862 Compact Titrosampler

Tutorial

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This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

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1 Introduction

The present tutorial helps you to get acquainted with the operation of the 862 Compact Titrosampler. You will be guided step by step through the most important dialog pages by using a simple pH titration as an example. Thereby you will learn how to efficiently operate and use the 862 Compact Titrosampler.

1.1 Structure of the tutorial

- Connecting the necessary devices and auxiliaries
- Configuration of electrode, solution, balance, printer and PC/LIMS report output
- Creating a titration method and titrating a single sample
- Printing the result automatically and manually
- Recalculating the result
- Defining method parameters
- Creating a sample table and titrating a sample series
- Storing the results as PC/LIMS reports on a USB stick and importing them into tiBase for further processing
- Importing PC/LIMS reports directly into tiBase with the software RS Server.

1.2 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 Setup and configuration

2.1 Setting up the 862 Compact Titrosampler

What you will need:

- A 862 Compact Titrosampler
- A propeller stirrer (802 Stirrer)
- Five sample vessels (120 mL content)
- A pH electrode with connection cable
- An 800 Dosino (dosing drive) with a dosing unit (e.g. 20 mL) and tubings
- A bottle with titrant (e.g. sodium hydroxide solution c(NaOH) = 0.1 mol/L)
- Possibly a printer with connection cable
- Possibly a balance with connection cable
- Possibly an 843 Pump Station with tubings and connection cable
- Possibly an 876 Dosimat plus or an 865 Dosimat plus

The manual for the 862 Compact Titrosampler describes in detail how to install the accessories. A few notes about this:

862 Compact Titrosampler

First of all, remove the green safety shield and the cable cover on the rear of the tower. This way you can easily install all tubings and cables. If everything necessary has been installed, you can fix the tubings and cables with the cable cover. Do not forget to reattach the safety shield. It ensures that it is not possible to accidentally reach into the working area of the lift while operations are running.

Titrants

During this tutorial you will carry out simple titrations. Select a base as titrant.

Sensor

Use a pH glass electrode for the acid/base titration. Do not forget to plug the electrode cable into the connector **Ind.** on the rear of the instrument.

Stirrer

Connect the propeller stirrer (**802 Stirrer**) on the rear of the instrument and place it in the titration head. Then you can attach the stirring propeller from below onto the rod stirrer.

Printer

Select a printer with a USB connector. Connect a USB hub (distributor) using the **6.2151.100 adapter plug USB MINI (OTG) - USB A** to the USB connector of the 862 Compact Titrosampler. Use a commercially available USB cable to connect the printer to the USB hub.

Installing an RS Server connection

With the software RS Server you can export PC/LIMS reports from the 862 Compact Titrosampler directly to the database tiBase.

For this you need a **6.2148.030 RS-232/USB Box** which you can connect to the 862 Compact Titrosampler with a USB cable and the **6.2151.100 adapter plug USB MINI (OTG) - USB A**. To be able to connect the RS-232/USB Box to the PC you need a serial connection cable (RS-232). This cable is to be connected to the RS-232/2 interface (COM 2).

Balance

If you connect a balance to the 862 Compact Titrosampler, you can transfer the sample size per push-button from the balance to the 862 Compact Titrosampler. For this you need a **6.2148.030 RS-232/USB Box** which you can connect to the instrument with a USB cable and the **6.2151.100 adapter plug USB MINI (OTG) - USB A**. To be able to connect the RS-232/USB Box to the balance you need a serial connection cable (RS-232) from the balance manufacturer.

Pump

Rinsing the electrode after the titration can be carried out in several ways:

The most simple method is to shortly immerse the electrode into a rinsing liquid. No pump is needed for this.

If a pump (**843 Pump Station**) is used, the electrode can be efficiently cleaned with rinsing liquid in a rinsing beaker or sample vessel. With the latter, even the titrated sample solution is aspirated.

Connect the 843 Pump Unit with a **6.2141.230** connection cable to the remote interface. Install the three **6.2740.020 spray nozzles** or the **6.2740.030 rinsing nozzles** on the titration head.

For details on connecting, see the manual 862 Compact Titrosampler.

876/865 Dosimat plus

In case you would like to automatically add an auxiliary solution to the sample before the titration, you will need a Dosimat in addition. Connect the Dosimat with a **6.2141.240 connection cable** to the remote interface of the 862 Compact Titrosampler.

If you are using an 843 Pump Station at the same time, connect the Dosimat to the second remote interface of the 843 Pump Station.

Samples and sample vessels

With the 862 Compact Titrosampler, only the 6.1459.300 (120 mL) sample beakers can be used. Use an acid or base as sample, which can be titrated with the selected titrant.

2.2 Configuration

NOTICE

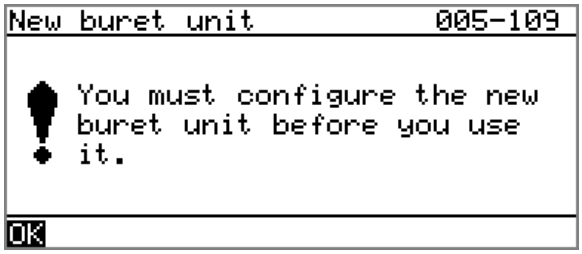
External devices (printer, balance and USB stick) must be connected to the USB connector and, if necessary, be switched on before switching on the 862 Compact Titrosampler.

2.2.1 Switching the instrument on and off

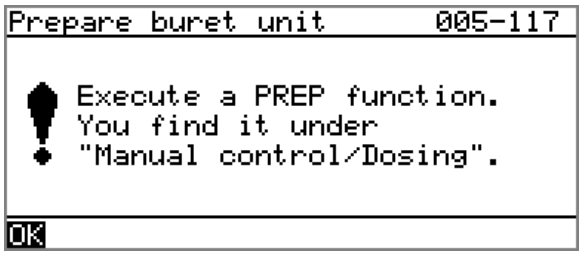
Switching on the instrument

Proceed as follows:

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

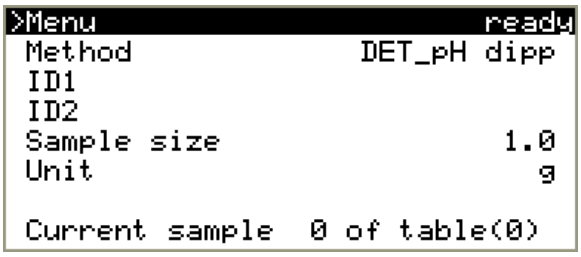


▪ Confirm the message with **[OK]**.
The request to carry out the **PREP** function appears:



All tubings and the cylinder are rinsed with the **PREP** (Preparing) function. The preparing of the buret unit is described in detail later on *(see chapter 3.3.1, page 24)*. The buret unit must however first be configured *(see chapter 2.2.5, page 8)*.

- Confirm the message with **[OK]**.
  The main dialog is displayed:



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.
- Press down the **[STOP]** key until the progress bar is finished.

2.2.2 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 862 Compact Titrosampler describes how to proceed.

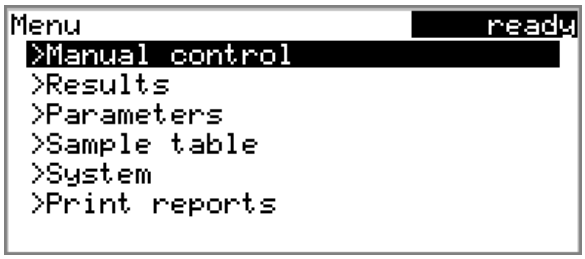
2.2.3 Setting the lift position

The lift position is set under **Menu ▸ System ▸ Lift**.

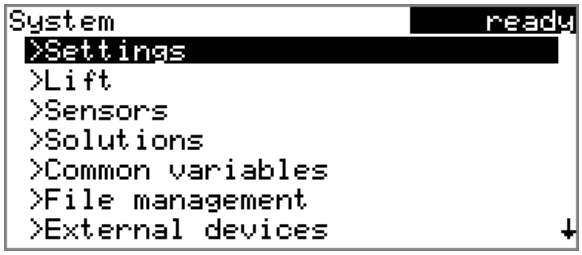
Proceed as follows:

1 Open the dialog Lift

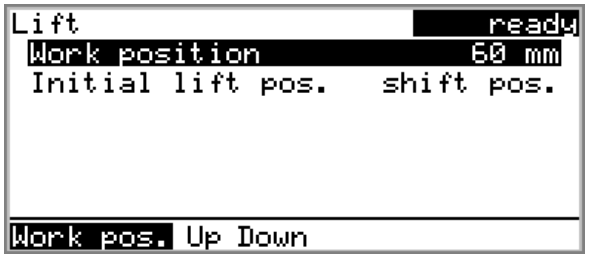
- In the main dialog, select **Menu** with the arrow keys **[⇧]** or **[⇩]** and confirm with **[OK]**.



- With the arrow key **[⇩]**, select the menu item **System** and confirm with **[OK]**.



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



2 Move the lift

- Select **Work position**.
- With **[Up]** and **[Down]** in the function bar, set the working height of the lift to the required value.
- By pressing the key **[BACK]** the set value is applied.

3 Switch to the main dialog

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

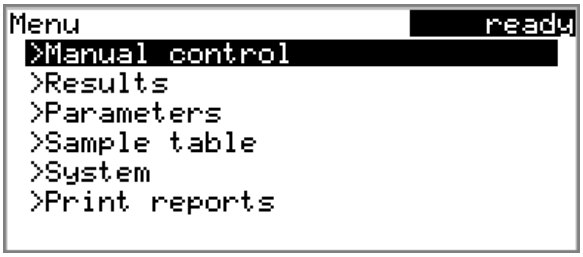
2.2.4 Configuring the electrode

The electrode is configured under **Menu ▸ System ▸ Sensors**.

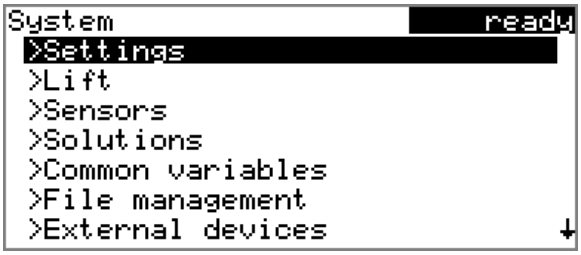
Proceed as follows:

1 Open the dialog Sensor list

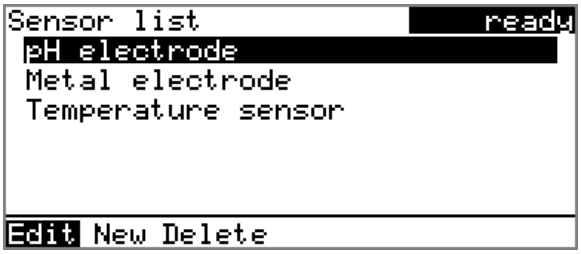
- In the main dialog, select **Menu** with the arrow keys **[⇧]** or **[⇩]** and confirm with **[OK]**.
  The main menu opens.



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



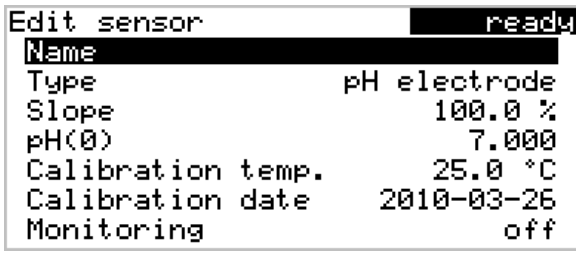
- Select the menu item **Sensors** and confirm with **[OK]**.
  The sensor list is displayed:



2 Add a new electrode

- Select **pH electrode**.
- In the function bar, select **[New]** and confirm with **[OK]**.

- In the dialog **New sensor**, select the sensor type **pH electrode** and confirm with **[OK]**.
  The dialog **Edit sensor** opens.



3 Define a name

- The parameter **Name** is already selected. Open the text editor with **[OK]**.
- Enter an unambiguous name for the new electrode.
- With **[Back]**, return to the dialog **Edit sensor**.
  The name is displayed.
- If needed, modify further parameters.

2.2.5 Adding and configuring a solution

NOTICE

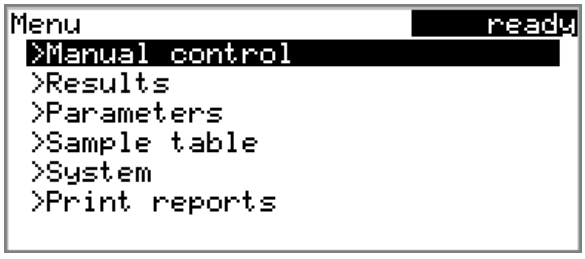
The buret unit must be attached before carrying out the instructions listed below.

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

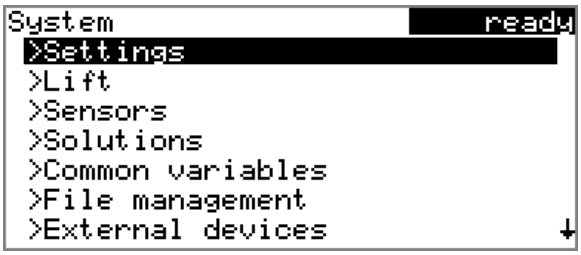
Proceed as follows:

1 Open the solution list

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



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



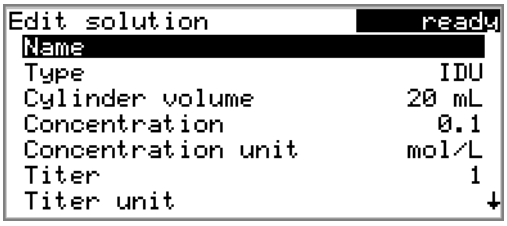
- Select the menu item **Solutions** and confirm with **[OK]**.
  The list of the configured solutions is displayed:

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.

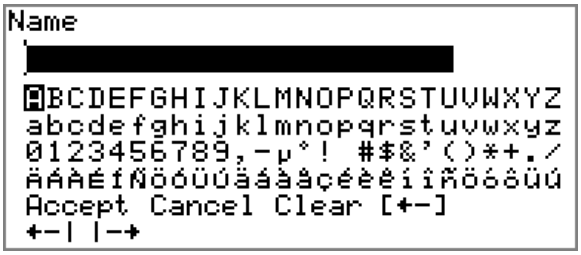
The designation **IDU** is the name for a dosing unit with integrated data chip (Intelligent Dosing Unit).

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:



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

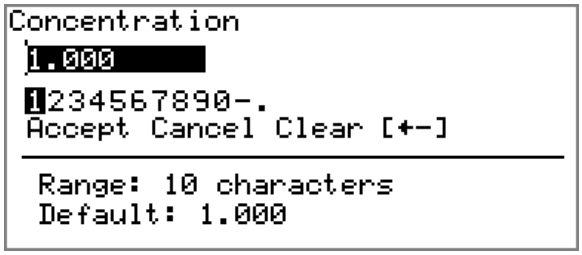


- Enter a name for the titrant.
  For this, use the arrow keys **[⇦]**, **[⇨]**, **[⇧]** and **[⇩]** to select the required character and press **[OK]** to apply it in the text line.
  [←–] deletes the character on the left of the cursor, **←–** and **|–→** move the cursor one character to the left or 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]**.



- 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 **mol/L** and apply with **[OK]**.

4 Switch to the main dialog

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

2.2.6 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

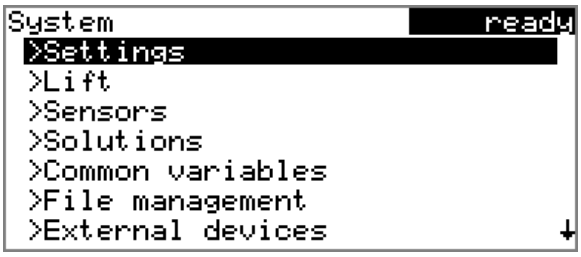
The configuration of the PC/LIMS report output and the external devices are defined under **Menu ▸ System ▸ External devices**.

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.

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



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

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]**.

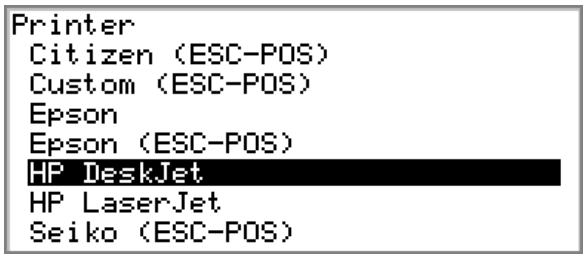
Selecting a printer

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

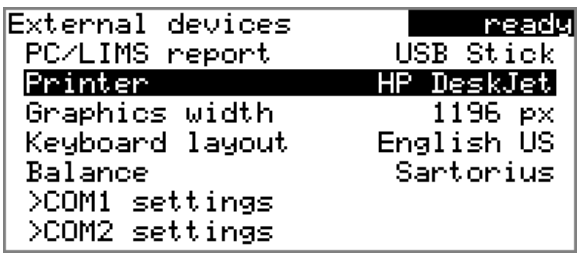
Proceed as follows:

1

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



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



Selecting a balance

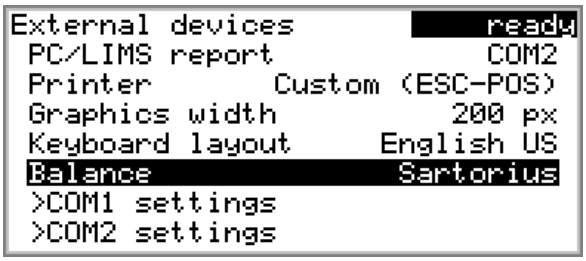
The sample size can directly be read in from a balance. For this, you have to select the balance type and configure it.

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 862 Compact Titrosampler opens.

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



  Under **COM1 settings** you have to set the interface parameters of the connected balance (see manual 862 Compact Titrosampler). 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 Titrating a single sample

In this section you will learn how to:

- create a titration method
- enter sample data
- titrate a sample
- define a report output with a printer
- view results
- recalculate a result
- manually print a report

3.1 Creating a titration method

The method is created using a method template defined in the 862 Compact Titrosampler. The method templates are already configured except for a few parameters.

The acid content of a sample is being determined. At the end of the determination, a report with result and curve is automatically printed out.

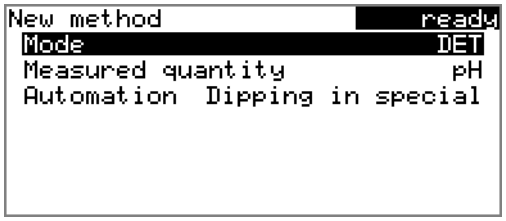
Proceed as follows:

Defining a new method

1 Open the method table

- In the main dialog, select **Method** and confirm with **[OK]**.
  The method table is opened.

- Select **New** and press **[OK]**.
  The dialog **New method** is displayed.



2 Select the titration mode

- Select **Mode** and press **[OK]**.
- Apply the default value **DET** with **[BACK]** or press **[OK]** and select **MET**.

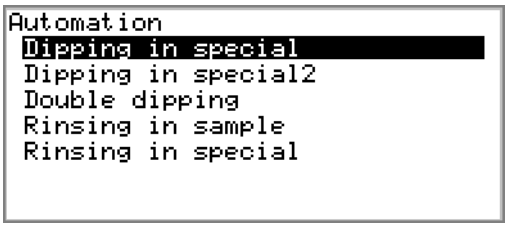
The 877 Titrino plus does not have the DET mode. Select **MET**.

3 Select the measured quantity

- Select **Measured quantity**.
- Apply the default value **pH** with **[BACK]**.

4 Select an automation sequence

- Select **Automation** and press **[OK]**.



- Select the required automation sequence. Available are:
  - **Dipping in special** = Immersing the electrode into a rinsing beaker after each titration (no pump is necessary).
  - **Dipping in special2** = Immersing the electrode into a rinsing beaker at the beginning of a sample series and after each titration. After the sample series, the electrode is immersed into a rinsing beaker on rack position 11 (no pump is necessary).
  - **Double dipping** = Immersing the electrode into a rinsing beaker on rack position 11 and into a rinsing beaker on the special beaker position after each titration (no pump is necessary).
  - **Rinsing in sample** = Rinsing the electrode in the sample beaker with aspirating the sample solution (pump is necessary).
  - **Rinsing in special** = Rinsing the electrode in a rinsing beaker with aspirating the rinsing solution (pump is necessary).

5 Return to the main dialog

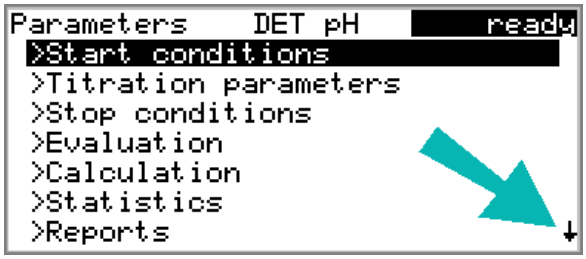
- Press **[BACK]** twice.

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

Selecting a solution

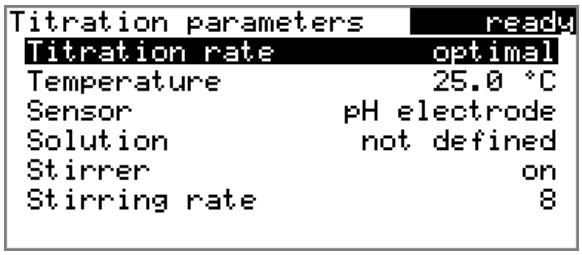
1 Open the dialog

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



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 **[⇩]**.

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



2 Open the list of solutions

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

- Select the newly configured solution and apply with **[OK]**.
  With **[BACK]**, return to the dialog **Parameters**.

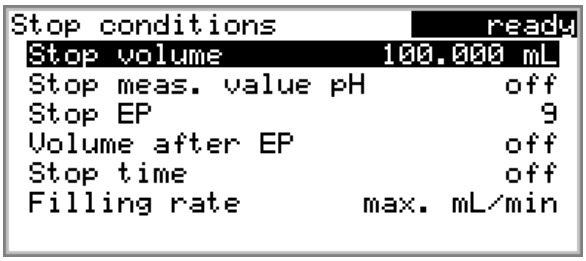
Defining stop conditions

You can define the conditions which automatically finish a titration. These may e.g. be the dosing of a certain volume of titrant or recognizing a certain number of equivalence points.

Proceed as follows:

1 Open the dialog Stop conditions

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



2 Define a stop volume

- Select **Stop volume** and press **[OK]**.
- Enter a value corresponding to the cylinder volume of the dosing unit used and apply with **Accept** or **[BACK]**.

3 Define a stop EP

- Select **Stop EP** and press **[OK]**.
- Enter **1** and apply with **Accept** or **[BACK]**.

4 Define a volume after EP

- Select **Volume after EP** and press **[OK]**.
- Enter **1**.
- Apply with **Accept** or **[BACK]**.
  As soon as an equivalence point has been detected, titrating is continued with 1 mL.
  If no equivalence point has been detected, the titration is finished after the defined stop volume.
- With **[BACK]**, switch to the dialog **Parameters**.

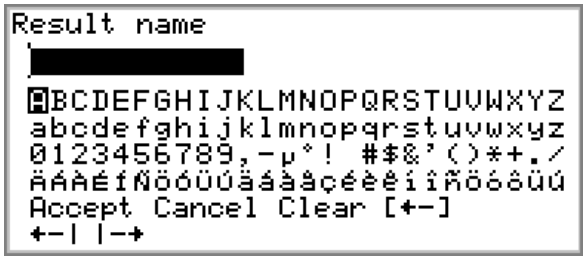
Defining a calculation

1 Define a name

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

  For each titration up to five results (R1…R5) can be calculated.
- Select the line **R1:** for the first result and press **[OK]**.

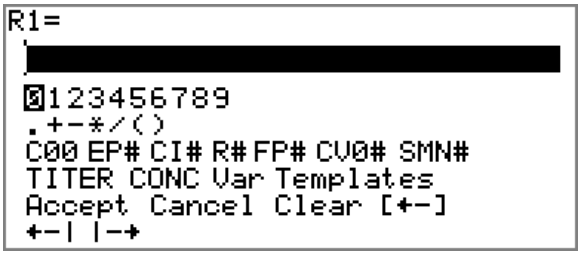
  In this dialog the properties for the result are defined.
- Select **Result name** and press **[OK]**.



- Enter a designation for the result, e.g. "Content".
- Apply the name with **Accept** or **[BACK]**.

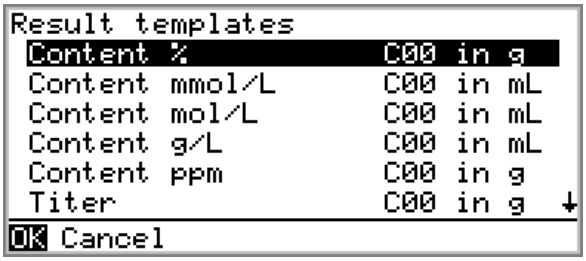
2 Enter a formula

- Select the line **R1=** and press **[OK]**.

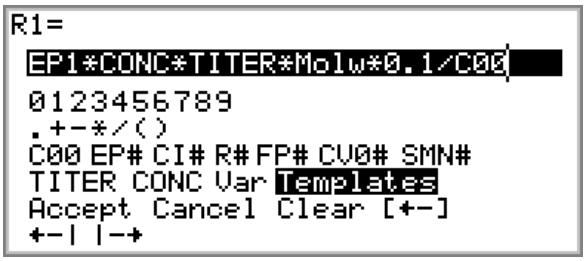


The formula for the calculation of the result is entered here. The formula editor consists of an input field, a sequence of numbers, mathematical operators, various variables and functions.
With the arrow keys **[⇦]**, **[⇨]**, **[⇧]** and **[⇩]**, you can move the cursor within the lines. With **[OK]** you can insert the selected character or the corresponding variable into the input field. The bottom lines contain special editing functions.

- Select **Templates** and press **[OK]**.



- Select **Content %** and press **[OK]**.



The formula for the calculation of the percentage content of a sample is not complete. It contains the following variables:

  - **EP1** = the consumption at the first endpoint in mL
  - **CONC** = the concentration of the selected solution
  - **TITER** = the titer of the selected solution
  - **C00** = the sample size of the sample
  - The wildcard **Molw**, for which the molecular mass of the sample is entered.

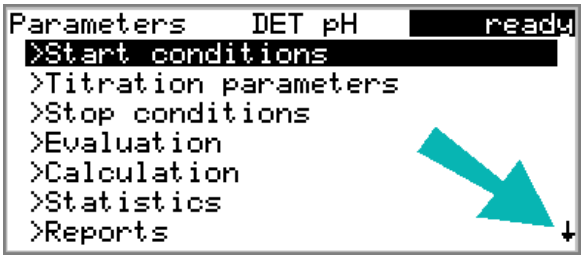
- Select **+−|** and press **[OK]** several times until the cursor is placed after **Molw** in the input field.
- Select **[+−]** and press **[OK]** several times until **Molw** has entirely been deleted.

- Enter the molar mass of the titrant as numerical value.
- Apply the formula with **Accept** or **[BACK]**.
- Click twice on **[BACK]** to switch to the dialog **Parameters**.

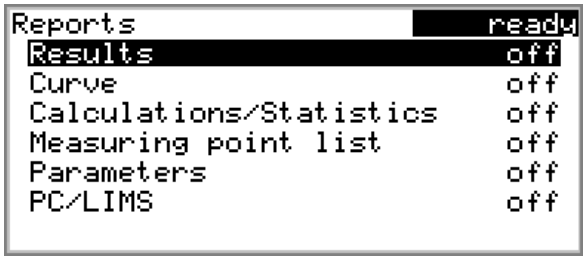
Defining the report output

1 Open the dialog Report

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:



2 Define the report output

- 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]**.
- Select the parameter **Calculations/Statistics** and confirm with **[OK]**.
- Select **on** and confirm with **[OK]**.
- With **[BACK]**, switch to the dialog **Parameters**.

Defining the automation parameters

1 Open the dialog

- With the arrow key **[⇩]**, select the menu item **Automation** and open the corresponding dialog with **[OK]**.
  The list of editable parameters for the automation sequence is displayed:

2 Define the dripping time

- Select the parameter **Dripping time** and confirm with **[OK]**.
- Enter a numerical value and confirm with **[OK]**.
- Apply with **[BACK]**.

3 Define the rinsing time

- Select the parameter **Rinsing time** and confirm with **[OK]**.
- Enter a numerical value.
- Apply with **[BACK]**.

4 Define the stirring rate

- Select the parameter **Stirring rate**.
- Enter a numerical value and confirm with **[OK]**.
- Apply with **[BACK]**.
- Repeated pressing on **[BACK]** will switch you to the main dialog.

Saving the method

1

- In the main dialog, select the menu item **Method** with the arrow key **[⇩]** and open the corresponding dialog with **[OK]**.

- In the function bar, select **Store** and with **[OK]**, open the dialog **Store method** with the default name.
- Open the text editor with **[OK]**.
- Enter a name
- Apply with **[BACK]**.
- Repeated pressing on **[BACK]** will switch you to the main dialog.

3.2 Entering sample data

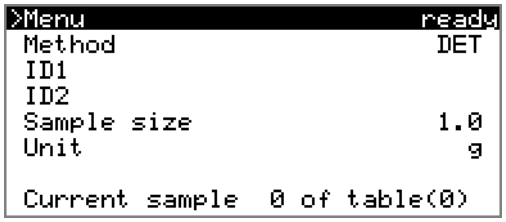
There are two possibilities to enter sample data, such as e.g. the sample size, in the instrument. For sample series with a lot of different samples, the sample table can be used. For single determinations or sample series with the same sample data, it can be entered on the main page of the instrument dialog.

For the first determination, for testing the created method, enter the data on the main page.

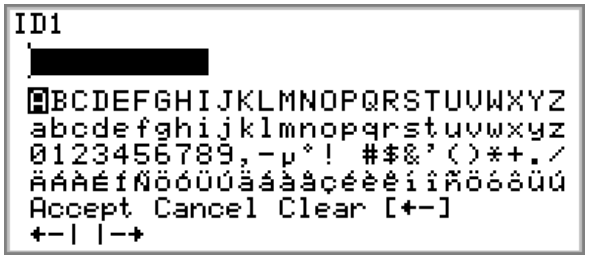
Proceed as follows:

1 Enter the sample identifications

- Switch to the main dialog with **[BACK]** if necessary.



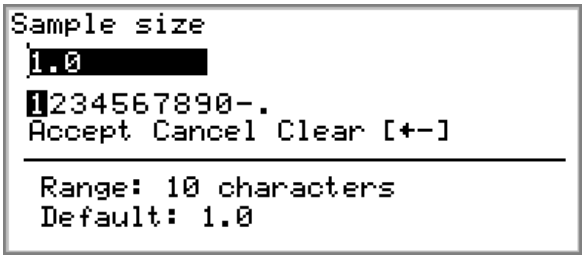
- Select the line **ID1** and press **[OK]**.



- Enter a designation for the sample (e.g. acetic acid) and apply with **Accept** or **[BACK]**.
- Select the line **ID2** and press **[OK]**.
- Enter a further designation for the sample (e.g. charge number or sampling date) and apply with **Accept** or **[BACK]**.

2 Enter the sample size

- Select the line **Sample size** and press **[OK]**.



- Enter the sample size and apply with **Accept** or **[BACK]**.
- Select the line **Unit** and press **[OK]**.

- Select the unit for the sample size and press **[BACK]** or **[OK]**.

Applying the sample size from the balance

If you have connected a balance, you do not need to open the input dialog of the sample size and the unit. On the balance, press the key (with the printer symbol) for printing the weight. The sample size and the corresponding unit are transferred to the 862 Compact Titrosampler and are displayed in the main dialog in the corresponding lines.

NOTICE

If the sample size is entered in the main dialog or into the sample table depends on whether the sample table is enabled or disabled.

Proceed as follows to disable the sample table:

1 Disable the sample table

- Press **[START]**.
- Select **Sample data** and press **[OK]**.
- Select **off** and press **[BACK]** or **[OK]**.
- Press **[BACK]**.

3.3 Carrying out a determination

If you have prepared a sample and entered the sample data, you can carry out a first titration.

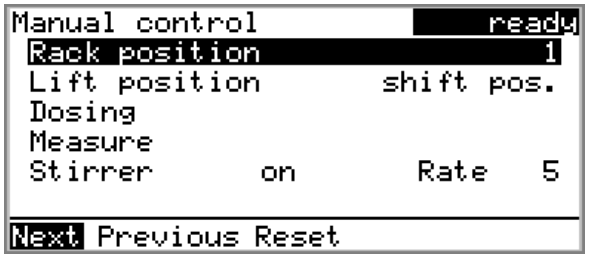
3.3.1 Preparing the titration

First, the dosing unit with the titrant has to be prepared. The tubings must be rinsed and bubble-free.

Proceed as follows:

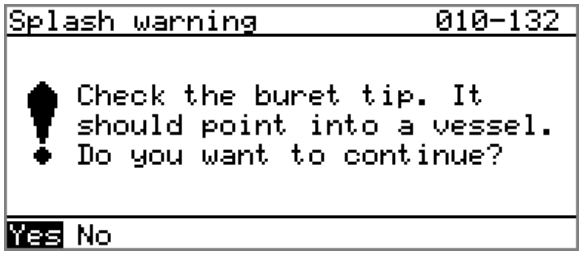
1 Prepare the dosing unit

- Place an empty sample beaker on any rack position between 1 and 11.
- In the main dialog, select **Menu** and press **[OK]**.
- Select **Manual control** and press **[OK]**.



In this dialog you can carry out all functions of the instrument. **Rack position** is already selected. In the line at the very bottom, all the functions you can carry out with the rack are displayed.

- With the arroy key **[⇨]** or **[⇦]**, select the function **Next** or **Previous** and press **[OK]** several times until the empty sample beaker is located in front of the tower.
- Select the line **Lift position** and press **[OK]**.
  The lift moves to the work position.
- Select the line **Dosing** and press **[OK]**.
  The following message is displayed:



- Confirm the message with **[OK]**.
  The function **PREP** is being carried out.
  Now the tubings of the dosing unit are automatically rinsed.

2 Rinse the electrode

- Fill a sample beaker with water (or another rinsing liquid) and place it on the rack position ▲.
- In the function bar, select **Reset** and confirm with **[OK]**.
  The rack position ▲ is moved to.
- Under **Lift position**, move the lift to the work position.
- Select the line **Stirrer** and switch the stirrer on by pressing **[OK]**.
- In the function bar, select **Stir-** for reducing or **Stir+** for increasing the stirring rate.
- Press **[OK]** until the required rate has been reached.
- With the function **off**, switch the stirrer off again.
- Select **Lift position** and move the lift right to the top with **[OK]**.
- Drip the electrode shortly and afterwards move the rack in order that the two sample beakers can be removed from the rack.
- With **[BACK]**, exit the **Manual control**.

3 Place the rinsing beaker and the samples

- Fill a sample beaker with water and place it on the **Special position** (marked with the symbol ▲) on the rack.
- Place the sample beaker with the first sample on the **Rack position 1**.

3.3.2 Carrying out the determination

1 Start the method

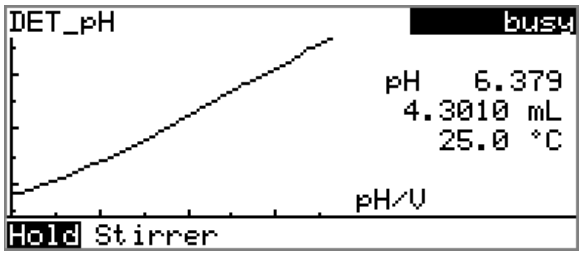
- Press **[START]**.
  A dialog is displayed where you can enter details on the sample series.

2 Define details on the determination

- Select **Number of samples** and press **[OK]**.
- Enter **1** and apply with **Accept** or **[BACK]**.
- Select **Next sample pos.** and press **[OK]**.
- Enter the rack position on which the sample to be titrated is placed, i.e. **1**.
- Apply with **Accept** or **[BACK]**.
- Select **Sample table** and press **[OK]**.
- Select **off** and apply with **[OK]** or **[BACK]**.
  If the sample table is deactivated, the sample data of the main page is applied.

3 Start the titration

- Press **[START]**.
  The determination starts. The individual steps of the methods are displayed.
  One can use the key **[BACK]** to switch back and forth between the live display and the main dialog. This allows to modify single parameters via the main page and main menu during a running determination. However, only those parameters which do not decisively influence the running determination can be modified. You can subsequently modify e.g. the **Stop EP** or the **Volume after EP** for the stop conditions.
  At the start of the titration, the titration curve and the current values (measured value, volume, temperature) are displayed. As the titration continues, the curve is automatically scaled anew in order that the entire titration run is always visible.

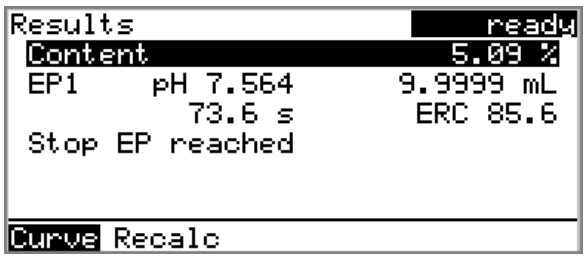


After the titration a report is printed out if this has been defined in the method. Afterwards, the electrode and the dosing tips are being rinsed. The individual steps of the rinsing procedure depend on the selected automation sequence. As a last step, the electrode is immersed into the rinsing solution or a storing beaker.

3.4 Displaying results

After the determination, the result page is displayed.

The results of the last determination are always available under **Menu ▸ Results**.



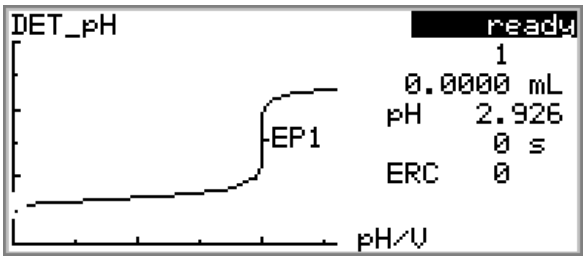
Name and result are displayed. Furthermore, the values of the endpoints found are displayed. These are always: measured value, volume, time and

ERC (Equivalence point Recognition Criterion). The stop criterion which caused the end of the determination is also indicated.

Proceed as follows to display the titration curve:

1 Display the titration curve

- Select **Curve** and press **[OK]**.



With the keys **[⇨]** and **[⇦]**, you can show the corresponding data (volume, measured value, time and ERC) of every single measuring point on the titration curve.

- With **[BACK]**, return to the result page.

3.5 Recalculating the determination

After the end of the titration, the result is shown on the display. The determination may be recalculated if needed.

In recalculating, the sample size, the calculation formula or the evaluation parameters can be modified.In the recalculating, the sample size, the calculation formula or the evaluation parameters, for example, can be modified.

As an example, the result in **%** can newly be calculated in **mol/L**.

Proceed as follows:

1 Open the dialog

- With **[BACK]**, return to the main dialog.
- Use**Menu ▸ Parameters ▸ Calculation** to open the dialog**Calculation**.

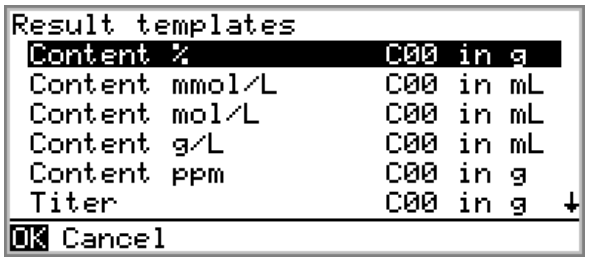
- Select **R2:** and press **[OK]**.

2 Enter a result name

- Select **Result name** and press **[OK]**.
- In the text editor, enter the name for the result in mol/L and press **[BACK]**.

3 Select a result template

- Select **R2=** and press **[OK]**.
- Select **Templates** and press **[OK]**.



- Select **Content mol/L** and press **[OK]**.
- Press **[BACK]**.

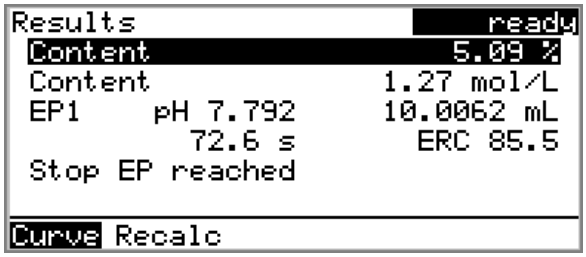
4 Select the unit

- Select **Result unit** and press **[OK]**.

- Select the result unit **mol/L** and press **[OK]**.
- With **[BACK]**, return to the dialog **Menu**.

5 Calculate the new result

- Select **Results** and press **[OK]**.
- In the function bar, select **Recalculate** and press **[OK]**.
  After the recalculation, the dialog **Results** is displayed with the content in mol/L.



3.6 Printing a report manually

You can print out the report manually via **Menu ▸ Print reports**.

Proceed as follows:

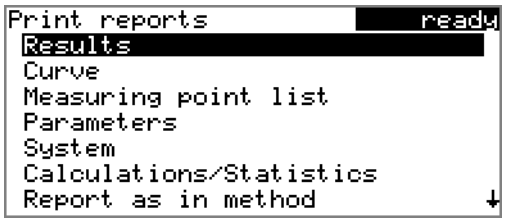
1 Open the main menu

- In the main dialog, select **Menu** and press **[OK]**.

2 Open the print dialog

- Select the menu item **Print reports** and press **[OK]**.

The dialog window with the available reports opens:



3 Select a report

- Select the desired report and press **[OK]**.

The report is being printed out.

The following reports can be printed out manually:

Results	Result report with determination properties, sample data, calculated results, etc.
Curve	Curve report. The width of the curve is defined in the system settings.
Measuring point list	Measuring point list report.
Parameters	Report with all method parameters of the loaded method.

System	System report with system settings, solution list, external devices, etc.
Calculations/Statistics	Calculation report. The statistics is also printed out in case of multiple determinations. The individual determinations with the respective sample size will be printed out for each result, along with the mean value and the absolute and the relative standard deviation.
Report as in method	The reports that are defined in the method will be printed out.
PC/LIMS	Machine-readable report with all of the data for a determination. This report can be saved as a TXT file on a connected USB stick or sent to a terminal program or to a LIMS via an RS-232 interface. The definition is made in the system settings.

4 Titrating a sample series

In this section you will learn how to:

- use the statistics
- save the result as PC/LIMS report on a USB stick
- define further titration parameters
- create a sample table
- read-in the sample size from a balance
- carry out a determination series
- import, process and save results in tiBase

4.1 Enabling the statistics

In the statistics overview of a sample series, the mean value (mean), the absolute and the relative standard deviation (s abs and s rel) are displayed. For the mean value, the number of individual results from which it has been calculated is displayed in parentheses.

The statistics is enabled under **Menu ▸ Parameters ▸ Statistics**.

Proceed as follows:

1 Open the dialog Statistics

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

2 Enable the statistics

- Select **Statistics** and press **[OK]**.
- Select **on** and confirm with **[OK]**.
  The parameter **Number of determinations** is additionally displayed.

3 Enter the number of determinations

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

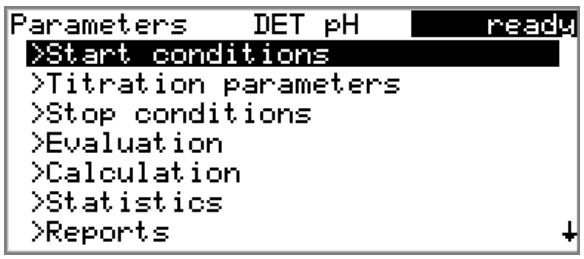
4.2 Defining the report output for PC/LIMS

The output of the results as PC/LIMS report is defined under **Menu ▸ Parameters ▸ Reports**.

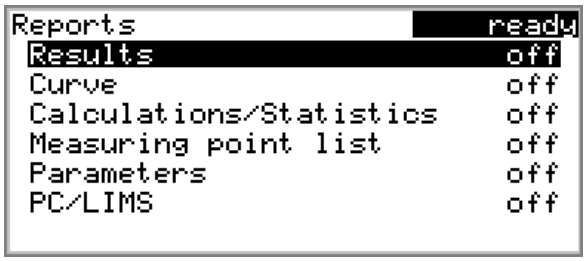
Proceed as follows:

1 Define the report output

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



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



- Select **PC/LIMS** and confirm with **[OK]**.
- Select **on** and confirm with **[OK]**.
  For all other parameters, select **off**.
- With **[BACK]**, return to the parameters dialog.

4.3 Defining the titration parameters

You can optimize a titration run by modifying single titration parameters according to the needs of the titration. For the following titration, the stirring rate, the dosing rate and the maximum waiting time are being modified.

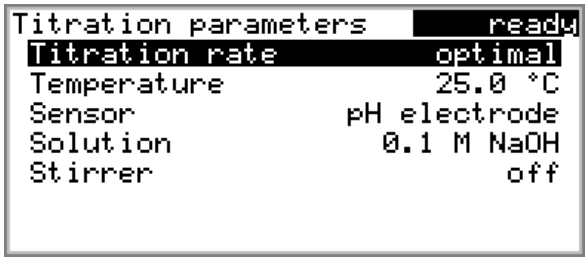
The titration parameters are defined under **Menu ▸ Parameters ▸ Titration parameters**.

Proceed as follows for this:

Modifying the stirring rate

1 Open the dialog

Use **Menu ▸ Parameters ▸ Titration parameters** to open the dialog **Titration parameters**.



2 Set the stirring rate

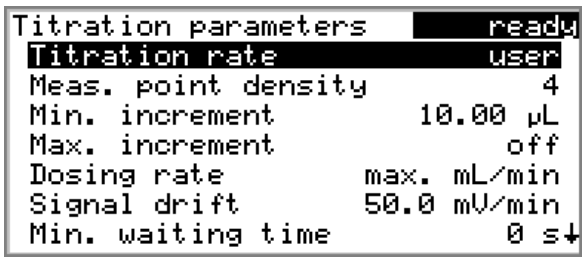
- Select **Stirring rate** and press **[OK]**.
- In the editor, enter the value **5**.
- Apply the value with **[BACK]**.

Modifying the titration parameters

1 Select user defined settings

- Select **Titration rate** and press **[OK]**.
- Select **user**.

- Apply with **[BACK]**.



2 Enter the dosing rate

- Select **Dosing rate** and press **[OK]**.
- In the editor, enter the value **20**.
- Apply the value with **[BACK]**.

3 Modify the maximum waiting time

- Select **Max. waiting time** and press **[OK]**.
- In the editor, enter the value **30**.
- Apply with **[BACK]**.

4.4 Saving the method

1 Open the method table

- In the main dialog, select **Method** with the arrow key **[⇩]** and press **[OK]**.
- In the function bar, select the function **Store** with the arrow key **[⇨]** and press **[OK]**.

2 Enter a method name

- Open the text editor with **[OK]**.
- Enter a name and press **[BACK]** twice.
  The new name is displayed in the method table.
- With **[BACK]**, return to the main dialog.

4.5 Creating a sample table

If you create a sample table you have the possibility to assign different methods to the samples of a sample series.

The sample table is created under **Menu ▸ Sample table**.

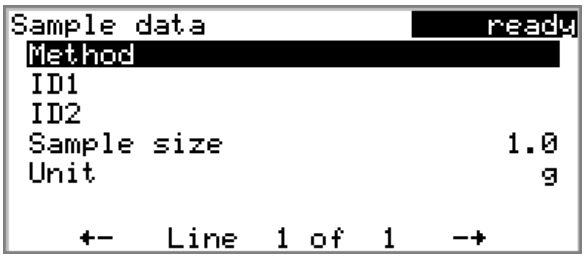
Proceed as follows:

1 Open the sample table

- In the main dialog, select **Menu** and press **[OK]**.
- Select **Sample table** and press **[OK]**.

2 Create the sample data

- In the function bar, select **Edit** with the arrow key **[⇦]** or **[⇨]** and confirm with **[OK]**.
  The dialog **Sample data** opens.



3 Select a method

- Select **Method** and press **[OK]**.
- In the dialog **Method**, select a method name and press **[OK]**.

4 Enter the sample identifications

- Select **ID1** and press **[OK]**.
- In the text editor, enter the sample identification **#8805923** (e.g. as the analysis number) for the first sample and press **[BACK]**.
- Select **ID2** (optional) and press **[OK]**.
- In the text editor. enter the additional indication for the sample **#8805923** (e.g. batch number, date, etc.) and press **[BACK]**.

5 Enter the sample size

The sample size can be entered two different ways.

Entering the sample size manually:

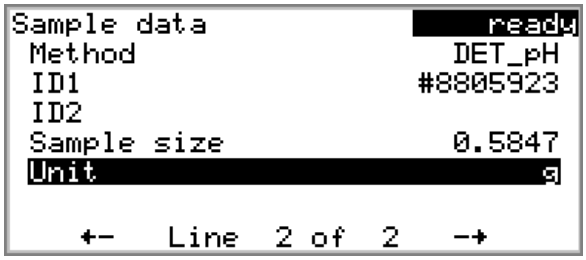
- Select **Sample size** and press **[OK]**.
- Enter the sample size and apply with **[BACK]**.

Applying the sample size from the balance:

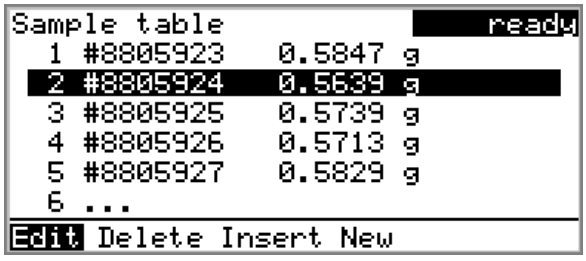
- On the balance, press the key **[Print]**.
  The sample size of the sample is transferred from the balance into the dialog **Sample data**.

6 Enter the data for more samples

- Press the arrow key **[⇨]**.
  In the sample table an additional line is inserted.
  Note the specifications in the lowest line. You can use the arrow keys **[⇦]** and **[⇨]** to switch from line to line.



- Enter additional sample data in the same way. Use **[BACK]** to return to the sample table.
  The sample table looks like this:



After creating the sample table return to the main dialog with **[BACK]**.

4.6 Carrying out a determination series

Before starting the determination series, ensure that the USB stick is connected with an adapter to the USB connector of the 862 Compact Titrosampler.

If the results are to be directly sent to a PC and imported into tiBase after the finished titration, the RS 232/USB Box must be connected with an adapter to the USB connector and an **RS Server** connection must be installed. Under **Menu ▸ System ▸ External devices ▸ PC/LIMS report**, **COM2** has to be selected.

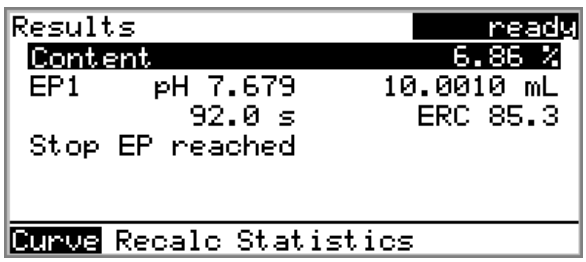
1 Define the sample series

- Press **[START]**.
  The dialog **Sample series** is displayed.
- Select **Number of samples** and press **[OK]**.
- In the text editor enter the value **5** and press **[BACK]**.
- Select **Next sample pos.** and press **[OK]**.
- In the text editor enter the number of the first sample position and press **[BACK]**.
- Select **Sample table** and press **[OK]**.
- Select the value **on** and press **[BACK]**.
  The dialog **Sample series** looks like this:

2 Starting determination series

- Press **[START]**.

The samples are titrated. After the titrations have finished, the results are saved on the USB stick or directly sent to the PC. The result of the last sample is shown on the display.



3 Import PC/LIMS reports with a USB stick into tiBase

- Connect the USB stick to the PC.
- Start tiBase.
- Click on the symbol of the program part **Database**.
- Via the menu **Determinations ▸ Import...**, the PC/LIMS reports are imported into the database.

or, when the 862 Compact Titrosampler is directly connected to a PC

4 Export PC/LIMS reports directly in tiBase

- Press **[F5]** in tiBase.

The determinations are displayed in the table **Determination overview**.

5 Display statistics

- In the dialog **Results**, select the function **[Statistics]** and press **[OK]**.
  On the display, the mean value **MW**, the absolute **s abs** and the relative standard deviation **s rel** are shown. For the mean value, the number of individual results from which it was calculated is displayed in parentheses.