



CH-9101 Herisau/Switzerland

Phone            ++41 71 353 85 85

Fax                ++41 71 353 89 01

CompuServe     100031,3703

Internet        <http://www.metrohm.com>

---

# 785 DMP Titrino

---

## Short instructions for use

---

8.785.1023

99.07 Ti

---

## Table of contents

---

	Page
<b>1. Getting started .....</b>	<b>1</b>
1.1 Principle of data input .....	2
1.2 Development of a method.....	3
1.3 Storing methods .....	7
<b>2. Titration and measuring modes .....</b>	<b>10</b>
2.1 Survey of the titration modes .....	10
2.2 Mode DET and MET, parameters .....	11
2.3 Mode SET, parameters.....	12
2.4 Mode MEAS and CAL, parameters.....	13
2.5 Mode TIP, parameters .....	14
2.6 Calculations .....	15
<b>3. Other functions .....</b>	<b>17</b>
3.1 Method memory.....	17
3.2 User name, key <user> .....	19
3.3 Sample data, keys <smpl data> and <silos> .....	19
3.4 Configuration, key <configuration> .....	20
<b>Index .....</b>	<b>21</b>

**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", e.g. <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

<CONFIG>

```
configuration
>monitoring
>peripheral units
>auxiliaries
>RS232 settings COM1
>RS232 settings COM2
>common variables
```

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

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>.

```
configuration
>auxiliaries
  dialog:      english
  date         1999-06-23
  time         15:23
  run number   0
  auto start   OFF
  start delay  0 s
```

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.

2 x <QUIT>

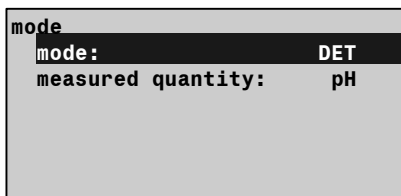
Quit the inquiries in the <CONFIG> key pressing <QUIT> twice.

## 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 10.

### Selecting the mode

<MODE>

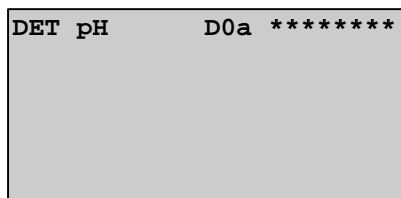


<←> or <→>  
 <ENTER>

Press the <MODE> key.

Select the mode DET with <←> or <→> keys, press <ENTER>, select the measured quantity "pH" and press <ENTER> again.

DET stands for Dynamic Equivalence point Titration. In this titration, the size of the volume increments vary as a function of the slope of the titration curve. After each increment, a preset measured value drift (or time) is awaited until the next increment is added (so called "equilibrium titration"). After the titration, the equivalence points are evaluated automatically.



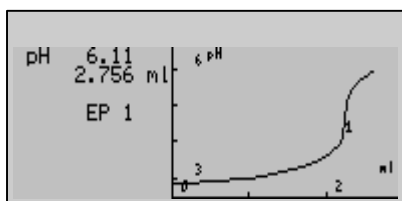
<START>

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

Mount an Exchange Unit with NaOH, c=0.1 mol/L on the Titrino.

Plug a combined pH glass electrode into measuring input ("Ind I").

Pipette 2 mL HCl, c =0.1 mol/L into the titration vessel, dilute it with ca. 20 mL. dist. water, adjust the stirrer and press <START>.

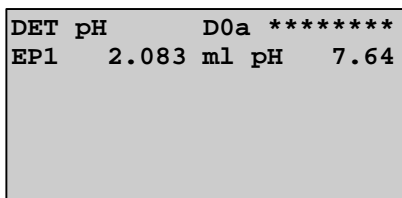


<STOP>

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

As soon as the Titrino has found an equivalence point, it will also be shown the left.

Let the titration continue for a short while, e.g. until ca. pH=11.50. Now stop it with <STOP>.



The equivalence point is displayed.

## Calculation of the result, entry of a formula

<DEF>

```
def
>formula
>silco calculations
>common variables
>report
>mean
>temporary variables
```

You may calculate results with the equivalence point. Press <DEF>.

Press <ENTER> to move on to the formula entry. The display now shows "RS?".

Press "1", i.e. the first formula.

<ENTER>

<1>

```
def
>formula
RS1=EP1*C01*C02/C00
```

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 16.

Calculate the content of your hydrochloric acid in g/L:

$RS1 = EP1 * C01 * C02 / C00$

EP\*conc(titrant)\*molar mass/sample size

If you made a typing mistake, you can delete the symbols one by one with <CLEAR>.

Confirm the formula with <ENTER>.

<ENTER>

```
def
>formula
RS1=EP1*C01*C02/C00

RS1 text          RS1
RS1 decimal places 2
RS1 unit:          g/l
RS1 limit control: OFF
```

You may enter a text for the result output, see page 7.

Enter the desired number of decimal places for the result.

Select the unit g/l with <←> or <→> or enter a text as unit.

2 x <QUIT>

Quit the formula entry by pressing <QUIT> twice.

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

## Entry of the calculation constants

<C-FMLA>

```
C-fmla
C01          0.0
C02          0.0
```

Press <C-FMLA>, to enter the calculation values.

The constants which have been used in the formula are requested:

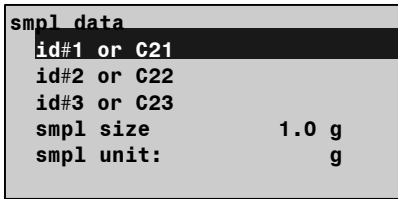
C01: Concentration of your titrant = 0.1 mol/L

C02: Molar mass of HCl = 36.47 g/mol

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 "smp1 size" and enter 2.

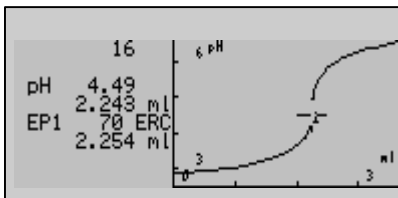
Select the unit "ml" for the sample size using the <←> or <→> keys and confirm with <ENTER>.

The result is recalculated.

### Viewing the titration curve

<←> or <→>

You can view the titration curve after the titration using the <←> or <→> keys.



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.

At the equivalence point, you find its ERC (see Instructions for Use page 20, 21) and its volume.

<←> or <→>

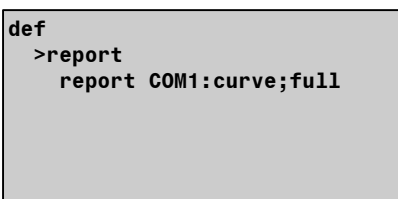
Quit the curve display with <←> or <→> key.

### Selection of the automatic report output

<DEF>  
<↓>  
<ENTER>  
<←> or <→>

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

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.)



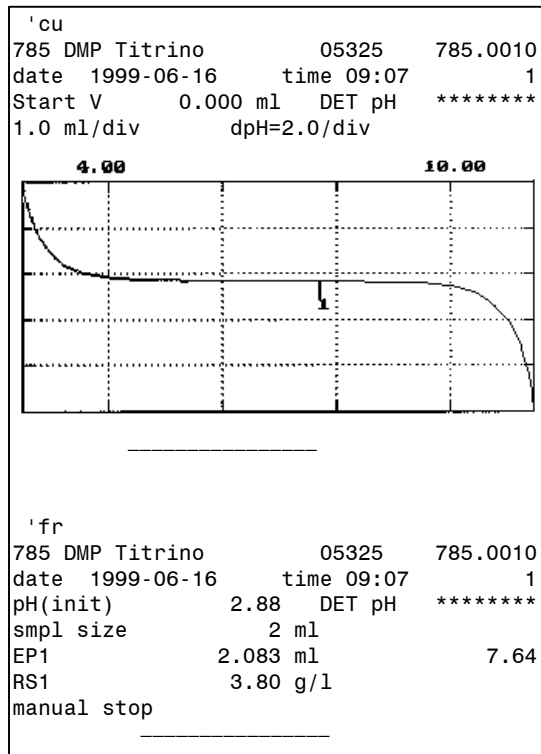
Select the individual report blocks with the <←> or <→> keys. Use a ";" as delimiter between the report blocks. If you wish to print out a curve and a full result report, set "curve;full".

<ENTER>

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

2 x <QUIT>

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



Identification of report type (cu = curve)

Start volume and method identification  
Scaling of curve axis

Instrument type with identification and program version  
Initial pH

Volume and pH value of EP1  
Calculated result

### Entry of a stop criterion

<PARAM>  
<↓>  
<ENTER>

You don't want to stop your titration manually each time. Let us enter an automatic stop criterion.

Press <PARAM> and place the cursor to ">stop conditions". Press <ENTER> to go to this inquiry group.

parameters	
>stop_conditions	
stop V:	abs.
stop V	99.99 ml
stop pH	aus
stop EP	9
filling rate max.	ml/min

The absolute stop volume. It can be used as a safety volume to prevent overflow of the titration vessel. Enter a value for the stop volume that appears suitable for your titration vessel.

Entries <ENTER>

Set the pH value, e.g. 11.5 as stop criterion.

2 x <QUIT>

If several stop criteria have been set, the one that is reached first, applies.

Confirm the input with <ENTER> and quit the inquiry with <QUIT>.

Try another titration with this method.

### 1.3 Storing methods

You learn how to operate the method memories.

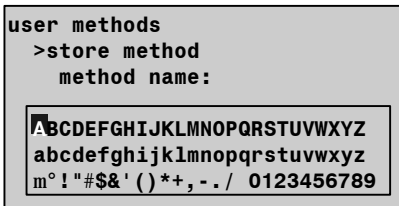
The Titrino offers 2 types of method memories:

- 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. HCl:

If you made a typing error you can delete the characters one by one with <CLEAR>.

<QUIT>  
 <ENTER>

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

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

The method runs now under the identifier "HCl".

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

'um			
785 DMP Titrino	02103	785.0010	
date 1999-06-13	time 07:49		
user methods		bytes	
DET pH	Titer_pH		190
DET U	Blank		178
DET U	Chloride		234
MET U	Diazo		208
MET Ipol	Br-Index		226
DET U	Perox.No		172
DET pH	HCl		108
	remaining bytes		98684
-----			

mode and meas.quantity

method name

### Recall a method from the internal method memory

<USER METH>  
<ENTER>

```

user methods
>recall method
  method name: *****

```

<←> 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 e.g.

- 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 card has a battery, which should be exchanged periodically, see page 57 of the Instructions for Use.

As an example, perform a backup from the internal method memory to the card. If the card is not formatted, see page 56 of the Instructions for Use.

<CARD>  
<↓>  
<ENTER>

```

user meth.
>backup
  dir.name: Backup

```

<←> or <→>  
<ENTER>

Press <CARD> and place the cursor to ">backup".

Confirm this function with the key <ENTER> and give a name for the backup directory.

If you wish to overwrite an existing directory, choose a name with <←> or <→>. Then press <ENTER>

The backup will be effected.

### Printing a list of contents of the card

The following card reports can be printed:

#### Current directory

<PRINT> <CARD> <ENTER>

name of the current directory

methods in this directory

remaining bytes on this card

```
'ad
785 DMP Titrino      02103  785.0010
date 1999-06-13    time 07:49
card label: Appl.785 dev.label:
Petro Chem                      bytes
MET Ipol              TAN              240
MET Ipol              TBN              240
MET Ipol              Br-Index         244
SET Ipol              BrNumber         198
remaining bytes          233864
-----
```

#### Contents of the whole card

<PRINT> <←> or <→> <ENTER>

Press <←> or <→> repeatedly until "mem card" appears in the display.

bytes that are being used in the directory "user meth."

the directory "Petro Chem" contains 4 methods

```
'cd
785 DMP Titrino      02103  785.0010
date 1999-06-13    time 07:50
card label: Appl.785 dev.label:

directory: user meth.
Acid      Tit.NaOH    Tit.HCl
W-Liquor
bytes: 620

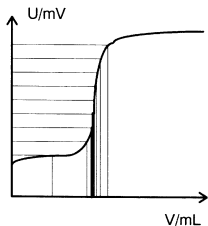
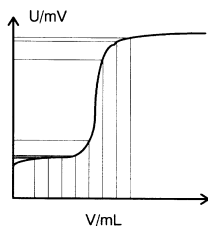
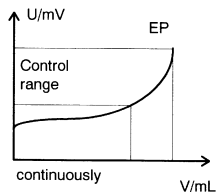
directory: Petro Chem
TAN      TBN      Br-Index
BrNumber
bytes: 922
remaining bytes on card: 121892
-----
```

## 2 Titration 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

	<b>DET</b> <b>Dynamic Equivalence point Titration</b>	<b>MET</b> <b>Monotonic Equivalence point Titration</b>	<b>SET</b> <b>Endpoint Titration</b>
<b>Titration</b>	<p>Reagent feeding: Variable volume increments, depending on the slope of the curve.</p>  <p>Drift controlled ("equilibrium titration") and/or after a fixed equilibration time.</p>	<p>Reagent feeding: Constant volume increments, independent of the slope of the curve.</p>  <p>Drift controlled ("equilibrium titration") and/or after a fixed equilibration time.</p>	<p>Titration to preset end-point.</p>  <p>continuously</p>
<b>Evaluation</b>	<p>The evaluation of EP's is based on the zero crossing of the second derivative with a Metrohm correction for the distortion of the curve from superimposed jumps. Can be combined with selectable recognition criteria.</p> <p><b>Recognition criteria:</b> as for MET</p>	<p>The evaluation of EP's is based on the Fortuin interpolation.</p> <p><b>Recognition criteria:</b> all EP's only the last EP only the greatest EP EP windows</p>	<p>Volume that has been dispensed up to the endpoint (EPX in ml).</p>
<b>Applications</b>	<p>Suitable titration mode for most problems. Specially recommended if jumps lie very close together and for very flat jumps.</p> <p><b>Note:</b> The reagent feeding algorithm is based on measured data. The curve should therefore not deviate markedly from S-shape.</p>	<p>For</p> <ul style="list-style-type: none"> <li>slow titration reactions (diazotations, coupling reactions)</li> <li>sluggish electrode response.</li> </ul>	<ul style="list-style-type: none"> <li>For rapid, quantitative determinations in analytical chemistry. Requirement: EP of the titration reaction is known and does not change during a determination series.</li> <li>If an excess of titrant must be avoided.</li> </ul>

## 2.2 Mode DET and MET, parameters

Display	Meaning	Input range
>titration parameters meas.pt.density min.incr. [V step] dos.rate signal drift equilibr.time start V: start V factor  dos.rate pause meas.input: temperature	Measuring point density. Minimum increment for DET. Volume increment for MET. Dosing rate for increments. Drift for measured value acquisition. Waiting time for value acquisition. Type of start volume: absolute, relative. Volume for <b>absolute</b> start volume. Factor for calculation of <b>relative</b> start volume: factor * smpl size. Dosing rate for start volume. Waiting time, e.g. after start volume. Measuring input for pH and U. Titration temperature.	0...4...9 0...10.0...999.9 ul 0...0.10...9.999 ml 0.01...150 ml/min, <b>max.</b> pH, U: 0.5...50..999 mV/min, <b>OFF</b> 0...26...9999 s, <b>OFF</b> abs., rel., <b>OFF</b> 0...999.99 ml 0...±999 999  0.01...150 ml/min, <b>max.</b> 0...999 999 s 1, 2, diff. -170.0...25.0...500.0 °C
>stop conditions stop V: stop V factor  stop pH  stop EP  filling rate	Type of stop volume: absolute or relative. Volume for <b>absolute</b> stop volume. Factor for calculation of <b>relative</b> stop volume: factor * smpl size. Stop at measured value pH, U, I.  Stop after a number of EP's have been found. Filling rate after the titration.	abs., rel., <b>OFF</b> 0...99.99...9999.99 ml 0...±999 999  pH: 0.00...±20.00, <b>OFF</b> U: 0...±2000 mV, <b>OFF</b> 1...9, <b>OFF</b>  0.01...150 ml/min, <b>max.</b>
>statistics status: mean   n= res.tab: delete   n=	Status of statistics calculation. Number n of single values for statistics. Result table for statistics calculation. Delete data from sample number n.	ON, <b>OFF</b> 2...20 <b>original</b> , delete n, delete all 1...20
>evaluation EPC  EP recognition:  fix EP1 at pH pK/HNP:	Endpoint criterion.  Type of EP recognition: all EP's, only greatest EP, only last EP, only EP's in windows, no evaluation. If "window" is selected, lower and upper limits of windows are inquired. Interpolation of volume at given pH, U, or I, resp. Up to 9 fix EP's. Evaluation of pK or half neutralization potential (HNP).	DET   0...5...200 MET   pH: 0.10...0.50...9.99 U: 1...30...999 mV <b>all</b> , greatest, last, window, <b>OFF</b>  pH: 0.00...±20.00, <b>OFF</b> U: 0...±2000 mV, <b>OFF</b> ON, <b>OFF</b>
>preselections req.ident: req.smpl size: limit smpl size: activate pulse:	Request of identifications after start. Request of sample size after start. Limit control of sample size. Pulse output on I/O line L6.	id1, id1 & 2, all, <b>OFF</b> value, unit, all, <b>OFF</b> ON, <b>OFF</b> ON, <b>OFF</b>

## 2.3 Mode SET, parameters

Display	Meaning	Input range
<b>&gt;SET1</b> <b>EP at pH</b>  <b>dynamics</b>  <b>max.rate</b> <b>min.rate</b> <b>stop crit:</b> <b>stop drift</b> <b>t(delay)</b>  <b>stop time</b>	Individual parameters for EP1. Preset EP1 at pH, U, or I, resp.  Distance from EP where constant dosing stops and controlling begins. Maximum dosing rate. Minimum dosing rate. Type of stop criteria. Titration stops if stop drift is reached. Stop if there is no dosing during t(delay). If t(delay) is "INF": stop after a time.	pH: 0.00...±20.00, <b>OFF</b> (0...±2000 mV, 0.0...±200.0 uA) pH: 0.01...20.00, <b>OFF</b> (1...2000 mV, 0.1...200.0 uA) 0.01... <b>10</b> ...150 ml/min, max. 0.01... <b>25.0</b> ...9999 ul/min <b>drift</b> , time 1... <b>20</b> ...999 ul/min 0... <b>10</b> ...999 s, INF  0...999 999 s, <b>OFF</b>
<b>&gt;SET2</b>	Parameters for EP2. Identical as SET1.	
<b>&gt;titration parameters</b> <b>titr.direction:</b>  <b>pause 1</b> <b>start V:</b> <b>start V</b> <b>factor</b>  <b>dos.rate</b> <b>pause 2</b> <b>extr.time</b> <b>meas.input:</b> <b>temperature</b> <b>time interval</b>	General titration parameters. +: Titration to higher pH, voltage, or current. Auto: Direction is set automatically. Waiting time <b>before</b> start volume. Type of start volume: absolute or relative. Volume for <b>absolute</b> start volume. Factor for calculation of <b>relative</b> start volume: factor * smpl size. Dosing rate for start volume. Waiting time <b>after</b> start volume. Extraction time. Measuring input for pH and U. Titration temperature. Time interval for measured value acquisition.	+, -, <b>auto</b>  <b>0</b> ...999 999 s abs., rel., <b>OFF</b> <b>0</b> ...999.99 ml <b>0</b> ...±999 999  0.01...150 ml/min, <b>max.</b> <b>0</b> ...999 999 s <b>0</b> ...999 999 s <b>1</b> , 2, diff. -170.0... <b>25.0</b> ...500.0 °C 1... <b>2</b> ...999 999 s
<b>&gt;stop conditions</b> <b>stop V:</b> <b>stop V</b> <b>factor</b>  <b>filling rate</b>	Type of stop volume: absolute or relative. Volume for <b>absolute</b> stop volume. Factor for calculation of <b>relative</b> stop volume: factor * smpl size. Filling rate after titration.	<b>abs.</b> , rel., <b>OFF</b> 0... <b>99.99</b> ...9999.99 ml 0...± <b>999 999</b>  0.01...150 ml/min, <b>max.</b>
<b>&gt;statistics</b>	Statistics calculation see at DET, page 11	
<b>&gt;preselections</b> <b>conditioning:</b> <b>display drift:</b> <b>drift corr:</b> <b>drift value</b> <b>req.ident:</b> <b>req.smpl size:</b> <b>limit smpl size:</b> <b>activate pulse:</b>	Automatic conditioning of titration vessel Display of drift during conditioning. Type of drift correction. Value for manual drift correction. Request of identifications after start. Request of sample size after start. Limit control of sample size. Pulse output on I/O line L6.	ON, <b>OFF</b> ON, <b>OFF</b> auto, man., <b>OFF</b> <b>0.0</b> ...99.9 ul/min id1, id1 & 2, all, <b>OFF</b> value, unit, all, <b>OFF</b> ON, <b>OFF</b> first, all, cond., <b>OFF</b>

## 2.4 Mode MEAS and CAL, parameters

### MEAS

Display	Meaning	Input range
>measuring parameters signal drift  equilibr.time meas.input: temperature time interval	Drift for measured value acquisition.  Waiting time for meas. value acquisition. Measuring input for pH and U. Measuring temperature. Time interval for measured value acquisition.	pH, U: 0.5..999 mV/min, <b>OFF</b> T: 0.5...999 °C/min, <b>OFF</b> 0...9999 s, <b>OFF</b> 1, 2, diff. -170.0... <b>25.0</b> ...500.0 °C 1... <b>2</b> ...999 999s
>statistics	Statistics calculation see at DET, page 11.	
>preselections req.ident: req.smpl size: Limit smpl size: activate pulse:	Request of identifications after start. Request of sample size after start. Limit control of sample size. Pulse output on I/O line L6.	id1, id1 & 2, all, <b>OFF</b> value, unit, all, <b>OFF</b> ON, <b>OFF</b> ON, <b>OFF</b>

### CAL

Display	Meaning	Input range
>cal. parameters meas.input: cal.temp. buffer 1 pH signal drift equilibr.time electr.id sample changer cal: activate pulse:	Measuring input. Calibration temperature. pH-value for buffer 1. up to 9 buffer. Drift for measured value acquisition. Waiting time for meas. value acquisition. Electrode identification. Calibration with Sample Changer. Pulse output on I/O line L6.	1, 2, diff. -20.0... <b>25.0</b> ...120.0 °C 0...±20.00 0.5.. <b>2</b> ...999 mV/min, <b>OFF</b> 0... <b>110</b> ...999 s, <b>OFF</b> up to 8 ASCII characters ON, <b>OFF</b> all, first, <b>OFF</b>
>statistics	Statistics calculation see at DET, page 11.	

## 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
<b>&gt;sequence</b> <b>method:</b>  <b>pause</b> <b>L4 output:</b> <b>L6 output:</b> <b>info</b>  <b>stirrer:</b>	Method from the internal method memory or from the card. Waiting time. Can be aborted with <QUIT>. Set a signal when on I/O line L4. Set a signal when on I/O line L6. The sequence will be held and an info appears in the display. Switching the stirrer ON/OFF.	method name  0...999 999 s, inf. active, inactive, pulse, <b>OFF</b> active, inactive, pulse, <b>OFF</b> up to 16 characters  <b>ON, OFF</b>
<b>&gt;statistics</b>	Statistics calculation see at DET, page 11.	
<b>&gt;preselections</b> <b>req.ident:</b> <b>req.smp1 size:</b> <b>limit smp1 size:</b> <b>meas.mode:</b>  <b>meas.input:</b> <b>temperature</b>	Request of identifications after start. Request of sample size after start. Limit control of sample size. Selection of the measured quantity for <MEAS/HOLD>. Measuring input for pH and U. Temperature for the compensation of the pH values.	id1, id1 & 2, all, <b>OFF</b> value, unit, all, <b>OFF</b> ON, <b>OFF</b> pH, U, I(pol), U(pol), T, <b>OFF</b>  1, 2, diff. -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 RS? RS1=EP1*C01/C00  RS1 text RS1 decimal places RS1 unit:  RS1 limit control: RS1 low lim. RS1 up.lim. RS1 L13 output:	Input of formula. Enter result number. Enter formula by means of 3 <sup>rd</sup> functions of keyboard. Text for result output. Number of decimal places for result output. Select result unit.  Limit control of the result. Lower limit for RS1. Upper limit for RS1 Output on line L13 if the result is out of limits.  Enter values of calculation variables with <C-FMLA>.	1...9  RS1 or up to 8 ASCII characters 0...2...5 %, 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 ON, OFF 0.0...999 999 0.0...999 999 OFF, active, pulse
>silos calculations  C24= C25= match id:	Allocations for silo calculation, see page 64 of the Instructions for Use. Enter values to be stored in the silo memory. Indication which id's must coincide for the statistical evaluation in the silo memory.	RSX, EPX, CXX  id1, id1 & 2, all, OFF
>common variables C30=	Allocations of common variables C30...C39. Assign RSX, EPX, CXX, or MNX.	RSX, MNX, EPX, CXX
>report  report COM1: report COM2:	Selection of report blocks for data output at COM1. Depends on the selected mode. If you wish several reports, use "," as separator. As for COM1.	full, short, mplist, curve, derive, comb, scalc full, scalc srt, calc, param, calib, ff
>mean MN1=	Allocations for statistics. Assign RSX, EPX, or CXX.	RSX, EPX, CXX
>temporary variables C70=	Allocations of temporary variables for calculations under TIP.	RSX, EPX, CXX

### Meaning of the calculation variables

C variables are

- determined by the method (C24...C27, C4X, C5X, C6X, C7X)
- 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 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.
C51...C59	Fix EP for DET and MET.
C61...C69	pK/HNP values for DET and MET.
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 19.

Display	Meaning	Input range
id#1 or C21 id#2 or C22 id#3 or C23 smpl size smpl unit:	Inquiries with silo = OFF (LED "silo" is OFF): } Sample identification. Can be used as } sample specific calculation values. Sample size Unit of sample size	up to 8 ASCII characters or 0...±999 999 -999 999...1...999 999 g, mg, ml, ul, pc, no unit or up to 5 ASCII characters

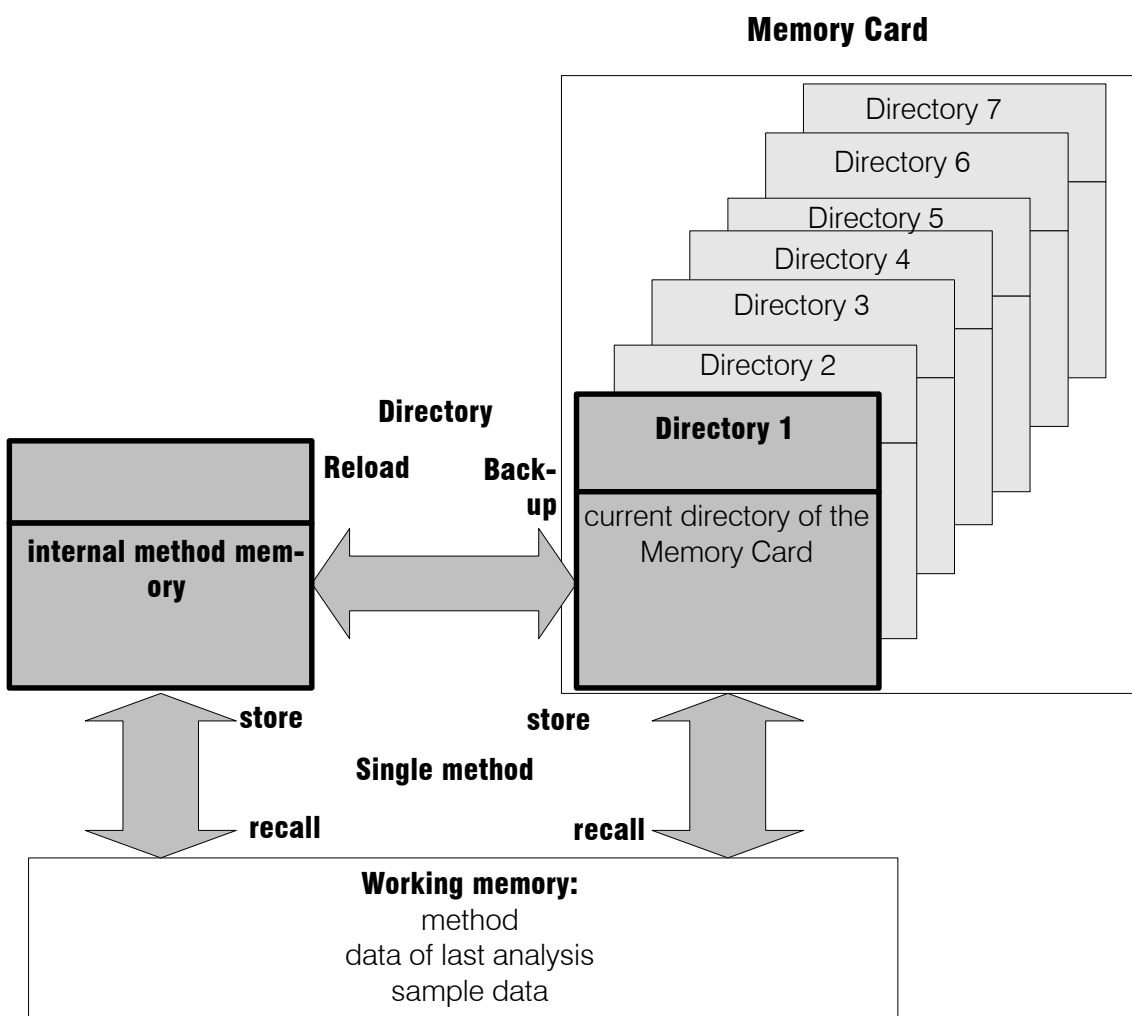
### 3 Other functions

This chapter gives you a survey over other functions of the Titrimo.

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 16 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 silo line method: id#1 or C21 id#2 or C22 id#3 or C23 smp1 size smp1 unit:	Input for the silo memory: Silo line number. Method name. } Sample identification. Can be used as specific calculation values. Sample size Unit of sample size.	1...255 up to 8 ASCII characters up to 8 ASCII characters -999 999...1...999 999 g, mg, ml, ul, pc, no unit or up to 5 ASCII characters
>delete silo lines delete line n	Delete individual silo lines. Line number of the line to be deleted.	1...255, OFF
>delete all silo lines delete all:	Delete all silo lines. Confirmation.	ON, OFF
cycle lines:  save lines:	With "ON", worked off silo lines will be copied to the highest line of the silo memory.  Determination results will be stored as C24 or C25 in the silo memory according to the allocations in the methods, see page 15.	ON, OFF  ON, OFF

### 3.4 Configuration, key <CONFIG>

Display	Meaning	Input range
>monitoring validation: time interval time counter calibration: meas.input: time counter service: next service system test report:	Monitoring functions Validation of Titrino. Time interval for the validation. Time elapsed since the validation. PH calibration Measuring input. Time interval for the calibration. Service of instrument. Date for the next service. Print-out of the system test report after switching on the Titrino.	ON, <b>OFF</b> 1... <b>365</b> ...9999 d 0...9999 d ON, <b>OFF</b> 1, 2, diff. 0...9999 d ON, <b>OFF</b> YYYY-MM-DD ON, <b>OFF</b>
>peripheral units send to COM1: send to COM2: man.reports to COM: balance:  stirrer control: remote box: keyboard:  barcode:	Settings of peripheral units. Selection of printer at COM1. as for COM1. Output of manually triggered reports. Selection of balance.  Stirrer control in titration sequences. Connection of a remote box. Type of the PC keyboard connected to the remote box. Target for datas entered by a barcode reader.	Epson, Seiko, Citizen, HP, <b>IBM</b>  1, 2, 1&2 <b>Sartorius</b> , Mettler, Mettler AT, AND, Precisa ON, <b>OFF</b> ON, <b>OFF</b> US, deutsch, francais, espanol, schweiz. <b>input</b> , method, id1, id2, id3, smpl size
>auxiliaries dialog:  date time run number auto start start delay result display: dev.label program	General settings. Selection of dialog language.  Current run number for result output. Automatic starts of titrations. Waiting time before start of titration. Result display at the end of determination. Device label. Program version.	<b>English</b> , deutsch, français, español, italiano, portugese, svenska YYYY-MM-DD HH:MM 0...9999 1...9999, <b>OFF</b> 0...999 999 s <b>bold</b> , standard up to 8 characters read only
>RS232 settings COM1 baud rate:  data bit: stop bit: parity: handshake:	RS232 settings for COM1. Baud rate.  Data bit. Stop bit. Parity. Handshake.	300,600,1200,2400, 4800, <b>9600</b> , 19200, 38400, 57600, 115200 7, <b>8</b> 1, 2 <b>none</b> , odd, even <b>HWs</b> , Swchar, Swline, none
>RS232 settings COM2	as for COM1.	
>common variables	Values of common variables C30...C39.	

## 4 Index

---

Backup .....	8, 18	Sample data .....	19
Balance .....	5	Sample size .....	5
C-Variables .....	16	Selection	
CAL .....	13	- Mode .....	3
Calculations .....	4, 15	- Report .....	5
Calibration .....	13	SET .....	12
Card .....	8, 18	Silo calculation .....	15
Configuration .....	20	Silo memory .....	19
Data input .....	2, 7	Stop criteria .....	6
DET .....	11	Store methods .....	7, 18
Dialog language .....	2	Summary .....	1
Formula .....	4, 15	Survey .....	10
Internal method memory .....	7, 18	Text input .....	7
Linkage .....	14	TIP .....	14
MEAS .....	13	Titration modes .....	10ff
MET .....	11	-Survey .....	10
Method memory .....	18	-Selection .....	3
- Printing .....	9	Titration procedure .....	14
Methods		Titration stop .....	6
- Backup .....	8	User name .....	19
- Development .....	3	Variables .....	16
- Recalling .....	8	Weight .....	5
- Storing .....	7		
Modes .....	10ff		
- Selection .....	3		
- Survey .....	10		
Operands .....	4, 16		
Parameters .....	11ff		
Printing .....	5		
Recall methods .....	8		
Report .....	5		
- Definitions .....	15		
Result			
- Calculation .....	4		
- Printing .....	5		
- View .....	5		