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758 KFD Titrino

Short instructions for use

8.758.1223 04.2002 / pkl

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Summary of the most important signs

Signs in the Titrino dialog:

> Title of inquiry groups. Press <ENTER> to go to the inquiries.

: Values can be chosen with keys <←> or <→>.

Signs that are used in the instructions for use:

<> sign for "key", for example <ENTER> or <←>.

1 Getting started

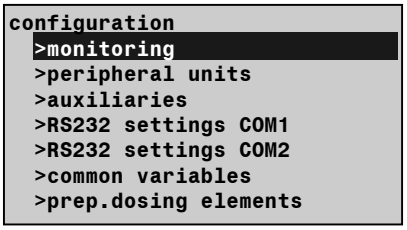
This is a step by step introduction into the operation of the Titrino.
You learn how to go round with the Titrino and you get an idea of the possibilities that the Titrino offers you.

1.1 Principle of data input

Press <STOP> if the Titrino is busy. It is now in the inactive standby state.

<CONFIG>

Then press the <CONFIG> key.

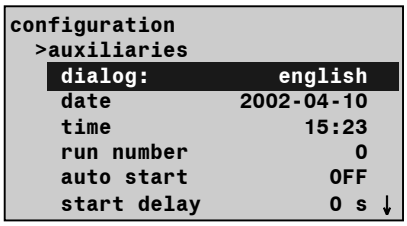


The first line indicates the "path", which means the place where you are right now: You pressed the <CONFIG> key and are now in the "configuration" inquiries.
In the next lines you find a list of the inquiry groups of key <CONFIG>. They are all marked with ">". This sign means that you get to the inquiries with <ENTER>.
The inquiry group ">monitoring" is inverted, which means that the cursor is placed on this line. You can move the cursor up and down with the <↑> and <↓> keys.

<↓>
<ENTER>

Set the cursor to ">auxiliaries" and open this inquiry group with <ENTER>.

The arrow in the lower right corner means that there are more inquiries. They appear if you move the cursor below.



Set the cursor to the inquiry "dialog:". You may select a different dialog language with the keys <←> or <→> (Key <→> "turns" forward, <←> backward).

<←> or <→>
<ENTER>

Select any language and press <ENTER>.

Note the sign ":" in the text "dialog:". If you see this sign in the dialog text, you can always use the <←> or <→> keys to select a value.

Readjust the language to "english" again.

2x <QUIT>

Quit the inquiries in the <CONFIG> key pressing <QUIT> twice.

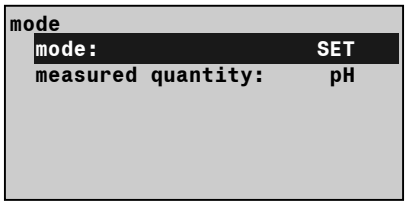
1.2 Development of a method

You learn, how to elaborate a method .
First, you select a titration mode. A general survey of the different titration modes is given on page 17.

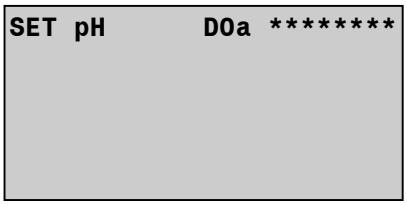
As an example, the endpoint titration of tap water, as it is used in the p+m value determination, was chosen.
Before an endpoint titration is started, a calibration should be performed (see page 9).

Selecting the mode

<MODE>



<←> or <→>
<ENTER>



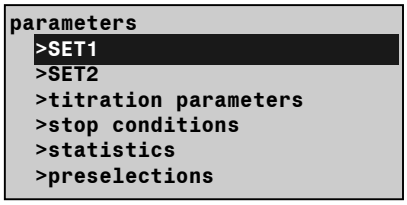
Press the <MODE> key.
Select the mode SET with <←> or <→> keys, press <ENTER>, select the measured quantity "pH" and press <ENTER> again.
SET stands for **S**et **E**ndpoint **T**itration. In the SET mode a titration to a given endpoint is performed. The resulting endpoint volume can be used for the result calculation.

The mode, the measured quantity, the selected dosing unit and the name of the method (********, because a standard method has been loaded) are displayed.

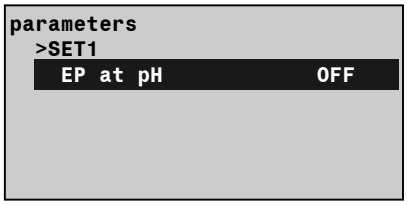
Enter the endpoint and the control parameters now.

Entry of the endpoint and the control parameters

<PARAM>



<ENTER>



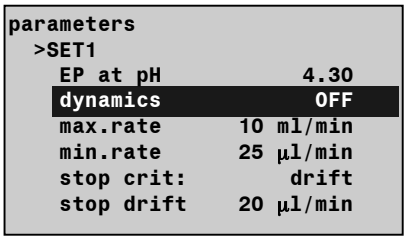
<4.3>
<ENTER>

Press the <PARAM> key.

Press <ENTER> to move on to the field, where you can enter the endpoint.

Enter for example 4.3 with the numeral keys and confirm with <ENTER>.

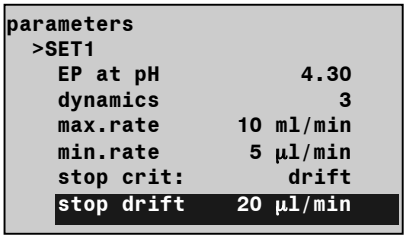
Then, in addition, the control parameters are required.



See right column

Under "dynamics" you enter the distance from the EP, where constant dosing should stop and controlling begins. Choose a range of 3 pH units and confirm with <ENTER>. Then, the cursor moves one line down.

For the maximum dosing rate outside the control range you can keep the standard value of 10 mL/min. With <↓> you move the cursor one line down.



For the minimum dosing rate inside the control range you enter 5 µL/min and confirm the value with <ENTER>.
For the stop criterion you can keep the setting "drift" and 20 µL/min as stop drift.

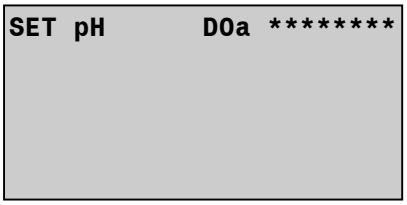
<QUIT>

Press <QUIT> to quit the inquiry of the control parameters.
The other parameters do not have to be changed in this example.

<QUIT>

Press the key <QUIT> again to quit the inquiry of the parameters.

Titration



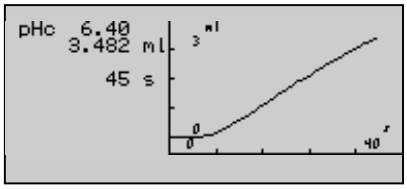
You are now ready to titrate. You titrate with the internal dosing unit D0, i.e. the Exchange Unit on the Titrino. If you already worked with the internal dosing unit, D0a is displayed. "a" means active.

Mount an Exchange Unit with HCl, c=0.1 mol/L on the Titrino and plug a combined pH glass electrode into measuring input 1 ("Ind I").

Put 100 mL tap water into your titration vessel.

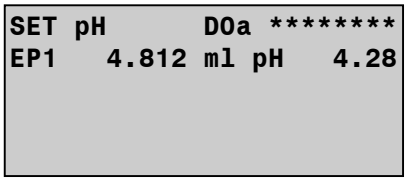
Position the electrode and the burette in a way that the burette tip points toward the stirring bar. Thus, the solution in contact with the electrode is always efficiently mixed.

<START>



Switch on the stirrer and press the <START> key.

During the titration, the titration curve is displayed. To the left of the curve, the current measured values (pH and volume) are displayed.

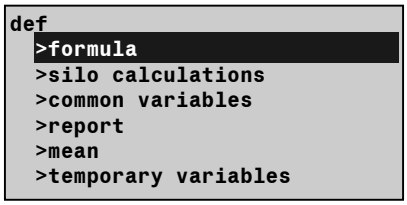


When the stop drift is reached, the titration stops automatically.

The endpoint is displayed.

Calculation of the result: entry of a formula

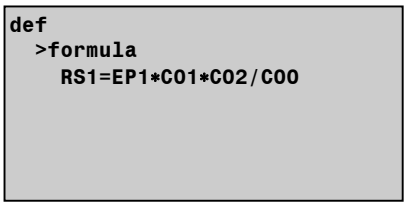
<DEF>



You may calculate the result with the endpoint.
Press <DEF>.

<ENTER>
<1>

Press <ENTER> to move on to the formula entry. The display now shows "RS? ".
Press "1", i.e. the first formula.



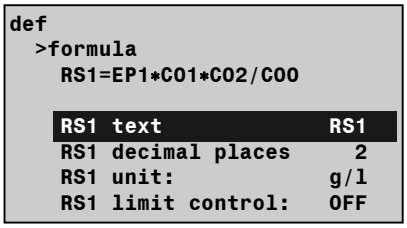
You can now enter a formula. Note here the inscriptions in the right corner of the keys and the numbers.
You can use mathematical operations, parentheses as well as the following symbols:

EP# EP's with 1-digit number, e.g. EP1.
RS# Previously calculated results, e.g. RS1 in the second formula.
C## Calculation values, e.g. C01. C00 is reserved for the sample size. The meaning of the different calculation values is given on page 23.

Calculate the acid capacity of the tap water (at pH 4.3, this is the value of methyl orange) in mmol/L using the following formula:
RS1=EP1*C01*C02/C00
EP * conc(titrant) * factor / sample size
If you made a typing mistake, you can delete the symbols one by one with <CLEAR>.

<ENTER>

Confirm the formula with <ENTER>.



You may enter a text for the result output, e.g. m value, see page 7.
Enter the desired number of decimal places for the result.
Select the unit mmol/L with <←> or <→> or enter a text as unit.

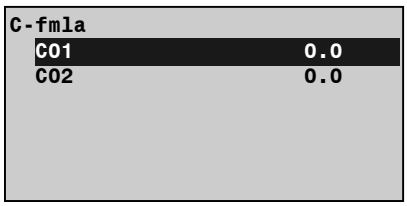
2x <QUIT>

Quit the formula entry by pressing <QUIT> twice.

Instead of the endpoint, the calculated result will be displayed. It is 0, because the calculation values C01 and C02 are still zero.

Entry of the calculation constants

<C-FMLA>

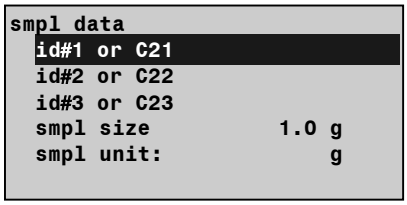


Press <C-FMLA> to enter the calculation values.
The constants which have been used in the formula are requested:
C01: Concentration of your titrant = 0.1 mol/L
C02: Factor to convert mol/L to mmol/L = 1000

The result is recalculated.

Entry of the sample size

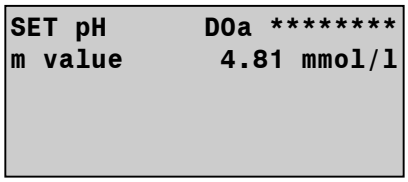
<SMPL DATA>



You also need the sample size for the calculation of your result. Enter it with the <SMPL DATA> key:
Place the cursor to "smpl size" and enter 100. Confirm with <ENTER>.

Select the unit "mL" for the sample size using the <←> or <→> keys and confirm with <ENTER>.

<↓>
<100>
<ENTER>
<←> or <→>
<ENTER>

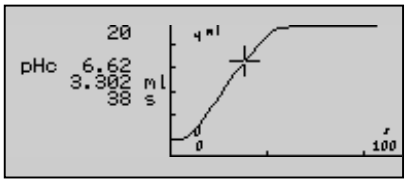


The result is recalculated.

Viewing the titration curve

<CURVE>

You can view the titration curve after the titration using the key <CURVE>.



With the <↑> and <↓> you can trace the curve. To the left the measured values of the current point are displayed. On the first line, you will find the index of the point.

<CURVE>

Quit the curve display with <CURVE>.

Selection of the automatic report output

If you have a printer connected, you can select the report blocks to be printed out automatically at the end of the titration.

<DEF>
<↓>
<ENTER>
<←> or <→>

Press <DEF> and place the cursor to ">report".
Press <ENTER> to define the report output.
(If you have your printer connected to COM2 press <ENTER> once again.)

```
def
  >report
    report COM1:curve;full
```

Select the individual report blocks with the <←> or <→> keys. Use a ";" as delimiter between the report blocks. If you wish to print out a curve and a full result report, set "curve;full".

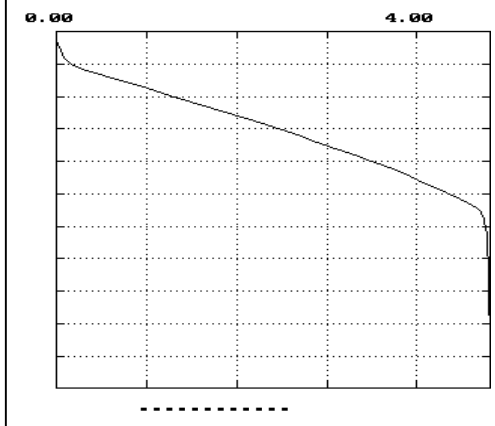
<ENTER>

Confirm the entry with <ENTER> and quit the inquiries with <QUIT>.

2x <QUIT>

Press <PRINT> <REPORTS> <ENTER> to print your reports. Your printout will look as follows:

```
 'cu
758 KFD Titrino        10196    758.0022
user                   pkl
date  2002-04-10    time  17:40        4
                       SET pH   ********
5.0  s/div      dV=1.0 ml/div
          ------------
```




```
          ------------

 'fr
758 KFD Titrino        10196    758.0022
user                   pkl
date  2002-04-10    time  17:41        4
card label:KFDMET1
pHc(init)      6.78    SET pH   ********
smpl size       100 ml
EP1           4.812 ml              4.28
m value        4.81 mmol/l
          ------------
```

Identification of report type (cu = curve)

User (only if entered)

Method identification
Scaling of curve axis

Curve

Instrument type with identification and program version

Card label
Initial pH (c means calibrated.)

Volume and pH value of EP1
Calculated result

1.3 Storing methods

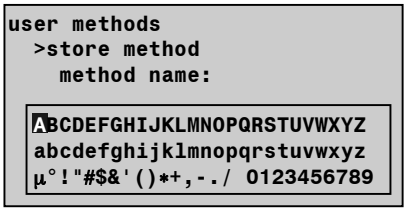
You learn how to operate the method memories.
The Titrino offers 2 types of method memories:

- Internal method memory, key <USER METH>
- External method memory on the card, key <CARD>

Storing a method in the internal method memory

<USER METH>
<↓>
<ENTER>

Press <USER METH>, place the cursor to ">store method" and press <ENTER>.



Press <CLEAR> to delete the existing method name (********).
Open text entry with key <ABC>.
A field with letters and symbols appears. You can select a letter with the cursor keys and confirm this letter with <ENTER>. The letter then appears in the input field of the method name.

Entries <ENTER>

Enter an identification for your method, e.g. m value.
If you made a typing error, you can delete the characters one by one with <CLEAR>.

<QUIT>

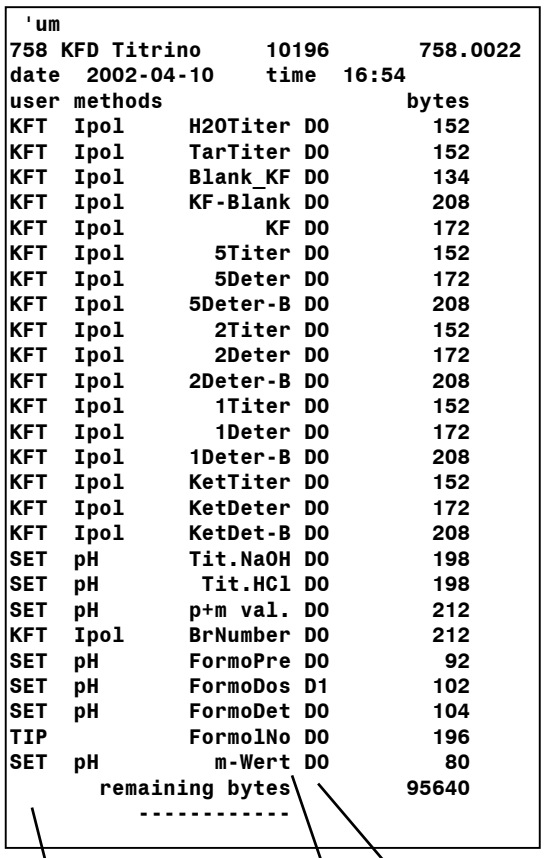
Quit the text input with <QUIT> when you completed your name.

<ENTER>

Confirm the name with <ENTER>. The method will be stored in the internal method memory.

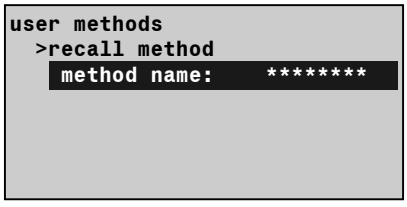
The method runs now under the identifier "m value".

A list of contents of the method memory can be printed with the key sequence <PRINT><USER METH> <ENTER>.



Recall a method from the internal method memory

<USER METH>
<ENTER>



<←> or <→>
<ENTER>

Stored methods can always be recalled into the working memory.

Press <USER METH> and <ENTER> to go to ">recall method".

You can select a method with <←> or <→> or enter its name directly.

Recall the method with <ENTER>.

The method is now ready to work.

Method memory on the card

The card offers additional memory space for methods. It may be used for example

- as a backup-medium for the internal method memory
- as an extended method memory, where the methods can be organized in various directories
- if every user wants to store his methods on his own card
- for exchanging methods between various laboratories, apparatus, and/or users

The use of the memory card is described in more detail on page 25 and in the Instructions for Use on page 58.

1.4 pH calibration

For an endpoint titration as it is described on page 2ff, a calibration should be performed before the titration.

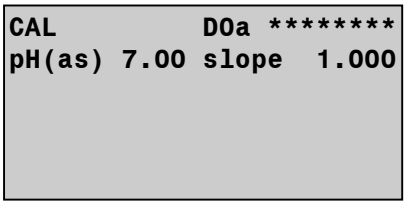
Selecting the mode CAL

<MODE>

Press the <MODE> key.

Select the mode CAL with <←> or <→> and press <ENTER> to confirm your selection.

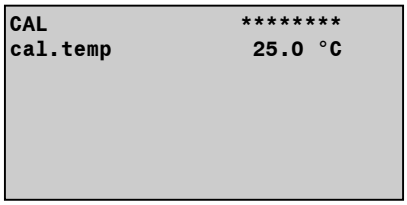
<←> or <→>
<ENTER>



The Titrino is ready for a 2 point calibration. In the second line of the display the current calibration data for measuring input 1 are shown.

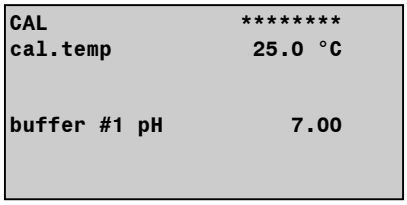
Calibration sequence

<START>



Immerse the electrode in the first buffer and press <START>.
First, the calibration temperature is measured. If no T sensor is connected, the temperature must be entered manually. The value is confirmed with <ENTER>.

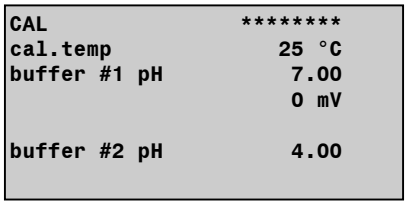
<ENTER>



The pH value of the first buffer is required.

Enter the nominal pH value of the first buffer at your calibration temperature and store the value with <ENTER>.

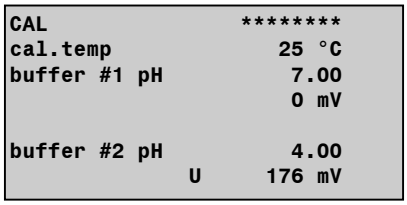
<ENTER>



The first buffer is measured and the potential is displayed. When the given drift criterion is reached, the measurement is stopped and the pH value of the second buffer is inquired.

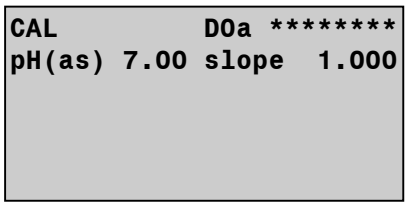
Rinse the electrode with water and immerse it in the second buffer.

<ENTER>



Enter the nominal value of the second buffer at your calibration temperature and store the value with <ENTER>. With the <STOP> key, the calibration can by interrupted. This results in a 1 point calibration.

The second buffer is measured and the potential is displayed. When the given drift criterion is reached, the measurement is stopped.



When the calibration is terminated, the current calibration data are displayed: pH(as) and slope.

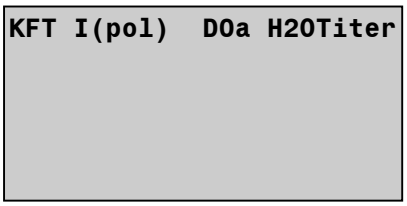
The calibration data can be viewed at any time with the <CAL.DATA> key. The calibration was performed at measuring input 1.

1.5 Karl Fischer titer determination

Now, we would like to perform a water determination. Therefor, the titer of the Karl Fischer reagent has to be determined first. At the same time, you learn how to store the titer as a common variable for following titrations.

First, a completely equipped KF titration vessel (KF equipment 6.5609.000) has to be installed on your stirrer or Ti-Stand. Mount an Exchange Unit with KF reagent on the Titrino and connect a double platinum electrode to the Pol-input ("Pol").

Loading the method and defining a common variable



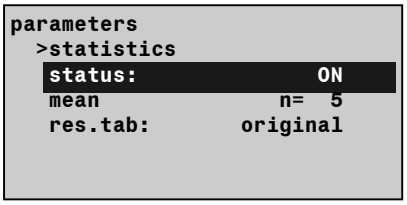
Load the method "H2OTiter" from the internal method memory, as it is described on page 8.

<PARAM>

You can inquire the settings of the method with the <PARAM> key.

<↓>
<ENTER>

Place the cursor on ">statistics". Press <ENTER> to go to this inquiry group.



The statistics calculations are switched on.
Place the cursor on "mean" and enter n = 3, because we would like to calculate the mean of 3 single determinations. Confirm the entry with <ENTER>.

<↓>
<3>
<ENTER>

Quit the inquiry by pressing <QUIT> twice.

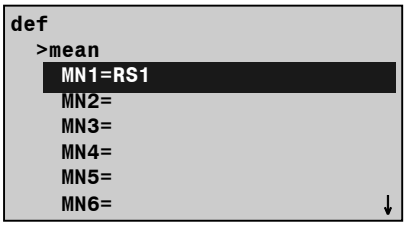
2x <QUIT>

Do not change the other parameters, because the method contains standard parameters that are optimized for most applications.

<DEF>

Press the <DEF> key and open the inquiry group ">mean".

<↓>
<ENTER>



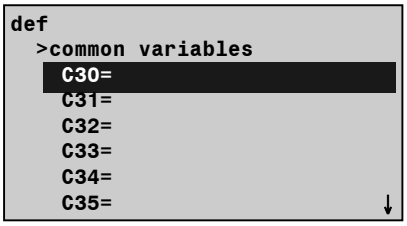
You see here that result RS1 is assigned to the mean value MN1.

What happens to this mean value?
It is assigned to a common variable (see below).

<QUIT>

Quit the inquiry with <QUIT>.

<↑>
<ENTER>



Open the inquiry group ">common variables" now. Values that should be stored permanently for later use can be assigned to common variables. The values of the common variables are preserved for all methods, even during power ON/OFF, until they are overwritten or deleted.
Up to 10 common variables (C30...C39) are available.

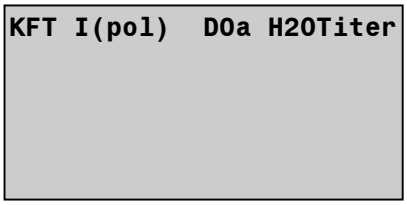
<↓>

If you move the cursor to the last line, you see that the mean value MN1 is assigned to common variable C39. Not only mean values, but also results, endpoints or variables can be assigned.

2x <QUIT>

Quit the inquiry with <QUIT>.

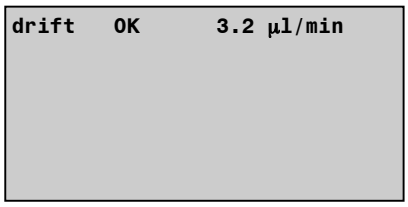
KF titer determination



You are now ready to titrate. You titrate with the internal dosing unit D0, i.e. the Exchange Unit on the Titrino.

Put 20 mL methanol into the titration vessel, switch on the stirrer and press <START>.

<START>



Now, the solution is conditioned to the first endpoint defined in the method. When conditioning is terminated, "drift OK" is displayed.

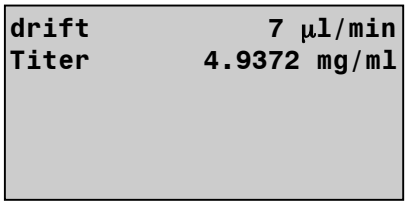
In the meantime tare a syringe with a long needle filled with distilled water on a high precision balance.

<START>

The titration is started with <START>.
Now, the Titrino requests the sample size. Puncture the septum and add 2–3 drops of water. Weigh back the syringe .
Or you can add exactly 10 µL water using a microsyringe. If you use a methanol standard, you need to adjust the calculation constants (see page 5).

Sample size
<ENTER>

Enter the sample size in gram and confirm it with <ENTER>.



During the titration, the titration curve is displayed. The titration will be terminated when the endpoint is reached. A report will be printed on the connected printer. (If no printer is connected, error 42 appears.)

After the titration, conditioning continues and the current drift is displayed.

see above

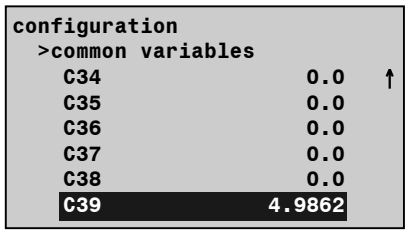
Perform two more titer determinations by pressing <START>, as soon as the solution is conditioned.

<STOP>

After the third titration you stop conditioning with <STOP>.

<CONFIG>
<↓>
<ENTER>
<↓>

Press the <CONFIG> key to open the inquiry ">common variables".



If you move the cursor to the last line, you see that the mean value of the KF titer is assigned to common variable C39.

Quit the inquiry with <QUIT>.

2x <QUIT>

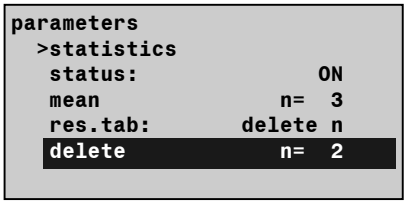
Delete a result from statistics calculation

<PARAM>
<↓>
<ENTER>
<↓>
<←> or <→>
<ENTER>

You want to delete, e.g., the second result of your titer determination. Press the <PARAM> key and open the inquiry group ">statistics". Place the cursor on "res.tab:" and choose "delete n" with the keys <←> or <→>. Confirm with <ENTER>.

<2>

Enter "n= 2".



If you confirm your entry with <ENTER> now, the result of your second titer determination will be deleted.

<ENTER>
<QUIT>

Quit the inquiry with <QUIT>.

The mean and the standard deviation are recalculated.

If you have connected a printer, you can print a new result report using the keys <PRINT><REPORTS> <ENTER> or a new statistics table, in which the deleted result is labeled with "*" using <PRINT><STATISTICS> <ENTER>.

1.6 Karl Fischer water determination

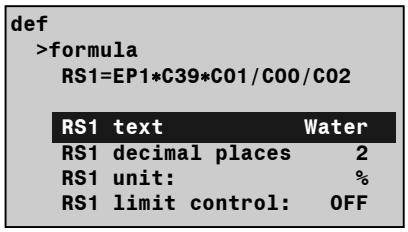
This method can be generally used for the determination of the water content of samples without previous blank value determination.

Adjust calculation constants

Load the method KFT Ipol "KF" from the internal method memory.

<DEF>
<ENTER>
<1>
<ENTER>

Press the <DEF> key and enter the formula inquiry to see, which calculation constants are used in the formula (see page 4).



As you can see, the common variable C39 is used, i.e. for the calculation of the water content the previously determined titer is taken into account automatically (see page 12). Thus for different titration reagents, each titer can be stored as a separate common variable.

If the water content is calculated in % and the sample size is entered in g, the standard values C01 = 0.1 and C02 = 1 can be used. Otherwise the values can be adjusted as described on page 5.

With the keys <PRINT><→><ENTER> the formula and the calculation constants can be printed. Press the cursor key until "calc" is displayed on the right.

KF titration

Exchange the used methanol against fresh one and perform a water determination of a moist solvent, as an example titration. Proceed as in the KF titer determination.

You can find some useful hints for the sample addition on page 25 of the Instructions for Use.

1.7 Working with several dosing units

Here you will learn how to work with several dosing units. Several dosing units can be used

- if a working station will be permanently installed for specific analysis, e.g. having a dosing unit specially prepared for Karl Fisher titrations.
- for addition of auxiliary solutions.
- if several titrations are being carried out in the same sample. The linking of various methods is possible with TIP (**Ti**tration **P**rocedure), see page 52 of the Instructions for Use.

Selection of the dosing unit in the titration method

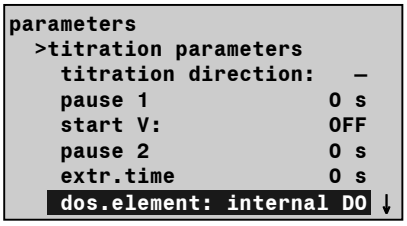
The dosing unit is selected in the method. The method runs always with the selected dosing unit.
Connect the dosing unit D1 and arm it with an Exchange Unit (the Dosino with a Dosing Unit, resp.).

Recall the method "KF" from the user memory: Press <USER METH>, then <ENTER>.
Select the method name "KF" with the keys <←> or <→> and recall the method with <ENTER>.

The dosing unit of this method is D0, i.e. the Titrino itself.

<PARAM>
<ENTER>
<↓>

To change the dosing unit, press <PARAM>, then <ENTER>. You are now in the inquiry group ">titration parameters".

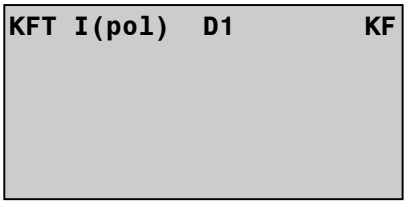


Place the cursor on "dos.element:".

<←> or <→>
<ENTER>

Choose the dosing unit with keys <←> or <→>:
internal D0: Dosing unit of the Titrino
external D1: External dosing unit, connected to 1 or 2.
Choose e.g. "external D1", confirm the input with <ENTER> and quit with the key <QUIT>.

2x <QUIT>



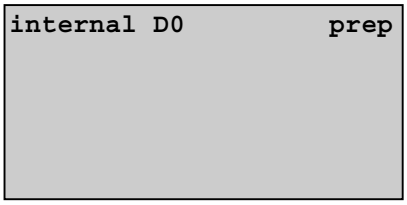
The display shows now "KFT I(pol) D1 KF".
D1 means that in this method the external dosing unit D1 is being used.
Start the method.
After the titration "D1a" appears in the display. "a" means "active", the dosing unit D1 is now active.

Manual dosing

Is used
- to prepare an Exchange Unit (or Dosing Unit, resp.)
- for quick dosing

If you press the key <DOS>, the dosing unit from the method is working. This dosing unit appears in the display.
If you wish to dose with another dosing unit, use the key <PREP> to select the dosing unit and press <DOS> to dose.

<PREP>



Press <PREP>. In the display appears "internal D0 prep", i.e. the dosing unit of the Titrino has been selected.

Press <PREP> again. In the display appears "external D1: prep".

<PREP>
<DOS>, <STOP/FILL>

Press the key <DOS> on the Titrino: The external dosing unit D1 doses. If you press the key <STOP/FILL> on the Titrino, it will fill again.

With <START>, the function "prep" is started. This prepares the dosing units. (The parameters for "prep" are under the key <CONFIG>, in the group ">prep.dosing elements").
Attention: With the function "prep", liquid will be expelled!

If the dosing unit D1 is a Dosino, you can empty the dosing unit completely (e.g. for cleaning). Choose the function "empty" with the key <←> or <→> and start with <START>.
Attention: With the function "empty", liquid will be expelled!

<QUIT>

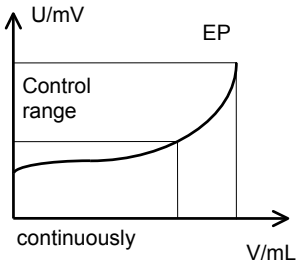
Quit the selection of dosing units with <QUIT>.

2 Titration, dosing and measuring modes

This chapter gives you a survey over the titration, dosing and measuring modes. You will find the parameters of all modes. The standard values are printed in bold face in the following tables.

If you are looking for more information to the different quantities, you will find the display text as a keyword in the index of the Instructions for Use.

2.1 Survey of the titration modes

	KFT, SET **Endpoint Titration**
Titration	Titration to preset endpoint. 
Evaluation	Volume that has been dispensed up to the endpoint (EPX in mL).
Applications	• KFT: Determinations of water contents. • For rapid, quantitative determinations in analytical chemistry. Requirement: EP of the titration reaction is known and does not change during a determination series. • If an excess of titrant must be avoided.

2.2 Mode KFT, parameters

Display	Meaning	Input range
>control parameters	Controlling parameters for KFT.	
EP at ...	Endpoint for Ipol. Endpoint for Upol	U: –2000 ... **250**...2000 mV I: –200.0... **25.0**...200.0 µA
dynamics	Distance from EP where constant dosing stops and controlling begins.	U: 1...**100**...2000 mV I: 0.1...**10**...200.0 µA
max.rate	Maximum dosing rate.	0.01...150 mL/min, **max**.
min.volume incr.	Minimum volume increment	0.1...9.9 µL, **min**
stop crit:	Type of stop criteria.	**drift**, time
stop drift	Titration stops if stop drift is reached.	1...**20**...999 µL/min
t(delay)	Stop if there is no dosing during t(delay).	0...**10**...999 s, INF
stop time	If t(delay) is "INF": stop time.	0...999999 s, **OFF**
>titration parameters	General titration parameters.	
titr.direction:	+: Titration to higher voltage or current. auto: Direction is set automatically.	+, **–**, auto
pause 1	Waiting time **before** start volume.	**0**...999999 s
start V:	Type of start volume: absolute or relative.	abs., rel., **OFF**
start V	Volume for **absolute** start volume.	**0**...999.99 mL
factor	Factor for calculation of **relative** start volume: factor ∗ smpl size.	**0**...±999999
dos.rate	Dosing rate for start volume.	0.01...150 mL/min, **max.**
pause 2	Waiting time **after** start volume.	**0**...999999 s
extr.time	Extraction time.	**0**...999999 s
dos.element	Selection of the dosing unit.	**internal D0**, external D1/D2
I(pol)	Polarization current for Ipol or	–127...**50**...127 µA or.
U(pol)	-voltage for Upol in 10 mV-intervals.	–1270...**400**...1270 mV
electrode test:	Performing of electrode test	ON, **OFF**
temperature	Titration temperature.	–170.0...**25.0**...500.0 °C
time interval	Time interval for measured value acquisition.	1...**2**...999999 s
>stop conditions		
stop V:	Type of stop volume: absolute or relative.	**abs.**, rel., OFF
stop V	Volume for **absolute** stop volume.	0...**99.99**...9999.99 mL
factor	Factor for calculation of **relative** stop volume: factor ∗ smpl size.	0...±**999999**
filling rate	Filling rate after the titration.	0.01...150 mL/min, **max.**
>statistics		
status:	Status of statistics calculation.	ON, **OFF**
mean n=	Number n of single values for statistics.	**2**...20
res.tab:	Result table for statistics calculation.	**original**, delete n, delete all
delete n=	Delete data from sample number n.	**1**...20
>preselections		
conditioning:	Automatic conditioning of titration vessel.	ON, **OFF**
display drift:	Display of drift during conditioning.	**ON**, OFF
drift corr:	Type of drift correction.	auto, man., **OFF**
drift value	Value for manual drift correction.	**0.0**...99.9 mL/min
req.ident:	Request of identifications after start.	id1, id1 & 2, all, **OFF**
req.smpl size:	Request of sample size after start.	value, unit, all, **OFF**
limit smpl size:	Limit control of sample size.	ON, **OFF**
oven:	RS-COM of Titrino where the oven is connected.	COM1, COM2, **no**
activate pulse:	Pulse output on I/O line L6.	first, all, cond., **OFF**

2.3 Mode SET, parameters

Display	Meaning	Input range
>SET1	Individual parameters for EP1.	
EP at pH	Preset EP1 at pH, U, or I, resp.	pH: 0.00...±20.00, **OFF** (0...±2000 mV, 0.0...±200.0 µA)
dynamics	Distance from EP where constant dosing stops and controlling begins.	pH: 0.01...20.00, **OFF** (1...2000 mV, 0.1...200.0 µA)
max.rate	Maximum dosing rate.	0.01...**10**...150 mL/min, max.
min.rate	Minimum dosing rate.	0.01...**25.0**...9999 µL/min
stop crit:	Type of stop criteria.	**drift**, time
stop drift	Titration stops if stop drift is reached.	1...**20**...999 µL/min
t(delay)	Stop if there is no dosing during t(delay). If t(delay) is "INF":	0...**10**...999 s, INF
stop time	stop after a time.	0...999999 s, **OFF**
>SET2	Parameters for EP2. Identical as SET1.	
>titration parameters	General titration parameters.	
titr.direction:	+:Titration to higher pH, voltage, or current. Auto: Direction is set automatically.	+, –, **auto**
pause 1	Waiting time **before** start volume.	**0**...999999 s
start V:	Type of start volume: absolute or relative.	abs., rel., **OFF**
start V	Volume for **absolute** start volume.	**0**...999.99 mL
factor	Factor for calculation of **relative** start volume: factor ∗ smpl size.	**0**...±999999
dos.rate	Dosing rate for start volume.	0.01...150 mL/min, **max.**
pause 2	Waiting time **after** start volume.	**0**...999999 s
extr.time	Extraction time.	**0**...999999 s
dos.element	Selection of the dosing unit.	**internal D0**, external D1/D2
meas.input:	Measuring input for pH and U.	**1**, 2, diff.
temperature	Titration temperature.	–170.0...**25.0**...500.0 °C
time interval	Time interval for measured value acquisition.	1...**2**...999999 s
>stop conditions		
stop V:	Type of stop volume: absolute or relative.	**abs.**, rel., OFF
stop V	Volume for **absolute** stop volume.	0...**99.99**...9999.99 mL
factor	Factor for calculation of **relative** stop volume: factor ∗ smpl size.	0...±**999999**
filling rate	Filling rate after titration.	0.01...150 mL/min, **max.**
>statistics	Statistics calculation see at KFT, page 18.	
>preselections		
conditioning:	Automatic conditioning of titration vessel	ON, **OFF**
display drift:	Display of drift during conditioning.	**ON**, OFF
drift corr:	Type of drift correction.	auto, man., **OFF**
drift value	Value for manual drift correction.	**0.0**...99.9 µL/min
req.ident:	Request of identifications after start.	id1, id1 & 2, all, **OFF**
req.smpl size:	Request of sample size after start.	value, unit, all, **OFF**
limit smpl size:	Limit control of sample size.	ON, **OFF**
low lim.	Lower limit for sample size.	**0.0**...999999
up lim.	Upper limit for sample size.	0.0...**999999**
activate pulse:	Pulse output on I/O line L6.	first, all, cond., **OFF**

2.4 Mode MEAS and CAL, parameters

MEAS

Display	Meaning	Input range
>measuring parameters		
signal drift	Drift for measured value acquisition.	pH, U: 0.5..999 mV/min, **OFF** T: 0.5...999 °C/min, **OFF**
equilibr.time	Waiting time for meas. value acquisition.	0...9999 s, **OFF**
meas.input:	Measuring input for pH and U.	**1**, 2, diff.
I(pol)	Polarization current for Ipol or	–127...**1**...127 µA or.
U(pol)	-voltage for Upol in 10 mV-intervals.	–1270...**400**...1270 mV
electrode test:	Performing of electrode test	ON, **OFF**
temperature	Measuring temperature.	–170.0...**25.0**...500.0 °C
time interval	Time interval for measured value acquisition.	1...**2**...999999s
>statistics	Statistics calculation see at KFT, page 18.	
>preselections		
req.ident:	Request of identifications after start.	id1, id1 & 2, all, **OFF**
req.smpl size:	Request of sample size after start.	value, unit, all, **OFF**
limit smpl size:	Limit control of sample size.	ON, **OFF**
low lim.	Lower limit for sample size.	**0.0**...999999
up lim.	Upper limit for sample size.	0.0...**999999**
activate pulse:	Pulse output on I/O line L6.	ON, **OFF**

CAL

Display	Meaning	Input range
>cal. parameters		
meas.input:	Measuring input.	**1**, 2, diff.
cal.temp.	Calibration temperature.	–20.0...**25.0**...120.0 °C
buffer 1 pH	pH value for buffer 1. up to 9 buffer.	0...±20.00
signal drift	Drift for measured value acquisition.	0.5..**2**...999 mV/min, OFF
equilibr.time	Waiting time for meas. value acquisition.	0...**110**...9999 s, OFF
electr.id	Electrode identification.	up to 8 ASCII characters
sample changer cal:	Calibration with Sample Changer.	ON, **OFF**
activate pulse:	Pulse output on I/O line L6.	all, first, **OFF**
>statistics	Statistics calculation see at KFT, page 18.	

2.5 Mode TIP, parameters

With TIP, methods and other functions can be linked to a titration sequence. Press the key <DEF> to define the titration sequence.

Display	Meaning	Input range
>sequence		
method:	Method from the internal method memory or from the card.	method name
pause	Waiting time. Can be aborted with <QUIT>.	**0**...999999 s, INF
L4 output:	Set a signal when on I/O line L4.	active, inactive, pulse, **OFF**
L6 output:	Set a signal when on I/O line L6.	active, inactive, pulse, **OFF**
info	The sequence will be held and an info appears in the display.	up to 16 characters
prep	Preparation of the dosing unit.	**internal D0**, external D1/D2
stirrer:	Switching the stirrer ON/OFF.	**ON**, OFF
>statistics	Statistics calculation see at KFT, page 18.	
>preselections		
req.ident:	Request of identifications after start.	id1, id1 & 2, all, **OFF**
req.smpl size:	Request of sample size after start.	value, unit, all, **OFF**
limit smpl size:	Limit control of sample size.	ON, **OFF**
low lim.	Lower limit for sample size.	**0.0**...999999
up lim.	Upper limit for sample size.	0.0...**999999**
meas.mode:	Selection of the measured quantity for <MEAS/HOLD>.	pH, U, I(pol), U(pol), T, **OFF**
meas.input:	Measuring input for pH and U.	**1**, 2, diff.
temperature	Temperature for the compensation of the pH values.	–170.0...500.0 °C

2.6 Calculations

The results are calculated with the formulas given in the method. For the calculation, the raw values, determined in the method (EP's and C variables), are available.
The results and the raw values can be assigned for further calculations, e.g. for statistics or as common variables.

Formula input and assignments, key <DEF>

Display	Meaning	Input range
>formula	Input of formula.	
RS?	Enter result number.	1...9
RS1=EP1*CO1/COO	Enter formula by means of 3rd functions of keyboard.	
RS1 text	Text for result output.	**RS1** or up to 8 ASCII characters
RS1 decimal places	Number of decimal places for result output.	0...**2**...5
RS1 unit:	Select result unit.	**%**, ppm, g/L, mg/mL, mg/pc, mol/L, mmol/L, g, mg, mL, s, mL/min, no unit or up to 6 ASCII characters
RS1 limit control:		ON, **OFF**
RS1 low lim.	Limit control of the result.	**0.0**...999 999
RS1 up lim.	Lower limit for RS1.	0.0...**999 999**
RS1 L13 output:	Upper limit for RS1 Output on line L13 if the result is out of limits. Enter values of calculation variables with <C-FMLA>.	**OFF**, active, pulse
>silo calculations	Allocations for silo calculation, see page 64 of the Instructions for Use.	
C24=	Enter values to be stored in the silo memory.	RSX, EPX, CXX
C25=		
match id:	Indication which id's must coincide for the statistical evaluation in the silo memory.	id1, id1 & 2, all, **OFF**
>common variables	Allocations of common variables C30...C39.	
C3O=	Assign RSX, EPX, CXX, or MNX.	RSX, MNX, EPX, CXX
>report	Selection of report blocks for data output at COM1.	
report COM1:	Depends on the selected mode. If you wish several reports, use ";" as separator.	param, full, short, mplist, curve, scalc full, scalc srt, calc, calib, ff
report COM2:	As for COM1.	
>mean	Allocations for statistics.	
MN1=	Assign RSX, EPX, or CXX.	RSX, EPX, CXX
>temporary variables	Allocations of temporary variables for calculations under TIP.	
C7O=		RSX, EPX, CXX

Meaning of the calculation variables

C variables are

- determined by the method (C24...C27, C4X, C5X, C6X, C7X, C8X)
- entered as sample specific data (C00, C21...C23)
- given as fixed constants in the methods (C01...C19)

Variable	Meaning
C00	Sample size, key <SMPL DATA>.
C01...C19	Method specific calculation values, such as molecular mass, factors, key <C-FMLA>.
C21...C23	Sample specific calculation values, such as dilution factors, key <SMPL DATA>.
C24, C25	Variables for storing determination results in the silo memory.
C26, C27	Means from silo calculations.
C30...C39	Common variables, e.g. for titer.
C40	Initial measured value of the sample, last measured value for MEAS.
C41	End volume.
C42	Determination time.
C43	Volume drift for KFT and SET with conditioning.
C44	Temperature.
C45	Dispensed start volume.
C46	Asymmetry pH (pH calibration).
C47	Electrode slope (pH calibration).
C48	Volume at the point of the curve with maximum voltage.
C49	Volume at the point of the curve with minimum voltage.
C70...C79	Temporary variables for calculations in TIP.

Sample data, key <SMPL DATA>

- Sample identifications or sample specific calculation values C21...C23
- Sample size C00

For working with the silo memory, see page 26.

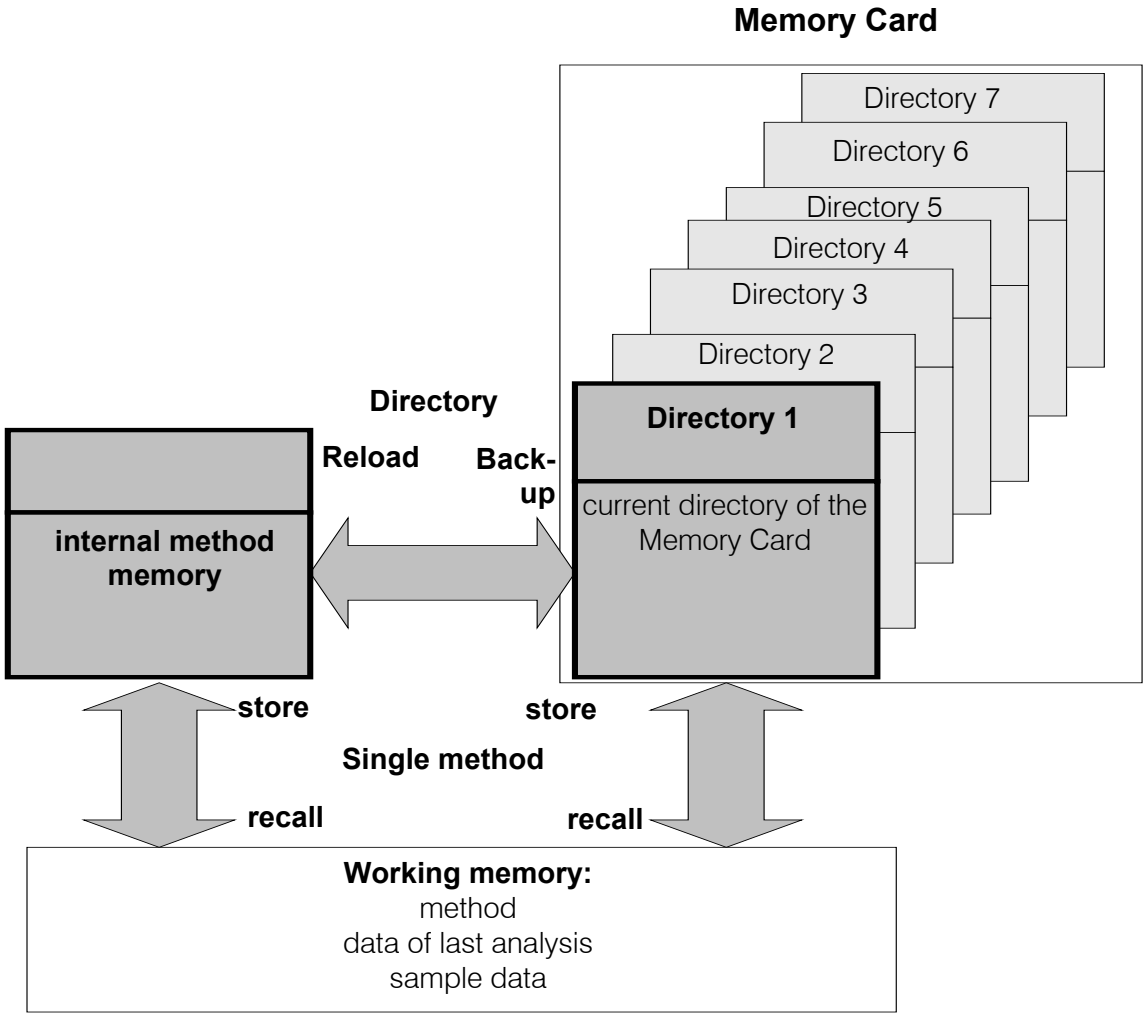
Display	Meaning	Input range
	Inquiries with silo = OFF (LED "silo" is OFF):	
id#1 or C21 id#2 or C22 id#3 or C23	} Sample identification. Can be used as sample specific calculation values.	up to 8 ASCII characters or 0...±999999
smpl size	Sample size	–999999...**1**...999999
smpl unit:	Unit of sample size	**g**, mg, mL, µL, pc, no unit or up to 5 ASCII characters

3 Other functions

This chapter gives you a survey over other functions of the Titrino.
If you are looking for more information to the different quantities, you will find the display text as a keyword in the index of the Instructions for Use.

3.1 Method memory

Methods can be stored in the internal method memory or on the memory card. These method memories are organized as follows:



Internal method memory, key <USER METH>

Display	Meaning	Input range
>recall method method name:	Recall method from the internal method memory to the working memory.	up to 8 characters
>store method method name:	Store method from the working memory to the internal method memory.	up to 8 characters
>delete method method name:	Delete method from the internal method memory.	up to 8 characters

Method memory on the card, key <CARD>

Display	Meaning	Input range
>recall method method name:	Recall method from the card (current directory) to the working memory.	up to 8 characters
>store method method name:	Store method from the working memory to the current directory on the card.	up to 8 characters
>delete method method name:	Delete method from the current directory on the card.	up to 8 characters
>change directory dir.name:	Change current directory on the card.	up to 10 characters
>create directory dir.name:	Create new directory on the card.	up to 10 characters
>delete directory dir.name:	Delete directory on the card together with its methods.	up to 10 characters
>backup dir.name:	Backup of the internal method memory on the card.	up to 10 characters
>reload dir.name:	Reload of the whole directory from the card to the internal method memory.	up to 10 characters
>format card label format:	Card formatting. Card labeling. Confirm formatting.	up to 8 characters ON, **OFF**
>change battery date	Date for changing the card battery.	YYYY-MM-DD

3.2 User name, key <USER>

If a user name is entered it will be printed in in the print-out.

Display	Meaning	Input range
name:	User name. Select a name with keys <←> or <→>.	up to 10 ASCII characters
>delete name:	Deletes a user name.	up to 10 ASCII characters

3.3 Sample data, keys <SMPL DATA> and <SILO>

In the silo memory sample data can be stored on reserve. For working without the silo memory see page 23 of the Instructions for Use.
Press the key <SILO> for working with the silo memory, and the key <SMPL DATA> to input data.

Display	Meaning	Input range
>edit silo lines	Input for the silo memory:	
silo line	Silo line number.	**1**...255
method:	Method name.	up to 8 ASCII characters
id#1 or C21 **id#2 or C22** **id#3 or C23**	Sample identification. Can be used as specific calculation values.	up to 8 ASCII characters
smpl size	Sample size	–999999...**1**...999999
smpl unit:	Unit of sample size.	**g**, mg, mL, µL, pc, no unit or up to 5 ASCII characters
>delete silo lines	Delete individual silo lines.	
delete line n	Line number of the line to be deleted.	1...255, **OFF**
>delete all silo lines	Delete all silo lines.	
delete all:	Confirmation.	ON**, OFF**
cycle lines:	With "ON", worked off silo lines will be copied to the highest line of the silo memory.	ON, **OFF**
save lines:	Determination results will be stored as C24 or C25 in the silo memory according to the allocations in the methods, see page 22.	ON, **OFF**

3.4 Configuration, key <CONFIG>

Display	Meaning	Input range
>monitoring	Monitoring functions	
validation:	Validation of Titrino.	ON, **OFF**
time interval	Time interval for the validation.	1...**365**...9999 d
time counter	Time elapsed since the validation.	**0**...9999 d
calibration:	PH calibration	ON, **OFF**
meas.input:	Measuring input.	**1**, 2, diff.
time counter	Time interval for the calibration.	**0**...9999 d
service:	Service of instrument.	ON, **OFF**
next service	Date for the next service.	YYYY-MM-DD
system test report:	Print-out of the system test report after switching on the Titrino.	ON, **OFF**
>peripheral units	Settings of peripheral units.	
send to COM1:	Selection of printer at COM1.	Epson, Seiko, Citizen, HP, **IBM**
send to COM2:	as for COM1.	
man.reports to COM:	Output of manually triggered reports.	**1**, 2, 1&2
balance:	Selection of balance.	**Sartorius**, Mettler, Mettler AT, AND, Precisa
stirrer control:	Stirrer control in titration sequences.	ON, **OFF**
remote box:	Connection of a remote box.	ON, **OFF**
keyboard:	Type of the PC keyboard connected to the remote box.	**US**, deutsch, francais, espanol, schweiz.
barcode:	Target for data eneterd by a barcode reader.	**input**, method, id1, id2, id3, smpl size
>auxiliaries	General settings.	
dialog:	Selection of dialog language.	**english**, deutsch, français, español, italiano, portugese, svenska
date		YYYY-MM-DD
time		HH:MM
run number	Current run number for result output.	**0**...9999
auto start	Automatic starts of titrations.	1...9999, **OFF**
start delay	Waiting time before start of titration.	**0**...999999 s
result display:	Result display at the end of determination.	**bold**, standard
dev.label	Device label.	up to 8 characters
program	Program version.	read only
>RS232 settings COM1	RS232 settings for COM1.	
baud rate:	Baud rate.	300,600,1200,2400, 4800, **9600**, 19200, 38400, 57600, 115200
data bit:	Data bit.	7, **8**
stop bit:	Stop bit.	**1**, 2
parity:	Parity.	**none**, odd, even
handshake:	Handshake.	**HWs**, SWchar, SWline, none
>RS232 settings COM2	as for COM1.	
>common variables	Values of common variables C30...C39.	

>prep.dosing elements	Preparation of titration burets.	
power ON prep:	Warning after power ON.	ON, **OFF**
report:	Report.	ON, **OFF**
dos.element:	Selection of dosing unit.	**internal D0**, external D1/D2
warn.interv.	Warning interval.	5...9999 min, **OFF**
dos.drive:	Selection of type of dosing unit.	**Dosimat**, Dosino
	Parameters for the internal dosing unit and for 685 Dosimat:	
volume DX	Volume.	0...**3.5**...99999.99 mL
cycle DX	Number of cycles.	1...**2**...9
dos.rate DX	Dosing rate.	0.01...150 mL/min, **max.**
fill rate DX	Filling rate.	0.01...150 mL/min, **max.**
	Parameters for the 700 Dosino:	
output:	Location, where liquid is expelled.	**tip**, flask
len.dos.tub.	Length of the dosing tube.	1.0...**40.0**...999.9 cm
diam.dos.tub.	Diameter of the dosing tube.	0.1...**2.0**...9.9 mm
len.asp.tub.	Length of the aspiration tube.	1.0...**25.0**...999.9 cm
diam.asp.tub.	Diameter of the aspiration tube.	0.1... **2.0**...9.9 mm
dos.rate DX	Dosing rate.	0.01...150 mL/min, **max.**
fill rate DX	Filling rate.	0.01...150 mL/min, **max.**

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