870 KF Titrino plus

Installation and tutorial

8.870.8004EN

Metrohm

870 KF Titrino plus

Installation and tutorial

Teachware
Metrohm AG
CH-9101 Herisau
teachware@metrohm.com

Although all the information given in this documentation has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please send us your comments using the address given above.

Documentation in additional languages can be found on *http://products.metrohm.com* under **Literature/Technical documentation**.

Table of contents

1 Introduction

1.1 Structure of the tutorial

This tutorial describes the installation and the first steps with the 870 KF Titrino plus. You will be introduced to the most important operating features by using a titer determination with a water standard, followed by the water determination of a sample as an example.

1.2 Further information

You will find general information about about Karl Fischer titration on the corresponding Metrohm CD. Additional information concerning the 870 KF Titrino plus can be found in the manual.

1.3 Symbols and conventions

The following symbols and styles are used in this documentation:

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**
	Note
	This symbol marks additional information and tips.

2 Installation

2.1 Setting up and connecting the instrument

870 KF Titrino plus and the 803 Ti Stand
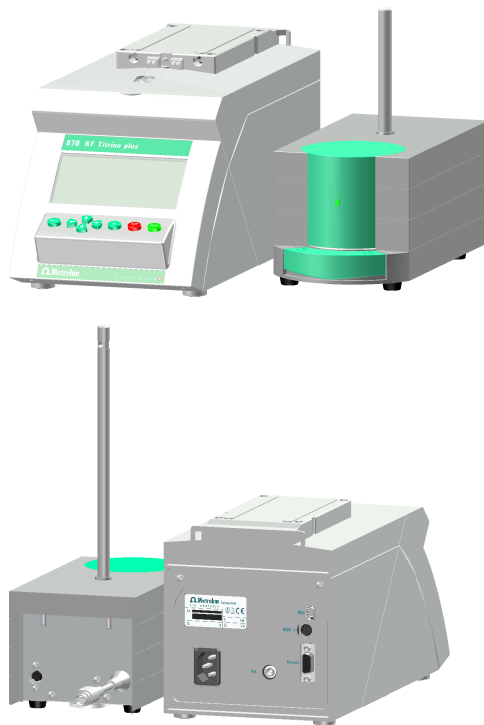
Mounting the stand
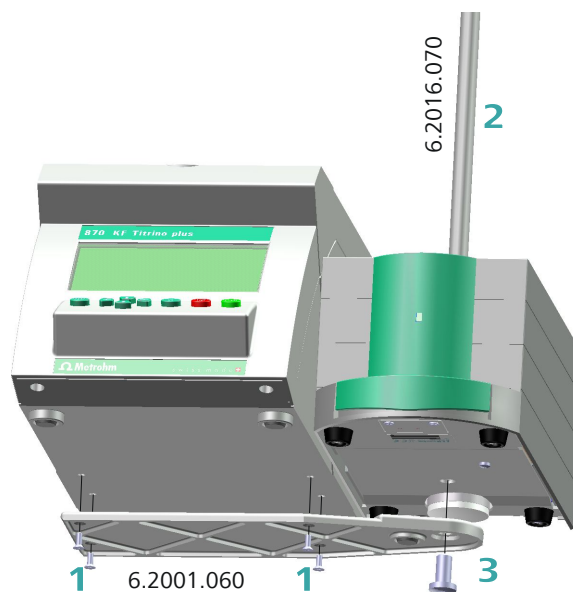
1 Screw the stand plate 6.2001.060 with the accompanying four screws tightly to the bottom of the instrument.

2 Guide the support rod 6.2016.070 from above into the titration stand and slide all the way down to the bottom.

3 Screw the stand plate with the hexagon screw (hexagon key supplied) firmly to the titration stand to mount the support rod.

Plugging in the mains cable
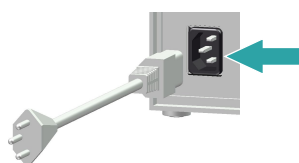
⚠ **Warning**

Note mains voltage.

Connecting the titration stand to the MSB 1
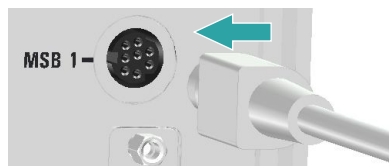
Observe the marking on the socket.

Connecting the electrode cable
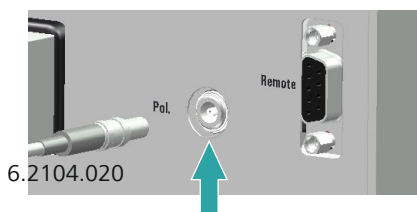
6.2104.020

The electrode cable 6.2104.020 is protected against accidental disconnection of the cable by means of a "pull-out protection" feature. If you wish to remove the plug, then you must first retract the outer plug sleeve.

Connecting a printer or other USB instruments

Adapter 6.2151.100 is supplied for the purpose of connecting instruments or storage media or similar that are equipped with a USB interface.

6.2151.100
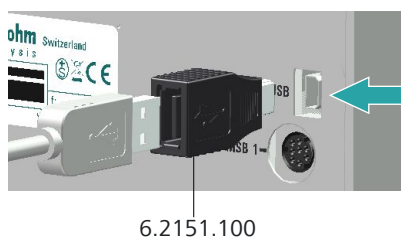
A printer can be connected directly to the adapter (with a connecting cable 6.2151.020), as can a USB keyboard or a USB storage medium (USB Memory Stick for storing methods, etc.).

If several instruments are to be connected, then it is recommended that a USB hub (available from speciality dealer outlets) be used and that this be connected to the adapter 6.2151.100. The USB hub then functions as a distributor to which several USB instruments, etc. are connected.

The cable 6.2151.120 is available as a possible alternative; using this cable, a printer, a USB hub or an RS 232/USB Box (see next section) can be attached directly, without an adapter, to the 870 KF Titrino plus.

Connecting a balance

Balances are equipped as a rule with a serial RS 232 interface. To connect a balance, you require an RS 232/USB Box 6.2148.030.
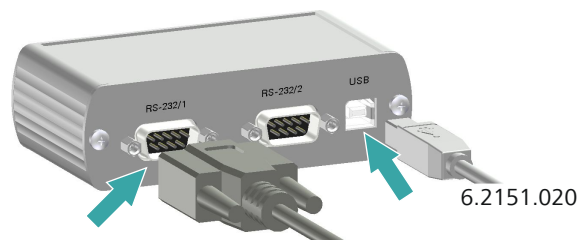
6.2151.020

When a USB cable 6.2151.020 is used, then the RS 232/USB Box 6.2148.030 can be connected to the 870 KF Titrino plus by means of a USB hub or an adapter 6.2151.100 (see preceding section).

Connect the 9-pin plug of the respective balance connecting cable to the **RS-232/1** connector. Consult the user manual for the balance or the manual for the 870 KF Titrino plus in order to select the correct connecting cable.

The parameters for the RS 232 interfaces on the instrument must match those on the balance. For this purpose, check the user manual for the balance and the manual for the 870 KF Titrino plus.

2.2 Setting up the KF titration cell

Mounting the KF titration cell

Install the KF titration cell as follows:

1 Screw the clamping ring 6.2013.010 tightly to the support rod.

2 Mount the vessel lid 6.1414.030 of the KF titration cell to the support rod. Keep the locking lever pressed down until it can be released at the desired position.

3 Fasten the titration vessel 6.1415.220 (or 6.1415.250) with a stirring bar 6.1903.020 (or 6.1903.030) inside on the vessel lid. Fold back the holding bracket upwards while doing so. The markings on the vessel lid and on the plastic ring must be aligned above one another. Afterwards, press the holding bracket downward in order to mount the titration vessel. The levers of the holding bracket must enclose the cams of the plastic ring on the titration vessel in order to ensure a secure hold.
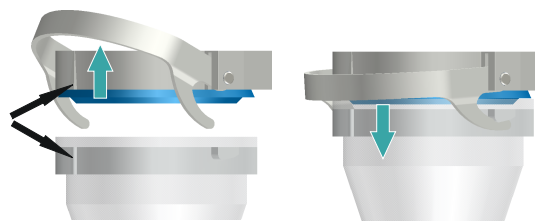
4 Adjust the height of the KF titration cell by pressing the locking lever. It should almost touch the surface of the stirrer. The position can now be fixed by readjusting the clamping ring.

Once the height of the KF titration cell has been adjusted correctly, the entire cell can be raised and swiveled as required by pressing the locking lever.

Filling the drying and adsorber tube

The drying tube 6.1403.040 and the adsorber tube 6.1609.010 must be filled with molecular sieve 6.2811.000 prior to mounting. Proceed as follows:

6.1403.040   6.1609.010

1 Insert a small plug made of cotton wadding into the bottom of the drying tube or adsorber tube. Do not pack the cotton wadding too tightly.

2 Fill up the molecular sieve up to the ¾ level.

3 Place a small plug made of cotton wadding on the molecular sieve. Do not pack the wadding too tightly.

4 Seal the drying tube or the adsorber tube with the appropriate cover.

Equipping the KF titration cell
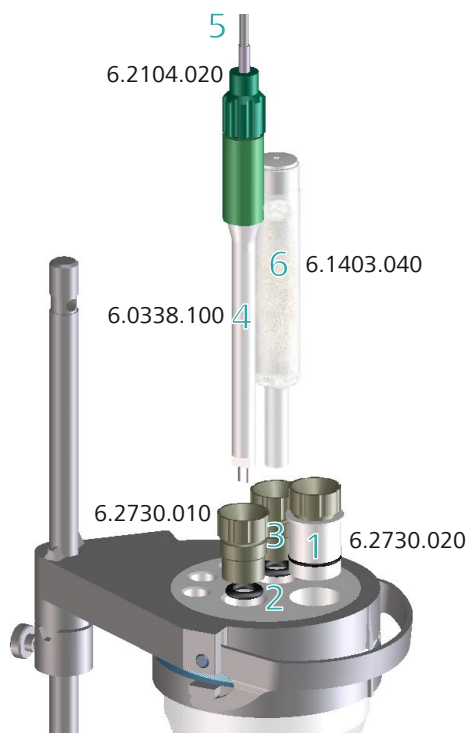
The KF titration cell can now be equipped as follows:

1 Introduce the septum stopper 6.2730.020 (with septum inserted) into the front opening of the vessel lid.

2 Insert the O-rings of the electrode and of the drying tube into the middle openings of the vessel lid.

3 Screw the two screw nipples 6.2730.010 into the openings with the O-rings. Do not screw them in too tightly.

4 Introduce the double Pt-wire electrode 6.0338.100 into the left-hand opening and then tighten the screw nipple until it seals.

5 Screw the electrode cable 6.2104.020 tightly onto the electrode.

6 Introduce the filled drying tube 6.1403.040 on the right of the electrode into the remaining opening and then tighten the screw nipple until it seals.

2.3   Setting up the aspiration and solvent bottle

Mode of operation of the 803 Ti Stand

With the 803 Ti Stand, on the one hand you can add fresh solvent (dehydrated methanol or a special KF solvent solution) easily at the press of a button, while on the other hand you can aspirate the KF titration cell at the press of a button. This can be accomplished if all of the required tubings have been set up correctly and if all of the connectors have been screwed tightly enough to seal.

The following diagram gives you an overview of the mode of operation of the 803 Ti Stand:
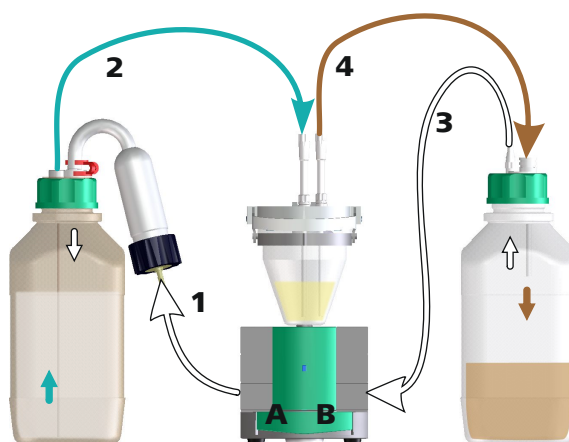
1.   Air will be pumped into the solvent bottle (on the left) for as long as the left-hand key **A** is kept pressed down.

2.   The overpressure in the solvent bottle pushes fresh solvent into the KF titration cell.

3.   Air will be aspirated from the aspiration bottle (on the right) for as long as the right-hand button **B** is kept pressed down.

4.   The vacuum in the aspiration bottle aspirates the liquid out of the KF titration cell and into the suction bottle.

Setting up the solvent bottle

Methanol or KF solvent is pumped out of the supply bottle by overpressure and into the KF titration cell. All of the bottle top connectors must be leak-proof for this reason.

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

6.1805.200
3
6.1609.010
5
6.2023.020
6.1446.040
2
1
6.1602.105
6
6.1819.030
7
4
6.1801.120
6.1608.023
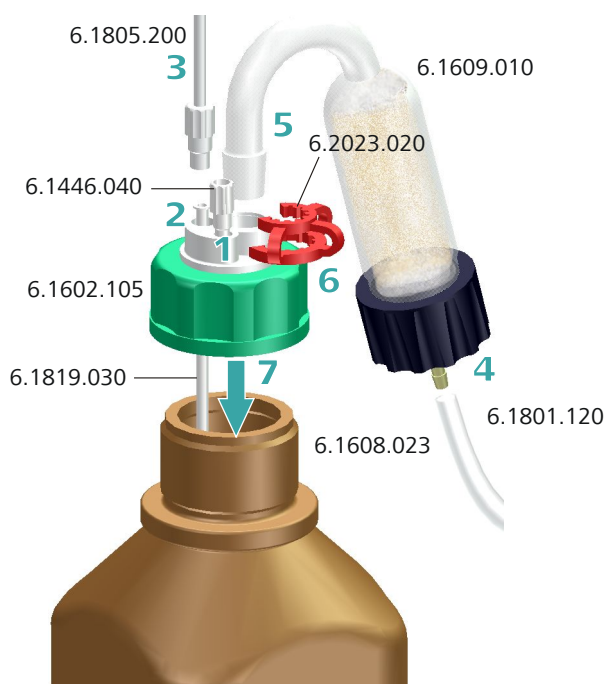
To equip the solvent bottle, proceed step-by-step as follows:

1 Place a thread stopper 6.1446.040 in the M6 connector (smallest opening) of a bottle top 6.1602.105 and screw it tightly.

2 Insert the long PTFE cannula 6.1819.030 into the M8 connector (second-smallest opening) of the bottle top.

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

4 Connect a PVC tubing 6.1801.120 to the adsorber tube 6.1609.010 that is filled with the molecular sieve.

5 Place the adsorber tube with the SGJ 14 standard ground joint on the bottle top.

6 Secure the SGJ 14 standard ground joint of the adsorber tube with the SGJ clip 6.2023.020.

7 Place the completely equipped bottle top 6.1602.105 on the amber glass bottle 6.1608.023 filled with solvent/methanol or 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.
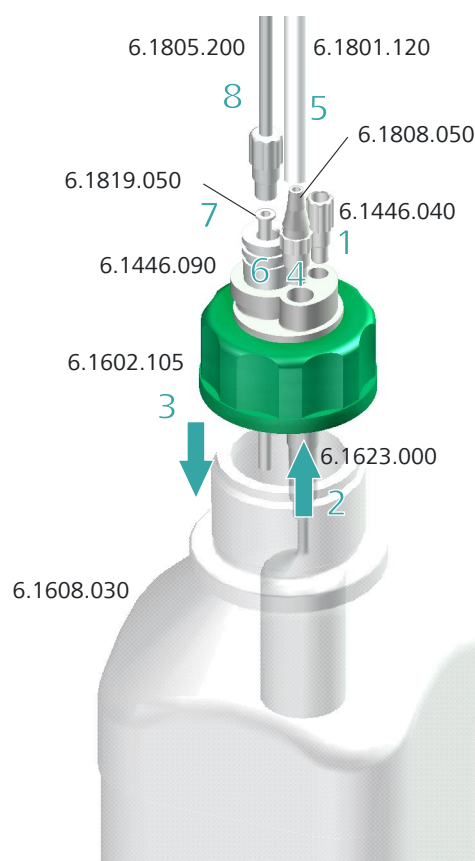
To equip the aspiration bottle, proceed step-by-step as follows:

1 Place a thread stopper 6.1446.040 in the M6 connector (smallest opening) of a bottle top 6.1602.105 and screw it tightly.

2 Introduce the overflow protection 6.1623.000 into the M8 connector from below (second-smallest opening) of the bottle top.

3   Place the bottle top on the clear glass bottle 6.1608.030 (or on a different bottle with GL 45 thread) and screw it tightly.

4   Place the olive 6.1808.050 in the M8 connector of the bottle top and screw it tightly.

5   Place the PVC tubing 6.1801.120 on the olive.

6   Insert the stopper 6.1446.090 into the remaining opening on the bottle top.

7   Introduce the PTFE cannula 6.1819.050 into the opening of the stopper.

8   Insert a PTFE tubing 6.1805.200 with M8 connector into the opening of the stopper and screw it tightly.

2.4   Connecting the pump

Connecting tubings to the pump

The pump connectors of the 803 Ti Stand are located on the rear side.
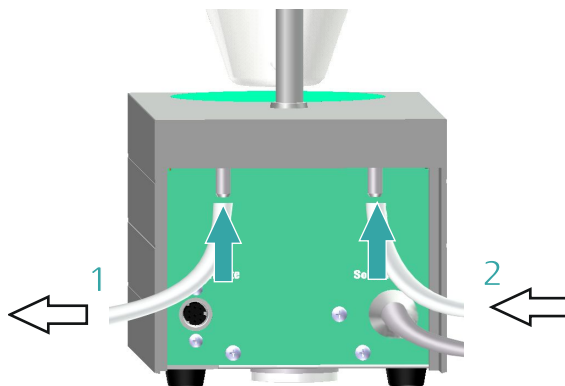
Please ensure that you connect the tubings to the pump correctly. Proceed as follows:

1   Fasten the PTFE tubing from the aspiration bottle (clear glass) securely to the **Waste** connector (left-hand connector).

2   Fasten the PTFE tubing from the solvent bottle (amber glass with drying tube) securely to the **Solvent** connector (right-hand connector).

2.5   Setting up tubings and tips

Setting up the aspiration and dosing tip
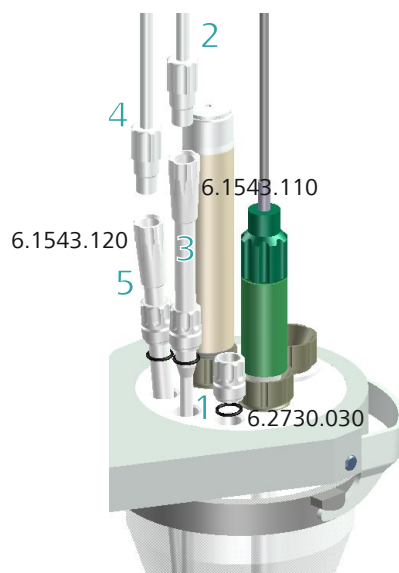
1 Place the three stoppers 6.2730.030 (including O-rings, but without nipples) in the rear openings of the vessel lid.

2 Screw on the dosing tip 6.1543.110 to the M8 PTFE tubing of the solvent bottle (amber glass).

3 Insert the dosing tip through the stopper in the middle rear opening of the vessel lid.

4 Screw the aspiration tip 6.1543.120 onto the M8 PTFE tubing of the aspiration bottle (clear glass).

5 Insert the aspiration tip through the stopper in the right rear opening of the vessel lid.

The end of the tip must touch the bottom of the vessel, but it must not inhibit the action of the stirring bar.

As an alternative to the aspiration tip 6.1543.120, the aspiration tip 6.1821.070 can also be used with an M10 screw nipple.

Attaching the exchange unit
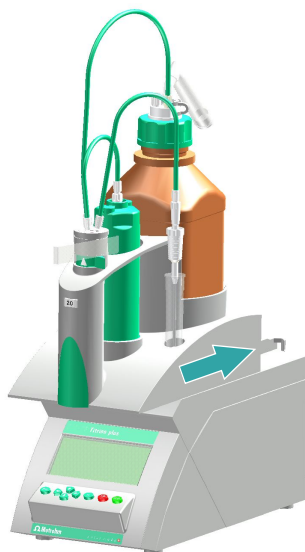
1 Slide the exchange unit from the front onto the 870 KF Titrino plus and push all the way to the rear.

It must snap in audibly.

Inserting the titration tip
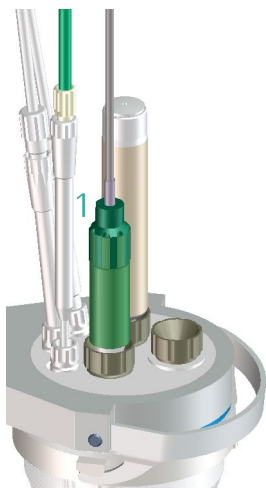
1 Insert the titration tip of the exchange unit into the remaining opening at the rear on the vessel lid.

The end of the tip should be located just above the stirring bar, but is not permitted to touch it.

3 Tutorial

3.1 Configuration

> ℹ️ **Note**
>
> External devices (printer, balance and USB stick) must be connected to the USB connector and, if necessary, be switched on before switching on the 870 KF Titrino plus.

3.1.1 Switching the instrument on and off

Switching on the instrument

Proceed as follows:

1
- Press the red **[STOP]** key.
  As soon as the buret unit has been recognized the following message appears:

```
New buret unit          005-109

    You must configure the new
    buret unit before you use
    it.

OK
```

- Confirm the message with **[OK]**.
  The request to carry out the **PREP** function appears:

```
Prepare buret unit      005-117

    Execute a PREP function.
    You find it under
    "Manual control/Dosing".

OK
```

All tubings and the cylinder are rinsed with the **PREP** (Preparing) function. The preparing of the buret unit is described in *chapter 3.2.2, page 26*. The buret unit must however first be configured *(see Chapter 3.1.3, page 16)*.
- Confirm the message with **[OK]**.

The main dialog is displayed:

```
>Menu                    ready
 Method         KFT Ipol-Blank
 ID1
 ID2
 Sample size               1.0
 Unit                        g
```

Switching off the instrument

Proceed as follows:

1 ▪ Keep the red **[STOP]** key pressed down.
A progress bar is displayed. If the key is released during this time, then the instrument will not be switched off.
▪ Keep the **[STOP]** key pressed down until the progress bar is finished.

3.1.2 Setting the dialog language

If the dialog does not appear in the appropriate language, the dialog language can easily be changed. Proceed as follows:

1 Open the system settings
▪ In the main dialog, select **Menu** and press **[OK]**.
▪ In the main menu, select **System** and press **[OK]**.
▪ In the system menu, select **Settings** and press **[OK]**.

2 Change the language
▪ Select **Language** and press **[OK]**.
▪ Select the required language and press **[OK]**.
▪ Press **[BACK]**.

If no second dialog language is available, a corresponding language file must first be loaded into the instrument. The chapter **Instrument diagnosis** in the manual of the 870 KF Titrino plus describes how to proceed.

3.1.3 Adding and configuring a solution

> **ℹ** **Note**
>
> The buret unit must be attached before carrying out the instructions listed below.

The solutions are configured under **System ▶ Solutions**.

Proceed as follows:

1 Open the solution list

- In the main dialog, select **Menu** with the arrow keys **[⇧]** or **[⇩]** and confirm with **[OK]**.
The main menu opens:

```
Menu                    ready
>Manual control
>Results
>Parameters
>System
>Control
>Print reports
```

- With the arrow key **[⇩]**, select the menu item **System** and confirm with **[OK]**.
The system dialog opens:

```
System                  ready
>Settings
>Solutions
>Files
>Devices
>Diagnosis
```

- Select the menu item **Solutions** and confirm with **[OK]**.
The list of the configured solutions is displayed:

```
Solution list           ready
                        *IEU
not defined              EU



Edit New Delete
```

The new solution has been entered into the list, but it does not have a name yet. The asterisk (*****) on the right-hand side indicates that this buret unit has been attached.

The designation **IEU** is the name for an exchange unit with integrated data chip (Intelligent Exchange Unit). **not defined** is the standard solution. It can be used to carry out determinations without having configured a solution. This standard solution can neither be renamed nor deleted.

2 **Define a name**

- With the arrow keys **[⇦]** or **[⇨]**, select the function **Edit** in the function bar and confirm with **[OK]**.
  The properties dialog opens:

```
Edit solution          ready
Name
Type               IEU
Cylinder volume    20 mL
Concentration      1.000
Concentration unit mol/L
Titer              1.000
Titer unit           ↓
```

- The parameter **Name** is already selected. Open the text editor with **[OK]**:

```
Name

▉

▉BCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789.-µ°!  #$&'()*+./
ÄÁÅÉÍÑÖÓÜÛàáåàçéèèïíîñöóôûû
Accept Cancel Clear [←-]
←-| |-→
```

- Enter a name for the titrant.
  For this, use the arrow keys **[⇦]**, **[⇨]**, **[⇧]** and **[⇩]** to select the required character and press **[OK]** to apply it in the text line.
  [←-] deletes the character on the left of the cursor, **←-|** and **|-→** move the cursor one character to the left or right. With **Clear** the entire text is deleted, with **Cancel** the text editor is closed, without applying the modifications. With **Accept**, the modification is applied and the text editor closed. The **[BACK]** key has the same function.
- Apply the name with **Accept** or **[BACK]**.

The text editor is closed and the new name is displayed in the properties dialog.

3 **Define the concentration and the unit**

- Select the parameter **Concentration** and open the editing dialog with **[OK]**.

```
Concentration
1.000

▉234567890-.
Accept Cancel Clear [←-]
_____
 Range: 10 characters
 Default: 1.000
```

- Enter the theoretical concentration of the titrant and apply with **Accept** or **[BACK]**.
  The input functions the same way as with the text editor.
- Select the parameter **Concentration unit** and use **[OK]** to open the list of available units.
- Select the unit **mg/mL** and apply with **[OK]**.

4 Switch to the main dialog

- Repeated pressing on **[BACK]** will switch you to the main dialog.

3.1.4 Configuring external devices

In the system settings you can define whether the results are to be put out as PC/LIMS reports. You have the possibility to save them on a USB stick and to read them into tiBase afterwards. The reports can also directly be sent to the PC and imported into tiBase. For this, you have to install the software **RS Server** on your PC.

For the titrations you can use further external devices. These include:

- Printer
- Balance
- Keyboard

The configuration of the PC/LIMS report output and the external devices are defined under **Menu ▸ System ▸ External devices**.

Proceed as follows:

1 Open the dialog External devices

- In the main dialog, select **Menu** with the arrow keys **[⇧]** or **[⇩]** and confirm with **[OK]**.
  The main menu opens.

```
Menu                    ready
>Manual control
>Results
>Parameters
>System
>Control
>Print reports
```

- Select the menu item **System** and open the system dialog with **[OK]**.

```
System                    ready
>Settings
>Sensors
>Solutions
>Common variables
>File management
>External devices
>Diagnosis
```

- Select the menu item **External devices** and confirm with **[OK]**. The list of configurable external devices is displayed:

```
External devices          ready
PC/LIMS report       USB Stick
Printer         Custom (ESC-POS)
Graphics width         200 px
Keyboard layout      English US
Balance               Sartorius
>COM1 settings
>COM2 settings
```

Saving PC/LIMS reports on a USB stick

1
- With the arrow key **[⇩]**, select the menu item **PC/LIMS report** and confirm with **[OK]**.
  The properties dialog **PC/LIMS report** opens:
- Select **USB Stick** and apply with **[BACK]**.

Sending PC/LIMS reports directly to a PC

If you directly send the PC/LIMS reports to a PC and import them into tiBase, you have to configure the COM2 port.

Proceed as follows:

1 Define the PC/LIMS report
- With the arrow key **[⇩]**, select the menu item **PC/LIMS report** and confirm with **[OK]**.
  The properties dialog **PC/LIMS report** opens:
- Select **COM2** and apply with **[BACK]**.

2 Configure the interface
- Select **COM2 settings** and confirm with **[OK]**.
- Select **Handshake** and confirm with **[OK]**.
- Select **software** and apply with **[Back]**.

Selecting a printer

If you would like to print the results automatically or manually, you have to configure a connected printer.

Proceed as follows:

1 ▪ With the arrow key **[⇩]**, select the menu item **Printer** and confirm with **[OK]**.
The printer list opens:

```
Printer
 Citizen (ESC-POS)
 Custom (ESC-POS)
 Epson
 Epson (ESC-POS)
 HP DeskJet
 HP LaserJet
 Seiko (ESC-POS)
```

▪ Select the printer type and apply with **[BACK]**.
The new printer is entered in the dialog **External devices**.

```
External devices      ready
 PC/LIMS report    USB Stick
 Printer           HP DeskJet
 Graphics width      1196 px
 Keyboard layout   English US
 Balance           Sartorius
 >COM1 settings
 >COM2 settings
```

Selecting a balance

The sample size can directly be read in from a balance. For this, you have to select the balance type and configure it.

Proceed as follows:

1 ▪ With the arrow key **[⇩]**, select the menu item **Balance** and confirm with **[OK]**.
The list with the balances supported by the 870 KF Titrino plus opens.

```
Balance
 AND
 Mettler
 Mettler AT
 Mettler AX
 Ohaus
 Precisa
 Sartorius          ↓
```

- Select the a balance type and apply with **[BACK]**.
  The balance is entered in the dialog **External devices**.

```
External devices         ready
 PC/LIMS report           COM2
 Printer       Custom (ESC-POS)
 Graphics width        200 px
 Keyboard layout    English US
 Balance           Sartorius
 >COM1 settings
 >COM2 settings
```

Under **COM1 settings** you have to set the interface parameters of the connected balance (see manual 870 KF Titrino plus). Use the identical settings as defined for the balance.

Switching to the main dialog

1 Repeated pressing on **[BACK]** will switch you to the main dialog.

3.2 Carrying out titrations

3.2.1 Creating a method for titer determination

Below you will find a description of how to create your own method for titer determination. The 870 KF Titrino plus contains method templates which are already configured except for a few parameters.

The titer of the reagent should be determined by a fivefold determination of a water standard. If you have a printer connected, then a report with the result and the curve should be printed out automatically at the end of the determination.

Proceed as follows:

1 **Load the method template**

```
>Menu                    ready
 Method        KFT Ipol-Blank
 ID1
 ID2
 Sample size           1.0
 Sample unit             g
```

■ In the main dialog, select **Method** and confirm with **[OK]**.
The method table with the stored templates opens:

```
Method table          ready
 KFT Ipol
 Titer Ipol
 Blank Ipol
 KFT Ipol-Blank
 KFT Upol
 Titer Upol            ↓
Load
```

■ Select the template **Titer Ipol**.
■ In the function bar, select the **Load** function and confirm with **[OK]**.

The method template **Titer Ipol** is now loaded and is displayed in the main dialog under **Method**.

```
>Menu                  ready
 Method          Titer Ipol
 ID1
 ID2
 Sample size           1.0
 Sample unit             g
```

2 Select a solution

■ In the main dialog, select **Menu** and confirm with **[OK]**.
The main menu opens.
■ Select the menu item **Parameters** and confirm with **[OK]**.
The parameters dialog opens:

```
Parameters             ready
 >Conditioning
 >Start conditions
 >Control parameters
 >Titration parameters
 >Stop conditions
 >Calculation
 >Statistics           ↓
```

■ Select the menu item **Titration parameters** and confirm with **[OK]**.

```
Titration parameters   ready
 Solution       not defined
 I(pol)             50 µA
 Electrode test       off
 Stirrer               on
 Stirring rate          8
 Temperature     25.0 °C
 Extraction time      0 s
```

- Select the parameter **Solution** and confirm with **[OK]**.
  The list of the configured solutions is displayed:

```
Solution
 not defined
 Titrant 5
```

- Select the newly configured solution and apply with **[OK]**.

3 **Adjust the calculation**

- With **[BACK]**, switch to the parameters dialog.
- Select the menu item **Calculation** and open the corresponding dialog with **[OK]**.

```
Calculation              ready
 (C00*FCT)/EP1
 Factor (FCT)             1.0
 Decimal places             4
 Result unit           mg/mL
```

The calculation formula is defined for every method template and cannot be modified.

- Select the parameter **Factor (FCT)** and open the editing dialog with **[OK]**.
- Enter the water content of the water standard used in mg/g (see certificate of the water standard).
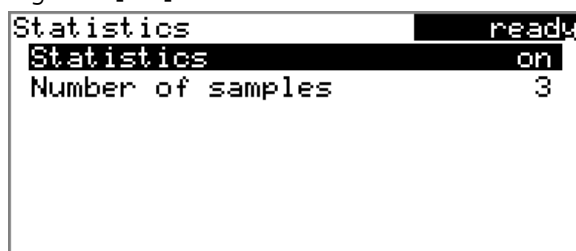- Apply the value with **Accept** or **[BACK]**.

> ℹ️ **Note**
>
> In the manual you will find details as to how the conversion factor **FCT** is to be adjusted if you do not use a water standard to carry out the titer determination.

---

4 **Activate the statistics**

- With **[BACK]**, switch to the parameters dialog.

- Select the menu item **Statistics** and open the corresponding dialog with **[OK]**.

```
Statistics              ready
 Statistics               on
 Number of samples         3




```

- Select the parameter **Number of determinations** and open the editing dialog with **[OK]**.
- Enter the number of titer determinations to be carried out, in this example **5**.
- Apply the value with **Accept** or **[BACK]**.

> **ℹ** **Note**
>
> Continue with step 6, if you do not have a printer connected.

5 **Select the reports**

- With **[BACK]**, switch to the parameters dialog.

```
Parameters              ready
 >Conditioning
 >Start conditions
 >Control parameters
 >Titration parameters
 >Stop conditions
 >Calculation
 >Statistics               ↓
```

The arrow at the lower right edge of the screen indicates that the dialog contains more menu items. These can be selected as usual with the arrow key **[↓]**.

- With the arrow key **[↓]**, select the menu item **Reports** and open the corresponding dialog with **[OK]**.
  The list of available reports is displayed:

```
Report                  ready
 Results                  off
 Curve                    off
 Calculations/Statistics  off
 List of meas. points     off
 Parameters               off
 PC/LIMS                  off
```

- Select the parameter **Results** and confirm with **[OK]**.
- Select **on** and confirm with **[OK]**.
- Select the parameter **Curve** and confirm with **[OK]**.

- Select **on** and confirm with **[OK]**.

6 **Save the method**

- The modified parameters are saved automatically. It is not necessary to save the method under a name of its own.

7 **Switch to the main dialog**

- Repeated pressing on **[BACK]** will switch you to the main dialog.

3.2.2 Preparing the buret unit

The **PREP** function is used to rinse the cylinder and tubings of the buret unit and fill them bubble-free. You should carry out this function before the first determination or once per day.

Proceed as follows:

1 **Open the manual control**

- In the main dialog, select **Menu** and confirm with **[OK]**.
  The main menu opens.
- Select **Manual control** and confirm with **[OK]**.

```
Manual control          ready
Dosing




PREP DOS ADD
```

2 **Carry out the PREP dosing function**

ℹ	**Note**

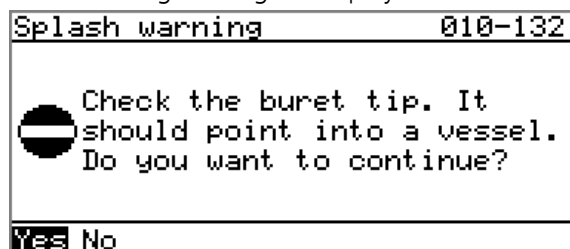Make sure that the buret tip is directed into a vessel that can accommodate the cylinder volume of your buret unit several times over.

■ With the arrow keys **[⇐]** or **[⇒]**, select the function **PREP** in the function bar and confirm with **[OK]**.
The following message is displayed:

```
Splash warning          010-132

      Check the buret tip. It
   ⊖  should point into a vessel.
      Do you want to continue?


Yes No
```

■ Select **Yes** and confirm the message with **[OK]**.

The preparing is carried out with permanently set parameters (see manual).

3.2.3   Carrying out a titer determination

1   **Condition the titration cell**

■ Add the working medium (e.g. methanol).
■ Press **[START]**.

Conditioning starts. **Conditioning not OK** is displayed until the endpoint is reached.

```
Titer Ipol              cond.busy

  Conditioning not OK

    Drift               80 µL/min


Stirrer
```

In the function bar, the **Stirrer** function is selected. The parameters dialog of the stirrer is opened by pressing **[OK]**.

```
Stirrer                 cond.ok

Stirrer      on     Rate      8




Off Stir- Stir+
```
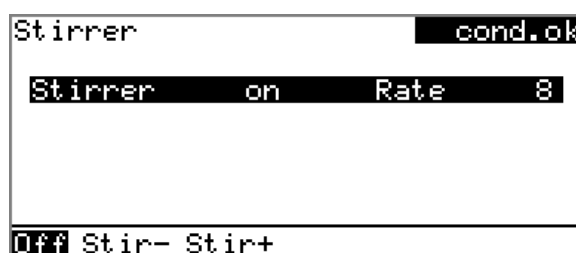
The stirring rate can be reduced with **Stir-** and increased with **Stir+**. **off** switches the stirrer off. If the stirrer is switched off, then this text switches to **on**. This can be used to switch the stirrer back on. This dialog is exited with **[BACK]**.

The working medium is titrated to the endpoint. This is indicated by **Conditioning OK**. The status is kept stable.

```
Titer Ipol              cond.ok

 Conditioning OK

 ↔Drift               0.5 µL/min


Stirrer
```

2 **Inject water standard**

> ℹ️ **Note**
>
> Calculate the amount of the water standard in such a way that a
> titration consumption of 10…90 % of the cylinder volume will
> result.

- Press **[START]**.
  Conditioning is stopped. The request for adding the water stand-
  ard will be displayed for 8 s.
  The water standard should be injected during this time.

```
Titer Ipol                  busy

 Add sample                  4 s




Stirrer
```

- Inject the water standard.

Afterward the request for the sample size appears:

```
Titer Ipol                  hold
Sample size                  1.0

 Press [START] key to continue


```

3 **Enter the sample size**
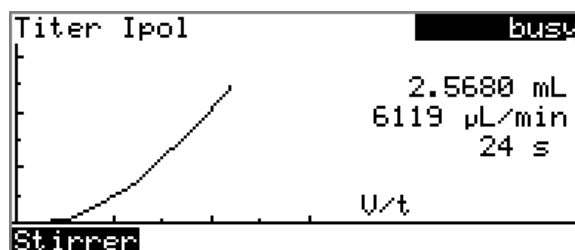
- Open the editing dialog with **[OK]**.
- Enter the sample size and apply with **Accept** or **[BACK]**.

4 **Start the titration**

- Press **[START]**.

The titration starts and the curve is displayed:

```
Titer Ipol              busy

                  2.5680 mL
                  6119 µL/min
                      24 s

              U/t
Stirrer
```

After the completion of the titration, the results dialog is displayed. If a printer is connected, then the report will now be printed out. Conditioning is restarted automatically.

```
Results            cond.ok
Titer          4.9993 mg/mL
EP1            5.1940 mL
Regular stop




Curve Recalc Statistics
```

5 **Carry out the remaining determinations**

- Carry out the remaining titer determinations in the same way.

6 **Show the statistics data**

- After the final determination, select the function **Statistics** in the function bar and confirm with **[OK]**.
  The statistical overview is shown.

```
Statistics         cond.ok
Titer
    Mean(5) 5.0011 mg/mL
      s abs 0.00641 mg/mL
      s rel 0.13 %
 Statistics 5/5

Details Reset Increase
```
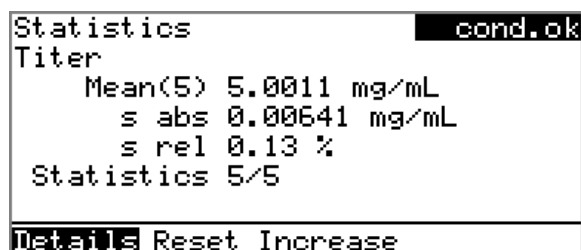
The mean value (**Mean( )**), the absolute and the relative standard deviation (**s abs** and **s rel**) are displayed in the overview. For the mean value, the number of individual results from which it has been calculated is displayed. In this example it is 5. **Statistics** shows how many determinations have already been carried out and how many determinations are to be carried out in total. All five determinations were carried out in this example.
- In the function bar, select the **Details** function and confirm with **[OK]**.

```
Details                    cond.ok
    Result           Sample size
  1 4.9993 mg/mL     2.5863 g
  2 5.0069 mg/mL     2.5907 g
  3 4.9916 mg/mL     2.5987 g
  4 5.0072 mg/mL     2.5904 g
  5 5.0007 mg/mL     2.5875 g
On/Off
```

The result and the sample size of each determination are shown. **On/
Off** removes the selected determination from the statistics. The line
will then be marked with an asterisk (*), the statistics will be recalcu-
lated automatically.

7	**Cancel the conditioning**

- Press **[STOP]**.

Conditioning is canceled and the dosing cylinder is filled.

3.2.4 Creating a titration method

Below you will find a description of how to create your own method for
water content determination. The 870 KF Titrino plus contains method
templates which are already configured except for a few parameters.

The water content of a sample should be determined by means of a triple
determination. If you have a printer connected, then a report with the
result and the curve should be printed out automatically at the end of the
determination.

Proceed as follows:

1	**Load the method template**

- In the main dialog, select **Method** and confirm with **[OK]**.
  The method table with the stored templates opens:

```
Method table              ready
 KFT Ipol
 Titer Ipol
 Blank Ipol
 KFT Ipol-Blank
 KFT Upol
 Titer Upol                   ↓
Load
```

- Select the template **KFT Ipol**.
- In the function bar, select the **Load** function and confirm with
  [OK].

The method template **KFT Ipol** is now loaded and is displayed in the
main dialog under **Method**.

2 **Select a solution**

- In the main dialog, select **Menu** and confirm with **[OK]**.
  The main menu opens.
- Select the menu item **Parameters** and confirm with **[OK]**.
  The parameters dialog opens:

```
Parameters          ready
>Conditioning
>Start conditions
>Control parameters
>Titration parameters
>Stop conditions
>Calculation
>Statistics            ↓
```

- Select the menu item **Titration parameters** and confirm with
  [OK].

```
Titration parameters   ready
Solution        not defined
I(pol)               50 µA
Electrode test         off
Stirrer                 on
Stirring rate            8
Temperature        25.0 °C
Extraction time        0 s
```

- Select the parameter **Solution** and confirm with **[OK]**.
  The list of the configured solutions is displayed.

```
Solution
not defined
 Titrant 5
```

- Select the newly configured solution and apply with **[OK]**.

3 **Adjust the calculation**

- With **[BACK]**, switch to the parameters dialog.

■ Select the menu item **Calculation** and open the corresponding dialog with **[OK]**.

```
Calculation              ready
 EP1*TITER*FCT/(C00*DIV)
 Factor (FCT)              0.1
 Divisor (DIV)            1.0
 Titer                  1.000
 Decimal places             2
 Result unit                %
```

The calculation formula is defined for every method template and cannot be modified. Depending on the unit of the sample size and the result, only the conversion factors **FCT** and **DIV** need to be adjusted.

■ Select the line with the calculation formula and press **[OK]**.

```
Result  Smpl  Factor     Divisor
 %       g     0.1        1
 %       mg    100        1
 %       mL    0.1        density¹
 ppm     g     1000       1
 ppm     mL    1000       density¹
 mg/mL   g     density¹   1
 mg/mL   mL    1          1        ↓
```

This conversion table is for purposes of information only. It is not possible to apply values taken from there.

■ Find the desired result unit and the unit of the sample size in the table and make a note to yourself of the factor and divisor contained in this line.
■ Close the table with **[BACK]**.
■ Enter the values for **Factor (FCT)** and **Divisor (DIV)** according to the conversion table shown above.

4 Activate the statistics

■ With **[BACK]**, switch to the parameters dialog.
■ Select the menu item **Statistics** and open the corresponding dialog with **[OK]**.
■ Select the parameter **Statistics** and confirm with **[OK]**.
■ Select **on** and confirm with **[OK]**.
  The parameter **Number of determinations** is additionally displayed.
■ Select the parameter **Number of determinations** and open the editing dialog with **[OK]**.
■ Enter the number of determinations to be carried out, in this example **3**.
■ Apply the value with **Accept** or **[BACK]**.

> **Note**
>
> Continue with step 6, if you do not have a printer connected.

5 **Select the reports**

- With **[BACK]**, switch to the parameters dialog.

```
Parameters           ready
 >Conditioning
 >Start conditions
 >Control parameters
 >Titration parameters
 >Stop conditions
 >Calculation
 >Statistics          ↓
```

The arrow at the lower right edge of the screen indicates that the dialog contains more menu items. These can be selected as usual with the arrow key **[↓]**.

- With the arrow key **[↓]**, select the menu item **Reports** and open the corresponding dialog with **[OK]**.
  The list of available reports is displayed:

```
Report               ready
 Results              off
 Curve                off
 Calculations/Statistics  off
 List of meas. points off
 Parameters           off
 PC/LIMS              off
```

- Select the parameter **Results** and confirm with **[OK]**.
- Select **on** and confirm with **[OK]**.
- Select the parameter **Curve** and confirm with **[OK]**.
- Select **on** and confirm with **[OK]**.

6 **Save the method**

- The modified parameters are saved automatically. It is not necessary to save the method under a name of its own.

7 **Switch to the main dialog**

- Repeated pressing on **[BACK]** will switch you to the main dialog.

3.2.5   Determining the water content of a sample

You can use either the working medium from the previous titer determination or fresh methanol.

1   Start conditioning

- Press **[START]**.

Conditioning starts. **Conditioning not OK** is displayed until the endpoint is reached.

```
KFT Ipol               cond.busy

 Conditioning not OK

    Drift              162 µL/min


Stirrer
```

In the function bar, the **Stirrer** function is selected. The parameters dialog of the stirrer is opened by pressing **[OK]**.

```
Stirrer                  cond.ok

 Stirrer      on      Rate      8




Off Stir- Stir+
```

The stirring rate can be reduced with **Stir-** and increased with **Stir+**. **off** switches the stirrer off. If the stirrer is switched off, then this text switches to **on**. This can be used to switch the stirrer back on. This dialog is exited with **[BACK]**.

The working medium is titrated to the endpoint. This is indicated by **Conditioning OK**. The status is kept stable.

```
KFT Ipol                 cond.ok

 Conditioning OK

 ↔Drift              1.8 µL/min


Stirrer
```

2 | **Enter the sample data**

You can enter information about the sample in different ways. You can enter the sample data (sample size and sample identifications) at the start of a determination. To do that, you can activate an automatic request by the instrument (under **Menu** ▶ **Parameters** ▶ **Start conditions**). You can also enter the sample data during the conditioning of the titration cell or during the running determination. Of course all this applies as well if you transfer the sample size from a balance.

By default, the automatic request of the sample size at the start of the determination is activated.

Now, enter information about the sample:

- Press **[BACK]**.
  The 870 KF Titrino plus switches from the live display to the main page.

```
>Menu                    cond.ok
 Method               KFT Ipol
 ID1
 ID2
 Sample size               1.0
 Unit                        g

```

- Select **ID1** and press **[OK]**.
- Enter the text (e.g. product name, number of the analysis etc.) and apply with **[BACK]**.
- Select **ID2** and press **[OK]**.
- Enter the text (e.g. batch number, sampling date etc.) and apply with **[BACK]**.
- With **[BACK]**, switch again to the live display.

3 | **Add sample**

> **Note**
>
> Calculate the amount of the sample in such a way that a titrant consumption of 10...90 % of the cylinder volume will result.

■ Press **[START]**.
Conditioning is stopped. The request for adding the sample will be displayed for 8 s.
The sample should be added during this time.

```
KFT Ipol                    busy

 Add sample                  5 s



Stirrer
```

■ Add the sample.

Afterward, the request for the sample size appears:

```
KFT Ipol                    hold
 Sample size              2.5875

 Press [START] key to continue


```

4   Enter the sample size

■ Open the editing dialog with **[OK]**.
■ Enter the sample size and apply with **Accept** or **[BACK]**.

5   Start the titration
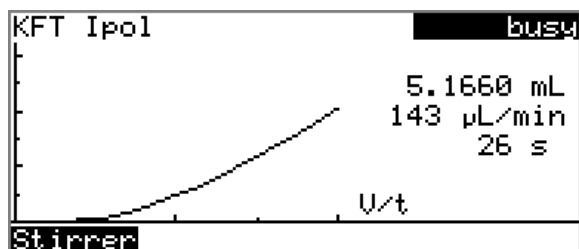
■ Press **[START]**.

The titration starts and the curve is displayed:

```
KFT Ipol                    busy

                        5.1660 mL
                       143 µL/min
                            26 s
                  V/t
Stirrer
```

After the completion of the titration, the results dialog is displayed. If a printer is connected, then the report will now be printed out. Conditioning is restarted automatically.

```
┌─────────────────────────────────┐
│Results              ▐cond.ok▌    │
│▐Water▌               6.91 %      │
│ EP1                 5.1950 mL    │
│ Regular stop                     │
│                                  │
│                                  │
│                                  │
├─────────────────────────────────┤
│▐Curve▌ Recalc Statistics         │
└─────────────────────────────────┘
```

6 **Carry out the remaining determinations**

- Carry out the remaining titer determinations in the same way.

7 **Show the statistics data**

- After the final determination, select the function **Statistics** in the function bar and confirm with **[OK]**.
The statistical overview is shown.

```
┌─────────────────────────────────┐
│Statistics           ▐cond.ok▌    │
│Water                             │
│    Mean(3) 6.92 %                │
│       s abs 0.050 %              │
│       s rel 0.72 %               │
│ Statistics 3/3                   │
│                                  │
├─────────────────────────────────┤
│▐Details▌ Reset Increase          │
└─────────────────────────────────┘
```

The mean value (**Mean( )**), the absolute and the relative standard deviation (**s abs** and **s rel**) are displayed in the overview. For the mean value, the number of individual results from which it has been calculated is displayed. In this example, it is 3. **Statistics** shows how many determinations have already been carried out and how many determinations are to be carried out in total. All three determinations were carried out in this example.

- In the function bar, select the **Details** function and confirm with **[OK]**.

```
┌─────────────────────────────────┐
│Details              ▐cond.ok▌    │
│   Result          Sample size    │
│▐1 6.91 %▌          0.3759 g      │
│ 2 6.87 %           0.3806 g      │
│ 3 6.97 %           0.3728 g      │
│                                  │
│                                  │
├─────────────────────────────────┤
│▐On/Off▌                          │
└─────────────────────────────────┘
```

The result and the sample size of each determination are shown. **On/ Off** removes the selected determination from the statistics. The line will then be marked with an asterisk (*), the statistics will be recalculated automatically.

8 **Cancel the conditioning**

- Press **[STOP]**.

Conditioning is canceled and the dosing cylinder is filled.