Functions of the keyboard

PC- / MF-2-keyboard	Keyboard TZ 2825	Operation with the TitroLine *alpha*
<F1>	<START>	Start of the displayed method.
<F2>	<STOP>	Cancellation of the method.
<F3>	<EDIT PARAM.>	Balance data editing.
<F4>	<FILL>	Filling of the cylinder; with <<CALC>> activation and deactivation of transfer parameters.
<F5>	<STORE PARAM.>	After pressing this key the final position of parameterization is reached and the following display appears <<check/store>>. This menu item can be used to decide whether to store or not.
<F6>	<MODE>	Display of the <MODE> survey menu to parameterize a method.
<F7>	<INIT>	Display of the <INIT> survey menu for initial parameterization.
<F8>	<CAL>	Display of the <CAL> menu for the calibration of the measurement channels.
<F9>	+ / -	Change in sign at <<titration end>> mV and input blank value and factors.
<ESC>	<ESC>	<ESC> returns you to the previous level.
ROLL DOWN	ROLL DOWN	Within a particular menu, the parameters are scrolled through backwards (scroll forward: <ENTER>). Within the menu items: scrolling through the parameters.
ROLL UP	ROLL UP	Within the menu items: scrolling through the parameters.
< → > < ← >	< → > < ← >	Scrolling within the survey menu to select menu items. Within the menu items: Moving the cursor to select the parameters. Selection of the standard parameters on the <<STD>> menu.

PC- / MF-2-keyboard	Keyboard TZ 2825	Operation with the TitroLine *alpha*
0...9, Decimal point	0...9, Decimal point	Input of method numbers, sample numbers and parameters.
<ENTER> or < ↵ >	<ENTER>	Confirmation of the input parameters. In the present operating instructions, both keys are referred to <ENTER>.
<DEL> or < ← >	<DEL>	Delete an input digit/character under which the cursor is positioned.
Letters	Letters and ALPHA key	Alphanumeric input is possible.
All other keys	———	No function.

Adjustment of the Display

In menu ”INIT” push buttons <roll up> / < roll down>!

Titration parameter

To change the pre-set titration parameter, enter the menu ”INIT”. Under <Sys> switch on the edit of standard parameter. After doing this it is possible to change all parameters.

Titration parameter consist of:

1. **End criteria** for the titration
   measuring value, ml-consumption, equivalence point, end point
2. **Speed of the titration**
   drift control, fixed delay
3. Control of the t**itration steps**
   dynamic, linear

Endpoint titration

Titration up to a defined pH or mV-value. The consumption at this point will be evaluated. Strong jumps will be controlled differently in comparison to weak ones.

Correct adaptation to the slope → precise result

	Curve type	Example	Risks if a wrong type is selected
1	steep	HCl versus NaOH	overtitration
2	medium	Acetic Acid versus NaOH	≥ 3: overtitration too slow
3	weak	Acetic Acid versus NH_4OH	too slow
4	buffered	strong carbonised water	too slow
5	special	Without automatic titration a linear titration	

Detection of the equivalence point of a titration

To stop a titration directly after an equivalence point, it is necessary to define the sensitivity of the detection.

High number = strong jump = insensitive

Attention:

1. High sensitivity = it is possible that titration will be stopped too early
2. It is recommendable to combine the end criteria with another criterion (i.e. measuring value or ml-consumption).

Step	Curve shape	Example
1	very weak jump	acetic acid next to hydrochloric acid
2	weak jump	chloride in trace range, Ca/Mg with ISE (ion sensitive electrode)
3	medium jump	phosphoric acid, both jumps
4	normal intense jump	HCl/NaOH
5	very intense jump	Redox-titration with very intense jump -CSB-

Control of the titration

The control of the titration consists of:

Speed of titration

Fixed — After each dosing step TitroLine *alpha* is waiting for a defined time in seconds.
Enter time in seconds

Drift controlled — TitroLine *alpha* is waiting until the measuring value is stable
Enter fast, medium, exact
Duration of the titration:
fast 2-3 min
medium: 3-5 min
exact: > 5 min
Unstable measuring values → long duration

Steps of the titration

Linear: constant dosing steps. Enter in ml
Dynamic: adaptation to the slope:
steep slope → small steps
flat slope → big steps
Attention: most curves will be titrated with step 1

Dynamic steps

Dynamic-step	Application	Example
1	Usual pH titration with medium and strong jumps many mV titrations	HCl with NaOH chloride with $AgNO_3$
2	Titrations with medium or several jumps	HCl an acetic acid with NaOH or chloride and bromide with $AgNO_3$, Cl in small quantities, iodometric titration
3	Flat jumps at pH titrations (at special applications)	
4	Explicit statement at some SGH applications	

Karl-Fischer Control

The Karl-Fischer determination must be adapted to:
- consumption
- speed of water giving off
- solvent

Reg. step	Application
1	Normal water content / unitary system
2	Low water content / unitary system
3	Normal water content but increased water release; unitary system and two-component system
4	Normal water content / two-component system
5	Low water content / two-component system

Control pH-stat-titrations

	pH Constancy	pH Constancy
Control stage	Δ pH < 0,1	Δ pH < 0,2
1	max. 0,05 mMol H^+-ions/min	max. 0,1 mMol H^+-ions/min
2	max. 0,2 mMol H^+-ions/min	max. 0,5 mMol H^+-ions/min
3	max. 0,5 mMol H^+-ions/min	max. 1,2 mMol H^+-ions/min
4	max. 1 mMol H^+-ions/min	max. 2,5 mMol H^+-ions/min
5	max. 2,5 mMol H^+-ions/min	max. 5,0 mMol H^+-ions/min

Stage 0 is used to define the smallest proton quantities in unbuffered systems.

In case of stage 0 a 10 ml dosing unit has to be used in order to be able to dose the required volumes.

Formulae

ml = ml; here calculation is continued with determined ml values
Epn = EP1 to EP2; the respectively found end point in terms of ml
Eqn = EQ1 to EQ2; the respectively calculated equivalence point in terms of ml
F = Factor 1 (multiplicative)
F2 = Factor 2 (multiplicative)
C = Factor 3 (multiplicative)
Q = Quotient; is automatically multiplied by the respective weighted-in quantity or preset weight in the calculation
B = Blank value (additive)

The formulae are as follows (example for an endpoint titration):

Formula 1: EPn • F • F2 / Q
Formula 2: (EPn - B) • F • F2 / Q
Formula 3: (EPn+1 - EPn) • F • F2 / Q
Formula 4: (B - EPn) • F • F2 / Q
Formula 5: (Q • F) / (EPn • F2)
Formula 6: (F • F2) / Epn
Formula 7: [(B • C) - (EPn • F)] • F2 / Q
Formula 8: EPn • F • F2

Note : Formula 3 can only be selected, if the number of EP/EQs is greater than 1. Formula 5 can only be selected if EQ = 0.

Weighed-in: **If a weighed-in or sample volume data is entered the result will always be divided with this value! Factor Q is an additional multiplication constant.**

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