

METROHM Ltd. CH-9100 Herisau (Switzerland)

Dosimat

665

Series 14 ...

8.665.1023

93.08 TI/gg

Modes

DOS	Dosing
DIS R	Repetitive dispensing
DIS C	Cumulative dispensing
PIP	Pipetting
DIL	Diluting
CNT D	Content Dispenser, preparation of solutions of preselected contents

Selection of modes with <mode>. Press key so many times until the right mode is displayed, then press <enter>.

Mode	Parameter	Explanation	Standard value	Input range
DOS	Δvolume: V-LIM	Security volume; stop if V-LIM is reached	OFF	.001...999.999 ml; OFF
	rate: ↑ ↓	Expelling rate Filling rate	OFF max.	.001...150 ml/min; OFF .001...150 ml/min; OFF
	blank factor smpl unit	Blank Factor Sample size Unit for result calculation	0 ml 1 1	0... ± 999.999 ml 0... ± 1E33 0... ± 1E33 Selectable units
DIS R	Δvolume: V-DIS	Dispensing volume	1 ml	.001...999.999 ml
	rate: ↑ ↓	Expelling rate Filling rate	OFF max.	.001...150 ml/min; OFF .001...150 ml/min; OFF
DIS C	Δvolume: V-DIS V-LIM	Dispensing volume Security volume; stop if V-LIM is reached	0.1 ml OFF	.001...999.999 ml .001...999.999 ml; OFF
	rate: ↑ ↓	Expelling rate Filling rate	OFF max.	.001...150 ml/min; OFF .001...150 ml/min; OFF
PIP	Δvolume: V-PIP	Pipetting volume	0.1 ml	.001...49.5 ml
	rate: ↑ ↓	Aspirating rate Expelling rate	OFF OFF	.001...150 ml/min; OFF .001...150 ml/min; OFF
DIL	Δvolume: V-PIP V-DIL	Pipetting volume Diluting volume	0.1 ml 1 ml	.001...49.5 ml .001...999.999 ml; OFF
	rate: ↑ ↓	Aspirating rate Expelling rate	OFF OFF	.001...150 ml/min; OFF .001...150 ml/min; OFF
CNT D	rate: ↑ ↓	Expelling rate Filling rate	OFF max.	.001...150 ml/min; OFF .001...150 ml/min; OFF

User memory

Storing a mode:
Recalling a stored mode:

<store><X><enter>, X = 0, 1...9
<recall><X><enter>, X = 0, 1...9

Instructions for use

665 Dosimat

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Explanation of symbols:

< >

means "key", e.g. <GO> means key "GO"



means "display"

22

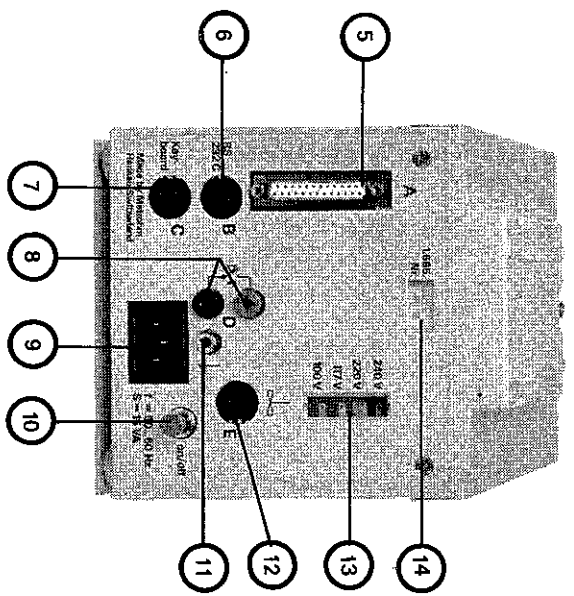
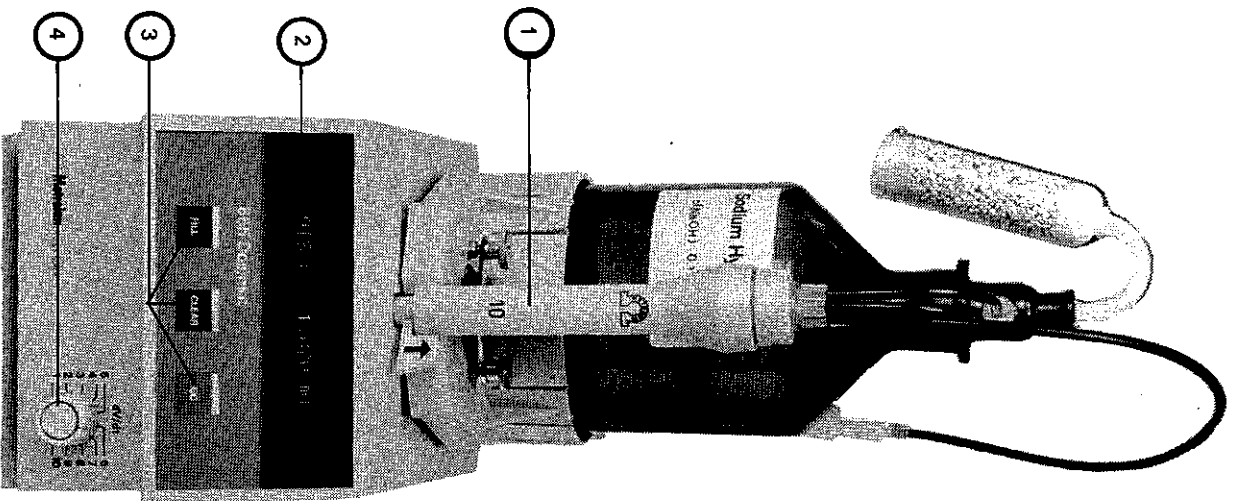
Explanation of symbols:

< >

means "key", e.g. <GO> means key "GO"



means "display"



1. Operating elements on the 665 Dosimat and their function

1 Exchange unit

Normally 6.3006.XXX or 6.3007.XXX models with automatic cock changeover.

Note: With some exchange units it is possible that the mechanism of the cock changeover is springy and you can hear a ticking noise. Press the changeover lever with your finger to the right side. Do not turn cock with Dosimat switched off!

2 Display

The 16 digit display shows all important information:

DOS 3.456 ml Mode (DOS = dosing)

and dosed volume.

Dosimat is in stand-by position.

DOS ↑ 3.456 ml

as above, but with Dosimat busy;

DOS ↓ 3.456 ml

as above;

but piston is moving downwards.

Displayed \uparrow or \downarrow resp., are specially important for very slow dosings where movements of the piston can not be clearly identified.

3 Operating keys at the Dosimat

FILL: Filling. This key is (with remote control off) always accessible and serves also as emergency stop.

CLEAR: Resetting of the volume display to 0.000 ml (with Dosimat in stand-by position).

GO: Start of mode.
With mode DOS, dosing goes on as long as \langle GO \rangle is pressed.

4 Analogue setting of dosing rate

Position 1 = lowest rate

Position 10 = highest rate

Expelling and filling rate can be set separately (see page 6).

Without keyboard, the filling rate is set to maximum (digitally controlled) and is therefore independant of the analogue setting.

5 Data inputs and outputs

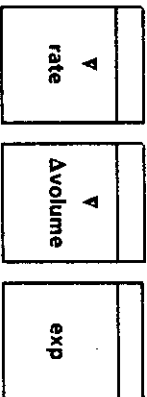
Via data transfer interface according to RS 232 C including optional analogue output.
For 25-pin D subminiature plug.

Important: Note plug position, pages 60 ff!

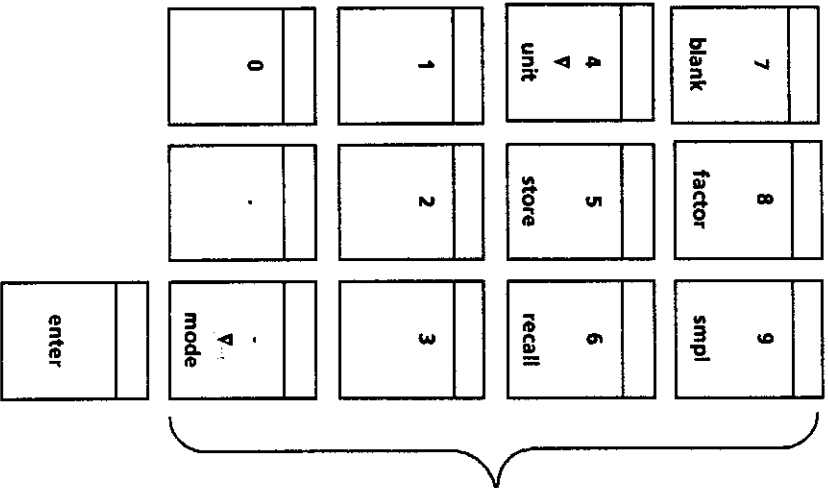
- 6** **Data inputs and outputs**
Via data transfer interface according to RS 232 C. For 8-pin plug.
(For details see page 60ff).
- 7** **Connection for keyboard**
(For details of operation with 6.2124.000 keyboard see page 4ff).
- 8** **Connection for external dosing contact**
E.g. 6.2107.000 push button cable or 6.2107.010 foot switch.
- 9** **Mains connection**
In power supply systems, in which strong HF interferences (transients) are superimposed on the mains voltage, the 665 Dosimat should be connected via an additional powerline filter, e.g. METROHM 615 model.
- 10** **Main switch**
Switching on and off 665 Dosimat.
The 665 Dosimat is equipped with a non-volatile memory, i.e. set parameters remain in the working memory if the Dosimat is switched off and on.
- 11** **Earthing socket**
The 665 Dosimat must be grounded effectively, if necessary through the separate earthing socket.
- 12** **Connection for stirrer**
Normally a Magnetic Stirrer (forms a complete titrating stand). Other stirrers may be connected as well, e.g. a METROHM Rod Stirrer.
Supply voltage output: +9 V DC ($I \leq 200$ mA)
- 13** **Indication of mains voltage**
- 14** **Identification plate**
Indication of model, series and serial number.

2. Operation with the keyboard

2.1 Keyboard, data input



Keys for parameters and exponent

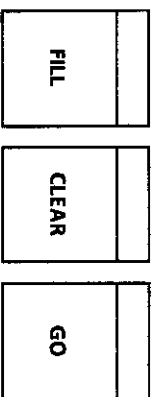


Numerical keys;

Calculation parameters
(blank, factor, smpl, unit);

Management of user memory
(store, recall);

Mode selection
(mode).



Main functional keys,
identical with the corresponding keys on the
665 Dosimat.

Rules for data input:

- On entering a negative number, key in minus sign first; <-> is not a change of sign key!
- Changeover between first functions (blank, factor etc.) and digits is done automatically. Terminate parameter entries with <enter>.
- The sign V marks keys with inquiry drums, i.e. pressing these keys several times, display shows new inquiries. A new value is stored or a new feature is selected with <enter>. The program then returns to the initial state, the inquiry drum is left. Entering an inquiry drum, that inquiry, where the drum has been left last time, is displayed first.
- The Dosimat works with a resolution of 10'000 pulses per burette cylinder volume. Resolution therefore depends on the exchange unit used:

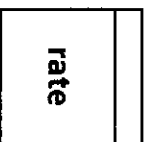
Exchange unit	Resolution	
	Avolume ml	rate ml/min
1 ml	.001	.001
5 ml	.001	.005
10 ml	.001	.010
20 ml	.002	.020
50 ml	.005	.050

If a volume value is entered which can not be dosed exactly with the exchange unit on the Dosimat, the value is rounded off to the next possible one and stored accordingly.

- Key <CLEAR> sets parameters 'rate ↑', 'rate ↓' and 'V-LIM' to "OFF".

2.1.1 Key <rate>

The inquiries of this key are identical for all modes.




rate: Expelling and filling rate.
This key is accessible live-keyboard (except in mode "DOS"), i.e. rate can be changed during a running function.



Expelling rate.
The range for digital setting depends on the volume of the exchange unit (EU):

1 ml EU:	.001 ...	3.00 ml/min
5 ml EU:	.005 ...	15.0 ml/min
10 ml EU:	.010 ...	30.0 ml/min
20 ml EU:	.020 ...	60.0 ml/min
50 ml EU:	.050 ...	150. ml/min


Key < CLEAR > sets , i.e. the rate can be controlled analogically by means of the potentiometer (4) at the 665

Dosimat.

If the preset rate is too high to be dosed with the exchange unit presently mounted, the rate is set automatically to its maximum.

Filling or aspirating rate.

The data input rules are the same as for ↓.

Additional, the filling or aspirating rate is set to maximum on changing the exchange unit (e.g. after  is displayed).



2.2 Modes

DOS: DOSing: Dosimat is dosing as long as < GO > is pressed. Result calculation can be activated.

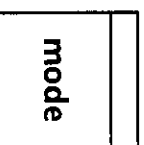
DIS R: DISpensing, Repetitive: Dosimat is dosing a stored dispensing volume if < GO > is pressed, burette cylinder is refilled and display reset to 0.000 ml.

DIS C: DISpensing, Cumulative: Dosimat is dosing a stored dispensing volume if < GO > is pressed, and the dispensed volume (V-DIS) remains displayed.

PIP: PIPetting: Aspirating and subsequent expelling of a stored pipetting volume.

DIL: DILuting: Aspirating a stored pipetting volume and subsequent expelling of the pipetting and diluting volume.

CNT D CoNTent DIspenser: Preparation of solutions with preselected content.



mode: The different modes are selected by the inquiry drum < mode > and loaded into the working memory with < enter >.

Example: Selection of mode "DIS C", cumulative dispensing.
 Press < mode >.
 Display shows that mode which has been selected last with key < mode >, e.g.
 [DOS].
 Press < mode > so many times until display shows
 [DIS C].
 Load mode "DIS C" into working memory with < enter >.
 Display shows [DIS C 0.000 ml].
 Now mode "DIS C" is ready to work, the piston is in zero position.

All modes which are loaded into the working memory by key < mode > are equipped with a set of standard parameters:

Mode	V-DIS/V-PIP ml	V-LIM/V-DIL ml	ml/min ↑	ml/min ↓	Calculation
DOS	-	OFF	OFF	max.	b = 0; f = 1; s = 1
DIS R	1	-	OFF	max.	-
DIS C	0.1	OFF	OFF	max.	-
PIP	0.1	-	OFF	OFF	-
DIL	0.1	1	OFF	OFF	-
CNT D	-	-	OFF	max.	-

2.2.1 Mode DOS, Dosing

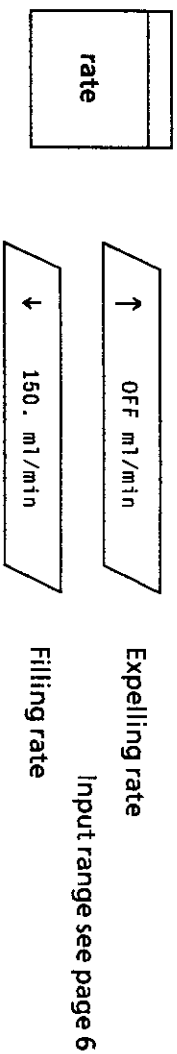
DOS 0.000 ml

Standard parameters:

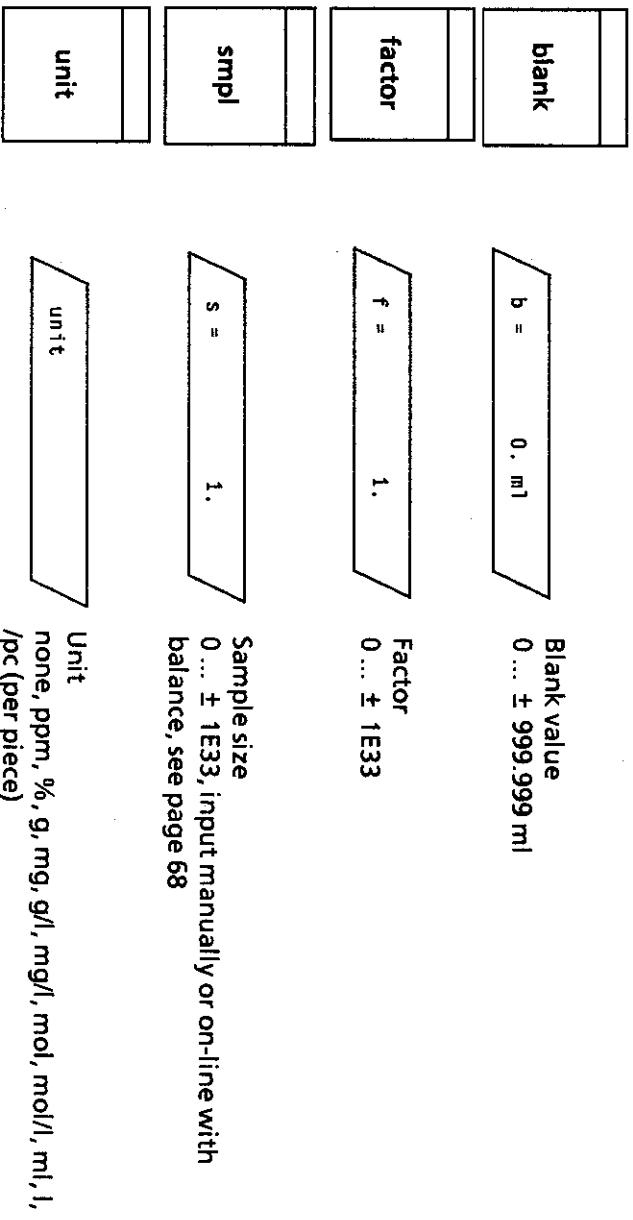
Avolume

V-LIM OFF

Security volume:
 Dosing is stopped if V-LIM is reached
 .001 ... 999.999 ml, OFF



Calculation values:



Special settings: see page 23

Result calculation:

If one of the calculation values (blank, factor, smp1) is not set to its standard value, a result is calculated on filling of the Dosimat according to formula:

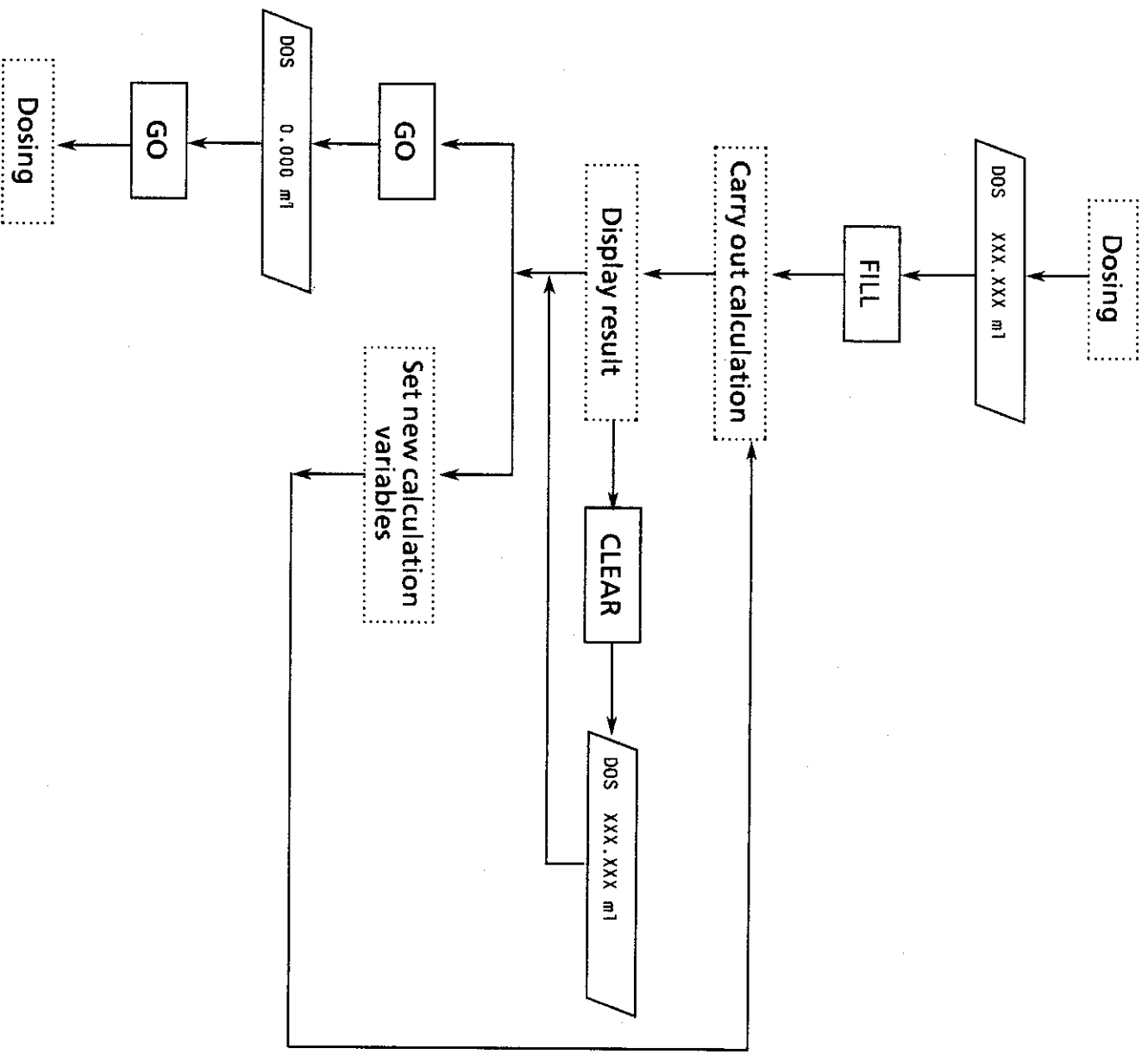
$$\text{Result} = \frac{(\text{dosed volume} - \text{blank}) * \text{factor}}{\text{smp1}}$$

The result is recalculated on every entry of a calculation value (blank, factor, smp1).

Pressing key <CLEAR>, display shows the dosed volume in ml.

To start a new dosing, press <GO> twice. Pressing <GO> once resets the volume in display to 0.000 ml.

Scheme, summary of possibilities in mode "DOS" with result calculation:



Printing the result on a printer:

If the Dosimat is set to send RS 232 on (special setting with key <4>, see page 23), filling the Dosimat or re-calculation triggers a print command.
A continuous number (#), the dosed volume and the calculated result are printed.
Set new calculation parameters for the next dosing only if display shows DOS 0.000 ml, i.e. press first <GO> once.
The continuous number is set to zero on switching on the Dosimat and incremented by 1 on every filling in mode DOS.

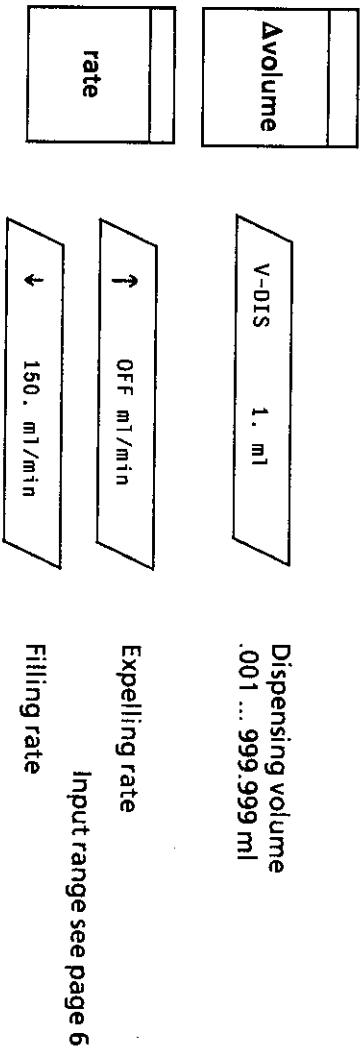
Example: Print-out of serial titrations

#01	U =	0.352 ml	R =	7.04 ppm
#02	U =	0.440 ml	R =	8.8 ppm
#03	U =	0.000 ml		
#04	U =	0.364 ml	R =	7.28 ppm
#05	U =	0.438 ml	R =	8.76 ppm
#06	U =	0.382 ml	R =	7.64 ppm
#07	U =	0.370 ml	R =	19.61 %
#08	U =	0.372 ml	R =	19.72 %
#09	U =	0.410 ml	R =	21.73 %
#10	U =	0.412 ml	R =	21.84 %
#11	U =	0.398 ml	R =	21.09 %
#12	U =	0.364 ml	R =	19.29 %
#13	U =	0.000 ml		
#14	U =	0.306 ml	R =	16.22 %
#15	U =	0.366 ml	R =	5.234 mg/l
#16	U =	0.362 ml	R =	5.177 mg/l
#17	U =	0.378 ml	R =	5.405 mg/l
#18	U =	0.378 ml	R =	5.405 mg/l
#19	U =	0.446 ml	R =	6.378 mg/l

2.2.2 Mode DIS R, repetitive dispensing

DIS R 0.000 ml

Standard parameters:



Special settings: see page 23

2.2.3 Mode DIS C, cumulative dispensing

DIS C 0.000 ml

Standard parameters:

Avolume	V-DIS 0.1 ml	Dispensing volume .001 ... 999.999 ml
	V-LIM OFF ml	Security volume: Dosing is stopped if V-LIM is reached. .001 ... 999.999 ml, OFF

rate	↑ OFF ml/min	Expelling rate Input range see page 6
	↓ 150. ml/min	Filling rate

Special settings : see page 23

Mode "DIS C" is suitable for continuous dosing with 2 Dosimats (see page 69).

2.2.4 Mode PIP, pipetting

PIP * 0.000 ml

Standard parameters:

Avolume	V-PIP 0.1 ml	Pipetting volume Input range depends on the volume of the exchange unit (EU): 1 ml EU: 0.001 ... 0.900 ml 5 ml EU: 0.001 ... 4.900 ml 10 ml EU: 0.001 ... 9.800 ml 20 ml EU: 0.002 ... 19.700 ml 50 ml EU: 0.005 ... 49.500 ml
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Note: The liquid of the exchange unit is mixed with the pipetted liquid if it is aspirated into the burette cylinder!

rate	↓ OFF ml/min	Aspirating rate Input range see page 6
	↑ OFF ml/min	Expelling rate

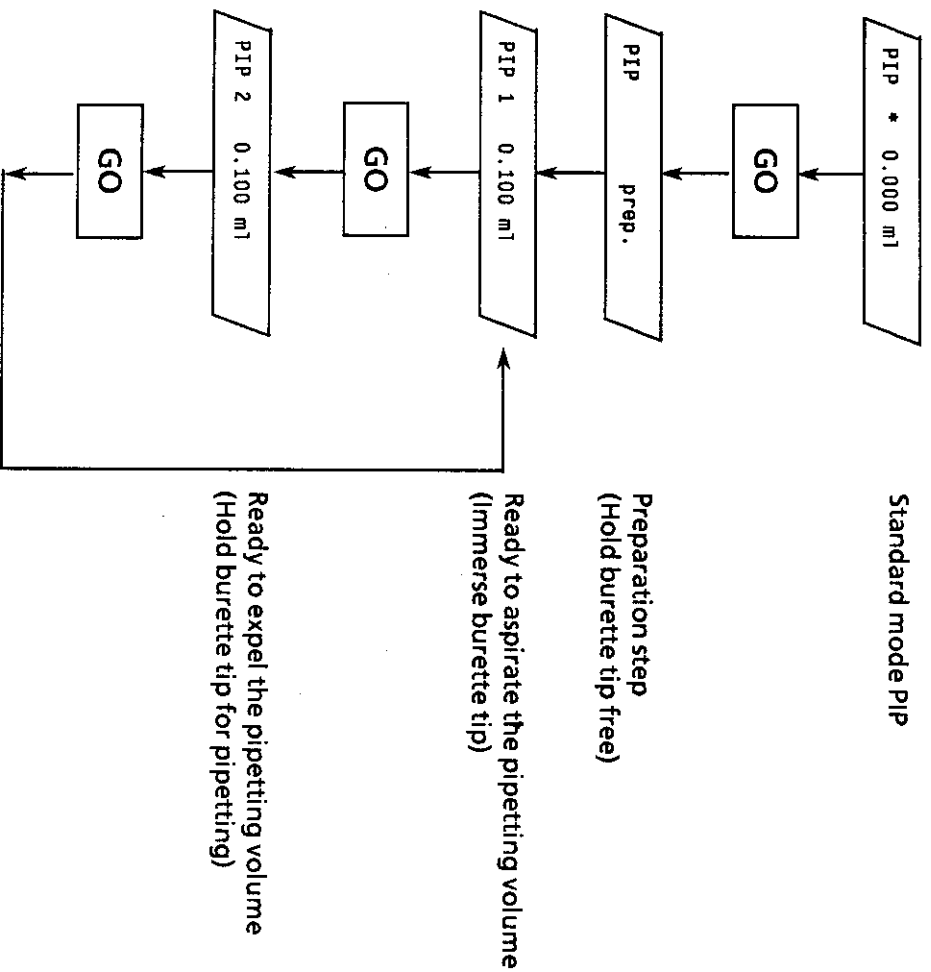
Sign * in the display means that mode "PIP" is not yet ready to use. With a first <GO>, a preparation step is carried out which is marked in display with $\frac{\text{PIP}}{\text{prep.}}$. This preparation step includes the formation of an air bubble which serves to separate the transfer solution of the exchange unit from the sample.

Then display shows $\frac{\text{PIP 1}}{0.100 \text{ mL}}$, i.e. the Dosimat is ready to aspirate the pipetting volume (0.1 ml). With <GO> the pipetting volume is aspirated and display shows $\frac{\text{PIP 2}}{0.100 \text{ mL}}$, which means that the Dosimat is ready to expel the pipetting volume. With the next <GO>, the volume is expelled and the Dosimat is then ready to aspirate the next pipetting volume without any preparation step.

If the pipetting volume is changed, a new preparation step is always carried out.

Note: A new air bubble is built with every preparation step, e.g. its volume increases. If you wish to keep the volume of the air bubble expel it in Mode DOS before changing V-PIP.

Summary of steps in mode "PIP":



Notes:

- For best pipetting results we recommend exchange units with volumes ≤ 20 ml and 6.5611.000 pipetting equipment, see page 72. The aspirating and expelling rates should not be higher than 20 ml/min.
- Hold tubing tip in an angle of app. 45° to the vessel wall during pipetting. Just the same as you do with glass pipettes!
- The vessel, containing the liquid you want to pipette should stand on the same level as the vessel into which you are going to expel the liquid in order to ascertain app. the same level of the pipetting tubing during work.

2.2.5 Mode DIL, diluting

DIL * 0.000 ml

Standard parameters:

V-PIP 0.1 ml	Pipetting volume
	Input range depends on the volume of the exchange unit (EU):
	1 ml EU: 0.001 ... 0.900 ml
	5 ml EU: 0.001 ... 4.900 ml
	10 ml EU: 0.001 ... 9.800 ml
	20 ml EU: 0.002 ... 19.700 ml
	50 ml EU: 0.005 ... 49.500 ml

Avolume

V-DIL 1. ml

Diluting volume
.001 ... 999.999 ml

Note: The diluting liquid is unintentionally mixed with the pipetted liquid if it is aspirated into the burette cylinder!

rate

↓ OFF ml/min

↑ OFF ml/min

Aspirating rate

Input range see page 6

Expelling rate

Sign * in the display tells you that mode "DIL" is not ready to use. With <GO> a preparation step is carried out during which V-PIP is expelled into the bottle of the exchange unit and an air bubble is built to separate the solution of the exchange unit from the sample. Then the Dosimat is ready to aspirate the pipetting volume (0.1 ml) which is displayed by DIL 1 0.100 ml and carried out after pressing <GO>.

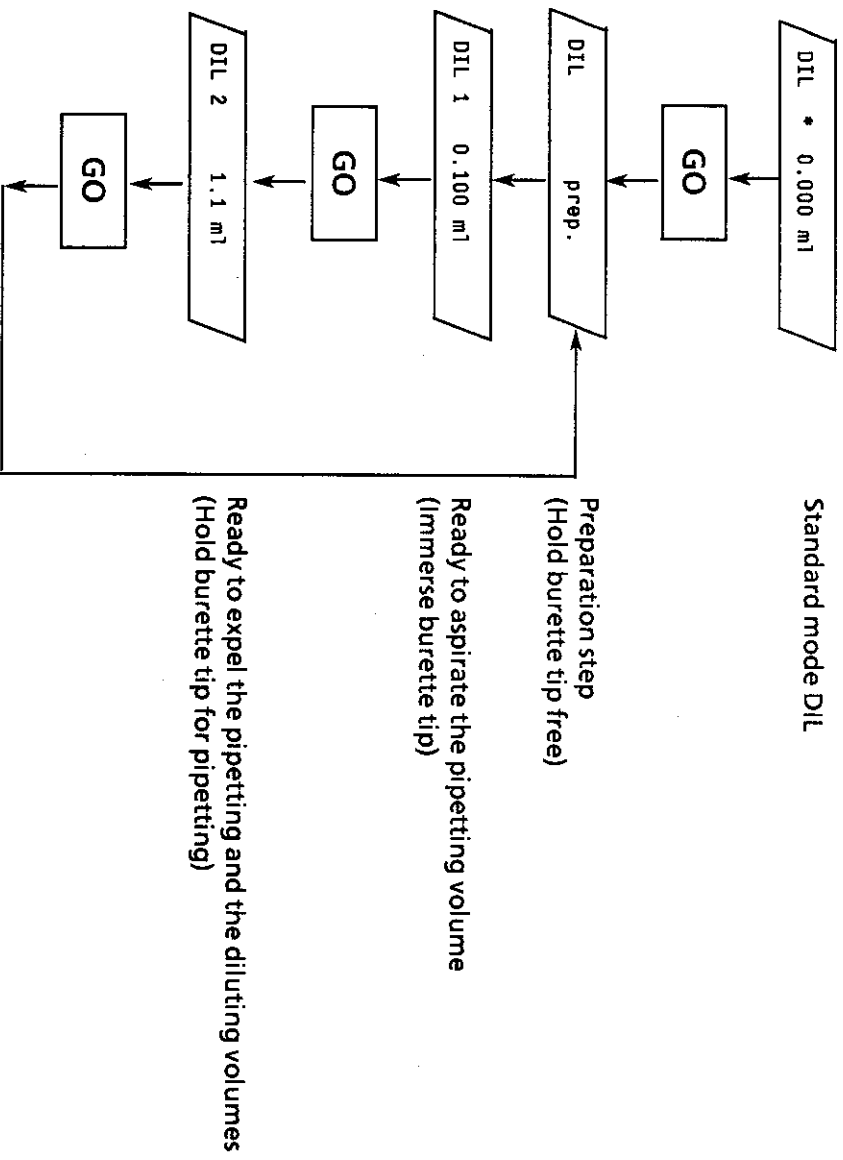
Then DIL 2 0.100 ml is displayed which means that the Dosimat is ready to expel the pipetting and the diluting volume (0.1 ml + 1 ml = 1.1 ml). This is executed after pressing <GO>. The preparation step is now carried out automatically and the Dosimat is ready to aspirate the next pipetting volume.

Note: If you wish to change V-PIP, it is best to change it during filling in the preparation step, when display shows DIL ↓ prep.

If V-PIP is changed at another time, a new preparation step is carried out, which changes the volume of the air bubble. The first dilution after such a change could be erroneous and should be discarded. Or expel air bubble in mode DOS and start Mode DIL from the beginning.

V-DIL can be changed at any time without a new preparation step.

Summary of steps in mode "DIL":

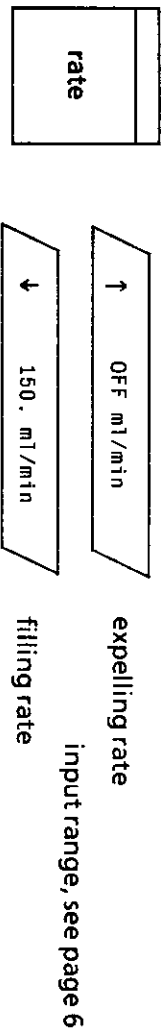


2.2.6 Mode CNT D, Content Dispenser

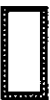


Mode CNT D is used to prepare solutions with a particular content. Doing this, the substance must not be weighed-out to a particular value in order to obtain the preselected content but the 665 Dosimat dispenses the amount of solvent calculated correspondingly.

Standard parameters:

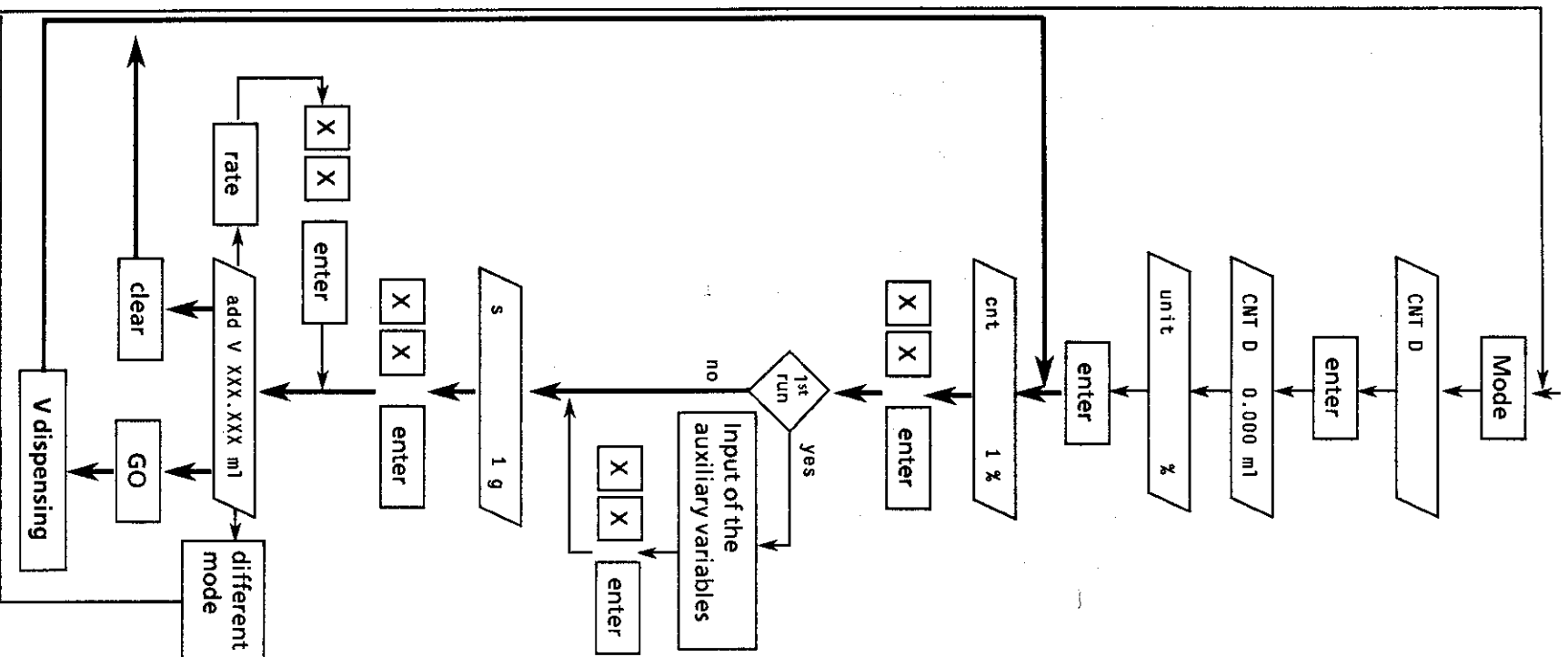


Content entries which can be implemented in the CNT D mode are summarized below and designated with



	Concentration	Fraction	Molality
Reference quantity (denominator)	Volume of the solution V/L	Sum of the components j	Mass of the solvent m_k / Kg
Specified quantity (numerator)	Amount-of-substance concentration c $c_j = n_j / V$ Units: mol/L, mmol/L Example: $c(\text{NaOH}) = 0.1 \text{ mol/L}$ Outdated: molarity, molar	Amount-of-substance fraction x $x_j = n_j / \sum n_j$ Unit: 1 Example: $x(\text{Au}) = 0.005$ Outdated: mole fraction, mole percent	Molality b $b_l = n_l / m_k$ Unit: mol/kg, mmol/kg Example: $b(\text{KOH, in EtOH}) = 1 \text{ mol/kg}$
Amount of substance n_j / mol	Mass concentration ρ $\rho_l = m_l / V$ Units: g/L, mg/L Example: $\rho(\text{Pb}^{2+}) = 1 \text{ g/L}$ Outdated: mg%	Mass fraction w $w_j = m_j / \sum m_j$ Units: %, ppm; 1 Example: $w(\text{H}_2\text{O}) = 5\%$ Outdated: weight percent	
Mass m_j / kg			

The operating sequence in the CNT D mode is as follows:



Selection of mode CNT D via key <mode> or <recall>

Transfer of mode CNT D

Following content units can be selected with key <unit> : %, ppm, g/l, mg/l, mol/l, mmol/l, mol/kg, mmol/kg.
 (On the basis of the inputted unit, branching to the appropriate calculation formula for /add V occurs.)

Input of the desired numerical value for the content

Inquiry regarding the auxiliary variables is dependent on the selected unit:

- M 1 g/mol] molar mass of the substance
 - [dens. 1 g/ml] density of the solvent
 - f = 1.00000] factor, e.g. for ionic standards, volume contraction, etc.

Input of the weighing, manually or via a balance (balance connection, see page 68)

Calculated volume is displayed and dispensed with <GO>. With <clear> the values for "cnt" and/or "s" can be changed (→ gives an idea of the approximate weighing!). The dosing rate <rate> and the mode <mode> can be altered.

Example: You need an EDTA solution with $c(\text{EDTA}) = 0.1 \text{ mol/l}$.

Select the CNT D mode and transfer it to the working memory with <enter>.

The display shows $\boxed{\text{CNT D } 0.000 \text{ ml}}$.

The following then appears automatically $\boxed{\text{unit } \%}$.

Select the unit "mol/l": Press key <unit> several times until $\boxed{\text{unit } \text{mol/l}}$ appears in the display and accept the unit with <enter>.

The display shows $\boxed{\text{cnt } 1 \text{ mol/l}}$.

Input the value 0.1: <. > <1 > <enter>.

The molar mass M is then requested: $\boxed{\text{M } 1 \text{ g/mol}}$.

Enter the molar mass of $\text{Na}_2\text{EDTA}\cdot 2\text{H}_2\text{O}$:
<3> <7> <2> <. > <2> <5> <enter>.

The display now shows $\boxed{\text{f} = 1.00000}$.

The factor for the volume contraction has been determined experimentally and is 0.981, see page 19.

Input of <. > <9> <8> <1 > <enter>.

The weighing is now requested. The display shows $\boxed{\text{s } 1 \text{ g}}$.

Since you still do not have an idea of the magnitude of the weighing, accept 1 g for the time being: press <enter>.

The display shows the calculated volume $\boxed{\text{add V } 26.354 \text{ ml}}$.

In this case, however, you need more of this solution and you thus want to weigh out more EDTA.

Press <clear>.

The display shows $\boxed{\text{cnt } 0.1 \text{ mol/l}}$

There remains the inquiry regarding the auxiliary variables, and immediately after <enter> the display $\boxed{\text{s } 1 \text{ g}}$ appears.

If you input 5 g, the volume to be dosed is calculated $\boxed{\text{add V } 131.766 \text{ ml}}$ etc.

If you have established the approximate weighing, weigh out approximately the same amount of EDTA and input the exact value of the weight.

The display shows the calculated volume once more, but now you can dispense this with <GO>.

The formulae for calculation of the volume to be dispensed " add V" are shown in the following table, with

cnt content in the selected unit
 M molar mass of substance to be weighed out
 f factor
 dens density of the solvent
 s weight of substance

	Unit	Computational formula add V =
Amount-of-substance concentration	mol/l mmol/l	$\frac{f \cdot s \cdot 10^3}{\text{cnt} \cdot M}$ $\frac{f \cdot s \cdot 10^6}{\text{cnt} \cdot M}$
Mass concentration	g/l mg/l	$\frac{f \cdot s \cdot 10^3}{\text{cnt}}$ $\frac{f \cdot s \cdot 10^6}{\text{cnt}}$
Mass fraction	% ppm	$\frac{f \cdot s \cdot (10^2 - \text{cnt})}{\text{cnt} \cdot \text{dens}}$ $\frac{f \cdot s \cdot (10^6 - \text{cnt})}{\text{cnt} \cdot \text{dens}}$
Molality	mol/kg mmol/kg	$\frac{s \cdot 10^3}{\text{cnt} \cdot M \cdot \text{dens}}$ $\frac{s \cdot 10^6}{\text{cnt} \cdot M \cdot \text{dens}}$

Applications of factor f

Factor f for ionic standards

With ionic standards, the mass fraction of a single ion A is usually specified. On the other hand, the solution is prepared from $A_n B_m$, e.g. a standard of 10 ppm Pb^{2+} prepared from $Pb(NO_3)_2$. The factor f is calculated from the formula:

$$f = \frac{n \cdot M(A)}{M(A_n B_m)} \quad \text{resp.} \quad f = \frac{m \cdot M(B)}{M(A_n B_m)}$$

where M(A): molar mass of ion A
 M(B): molar mass of ion B
 M($A_n B_m$): molar mass of substance $A_n B_m$

Example: You wish to prepare a 5 % aqueous Cl⁻ solution from NaCl.

Inputs for the auxiliary variables:

f 0.606666

dens. 0.98704 g/ml (water at 25 °C)

The following table shows several factors for the most common ionic standards.

Cation	Standard prepared from:	Factor f	Anion	Standard prepared from:	Factor f
Na ⁺	NaCl NaNO ₃	0.39339 0.27050	F ⁻	NaF	0.45245
K ⁺	KCl KNO ₃	0.52441 0.38670	Cl ⁻	NaCl KCl	0.60666 0.47550
Ca ²⁺	CaCl ₂	0.36111	Br ⁻	NaBr·2H ₂ O KBr	0.57514 0.67141
Ba ²⁺	BaCl ₂ ·2H ₂ O Ba(NO ₃) ₂	0.56222 0.52550	I ⁻	KI	0.76444
Cu ²⁺	Cu(ClO ₄) ₂ Cu(NO ₃) ₂ ·6H ₂ O	0.24214 0.21494	SO ₄ ²⁻	K ₂ SO ₄	0.55087
Pb ²⁺	Pb(ClO ₄) ₂ ·3H ₂ O Pb(NO ₃) ₂	0.45028 0.62557	NO ₃ ⁻	NaNO ₃ KNO ₃	0.72950 0.61319
			PO ₄ ³⁻	Na ₂ HPO ₄ ·12H ₂ O Na ₃ PO ₄ ·12H ₂ O	0.26519 0.24985

The factor f as correction for substances with admixtures

e.g. water of crystallization, impurities, moisture.

The factor f as correction for the volume contraction

In the cases of the amount-of-substance concentration c (units mol/l and mmol/l) and the mass concentration ρ (units g/l and mg/l), the concentration is referred to the volume of the solution.

$$c_i = n_i/V \text{ resp. } \rho_i = m_i/V$$

where n_i amount of substance i
 m_i mass of substance i
 V volume of the solution

Since the volume of the solvent V_0 is dispensed in the operational method of the CNT D mode, higher concentrations require a correction factor which takes the difference between V_0 and V (volume of the solution) into consideration:

$$f = \frac{V_0}{V}$$

This factor can be determined with the Dosimat in the DOS mode:

A solution of the desired concentration is prepared in the conventional manner in a volumetric flask by dispensing the solvent with the aid of the Dosimat up to the mark of the flask (V_0). If the volume V of the volumetric flask is inputted in the calculation parameter "s", the factor f is calculated directly by the Dosimat and appears on the display.

The factor f determined in this manner holds for the appropriate substance/solvent pair in the measured concentration range with the possibility of linear extrapolations up to concentrations of ca. 1 mol/l.

Several correction factors are shown in the following table:

Substance/solvent	Concentration c	0.05 mol/l	0.1 mol/l	1 mol/l
Potassium hydrogen phthalate/water		0.999	0.998	0.982
Na ₂ EDTA·2H ₂ O/water		0.991	0.981	-
NaCl/water		0.999	0.998	0.982
KNO ₃ /water		0.998	0.997	0.960
CuSO ₄ ·5H ₂ O/water		0.995	0.992	0.904

2.3. User memory

Up to 10 modes, complete with their user selected, specific parameters, can be stored in the user memory.

The relation of the different memories is shown in Fig. 2.1:

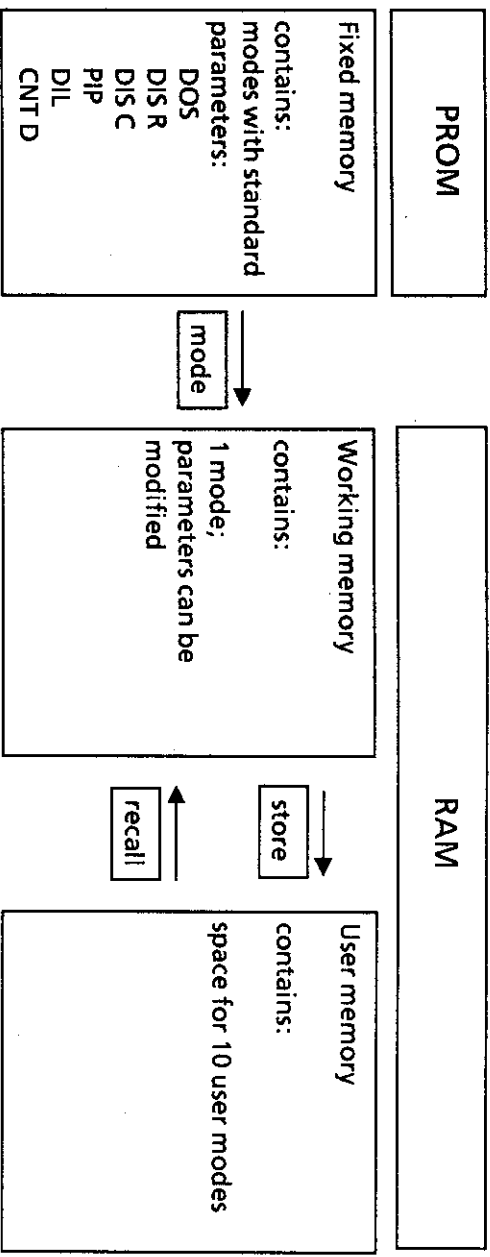
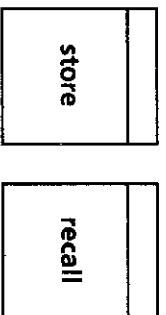


Fig. 2.1



The management of the user memory is carried out by means of the keys <store> and <recall>:

Storing a mode at address X
(X = 0,1...9).

Loading a mode from the user
memory into the working memory.

<store> <X> <enter> Loading a mode from the user
<recall> <X> <enter> memory into the working memory.
Ex factory, the standard modes are stored in the user memory.

Example:
 For different titrations you need mode DOS with different calculation parameters for result calculation.

1st Titration: Determination of Cl⁻ (table salt)

Calculation: Result in g/l = volume dosed * 5.85 / 25
 Calculation values: factor = 5.85
 simpl = 25 (sample size = 25 ml)
 unit = g/l
 Store this mode as mode 1 in the user memory:
 Press <store> <1> <enter>.

2nd Titration: Determination of N

Calculation: Result in % = volume dosed * 0.14 / sample size
 Calculation values: factor = 0.14
 unit = %
 Store this mode under address 2 in the user memory:
 Press <store> <2> <enter>.

Put the parameters of the stored modes on your user memory card in order to always have a list of the contents of your user memory:

Metrohm		665 Dosimat		User Memory		
Nr.	Mode	V-DIS/ V-PIP ml	V-LIM/ V-DIL ml	↓ ml/min	↓ ml/min	Calculation
0						
1	DOS		OTF	analog	max.	$V = 5.85$ $S = 25$ g/l
2	DOS		"	"	"	$V = 0.14$ %
3						
4						
5						
6						
7						
8						
9						

6.2242.000

Write on your user memory card either with lead-pencil or with waterproof felt-tip pen, and erase your entries with an eraser.

2.4. Special settings

Special settings can be executed by pressing key <0> during switching on the Dosimat. Then the blinking display

special key 0..5

appears.

Settings can now be done with keys 0...5.

Pressing key <CLEAR> once, leads back to the blinking display special key 0..5 and pressing key <CLEAR> again leads to the corresponding mode in the working memory.

Pressing key <GO>, the next inquiry is displayed.

Key	Display	Explanation
< 0 >	Prog 020 DD 010	Display of program number
< 1 >	baud rate 9.6 K	Setting of baud rate (data transfer rate). (110, 150, 300, 600, 1.2K, 2.4K, 4.8K, 9.6K, 19.2K; press <GO> until the right number is displayed and store with <enter>). Several quantities are set to a fixed value: data bit = 7, parity = even, stop bit = 1.
< 2 >	#V(B)/1000 mV 1	Number of burette volumes per 1000 mV at the analogue output. (1,2,3...10 V(B); press <GO> until the right number is displayed and store with <enter>)
< 3 >	auto fill on	Automatic refilling in mode "DOS" if more than one burette volume has been expelled. (on = yes; off = no; press <GO> until the right answer is displayed and store with <enter>)
< 4 >	send RS232 off	Data transfer to a printer in mode "DOS". (on = yes; off = no; press <GO> until the right answer is displayed and store with <enter>)
< 5 >	balance Mettler	Choice of balance to be connected. (Mettler, Sartori = Sartorius; press <GO> until the right balance is displayed and store with <enter>, for details see page 68)

3. Error messages, troubleshooting

3.1. Special messages and error messages

Error messages are displayed as soon as the error is recognised by the instrument.

General error message:

blinking value

The value keyed in is out of the input range (see page 79).

The following list of error messages is alphabetical:

cylinder empty1

The Dosimat is set to auto fill off and one burette volume has been expelled in mode DOS.
Exit: <FILL>

error 1

Check sum error in PROM.

error 2

RAM-check: error in on-chip-RAM.

error 3

RAM-check: error in off-chip-RAM.

error 4

RAM-check: error in on- and off-chip-RAM.

error 5

Check sum error in off-chip-RAM.

Exit: RAM has to be re-initialised. Switch Dosimat off. Press

<FILL> during switching it on again. Display shows

RAM init. Press <GO>. Display shows

RAM init. passed. <CLEAR> leads to basic programme with

display DOS 0.000 ml (see also page 40)

Note: Stored user modes will be cleared on re-initialising of the RAM and standard mode DOS is loaded into the working memory.

INF

In mode DOS, a result has been calculated with s = 0.
Exit: <CLEAR>

NAN

(Not a Number.) In mode DOS, a result has been calculated with s = 0 and f = 0.
Exit: <CLEAR>

} Call METROHM service

no exch. unit!

Exchange unit is not (properly) mounted.
Exit: Mount exchange unit properly.
Note: Filling or aspirating rate is set to maximum.

V > XXXX ml

In mode CNT D the volume to be dosed is > 999.999 ml.
Exit: <CLEAR> and enter new weight.

V < XXXX ml

In mode CNT D the volume to be dosed is smaller than the smallest possible increment which can be dosed with the exchange unit mounted.
Exit: <CLEAR> and enter new weight.

volume < resol. 1

The volume to be expelled is smaller than the resolution of the burette with the exchange unit mounted on the Dosimat.
Exit: Change volume to a value which can be expelled with the exchange unit mounted on the Dosimat
or
mount an exchange unit where the volume can be expelled.

V-LIM reached!

Security volume is reached.
Exit: <FILL>

V-PIP > V(B) 1

The stored pipetting volume is higher than the burette volume of the exchange unit mounted on the Dosimat (see input range for V-PIP, page 11).
Exit: Change volume to a value which can be expelled with the exchange unit mounted on the Dosimat
or
mount an exchange unit where the volume can be expelled.

3.2. Diagnosis

Der 665 Dosimat ist ein sehr präzises und zuverlässiges Dosiergerät. Dank seines robusten Aufbaus können seine Funktionen kaum durch äußere mechanische oder elektrische Einflüsse beeinträchtigt werden.

Obwohl nicht ganz auszuschliessen ist, dass im Gerät gelegentlich eine Störung auftreten könnte, erscheint die Möglichkeit doch grösser, dass Fehlfunktionen durch Fehlbedienung oder -handhabung oder durch unsachgemässe Verbindungen und den Betrieb mit Fremdgeräten verursacht werden.

In jedem Fall ist es daher ratsam, den Fehler mit der schnell und einfach durchzuführenden Diagnose einzukreisen. Dadurch braucht der Kunde den Metrohmservice erst anzurufen, wenn ein tatsächlicher Fehler im Gerät vorliegt. Zudem kann er dann anhand der Nummerierung im Diagnoseprogramm den Servicetechniker viel genauer informieren.

Bei Rückfragen immer Fabrikations- und Programmnummer (siehe Sondereinstellungen) angeben, und evtl. Fehleranzeige angeben.

(Achtung: Falls die Tastatur 6.2124.000 nicht zur Verfügung steht, können nur die Punkte 10 und 11 dieser Anleitung durchgeführt werden.)

Vorgehen

- Die Diagnoseschritte sind der Reihe nach auszuführen und mit den Reaktionen des Dosimaten (eingedrückt) zu vergleichen. Im "Ja"-Fall ist mit der nächsten Anweisung weiterzufahren.

- Zeigt das Gerät nicht die erwartete Reaktion ("Nein"-Fall), so ist der entsprechende Diagnoseschritt zu wiederholen, um Bedienungsfehler auszuschliessen. Mehrmalige Falschreaktionen deuten jedoch mit grosser Wahrscheinlichkeit auf eine Störung hin.

- Gebrochen unterstrichene Zeichen in der Anzeige bedeuten, dass diese blinkend erscheinen.

- Die mit einem Dreieck (▷) bezeichneten Diagnoseschritte erlauben bei Wiederholungen einen Wiederanstieg in den Testablauf unter folgender Voraussetzung:

Diagn. key 0...7

Wenn nicht: Taste "CLEAR" drücken (evtl. mehrmals)

Nötigenfalls das Netz AUS und nach einigen Sekunden wieder einschalten. Gleichzeitig Taste 9 drücken, bis die Anzeige 'diagn. key 0...7' erscheint.

- Nach dem Drücken der Taste "CLEAR" während der Anzeige 'diagn. key 0...7', springt das Gerät ins Gerätereprogramm zurück. Für den Wiederanstieg in die Diagnose siehe vorgängigen Punkt.

- Fehleranzeige: Ein Fehler wird in der Anzeige folgendermassen dargestellt:

Error — Exx:YYYYYYYYYYY
Fehler- Text

Beispiel: E50: f out limit

The 665 Dosimat is an extremely precise feeding instrument of high performance and reliability. Its solid construction hardly allows its functions to be impaired by any external mechanical or electrical influence.

It can never be fully excluded that a fault occurs inside the unit, however, the chance is greater that possible troubles are due to improper operation or handling, to incorrect interconnections or improper operation of peripheral units.

In all cases it is advisable to localize faults by means of these diagnosis instructions which are easy to follow and carry out. The customer thus only needs to call for factory service if a fault is found in the unit. Moreover the numbered diagnosis steps allow the customer to give more precise information about the nature of the fault.

For inquiries to Metrohm always advise the serial number and program number (see special keys) of the instrument. If displayed, also state the fault indication.

(Note: If the key board 6.2124.000 is not available, only items 10 and 11 of these instructions can be carried out.)

Procedure

- Carry out the test steps in order and check whether the Dosimat responds as described. If this is the case, carry out the next step.

- If the instrument does not respond as expected repeat the corresponding diagnosis step in order to exclude possible handling error. If the instrument's response differs from what it should be, the instrument is likely to be defective.

- Sections underlined in broken lines mean that they are displayed in flashing mode.

- The diagnosis steps denoted by a triangle (▷) can be used as re-entry points for repetitions provided the display shows:

Diagn. key 0...7

If the above message is not in the display, press "CLEAR" key (perhaps several times)

If necessary switch power off and, after a few seconds, on again. Simultaneously press key 9 until the display shows "diagn. key 0...7".

- If "CLEAR" is pressed while the display shows 'diagn. key 0...7', the instrument is switched back to the Dosimat programme. To re-assume diagnosis, proceed as described above.

- Fault indication: A fault is displayed in the following way:

Error — Exx:YYYYYYYYYYY
fault no. text

Example: E50: f out limit

- Durch einen Fehler in der Steuerelektronik besteht die Möglichkeit, dass der Bürettenantrieb am oberen oder unteren Ende des Zylinders verklemt. Bei einer Verklemmung am oberen Ende und bei einem Stillstand des Antriebs generell kann aber die Wechseleinheit nicht mehr entfernt werden. In diesem Fall ist wie folgt vorzugehen:

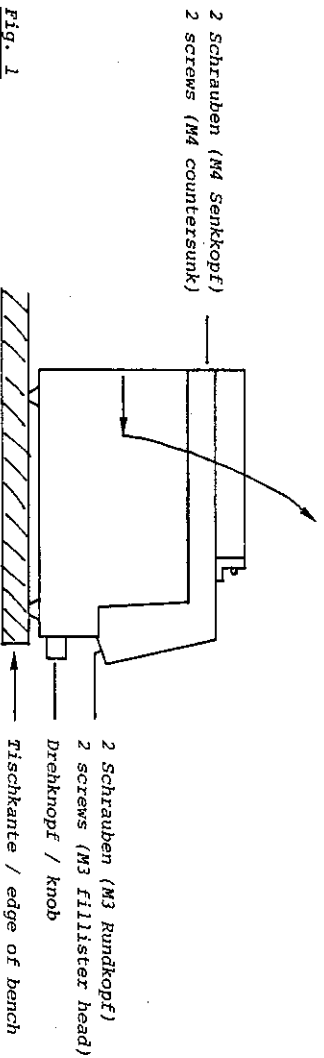


Fig. 1

- A fault in the control system can cause the burette drive to be jammed in the upper or lower end position of the cylinder. In case of jamming at the upper end and generally when the drive is blocked, the exchange unit cannot be removed. In this situation proceed as follows:

- Gerät vom Netz trennen!
- Drehknopf entfernen
- Gerät so über Tischkante stellen, dass die M3-Schrauben entfernt werden können (Fig. 1)
- M4-Schrauben entfernen

- Geräteoberteil samt Wechseleinheit durch die mit dem Pfeil angegebene Bewegung abheben

Achtung: Die elektronischen Schaltungen sind jetzt zugänglich!! Diese auf keinen Fall berühren.

- Spindel durch drehen am grossen Zahnrad vom mechanischen Anschlag entfernen (Bei Motorstillstand Spindel von Hand in 0-Position bringen).

Regenerieren der Anzeige

Eine einseitige Beanspruchung der Anzeige kann die Ursache für unterschiedliche Helligkeit der Leuchtpunkte sein. Die Diagnose ermöglicht deshalb ein Regenerieren der Anzeige. Dazu wird die "Diagnose Anzeige" (s. Punkt 4) benutzt und deren Gruppe 1 solange laufen gelassen, bis in der Anzeige 16x das Punktemuster steht: stop durch < 5 >. Dieses Muster wird solange eingeschaltet gehalten, bis sich ein befriedigendes Resultat ergibt.

- Disconnect power plug!
- Remove knob
- Slide the unit to the edge of bench, so that the M3 screws can be removed (Fig. 1)
- Undo M4 screws

- Lift off upper part of unit together with exchange unit by movements as shown in Fig. 1.

Caution: The electronic circuits are now uncovered!! Do not touch them.

- Displace the spindle from the mechanical stop by turning on the large gear wheel. (When the motor is inoperative, turn the spindle by hand into 0-position).

Regeneration of display

Under certain conditions the matrix points of the display may show differences in brightness. To regenerate the display, apply "Diagnosis of display" (Item 4) and leave running group 1 until the 16 dotted patterns are displayed: stop with < 5 >. Keep this pattern displayed until the result is satisfactory.

Benötigte Geräte:

- Wechseleinheiten möglichst unterschiedlicher Zylindervolumina (oder Dummy-Wechseleinheit 3.496.0070)
- Stoppuhr oder Uhr mit Sekundenzeiger
- Drucktastenkabel 6.2107.000 (EA 858) oder normales Laborkabel mit 4 mm Bananensteckern
- Tastatur 6.2124.000

Nur erforderlich, wenn auch externe Funktionen überprüft werden sollen:

- Digital- oder Analogvoltmeter (evtl. angeschl. geeichten Schreiber verwenden)
- Teststecker 3.496.8360

Equipment required:

- Exchange units if possible with different cylinder volumes (or dummy exchange unit 3.496.0070)
- Stop watch or watch with second hand
- Push-button cable 6.2107.000 (EA 858) or ordinary test lead with 4 mm banana plugs
- Key board 6.2124.000

Additional requirements to check external functions:

- Digital or analogue voltmeter (perhaps a calibrated recorder)
- Test plug 3.496.8360

1. Tastatur anschliessen

- 1.1 Externanschlüsse (und evtl. angeschlossenes Rührwerk) entfernen
Wechseleinheit entfernen

1. Connect key board

- 1.1 Disconnect external connections and stirrer
Remove exchange unit

- 1.2 Netz EIN und sofort die Taste 9 drücken (gedrückt halten, bis Einschalt-Testmuster verschwindet)

- 1.2 Power ON and simultaneously press key 9 (keep pressed until switch-on test pattern disappears)

diag. key 0...:7

diag. key 0...:7

2. Diagnose Zylindercode

2. Diagnosis of cylinder code

- 2.1 < 0 > drücken

- 2.1 Press < 0 >

cylinder code

cylinder code

- 2.2 < GO > drücken

- 2.2 Press < GO >

no exch. unit!

no exch. unit!

- 2.3 Wechseleinheit (oder Dummy) aufsetzen

- 2.3 Insert (dummy) exchange unit

code: xx ml

code: xx ml

xx: überprüfen, ob ml-Code der verwendeten Wechseleinheit angezeigt wird

xx: check whether the displayed ml-code corresponds to the exchange unit.

Der Vollständigkeit halber können verschiedene Wechseleinheiten aufgesetzt und der Code abgelesen werden.

Various exchange units can be inserted to verify their ml-code.

Fehleranzeige:

Ist eine Wechseleinheit falsch codiert oder liegt in den Codeschaltern ein Defekt vor, so erscheint die Anzeige: E 90: ..no code!

Fault indication:

If an exchange unit is coded incorrectly or if the code switches are inoperative, the display shows: E 90: ..no code!

2.4 < CLEAR > drücken

diagm. key 0...7



3. Diagnose Tastatur

3.1 < 1 > drücken

keys test



3. Diagnosis of key board

3.1 Press < 1 >

keys test

3.2 < GO > (oder < enter >) drücken

key: rate) *

3.2 Press < GO > (or < enter >)

key: rate) *

In der Anzeige steht nun die Aufforderung, eine Taste (im Beispiel 'rate') der Tastatur 6.2124.000 zu drücken. Wird diese gedrückt, so erscheint kurz der Name der betreffenden Taste (im Beispiel 'rate') auf der rechten Seite der Anzeige:

key: rate) rate

während 50 ms

Ist dieser Test positiv verlaufen, so erscheint anschließend der Name der nächsten zu drückenden Taste, usw.

Nach der letzten Taste (GO) erscheint:

keys o.k.

Fehleranzeige:

a) Erscheint der Name der gedrückten Taste nicht (während 50 ms) rechts in der Anzeige, so ist die Taste defekt (oder der entsprechende Signalpfad unterbrochen).

b) Erscheint die Anzeige E 10: und rechts der Name einer anderen Taste, so liegt ein Fehler in der Tastaturmatrix vor, oder es wurde die falsche Taste gedrückt.

Eine allfällige Fehleranzeige kann durch drücken der Taste 'CLEAR' wieder aufgehoben werden. Mit der Anzeige 'breaking off' werden Sie gefragt, ob Sie den Test abbrechen wollen, was Sie mit 'CLEAR' tun können. Man kann aber den Test auch mit < GO > wieder fortsetzen, bis die Anzeige "keys test end" erscheint.

2.4 Press < CLEAR >

diagm. key 0...7

3. Diagnosis of key board

3.1 Press < 1 >

keys test

3.2 Press < GO > (or < enter >)

key: rate) *

The display requests to press a key on the keyboard 6.2124.000 ("rate" in this example). After pressing this key the respective key briefly appears on the right-hand side of the display (example "Rate"):

key: rate) rate

for 50 ms

If the test is positive the next key to be pressed is displayed, etc.

After pressing the last key (GO):

keys o.k.

Fault indication:

a) If the name of a pressed key is not displayed on the right-hand side (for 50 ms), the key is faulty or the respective signal path interrupted.

b) Display E 10: and on the right-hand side the name of a wrong key indicates a fault in the keyboard matrix, or the wrong key was pressed.

A fault indication may be cancelled by pressing "CLEAR". "breaking off?" is then displayed, asking you whether you want to stop the test or not. To stop press < CLEAR > To continue press < GO > until the display shows "keys test end".

* Bei gewissen Geräten "=" statt ")", siehe * bei 4.2

* With certain units "=" instead of ")", see * at 4.2

3.3 < CLEAR > drücken

diag. key 0...7



4. Diagnose Anzeige

4.1 < 2 > drücken

display test

4.2 < GO > drücken

Es werden Zeichen zur optischen Kontrolle der Anzeige generiert, in 5 Gruppen:

Gruppe:

1) Alle Punkte der 7x5 Punktmatrix leuchten (entsprechend 7F in der Tabelle)

2) ganze Anzeige wird gelöscht (ca. 1 s) (entsprechend 00 und 20 in der Tabelle)

3) * Schachbrettmuster erscheint 16 mal in der Anzeige. Muster wechselt alle 300 ms mit seinem inversen Bild (entsprechend 01 und 02 in der Tabelle)

4) Alphabet in Grossbuchstaben wird angezeigt, wobei 16x der gleiche Buchstabe in der Anzeige steht; Wechsel nach gleicher Zeit wie oben

5) Zeichensatz wird endlos in Laufschrift angezeigt (ab 20...7F, 00...1F*)

Anhalten des Testablaufs: durch < 5 >
Neustart " " : erneut < 5 >
Angefangenen Zyklus (Gruppen 1, 2, 4, 5) abbrechen:
(1x) < 5 >, < CLEAR > (es erscheint die nächste Gruppe)
(Gruppe 3 kann nur gestartet und gestoppt werden)
Gruppe 5 wird, falls nicht durch < 5 > und < CLEAR > abgebrochen, endlos angezeigt.

* Es ist möglich, dass bei gewissen Serien Anzeigetreiber mit einem verminderten Zeichensatz eingesetzt werden, bei denen das Schachbrettmuster nicht erscheint, sondern an dessen Stelle nur abwechselungsweise " ! " in der Gruppe 5 wird ausserdem der Zeichensatz 00...1F nicht erscheinen.

3.3 Press < CLEAR >

diag. key 0...7



4. Diagnosis of display

4.1 Press < 2 >

display test

4.2 Press < GO >

The characters are generated in 5 groups for an optical check of the display:

Group:

1) All dots of the 7x5 matrix are displayed (item 7F in the table)

2) Display is blanked (about 1 s) (items 00 and 20 in the table)

3) * A chessboard pattern appears 16 times on the display. The pattern changes all 300 ms to its inverse character (according to 01 and 02 in the table)

4) The alphabet is displayed in capital letters, the same letter being indicated 16 times; a change takes place in the same rhythm as above

5) The whole character composition is shown in endless moving picture (from 20 to 7F, then 00 to 1F*)

To stop the running test: press < 5 >
Restart the test: press < 5 > again
Breaking off a cycle in process (groups 1, 2, 4, 5):
(1x) < 5 >, < CLEAR > (the next group is displayed)
(Group 3 can only be started and stopped)
Group 5 is displayed endless, unless breaking off by < 5 > and < CLEAR >.

* It is possible that in some series display drivers with a reduced character composition are fitted. In this case the symbols " and ! are displayed alternately instead of the chessboard patterns. Moreover, the composition 00 to 1F in group 5 will not appear.

00	Input Data	Character
01	Input Data	Character
02	Input Data	Character
03	Input Data	Character
04	Input Data	Character
05	Input Data	Character
06	Input Data	Character
07	Input Data	Character
08	Input Data	Character
09	Input Data	Character
10	Input Data	Character
11	Input Data	Character
12	Input Data	Character
13	Input Data	Character
14	Input Data	Character
15	Input Data	Character
16	Input Data	Character
17	Input Data	Character
18	Input Data	Character
19	Input Data	Character
20	Input Data	Character
21	Input Data	Character
22	Input Data	Character
23	Input Data	Character
24	Input Data	Character
25	Input Data	Character
26	Input Data	Character
27	Input Data	Character
28	Input Data	Character
29	Input Data	Character
30	Input Data	Character
31	Input Data	Character
32	Input Data	Character
33	Input Data	Character
34	Input Data	Character
35	Input Data	Character
36	Input Data	Character
37	Input Data	Character
38	Input Data	Character
39	Input Data	Character
40	Input Data	Character
41	Input Data	Character
42	Input Data	Character
43	Input Data	Character
44	Input Data	Character
45	Input Data	Character
46	Input Data	Character
47	Input Data	Character
48	Input Data	Character
49	Input Data	Character
50	Input Data	Character
51	Input Data	Character
52	Input Data	Character
53	Input Data	Character
54	Input Data	Character
55	Input Data	Character
56	Input Data	Character
57	Input Data	Character
58	Input Data	Character
59	Input Data	Character
60	Input Data	Character
61	Input Data	Character
62	Input Data	Character
63	Input Data	Character
64	Input Data	Character
65	Input Data	Character
66	Input Data	Character
67	Input Data	Character
68	Input Data	Character
69	Input Data	Character
70	Input Data	Character
71	Input Data	Character
72	Input Data	Character
73	Input Data	Character
74	Input Data	Character
75	Input Data	Character
76	Input Data	Character
77	Input Data	Character
78	Input Data	Character
79	Input Data	Character
80	Input Data	Character

Fig. 2 Charaktertabelle

Fig. 2 Table of characters

Nach Abbruch der Gruppe 5 erscheint:

DP, keys test

← während 1,5 s

Anschließend erscheint:

key: FILL)

← Name der Taste auf dem Dosimat

Prozedere wie unter 3.2, jedoch Tasten auf dem Dosimaten betätigen

Nach erfolgter Prüfung erscheint:

display o.k.

4.3 < CLEAR >

diagm. key 0...7

5. Diagnose Analosausgang

(nur sofern eingebaut, standardmässig bei Varianten 2.665.0020
2.665.0040,
falls nicht eingebaut, weiter bei 6.)

After breaking off group 5 there appears:

DP, keys test

← for 1.5 s

Afterwards:

key: FILL)

← name of key on Dosimat

Proceed as under 3.2, however actuate keys on Dosimat

When the test is terminated:

display o.k.

4.3 < CLEAR >

diagm. key 0...7

5. Diagnosis of analogues output

(If fitted only: fitted as a standard with versions 2.665.0020
2.665.0040,
if not fitted go on with item 6)

5.1 Spannungsmessgerät (Voltmeter, DVM, Schreiber) an Analogausgang anschliessen:
Stecker A/21 (0 to +1 V) } s. auch Gebrauchs-
Stecker A/11 (ground) } anweisung, S. 51

5.1 Connect voltmeter, DVM or recorder to the analogue output:
plug A pin 21 (0 to +1 V) } see also instr.
plug A pin 11 (ground) } for use, page 51

5.2 < 3 >

5.2 < 3 >

analog output

analog output

5.3 < GO >

5.3 < GO >

V-out = 0.000 V

V-out = 0.000 V

Spannungsmessgerät zeigt 0 V (Toleranz ± 6 mV). Toleranz des Messgerätes berücksichtigen!

Measuring instrument reads 0 V (tolerance ± 6 mV). Take also into account the tolerance of the measuring instrument!

5.4 < GO >

5.4 < GO >

V-out = 1.000 V

V-out = 1.000 V

Spannungsmessgerät zeigt $\Delta \pm 1.000$ V (Toleranz: ± 6 mV + Tol. von 5.3)

Measuring instrument reads $\Delta \pm 1.000$ V (tolerance: ± 6 mV + tol. of point 5.3)

5.5 < GO >

5.5 < GO >

V-ramp 1...2

V-ramp 1...2

In dieser Testposition produziert der Dosimat am Analogausgang eine Spannungsrampe (Dreiecksspannung) $U = 0V..1V..0V$. Es können 2 verschiedene Anstiegs- bzw. Abfallzeiten gewählt werden:

In this test sequence the Dosimat produces at the analogue output a voltage ramp (triangle voltage) $U = 0V..1V..0V$. Two different rising or falling times can be selected:

mit Taste 1 und GO:
Anstiegs- bzw. Abfallzeit = 48 ms
fortgesetzte Rampe für Überprüfungen mit dem Oszilloskop * + Service (Ausstritt mit < CLEAR >)
mit Taste 2 und GO:
Anstiegs- bzw. Abfallzeit = 40 s
Rampe (1x), für Überprüfungen mit einem Schreiber (Ausstritt erfolgt automatisch).

with key 1 and GO:
rising or falling time = 48 ms each
continued ramp for examination with the oscilloscope * + service (leave with < CLEAR >)
with key 2 and GO:
rising or falling time = 40 s each
ramp (1x), for examinations with a recorder (leaving happens automatically)

5.6 < 2 >

5.6 < 2 >

V-ramp = 40s 1/1

V-ramp = 40s 1/1

5.7 < GO >

5.7 < GO >

V-ramp = 40s 1/1

V-ramp = 40s 1/1

Es wird eine Rampe aufgezeichnet (Dauer: 80 s)

A ramp is produced (duration 80 s)

* Bei Verwendung eines Kabels am Analogausgang kann der KO Hr-Schwingungen registrieren, die jedoch keine Störung verursachen. Eine entsprechende Aenderung ist in Vorbereitung.

* When connecting a cable to the analogue output, RF oscillations may be registered by the CRO, however, they do not cause any trouble. A respective modification is in preparation.

5.8 Die Aufzeichnung überprüfen:

- Linearität der Aufzeichnung
- (evtl.) Länge des Papiervorschubes, entsprechend 40 s und gewählter Einstellungen

Nach Beendigung erscheint die Anzeige:

V-ramp 1...2

5.9 < CLEAR >

diag. key 0...7

6. Diagnose Digitaltimer

(Der Digitaltimer ist der Teil der elektronischen Schaltung im Dosimat, der für die digitale Spindelgeschwindigkeit verantwortlich ist.)

6.1 < 4 >

timer dig. test

6.2 < GO >

timer dig.

Es wird die Frequenz des Digitaltimers während 1,5 s gemessen. Ist Testverlauf positiv, so erscheint in der Anzeige o.k., andernfalls E 50.

6.3 < CLEAR >

diag. key 0...7

7. Diagnose Analogtimer

(Der Analogtimer ist der Teil der elektronischen Schaltung im Dosimat, der für die analoge Spindelgeschwindigkeit (einstellbar am Knopf 'dv/dt') verantwortlich ist.)

7.1 Knopf 'dv/dt' an den Rechtsanschlag drehen

7.2 < 5 >

timer ana. test

5.8 Examine the recorded ramp:

- linearity of the ramp
- perhaps length of advanced paper, corresponding to 40 s and settings selected

When terminated display:

V-ramp 1...2

5.9 < CLEAR >

diag. key 0...7

6. Diagnosis of digital timer

(The digital timer is that part of the electronic circuit in the dosimat which is responsible for the digital spindle speed rate.)

6.1 < 4 >

timer dig. test

6.2 < GO >

timer dig.

The frequency of the digital timer is measured during 1.5 s. If the test is positive, the display shows o.k. otherwise E 50.

6.3 < CLEAR >

diag. key 0...7

7. Diagnosis of analogue timer

(The analogue timer is that part of the electronic circuit in the dosimat which is responsible for the analogue spindle speed rate (adjustable with knob "dv/dt").)

7.1 Turn knob "dv/dt" fully to the right

7.2 < 5 >

timer ana. test

7.3 < GO >

timer ana.

Es wird die Frequenz des Analogtimers während 1,5 s gemessen. Ist der Testverlauf positiv, so erscheint in der Anzeige o.k., andernfalls E 51.

7.3 < GO >

timer ana.

The frequency of the analogue timer is measured during 1.5 s. If the test is positive, the display shows o.k. otherwise E 51.

7.4 < CLEAR >

diagn. key 0...7

7.4 < CLEAR >

diagn. key 0...7

8. Diagnose Extern Ein- und Ausgänge

Dieser Test ist nur sinnvoll, wenn der 665 Dosimat über den Stecker am Anschluss A mit andern geräten zusammengeschalteet benutzt wird. Zudem wird für diesen Test ein Teststecker 3.496.8360 benötigt, der normalerweise im Reparaturservice eingesetzt wird. Dieser Stecker kann aber mit der obigen Nummer auch von Kunden erworben werden.

Der Vollständigkeit halber sei hier das Vorgehen angegeben.

(Falls Diagnose der Extern-Ein- und Ausgänge nicht erwünscht, weiter bei Punkt 9.)

Verbindungen im Teststecker 3.496.8360:

OUT		IN
Ready	(#RDY#) ----->	536 (#536#)
Limit Vol.	(#LV0#) ----->	G02 (#G02#)
Job End	(#JEN#) ----->	FILL (#FILL#)
Reserve	(#RES#) ----->	Res. (#RES#)
Imp 10'000	(#IP1#) ----->	G01 (#G01#)
RTS	(#RTS#) ----->	CTS (#CTS#)
DTR	(#DTR#) ----->	DSR (#DSR#)
TXD	(#TXD#) ----->	RLSD (#RLSD#)
		(beide : #R*RL#)

For the sake of completeness the respective procedure is stated below.

(If diagnosis of external inputs/outputs not needed, go on with item 9.)

Connections in test plug 3.496.8360:

8.1 Stecker 3.496.8360 an Platz A einstecken (Gerät nicht ausschalten, auf Richtung des Steckers achten!); roten Bananenstecker in rote Buchse 'D'.

8.1 Insert plug 3.496.8360 to location A. (Do not switch off the unit, take care of the direction of the plug!); Red banana plug to red socket 'D'.

8.2 < 6 >

8.2 < 6 >

extern In/output

extern In/output

8.3 < GO >

8.3 < GO >

Die Externausgänge sind über den Stecker 3.496.8360 mit den entsprechenden Eingängen verbunden. Das Diagnoseprogramm setzt jeden Ausgang 5x auf Logisch 1 und 0 und fragt gleichzeitig über den entsprechenden Eingang den Zustand ab.

The external outputs are connected to the respective inputs via plug 3.496.8360. The diagnosis program sets each output 5 times to log 1 and log 0 and simultaneously scans the respective inputs.

Ist der Testverlauf positiv, so erscheint in der Anzeige o.k., andernfalls erscheint eine Fehlermeldung E.. zusammen mit der Angabe der betreffenden Leitung (gemäss obenstehender Tabelle).

If the test is positive, the display shows o.k. otherwise it reads an error message E.. together with the respective connection (see table above).

Fehlermeldungen:

E 55: Ein Ausgang ist auf 1 gesetzt; der betreffende Eingang weist aber den Pegel 0 auf
z. B. E 55: Rdy = 1/536 = 0

E 56: Ein Ausgang ist auf 1 gesetzt; ein nicht betroffener Eingang weist aber den Pegel 1 auf
z. B. E 56: Rdy = 1/GO 2 = 1

E 57: Alle Ausgänge sind auf 0 gesetzt, aber einer der Eingänge weist Pegel 1 auf
z. B. E 57: 00 /RxRL = 1
RxRL: beide Eingänge RxD und RLSD haben den Logikpegel 1

Im Fehlerfalle mit < GO > weiterfahren bis Anzeige "ext. in/out end"

8.4 < CLEAR >

diag. key 0...7

Stecker 3.496.8360 wieder entfernen

Fault indication:

E 55: An output is set to 1, the respective input, however, has log 0
e.g. E 55: Rdy = 1/536 = 0

E 56: An output is set to 1, a wrong input, however, has log 1
e.g. E 56: Rdy = 1/GO 2 = 1

E 57: All outputs are set to 0, but one of the inputs has log 1
e.g. E 57: 00 /RxRL = 1
RxRL: both inputs RxD and RLSD have log 1

In case of error continue with < GO > until display reads "ext. in/out end"

8.4 < CLEAR >

diag. key 0...7

Withdraw plug 3.496.8360 again



9. Diagnose Spindeltrieb und Hahnumschaltung



9. Diagnosis of spindle drive and cock changeover

9.1 Drucktastenkabel 6.2107.000 (EA 858) anschliessen (sofern vorhanden)

9.1 Connect push-button cable 6.2107.000 (EA 858) (if available)

9.2 Netz aus
5 s warten

9.2 Power off
wait for 5 s

9.3 Netz EIN und gleichzeitig < 0 > drücken (gedrückt halten, bis Punktemuster verschwindet)

9.3 Power ON and simultaneously press < 0 > (keep pressed until dotted pattern disappears)

special key 0..5

special key 0..5

9.4 < 3 >

9.4 < 3 >

auto fill

auto fill

ablesen, ob 'on' oder 'off' (Einstellung aufschreiben oder sich merken!)

check whether display reads "on" or "off" (make note!)

9.5 nur ausführen, falls auto fill 'on':
(sonst weiter mit 9.6!)

9.5 Carry out only if auto fill "on":
(otherwise go on with item 9.6!)

< GO >

auto fill OFF

auto fill OFF

9.6 < enter >, < CLEAR >

In der Anzeige erscheint das Punktemuster und anschließend der vor Beginn der Diagnose zuletzt benützte Mode

Dosimat füllt

9.6 < enter >, < CLEAR >

The dotted pattern is displayed, afterwards the display changes to the mode used last before starting the diagnosis

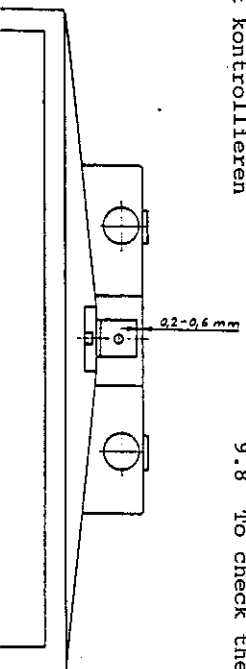
Dosimat fills

9.7 Wechseleinheit entfernen

9.7 Remove exchange unit

9.8 Spindelnullpunkt kontrollieren

9.8 To check the spindle zero



Die Spindel muss 0,2 - 0,6 mm unter der Kante der Aufnahmeplatte liegen

The spindle must be 0.2 to 0.6 mm below the edge of the mounting plate

9.9 Der Steg der Hahnkupplung muss genau parallel zu den Seitenkanten des Dosimaten liegen



9.9 The link piece of the cock coupling must be parallel to the side walls of the Dosimat

9.10 Wechseleinheit wieder aufsetzen

9.10 Insert exchange unit again

Dosimat füllt

Dosimat fills

Es erscheint wieder der vor der Durchführung der Diagnose zuletzt benützte Mode in der Anzeige.

Again the mode used last before starting the diagnosis appears in the display.

9.11 < mode > mehrmals drücken bis

9.11 Actuate < mode > several times until the display reads

DOS

DOS

erscheint.

9.12 < enter >

9.12 < enter >

DOS 0.000 ml

DOS 0.000 ml

9.13 < rate >

9.13 < rate >

OFF ml/min

OFF ml/min

9.14 < rate >

9.14 < rate >

xx ml/min

xxx ml/min

xx: (je nach WE-Code)

xx: (depending on exchange unit code)