write protection

Create PC/LIMS report



## 2 Activating Save determination and defining the memory location

- Activate the **Save determination automatically** check box.
- Select the memory location under **Memory**. You can choose between **External memory 1** (e.g., a USB flash drive) or **Shared memory** (memory location in a computer network).

A USB flash drive (external memory 1) must be plugged in on the 917 Coulometer before a determination is carried out. This memory location must already be defined in the device manager at the time of the selection of a shared memory location in a computer network. Before a determination is carried out, the 917 Coulometer must be connected to the network with an Ethernet cable.
- Tap on the selection symbol next to the input field **Group** and select an existing group or create a new group.

The determination data can be stored on the storage medium in various groups (= folders on the storage medium).
- Define the designation for the file name.

Two sample identifications or the method name are available for selection. If you tap on the input field **File name**, then you can enter a designation of your own for the file name.
- Activate or deactivate **write protection**.

You can protect the original determination data against overwriting.

## 3 Activating the PC/LIMS report and defining the memory location

- Activate the **Create PC/LIMS report** check box.

Define the memory location for the PC/LIMS report in the device manager.
- Return to the main dialog with the [] fixed key.



### NOTICE

---

These settings are method-specific. The determination data is saved to the defined memory location for all determinations which are carried out with this method. You can define different memory locations for your methods.

**NOTICE**

The settings for the PC/LIMS report (memory, RS-232, coding) must be undertaken in the "Edit instrument/PC/LIMS report" dialog.

## 7.2 Modifying the titration parameters

You can optimize a titration run by modifying individual titration parameters according to the needs of your analysis. For the following titration, the stirring rate, the extraction time and the start drift are being modified.

### Setting the stirring rate

#### 1 Opening the stirrer settings

- In the main dialog, tap on **[Edit parameters]**.
- Select the **KFC** command and tap on **[Edit command]**.
- Tap on **[Stirrer]**.

#### 2 Modifying the stirring rate

- Tap on **[-]** or **[+]** to modify the stirring rate.  
You can use the check box **Switch off automatically** to set whether or not the stirrer is switched off at the end of the titration.
- Use the **[↔]** fixed key to return to the **KFC** command.

**NOTICE**

Thorough mixing is important with coulometric titration.  
We recommend a Stage 8 stirring rate or Stage 15 when used in combination with an oven.



## Modifying the settings for the titration

### 1 Setting an extraction time



#### NOTICE

The input of an extraction time is recommended, e.g., with samples that release water slowly or if a Karl Fischer oven (e.g., *885 Compact Oven SC*) is used. The extraction time corresponds to the minimum duration of the titration.

- Tap on **[Titration parameters]**.
- Under **Extraction time**, enter the desired time.  
Use the [] fixed key to return to the **KFC** command.

### 2 Modifying the start drift

- Tap on **[Conditioning]**.
- Under **Start drift**, enter the desired value.
- Define additional stop parameters under **[Cond. options]**.  
Conditioning will be canceled if one of the stop parameters set here is achieved before the start drift is reached.

## 7.3 Creating a sample table

If you would like to prepare a sample series in advance, you can use the sample table. Proceed as follows:

## Filling the sample table with sample data

### 1 Activating the sample table

- In the main dialog, tap on **[Control]**.

- Activate the **Sample table** check box.
- Return to the main dialog with the [**←**] fixed key. A new button is now visible in the main dialog.



## 2 Entering the sample data

- Tap on **[Sample table]**.

Sample table		
No.	Identification 1	Sample size
1	...	

The sample table is still empty. The first line is highlighted.

- Tap on **[Edit]**.

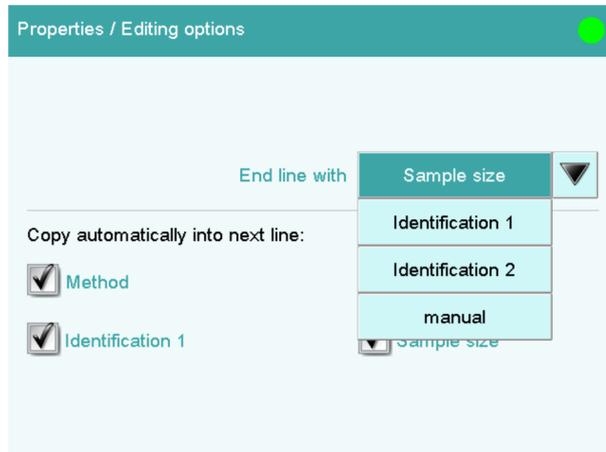
Sample table / Edit		
Line number	-	1 +
Method	▼	
New sample		
Identification 1	[Input field]	
Identification 2	[Input field]	
Sample size	1.0	g ▼

- Tap on the selection symbol next to the input field **Method**.
- Select a saved method.

A particular method can be selected for each sample which is to be processed. If no method is specified, then the currently loaded method is executed.



- Fill out the fields for sample identification and the sample size. The line number is automatically increased by one after the sample size has been entered. The next sample size can be entered directly. The criterion, after which the line number should be increased by one, can be modified in the properties dialog of the sample table under **[Editing options]**.



- Use the [ $\leftarrow$ ] fixed key to return to the sample table.
- Switch to the main dialog with the [ $\uparrow$ ] fixed key after the desired number of sample data has been filled in.

## 7.4 Carrying out titrations using the sample table

Now carry out the titrations with the samples for which you have entered sample data.

Each time that you press the [ $\triangleright$ ] fixed key, the sample data will be loaded from the top line of the sample table and applied for the current titration. This line will be deleted at the end of the titration. The sample data of the next line down will be used for the next titration.

A result report will be printed out and a PC/LIMS report will be saved after each titration if you have defined or activated these options.



### NOTICE

The sample table can also be used with automated determinations.



## 8 Setting up the user administration

If different persons are working on the instrument, we recommend that the user administration of the 917 Coulometer be used. This means that everyone can use their user identification to log on to the instrument. The reports will then automatically contain the respective user name.

In addition, a dialog level can be set up for each user. In addition to the expert dialog, with access to all functions and settings, a routine dialog can be selected with limited access rights. The available functions and dialog areas can be configured for the routine dialog.

Administrator rights can be assigned to users who are permitted to administer methods and to make configuration settings.

If you create a user list, then you can use it in different ways. You can apply different combinations of login options. Three possibilities are listed in the following:

- User name can be selected in the main dialog without login
- Automatic login with USB flash drive
- Login with password

### 8.1 Creating a user list

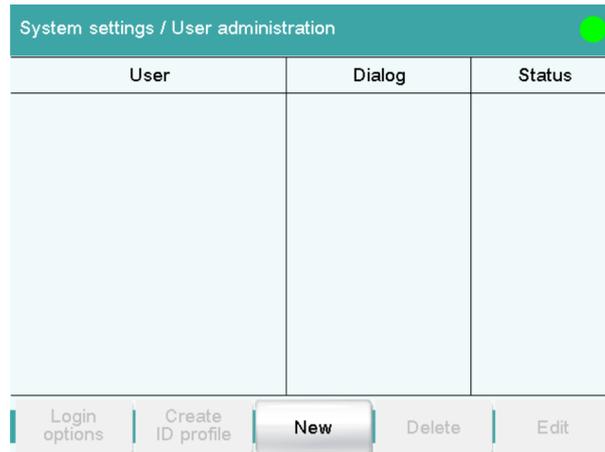
The creation of a user list is required for all of the possibilities of the user login.

#### Defining users

Proceed as follows:

##### 1 Opening the user administration

- In the main dialog, tap on **[System]**.
- Tap on **[System settings]**.
- Tap on **[User admin.]**.



## 2 Creating a new user

- Tap on **[New]**.

User administration / Edit user

User:

Full name:

Dialog: Expert dialog ▼

Status: active ▼

Admin. rights:

Buttons: Cancel, Favorites, Signature method, Signature determ.

- Tap on the input field **User** and enter an unambiguous user identification (e.g., abbreviation). Close the input dialog with **[OK]**.
- Tap on the input field **Full name** and enter the name of the user. Close the input dialog with **[OK]**.
- Tap on the selection list **Dialog** and select either **Expert dialog** or **Routine dialog**. Remember that the system settings cannot be changed except in the expert dialog. The setting is effective only when working with login.
- Activate or deactivate the administrator rights. The user administration can be used only with administrator rights. At least one person must be in possession of administrator rights.
- Return to the user administration with [**←**].
- Define additional users.
- Return to the main dialog with [**🏠**].



If you would like to work without a login, it is sufficient to create a user list. Each user can select his or her entry from the user list in the main dialog. Then the user name will be printed out with reports and/or saved along with a determination.

## 8.2 Automatic login with USB flash drive

It is possible to have automatic user recognition without requiring that a password be entered. If each user uses a USB flash drive of his or her own with his or her user profile, then the instrument can recognize whose USB flash drive it is at the time of the switching on. User login then takes place automatically.

The USB flash drive can be used for saving determination data, methods, PC/LIMS reports or for backing up the entire system.

### Creating user profiles

You now need to create an ID profile for each user on a separate USB flash drive. The USB flash drive must be formatted.

Proceed as follows:

#### 1 Plugging in the USB flash drive

- Return to the main dialog with [].
- Plug in a USB flash drive into the rear of the 917 Coulometer.
- Wait until a message appears which confirms that the USB flash drive has been recognized.

#### 2 Saving the user profile

- Switch over to the user administration with **[System]**, **[System settings]** and **[User admin.]**.
- Select a user name.
- Tap on **[Create ID profile]**.

A message will appear which confirms the creation of the ID profile.

If you now set the login options, you will automatically be logged in at once with this ID profile.

## Setting the login options



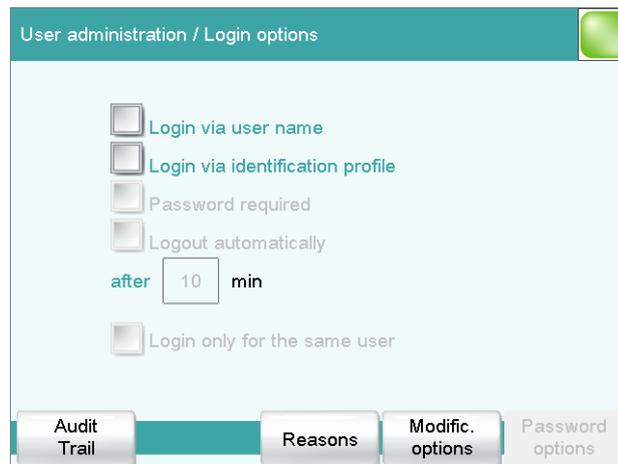
### NOTICE

The following steps are possible only if the user has administrator rights.

Proceed as follows:

#### 1 Opening the login options

- In the user administration, tap on **[Login options]**.



#### 2 Activating login with ID profile

- Activate **Login via identification profile**.
- Deactivate all other settings.
- Return to the user administration with [].

You can confirm the request following the creation of ID profiles with **[Yes]** if you have created an ID profile beforehand. Make sure that the USB flash drive is plugged in.



### NOTICE

If you have not yet created any ID profiles, then you must confirm the request with **[No]**. Then you can deactivate the **Login via identification profile** and create an ID profile in the user administration.

Confirm any messages which may appear with **[Yes]**.

An automatic login will now take place.



- Activate **Password required**.

Many settings are possible in the login options. Consult the manual of the 917 Coulometer to look these up if necessary.



#### NOTICE

The login dialog is called up as soon as you exit the login options dialog with [] or []. You must then log in for the first time. You must define and enter a password to accomplish this.

If the login dialog is not called up, switch the instrument off and then back on again.

#### First login

You must define a password at the time of the first login on the instrument. Proceed as follows:

#### 1 Entering the user name

- Tap on the input field **User**, enter the user name and confirm with [**OK**].
- Tap on [**Change password**].



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