EDOS 5222

Bedienungsanleitung
Instruction manual

eppendorf

Technische Daten / Technical Data (s. Abschnitt 13 /see chapter 13)

	Vol.		*Δ*			*CV*		
		Max No. Steps	***1/10 max. Vol.***	***1/2 max. Vol.***	***max. Vol.***	***1/10 max. Vol.***	***1/2 max. Vol.***	***max. Vol.***
Pip 10	0.5, 0.6, 0.7, ... 10.0 µl	1	± 2.5 %	–	± 1.0 %	≤ 1.8 %	–	≤ 0.4 %
Pip 100	10.0, 10.1, 10.2, ... 100.0 µl	1	± 1.0 %	–	± 0.6 %	≤ 0.4 %	–	≤ 0.2 %
Pip 1000	100, 101, 102, ...1000.0 µl	1	± 0.8 %	–	± 0.6 %	≤ 0.3 %	–	≤ 0.2 %
0.1 ml Combitip plus	1.0, 1.1, 1.2, ... 100.0 µl	100	± 1.0 %	± 1.0 %	± 1.0 %	≤ 2.0 %	≤ 1.0 %	≤ 0.5 %
0.2 ml Combitip plus	2.0, 2.2, 2.4, ... 200.0 µl	100	± 1.0 %	± 1.0 %	± 1.0 %	≤ 1.5 %	≤ 0.5 %	≤ 0.5 %
0.5 ml Combitip plus	5.0, 5.5, 6.0, ... 500.0 µl	100	± 0.9 %	± 0.9 %	± 0.9 %	≤ 0.7 %	≤ 0.5 %	≤ 0.3 %
1.0 ml Combitip plus	10, 11, 12, ... 1000 µl	100	± 0.9 %	± 0.7 %	± 0.5 %	≤ 0.5 %	≤ 0.4 %	≤ 0.2 %
2.5 ml Combitip plus	20, 21, 22, ... 2500 µl	125	± 0.8 %	± 0.5 %	± 0.5 %	≤ 0.5 %	≤ 0.25 %	≤ 0.2 %
5.0 ml Combitip plus	40, 41, 42, ... 5000 µl	125	± 0.8 %	± 0.6 %	± 0.5 %	≤ 0.3 %	≤ 0.2 %	≤ 0.15 %
10.0 ml Combitip plus	0.10, 0.11, 0.12, ... 10.00 ml	100	± 0.5 %	± 0.5 %	± 0.5 %	≤ 0.3 %	≤ 0.15 %	≤ 0.15 %
25.0 ml Combitip plus	0.20, 0.21, 0.22, ... 25.00 ml	125	± 0.3 %	± 0.3 %	± 0.3 %	≤ 0.3 %	≤ 0.15 %	≤ 0.15 %
50.0 ml Combitip plus	0.40, 0.41, 0.42, ... 50.00 ml	125	± 0.3 %	± 0.3 %	± 0.3 %	≤ 0.25 %	≤ 0.25 %	≤ 0.15 %
Multi 50	5.0, 5.1, 5.2, ... 50.0 µl	1 (10)	± 4.0 %	–	± 1.0 %	≤ 2.0 %	–	≤ 0.5 %
Multi 300	30.0, 30.2, 30.4, ... 300.0 µl	1 (10)	± 1.5 %	–	± 0.6 %	≤ 0.8 %	–	≤ 0.2 %
Multi 1200	50, 51, 52, ... 1200 µl	1 (24)	± 6.0 %	–	± 1.2 %	≤ 0.9 %	–	≤ 0.3 %

Δ = Unrichtigkeit / Inaccuracy
CV = Unpräzision / Imprecision

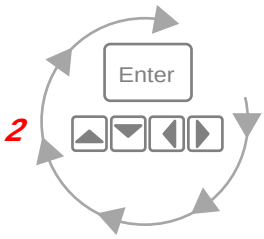
Disp >> Single dispense <<

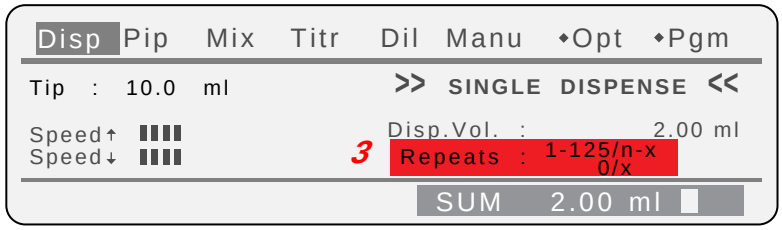
Disp >> Multi dispense <<

Disp

Single Dispense

1





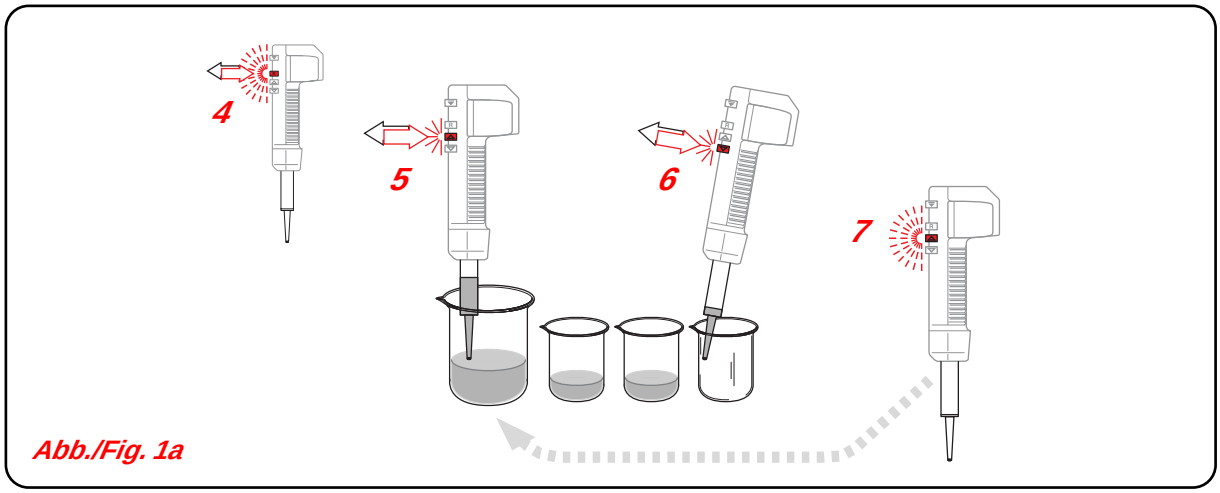
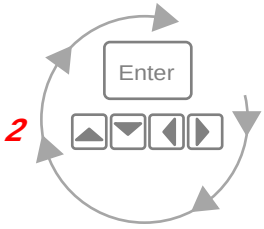


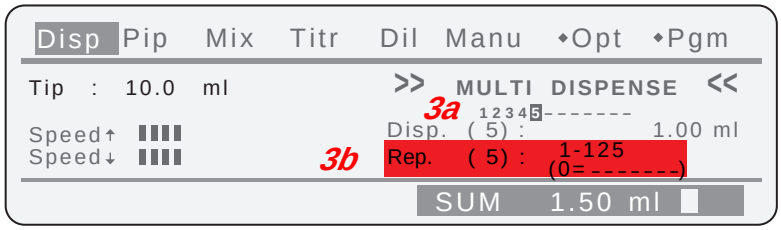
Abb./Fig. 1a

Disp

Multi Dispense

1





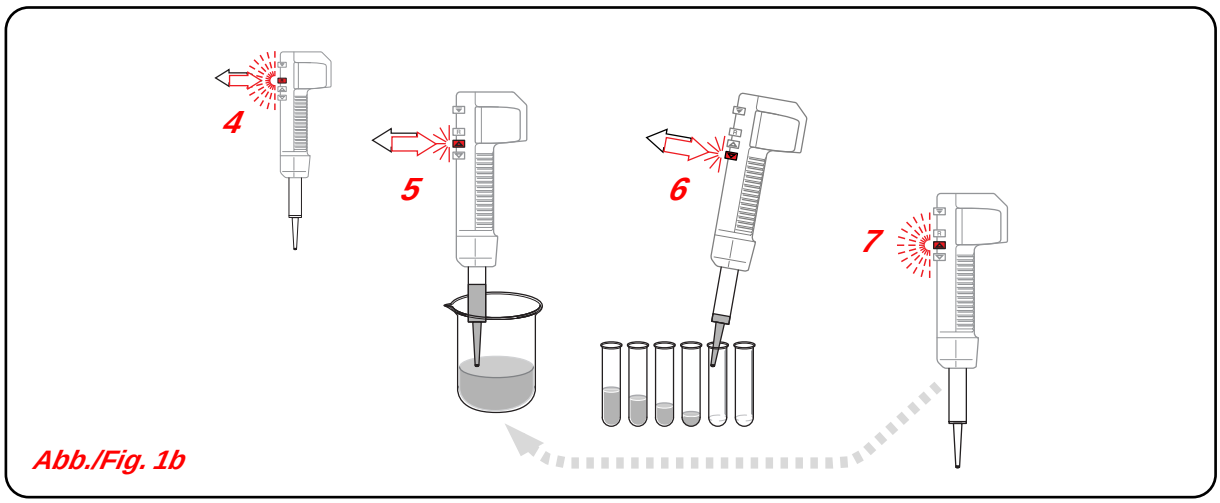
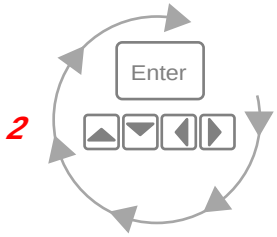


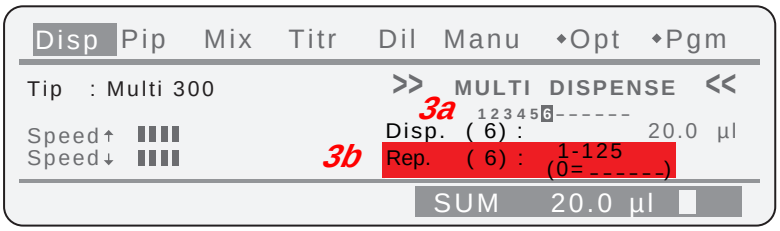
Abb./Fig. 1b

Disp >> Multi dispense <<

Disp **Multi Dispense**

1





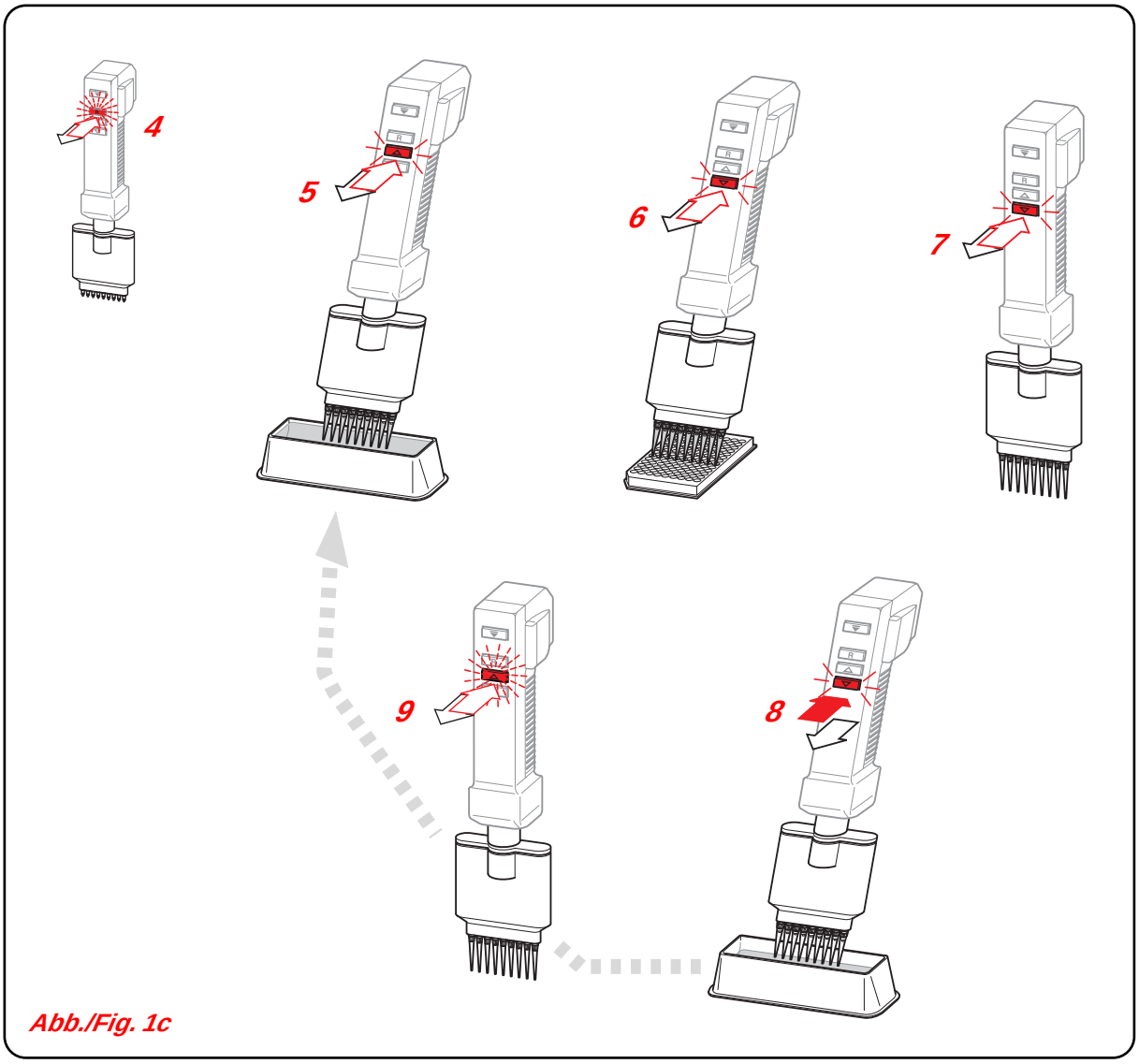


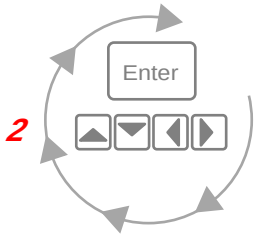
Abb./Fig. 1c

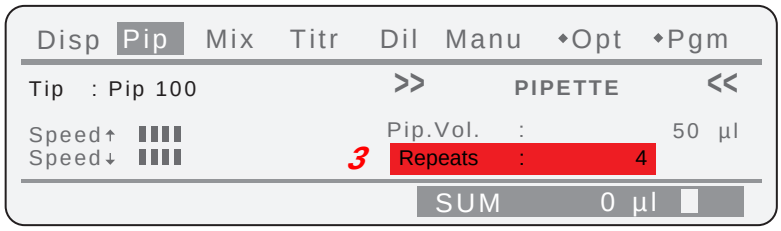
Abb./Fig. 1d

Pip >> Pipette <<

Pip **Pipette**

1





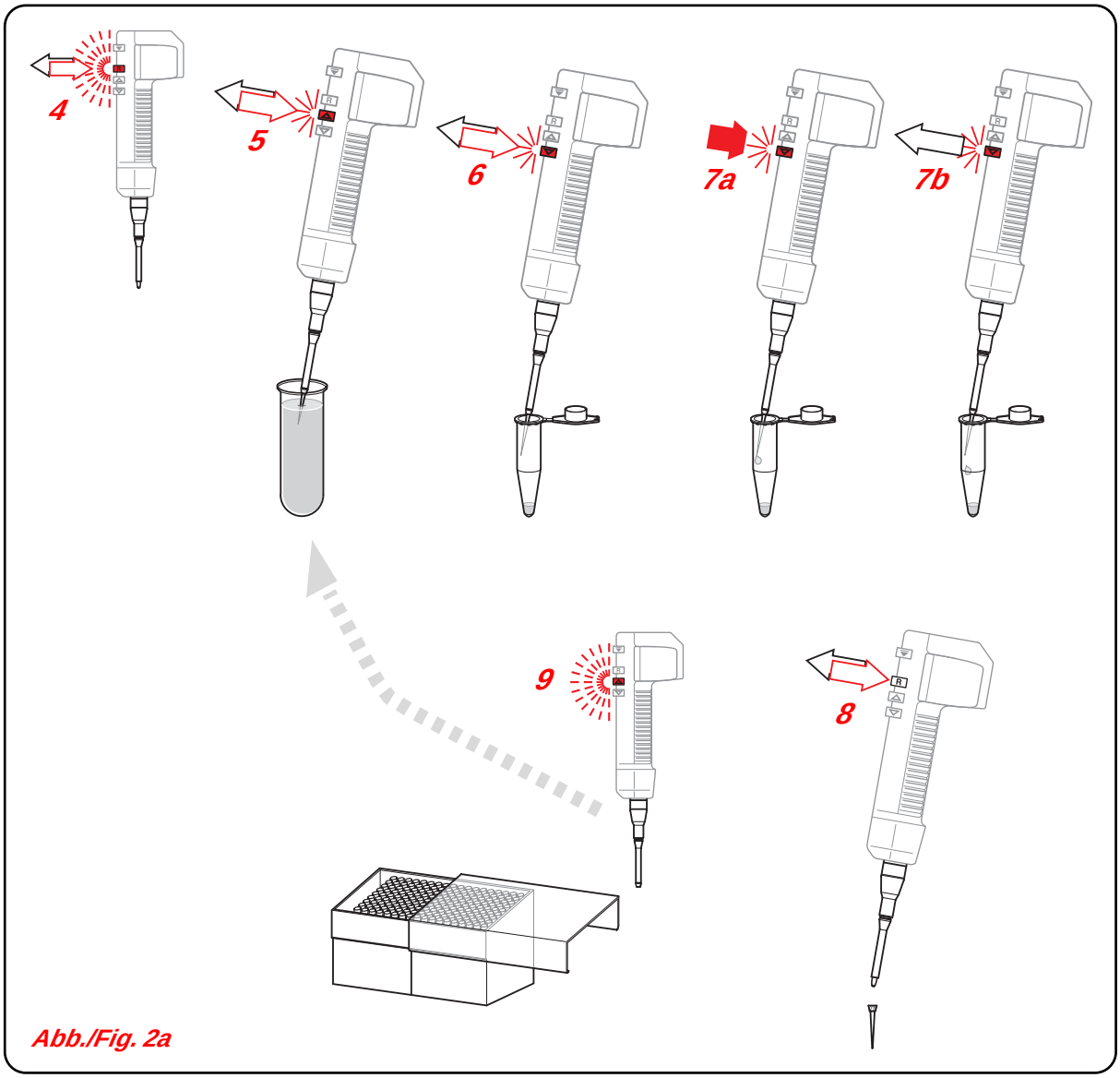


Abb./Fig. 2a

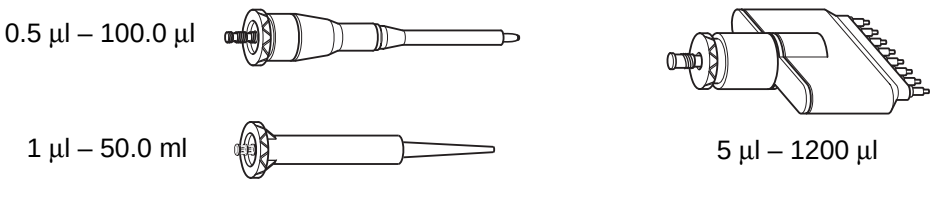
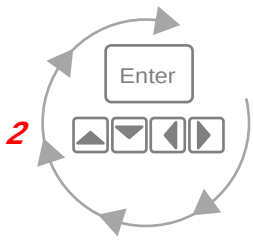


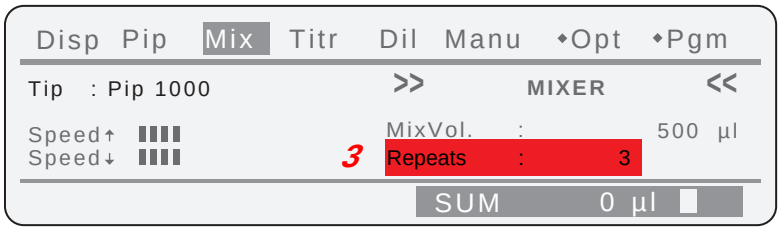
Abb./Fig. 2b

Mix >> Mixer <<

Mix **Mixer**

1





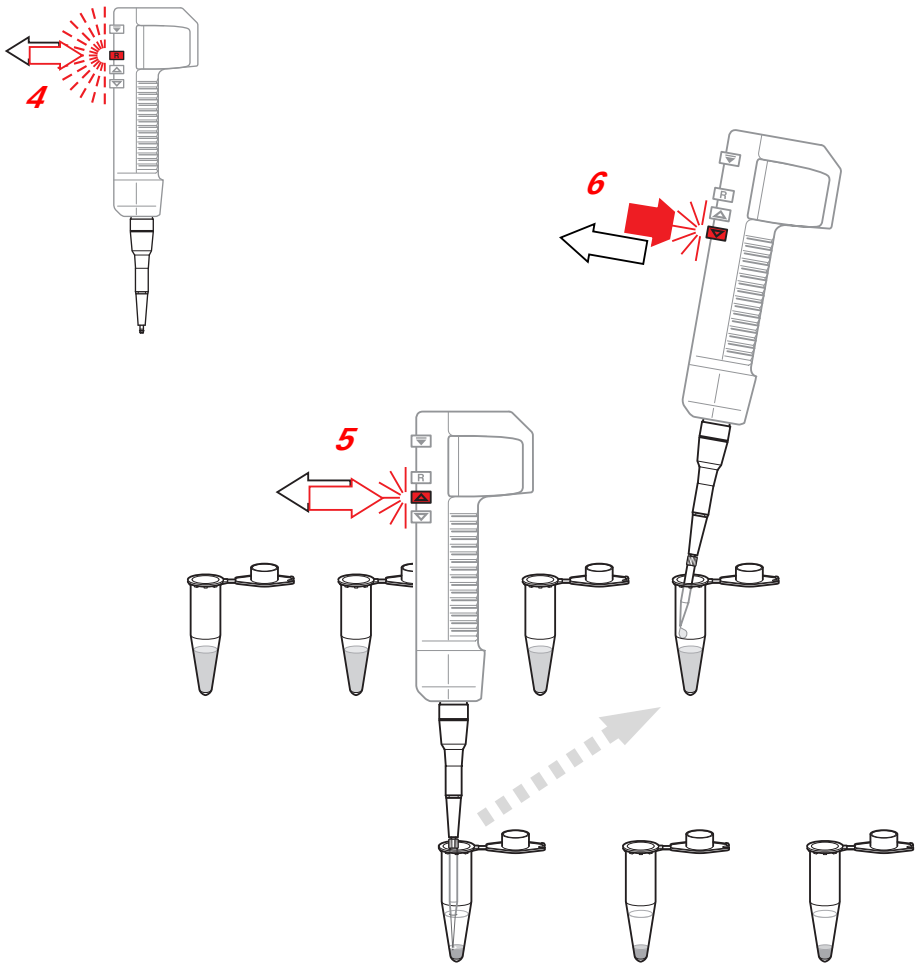


Abb./Fig. 3a

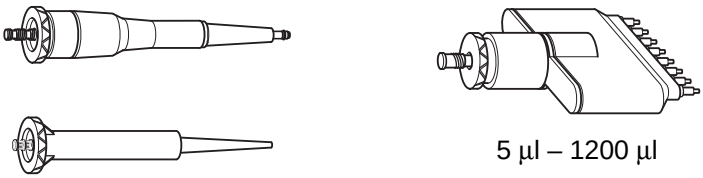
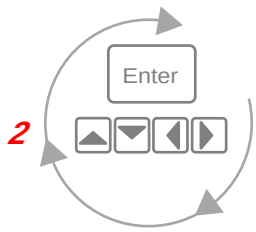


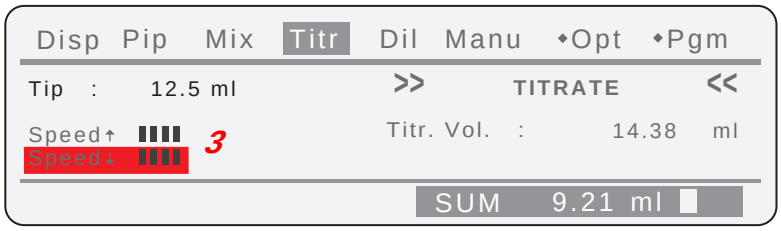
Abb./Fig. 3b

Titr >> Titrate <<

Titr **Titrate**

1





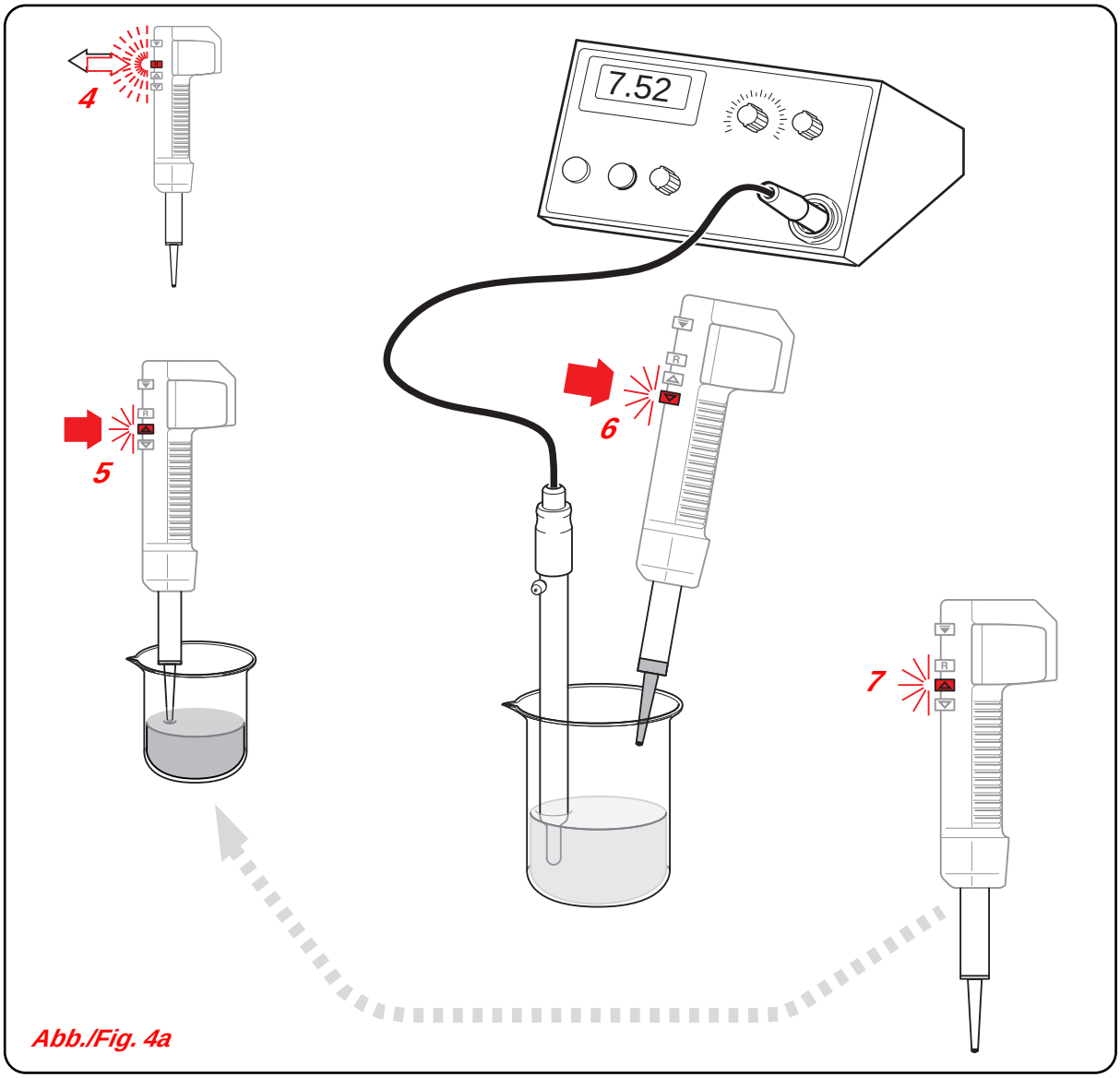


Abb./Fig. 4a

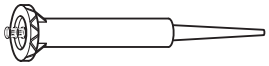
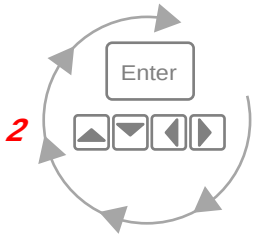


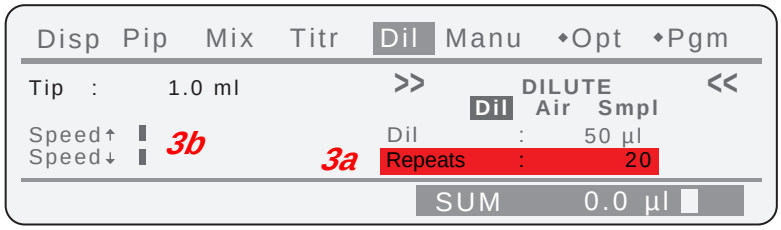
Abb./Fig. 4b

Dil >> Dilute <<

Dil **Dilute**

1





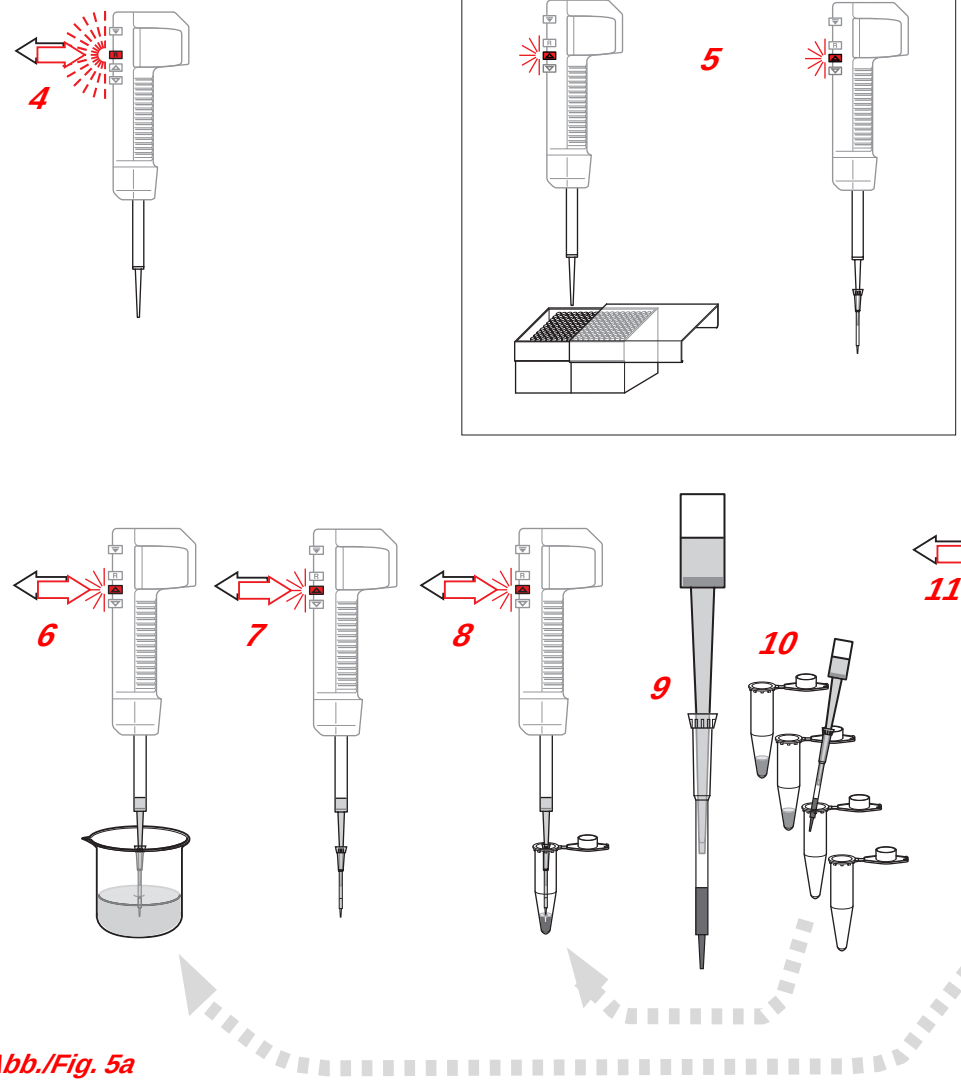


Abb./Fig. 5a

2 µl – 50.0 µl
(CBT 0.2 + 1.0 ml)

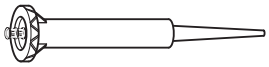
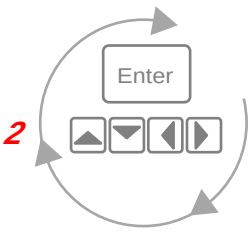


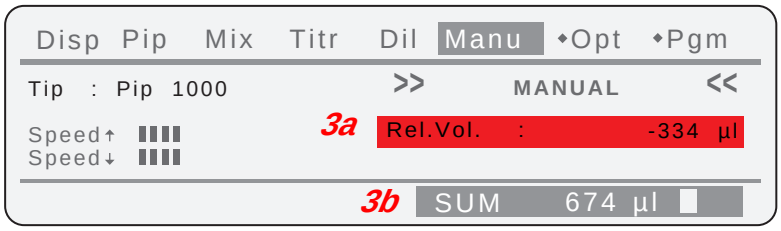
Abb./Fig. 5b

Manu >> Manual <<

Manu **Manual**

1





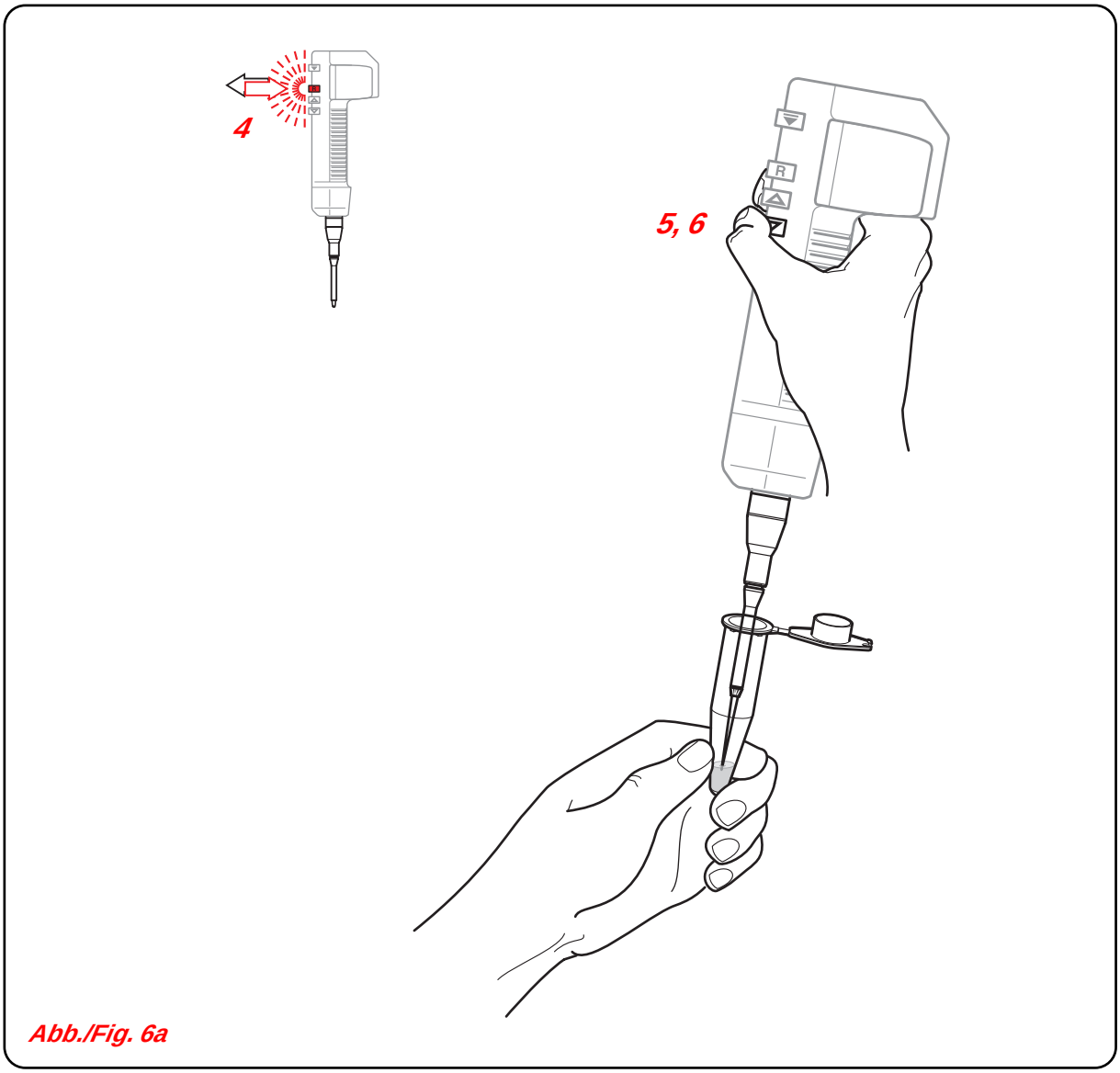


Abb./Fig. 6a

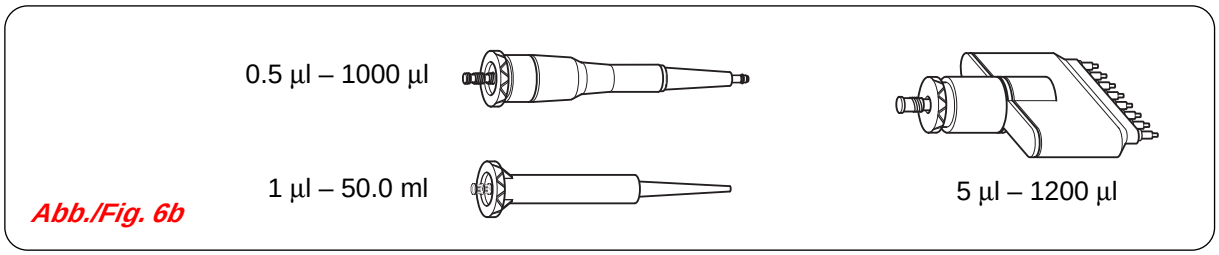


Abb./Fig. 6b

Contents

1 Introduction

Dear Customer,

The electronic dispensing system EDOS from Eppendorf is an all-purpose device for dispensing, pipetting, mixing, measuring and titrating liquids:

- ***Dispensing*** liquids from a filled dispensing tip in all large partial volumes desired: ***Disp*** function
- ***Pipetting*** as with manual pipettes, with ejectable tips: ***Pip*** function
- ***Mixing*** liquids by aspirating and dispensing in succession with one dispensing tip: ***Mix*** function
- ***Titrating*** by exactly measuring a liquid volume dispensed: ***Titr*** function
- ***Dilution series,*** which can be executed in a pre-programmed sequence: ***Dil*** function
- ***Aspirating*** and ***dispensing*** any amount of liquid without a pre-selected volume: ***Manu*** function

All functions are carried out by hand, as with manual pipettes, but without applying force. They are supported by intelligent device software.

The device functions can be activated and controlled externally using a foot switch or an SPS. With the aid of the "EDOS programming package", the device can be linked up to a PC, from which it can then be programmed and controlled.

Using the well-known plastic dispensing tips from Eppendorf (Combitips, pipette tips), a variety of samples and liquids can be dispensed in direct succession simply by exchanging the tip.

Eppendorf dispensing tips used in conjunction with EDOS conform to all safety regulations. When used correctly, they guarantee accurate and precise measurement of liquid.

For applications which demand high standards of purity, we recommend biopur pipette tips and Combitips plus, which are colorless, sterile, pyrogen-free, DNA-free, RNase-free and ATP-free.

Automatic recognition of the dispensing tips and dispensing adapters (Combitips plus, pipetting adapters) by the dispensing grip, together with the possibility of attaching and ejecting the tips from racks using only one hand, makes operation extremely simple and expand the range of possibilities of the device (automation).

Due to these features, EDOS 5222 is suitable for use in biochemical, molecular biological, clinical and industrial laboratories.

This Instruction Manual is valid from program version V 2.21 / 3.21 onwards.

2 Components of the device

2.1 EDOS (Fig. I)

1 Dispensing grip, into which the various different dispensing parts are inserted (Section 2.1 + 3.3).

2 Control unit for selecting functions and entering dispensing values.

3 Knurled screw for adjusting the brightness of the display.

Additional accessories not contained in the delivery package: tension release for the dispensing grip, foot switch, EDOS programming package (see Section 11).

2.1.1 Installing the device

Connect the control unit to the dispensing grip. Secure the plug with the screws supplied.

Before plugging in the hand dispenser (the cable is contained in the delivery package), compare your power supply with the electrical requirements listed on the identification plate of the control unit.

To switch on the device, press the ***On/Off*** key of the control unit for approximately one second.

After the device has been switched on, the three lower keys of the dispensing grip light up several times (red, green, yellow). The title of the EDOS program appears briefly in the display, first dark with a light background and then light with a dark background.

After the dispensing component has been inserted into the dispensing grip (see Section 3.1), the device is ready for operation. The dispensing component and the parameter values last programmed for this dispensing component appear in the display of the control unit.

2.1.2 Storage rest for the dispensing grip and the cable holder (Fig. II)

Holding the narrow sides, rotate the ground plate of the rest for the dispensing grip to the left or right and insert it into the grooves on the longer side of the housing. Push the rest sideways under the control unit.

Insert the cable holder into the hole of the rest which is directly next to the control unit.

Clamp the cable of the dispensing grip between the spiral on the upper end of the cable holder so that the dispensing grip can be placed on the rest. The dispensing grip can now be easily moved approximately 70 cm to the right and left of the control unit without being disturbed by the cable.

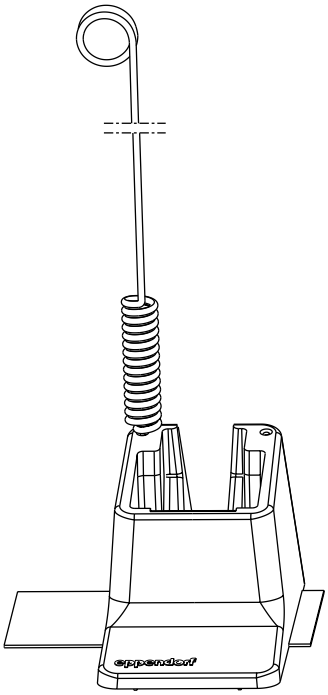


Fig. II

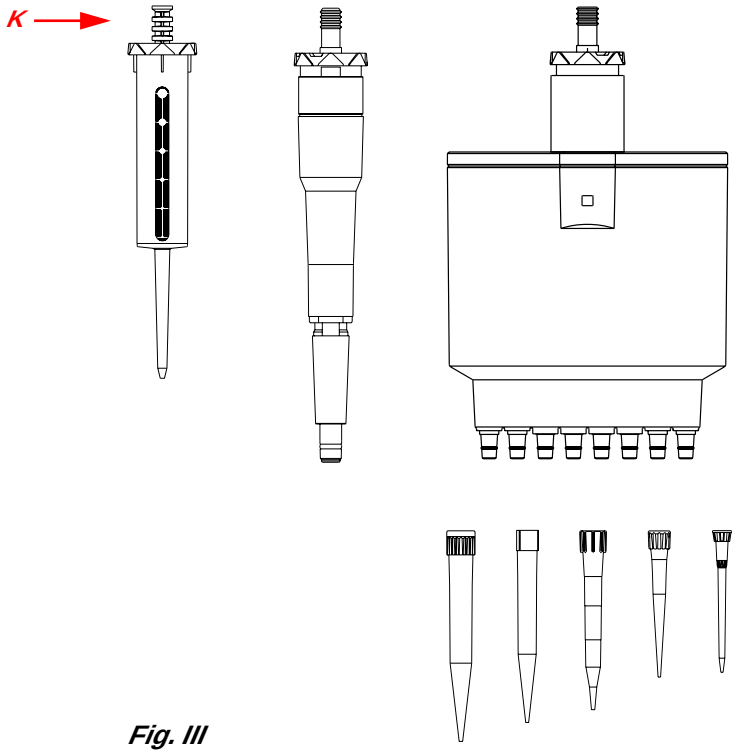


Fig. III

2.2 The dispensing components (Fig. III)

Liquid is aspirated into dispensing components which are inserted into the dispensing grip:

Eppendorf Combitips plus	All sizes (0.1 ml to 50.0 ml). The size of the Combitip indicates the maximum volume which can be aspirated. Only Combitips plus can be used with EDOS 5222. ***Liquid is aspirated directly*** into the Combitips.
Pip 1000, Pip 100, Pip 10	These are the pipetting adapters (lower housing of the pipette) onto which 1 000 µl, 100 µl and 10 µl or 20 µl pipette tips are attached. ***Liquid is only aspirated into the pipette tips***.
Multi 1200, Multi 300, Multi 50	Pipetting adapters for multi-channel dispensing (lower parts of eight-channel pipettes) with 100 µl, 300 µl and 1250 µl pipette tips. ***Liquid is only aspirated into the pipette tips***.

The dispensing volumes and the steps for the individual dispensing components can be found in the "Vol." column of the table on the first fold-back cover of the instruction manual.

Try out the dispensing grip (The device is plugged in and switched on, see Section 2.1.1).

3 The dispensing grip

Fig. IV

3.1 Inserting and removing the dispensing components (Fig. IV)

Press the ***R*** key of the dispensing grip.

With the coupler facing forwards, push the dispensing component up into dispensing grip until it locks into place. (Fig. III, K) (When used together with the Multipette® plus, Combitips plus are inserted in exactly the same way).

The dispensing grip recognizes the dispensing component from the code on the edge of the cylinder. The dispensing component inserted appears immediately with parameter Tip, together with the last parameter values entered for this dispensing component (see Section 4.3.8).

The gray adapter must be attached to the 50 ml Combitip plus (using a bayonet joint) before it is inserted into the dispensing grip. An adapter is included with the device accessories.

To remove a dispensing component, hold the dispensing grip upright and press ▽. The piston is then pushed completely into the cylinder and then moves back slightly, thus releasing the dispensing component. Hold the dispensing components when pressing to prevent them from falling onto the floor.

Caution: The piston in the dispensing component performs a movement similar to that of "Reset" (see Section 3.3). Any liquid in the dispensing component will be dispensed when the dispensing component is ejected.

Fig. V

3.2 Inserting and removing the multi-channel adapter (Fig. V)

When inserting the housing of the Multi 50 and Multi 300 adapters, pull it down to the stop and then insert into the dispensing grip with the coupler facing forwards.

The Multi 1200 adapter can be inserted into the dispensing grip as described in Section 3.1.

Remove the multi-channel adapters as described in Section 3.1.

3.3 The control keys (Fig. VI)

Fig. VI

R: Reset — Pressing the ***R*** (Reset) key:

The motor moves the piston mounting to its lowest position, known as the Reset Position = "Zero Position". If the Pip ***1000, 100 or 10*** or ***the Multi 1200, 300 or 50*** adapters are used, the piston then moves back slightly. If a dispensing component is attached, the piston is pushed completely into the dispensing component at least once.

Caution: Any liquid in the dispensing component will be dispensed when the ***R*** key is pressed!

Aspirating/Dispensing:
Depending on which key has been pressed, the motor moves the piston in the dispensing component up or down.

Key for ejecting/releasing dispensing components that have been inserted (see Section 3.1).

Caution: If the ejection of the dispensing part is defective, the dispensing part is forced loose by an upward and downward movement five times. If the dispensing part cannot be loosened, the error message "Eject manually" appears in the display and the red LED in the ***R*** (Reset) ***key*** flashes rapidly. A dispensing part which is jammed can be ejected by pressing the ***R key***.

3.4 Handling the dispensing grip (Fig.VII)

Pick up the dispensing grip as shown in the photograph, in your right or left hand. The keys are operated using the thumb.

Fig. VII

3.5 Tip ejection

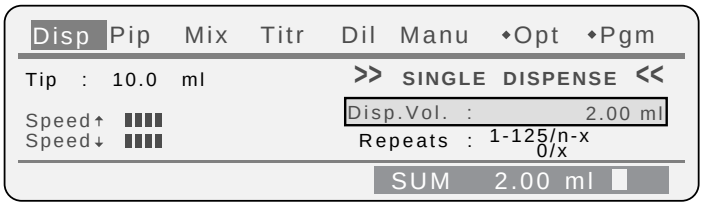
The tips attached to the Pip 10, 100, 1000 and Multi 50, 300, 1200 pipetting adapters are ejected by pressing the ***R*** key.

3.6 Radioactivity mode

If the EEPROM in the dispensing grip is switched off and if the data in the EEPROM in the control unit is retained, the dispensing grip may be used for radioactive tasks. The settings for such tasks must be carried out by a service technician.

4 The control unit

4.1 The display (Fig. VIII)



The display is divided into A ***top line***, the ***command line***, in which the functions executed by EDOS can be selected. The active function appears with a dark background.

A ***middle field***, the ***entry field***, in which all adjustable parameter values necessary for the function are displayed after a dispensing component has been inserted. If no dispensing component has been inserted, all displays on the right-hand side of the entry field are deleted.

A ***bottom line*** in which the position of the piston in the dispensing component is displayed on the right and a comment appears on the left.

4.2 The keypad

On Off

Press this key briefly to switch on/off the display of the control unit as well as the power supply of the dispensing grip. The function which was selected before the device was switched off appears in the display. This can be executed immediately after a dispensing component has been inserted.

Disp Pip Mix Titr Dil Manu

Press the appropriate ***function key*** to call up the dispensing (Disp), pipetting (Pip), mixing (Mix), titrating (Titr), diluting (Dil) and manual (Manu) functions.
The functions appear in the display together with the last parameter values entered and can be executed immediately.
In the top line of the display, the function selected is denoted by a dark background.

Opt

This function allows access to the operating parameters of the device (e.g. switching on/off the acoustic signal).

Prog

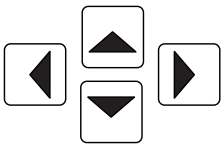
Programs can be stored and called up with this function.

Mode

Press ***Mode*** to activate the command line well as the higher program level when the programs are branched.

Enter

After a function has been called up, the parameters in the entry range of the display can be activated in succession by pressing ***Enter***.



Use the cursor keys to set parameter values and to enter numbers (see below).

4.3 Entering/displaying parameter values for a function

After a function key has been pressed, the function is activated with the last parameter values set and can be executed immediately with the dispensing component that has been inserted into the dispensing grip.

By repeatedly pressing ***Enter***, the parameter values can be activated clockwise one after the other, and can be changed using the ***cursor keys***. The ***activated parameter*** is highlighted.

First of all, the ***Volume*** parameter is activated. With the ***Disp*** function: Single Dispense/Multi Dispense.

The function can be executed immediately using the modified parameter value. The modification does not have to be confirmed by pressing ***Enter***.

4.3.1 Entering numbers

Use the ◀ ▶ keys to select the position of the decimal point. Set the number by using the ▲ ▼ keys.

If the ▲ ▼ keys are held down, the numbers scroll up and down until 0 is reached.

4.3.2 Tip

The dispensing component is recognized by the dispensing grip due to the code on the cylinder rim. Its designation appears automatically in the display after the dispensing component has been inserted.

4.3.3 Volume

Disp. Vol., ***Pip. Vol.***, ***Mix. Vol.***, ***Dil. Vol.***, ***Titr. Vol.***, ***Rel. Vol.***

The volume to be dispensed is entered

- in µl, as a number of maximum four digits or
- in ml, with up to two digits before and after the decimal point.

Each dispensing component has a minimum and a maximum adjustable volume (see first fold-back cover, Table, "Vol." column).

The name of the volume corresponds to the function selected, i.e. ***Disp***, ***Pip***, ***Mix***, ***Dil***, ***Titr***, ***Manu***.

4.3.4 Repeats

If a number between 1 and 125 is entered, Repeats denotes:

- The number of times a volume is repeatedly dispensed (repeat number) (max. 125)
- The number of mixing strokes with which liquid is aspirated/dispensed with a tip during mixing (with the Mix function, the maximum number is 20).

While this function is active, the number of ***remaining*** dispensings appears in the display, to the right of the repeat number.

If 0 is entered as the repeat number:

- The function can be repeated as often as desired. The number of dispensings ***that have been executed*** is displayed next to the 0.
- The accompanying partial step and all subsequent partial steps of a dispensing sequence are not executed (Multi Dispense function).

4.3.5 Speed

Eight aspirating/dispensing speeds can be switched between two speed ranges, ranging from 'slow' (one block) to 'quick' (eight blocks).

Switching between two speed ranges

For better dispensing of high-viscosity liquids, it is possible to switch the speed from "Normal Speed" to "Slow Speed".

How to switch the speed (see Section 4.1 and 4.2):

– Using the ***Enter*** key, select the "Speed ↑ ▮▮▮▮▮▮" or "Speed ↓ ▮▮▮▮▮▮" parameter.
(The activated parameter is framed in the display.)

– Hold down one of the arrow keys ◄ ▼ ▲ ► for one second.

– When the acoustic signal is emitted, "Slow Speed" appears briefly in the bottom left of the display.

– At the same time, the speed bars are reduced to half of their original height: "Speed ↑ ▮▮▮▮▮▮".

The speed bars can be changed within one range by pressing the arrow keys briefly. It is possible to switch back from "Slow Speed" to "Normal Speed" by once again holding down one of the arrow keys for one second. "Normal Speed" appears in the bottom left of the display. The speed bars revert to their original height. The speed range selected remains altered when the function (Disp, Pip, Mix, Titr, ..) is changed or when Off / On is pressed. "Normal Speed" is five times quicker than "Slow Speed". The motor becomes louder when "Slow Speed" is selected.

4.3.6 Single Dispense/Multi Dispense (appears only when the ***Disp*** function is selected)

With ***Single Dispense***, one selected partial volume can be dispensed repeatedly after liquid has been aspirated.

With ***Multi Dispense*** a dispensing sequence consisting of several different partial volumes can be programmed (see Section 5.2.2).

Strictly speaking, this parameter does not belong to the entry field; it is actually an extension of the command line. The ***Single Dispense*** or ***Multi Dispense*** function can only be executed after the parameters have been confirmed by pressing ***Enter***.

4.3.7 Single Autodispense/Multi Autodispense

With AutoDispense, dispensing steps are executed automatically in programmable time intervals (see Section 5.2.4).

4.3.8 Programming the control unit

After a function has been called up, the dispensing component last used with this function appears in the entry field, together with the parameter values entered.

If a new dispensing component is inserted, the parameter values last entered for this component appear at the same time.

It is possible to program the device so that work continues directly after a new dispensing component has been inserted.

See Section 7 for storing programs, with 30 program positions

Diagrams showing how to execute the functions can be found on the inside of the fold-back cover at the front and back of this manual. The parts of the diagrams which are numbered are explained below next to the corresponding number.

5 The functions

5.1 General rules for executing functions

Before executing any functions, please ensure that the necessary dispensing component has been inserted into the dispensing grip.

5.1.1 General notes on the diagrams

Numbers 1 – 4 on diagrams 1 – 6 on the front and back fold-back covers:

1) Press the function key.

2) Press ***Enter*** to select parameters:

   Disp.Vol., Pip.Vol., Mix.Vol.Titr.Vol.,
   Dil, Air, Smpl, Rel.Vol.= Volume dispensed

   Repeats = Number of repeats

   Speed = Aspirating and dispensing speed.

   Set values using the cursor keys.

   Tip: Dispensing components are automatically recognized by EDOS when inserted into the dispensing grip, and appear in the display under the parameter ***Tip*** (see Section 4.3.2).

3) Repeats = 0/x: Any number of volumes dispensed; x = Number of volumes not yet dispensed.

   Repeats = (1–125)/n – x: Number of the pre-selected volumes (1–125); n – x = Number of volumes not yet dispensed.

   This is different to the Mix and Multi Dispense functions!

4) If the ***R*** key flashes red: Press the key briefly.

   Caution: After this ***Reset*** has been executed, the piston of the dispensing component is pushed completely into the cylinder. Any liquid in the dispensing component will be dispensed!

5.1.2 Interrupting a dispensing process

All dispensing processes can be interrupted by pressing the ***R*** key. This does not affect the counting of the repeats (see Section 6). If ***R*** is pressed when the piston is moving, the piston stops; Reset is executed the next time ***R*** is pressed.

5.1.3 Residual liquid in the dispensing components

There are two possibilities for liquid remaining in the dispensing component

- ***When pipetting and mixing with pipette tips, this liquid forms part of the dispensing volume and is added to the volume*** via blow-out.
- In all other cases, the liquid remains in the dispensing component (Combitip), or is discarded (when dispensing with multi-channel adapters) (see Sections 6.1 and 6.2).

5.2 Dispensing (***Disp*** function)

Dispensing in partial volumes.

5.2.1 Single Dispense:

Disp

Partial volumes are all the same size.

Figure 1a (front fold-back cover):

For numbers 1) – 4), see Section. 5.1.1.

5) Aspirating: The ▲ key lights up; press the ▲ key briefly.

6) Dispensing: The ▼ key lights up; rest the tip of the Combitip against the inside of the cup. Press the ▼ key briefly.

7) The ▲ key flashes: Aspirate liquid again.

When all partial volumes n have been dispensed, a long signal can be heard and the ▲ key remains permanently lit. The residual liquid in the Combitip does not form part of the dispensing volume of the last step! (see Section 5.1.3).

See Section 6.4 for dispensing in free jet.

5.2.2 Multi Dispense:

Disp

Partial volumes are of different sizes.

Figure 1b (front fold-back cover).

For numbers 1), 2) and 4), see Section 5.1.1:

3 a) Twelve different partial volumes Disp (k = 1–12) can be dispensed; the current partial volume k is marked in the index column.

3 b) All partial volumes can be repeated 1 – 125 times

Rep (k) = 1 – 125
Rep (k) = 0: Partial volume k and all following partial volumes are not executed.

Numbers 5), 6) and 7) are as per Single Dispense

Example: Dispensing 1.5; 1.5; 1.0; 1.0; 0.5; 0.5; 0.5 ml:

Tip	=	10.0 ml
Disp (1)	=	1.50 ml
Rep (1)	=	2
Disp (2)	=	1.0 ml
Rep (2)	=	2
Disp (3)	=	0.5 ml
Rep (3)	=	3
Disp (4)	=	any
Rep (4)	=	0

When all partial volumes have been dispensed, a long signal can be heard and the ▲ key remains permanently lit. The residual liquid in the Combitip does not form part of the dispensing volume of the last step! (see Section 5.1.3).

5.2.3 Dispensing with Multi 50, Multi 300 and Multi 1200 multi-channel adapters

Disp

Figure 1c (front fold-back cover): for numbers 1), 2) and 4), see Section 5.1.1.

Numbers 3a + b), 5) and 6) are as per Single Dispense and Multi Dispense with Combitips. However, please note the following:

7) ***Tip is empty*** — If the ▼ key is pressed, a long signal can be heard, and the piston does not move. Blow-out is then necessary.

8) ***Blow-out*** — (Removing the residual liquid from the tips) ***is necessary.*** Hold the multi-channel adapter with the tips resting against the inside of a waste cup and hold down the ▼ key. Remove the tip from the liquid which has been dispensed and release the ▼ key. Blow-out can be repeated as often as desired.

When dispensing with multi-channel adapters, the residual liquid does ***not*** form part of the dispensing volume! (see Section 5.1.3)

9) ▲ flashes: — Aspirate new liquid. When all partial volumes have been dispensed, a long signal can be heard and the ▲ key remains permanently lit.

5.2.4 Single Autodispense/Multi Autodispense

Disp

Dispensing steps can be activated ***automatically*** if ***AutoDisp*** = ***on*** is set under the ***Opt*** function.

Key sequence on the control unit
– Press the "Opt" function key
– Use ◀ ▶ to select AutoDisp in the command line.
– Enter: Parameter ***AutoDisp is on/off*** is marked.

If ***AutoDisp*** is not switched on:
– Use the ▲ ▼ keys to set switch ***AutoDisp is on***.
– Enter: Parameter time/sec is marked.
– Use the cursor keys to set the time interval in seconds between two dispensings (minimum 0.1 sec., maximum 7,200 secs. = 2 hours).

Entries are made in the format hours (***H***):minutes (***M***):seconds(***s***): ***H:MM:ss.s***.

– Press the ***Disp*** key (to call up the "Disp" function).
When the Disp function has been called up, the active AutoDisp mode is denoted in the display by "Single AutoD" or "MultiAutoD".

The ***Autodispense*** mode is started by pressing the dispensing key ▼ .

Autodispense can be interrupted by pressing the same key again. The dispensing step which is being carried out is completed (i.e. is not interrupted). *"Stopped"* appears in the display.

Presing the Reset key stops the dispensing step immediately.

Figure 1d: Dispensing components used with the ***Disp*** function.
Attach pipette tips to the pipetting adapters!

5.3 Pipetting (Pip function)

Pip

Dispensing liquid with ejectable pipette tips

Figure 2a (front fold-back cover): for numbers 1) – 4), see Section 5.1.1.

5) Aspirating: The ▲ key lights up; press key briefly.

6) Pipetting: The ▼ key lights up; press key briefly

7a + b) Blow-out: Hold the pipette tips against the inside of the cup and ***hold down*** the ▼ key. Remove the tip from the liquid which has been dispensed and release the ▼ key. Blow-out can be repeated as often as desired.

When dispensing with ejectable pipette tips, ***the residual liquid forms part of the dispensing volume!*** (see Section 5.1.3).

8) Tip ejection: The pipette tips are discarded after the ***R*** key has been pressed.

9) The ▲ key flashes: Aspirate liquid again.

When all volumes have been pipetted, a long signal can be heard and the ▲ key remains permanently lit.

Pipetting with Combitips is the equivalent of pipetting with Repeats number 1. If different liquids have to be dispensed in succession from the same Combitip, it is possible to rinse between dispensings:

Aspirate a volume of the next sample and then discard with Reset (into the waste cup).

Working from the "Zero Position" (= Reset position, see Section 6), aspirate and dispense another volume from the sample.

The counting of the number of steps dispensed is not affected.

Fig. 2b: Dispensing components which can be used with the ***Pip*** function

Attach pipette tips to the pipetting adapters!

5.4 Mixing (***Mix*** function)

Mix

Mixing liquid by aspirating and dispensing with a dispensing tip

Figure 3a: ***Mixing with pipetting adapters*** (front fold-back cover)

For numbers 1), 2) and 4), see Section 5.1.1.

3) Repeats = 1 – 20: Number of mixing cycles (1 mixing cycle = 1 x aspirating and dispensing the set volume)

Attach the pipette tip.

5) Mixing: The ▲ key lights up. Immerse the tip in the liquid and press the key. The mixing stroke is executed with the set speeds for the movement in both directions.

6) Blow-out: Hold the pipette tip against the inside of a waste cup and ***hold down*** the ▼ key. Remove the tip from the liquid which has been dispensed and release the ▼ key.
Blow-out can be repeated as often as desired.

When a long signal is heard and the ▲ key lights up, the mixing cycle has finished.

Blow-out does not occur when Combitips are used.

Figure. 3b: Dispensing components which can be used with the ***Mix*** function
Attach pipette tips to the pipetting adapters!

5.5 Titrating (Function ***Titr***):

Titr

Measuring any volume of liquid dispensed.

Figure 4a (front fold-back cover):

For numbers 1), 2) and 4), see Section 5.1.1.

3)	Speed ↓	To ensure exact titration, the dispensing speed is reduced by one level after every dispensing step. At the lowest level, the speed remains constant. However, higher speeds can be set at any time by pressing the appropriate key.
5)	Aspirating:	The ▲ key lights up. Hold down the key until the required amount of liquid has been aspirated.
6)	Dispensing:	The ▼ key lights up. Liquid is dispensed for as long as the ▼ key is held down.
7)	The ▲ key lights up:	Aspiration is now possible again.

All quantities of liquid that have been dispensed are added together under the Titr.Vol. parameter. Aspirating a new quantity of liquid by pressing the ▲ key or executing Reset (by pressing the ***R*** key) does not interrupt the counting process of Titr.Vol.

Press ***Titr*** to begin new titration (when counting of the volume dispensed begins, Titr.Vol. = 0).

Figure 4b: Dispensing components that can be used with the ***Titr*** function.

5.6 Diluting (***Dil*** function):

Dil

Attaching a 10 µl tip to a Combitip.

Aspirating diluting liquid in a Combitip + tip, sufficient for the desired number of dilutions.

Aspirating an air bubble and sample into the 10 µl tip. Dispensing the sample + air bubble + partial volume of diluting liquid.

Figure 5a (back fold-back cover):
For numbers 1) and 4), see Section 5.1.1.

2)		***Go through the entry field three times by pressing the Enter key*** in order to set the volumes for the diluting liquid (***Dil***), air bubble (***Air***) and sample (***Smpl***) respectively.
3a)	Repeats:	Number of dilutions to be carried out (max. 125).
3b	Speed ↑↓	Aspirating and dispensing speed selected should be as low as possible.
5)		Attach the 10 µl to the Combitip.
6)	Filling a Combitip + tip with diluting liquid	The ▲ key lights up; press the key briefly.
7)	Aspirate the air bubble:	The ▲ key lights up; press the key briefly.
8)	Aspirate the sample:	The ▲ key lights up; press the key briefly.
9)		10 µl tip on the Combitip with sample, air bubble and diluting liquid.
10)	Carry out dilution:	The ▲ key lights up. Press the key briefly
11)	The ▲ key flashes:	Aspirate diluting liquid again.

When all n dilutions have been carried out, a long signal can be heard and the ⏶ key lights up and remains lit.

Can be carried out with 0.2 ml and 1.0 ml Combitips

Sample volume	minimum 1/100 of the nominal volume of the Combitip
Sample volume	maximum 50 µl
Diluting	maximum 1/100 (1+99)
Diluting	minimum 1/2 (1+1)
Volume of air bubble	minimum 4 µl

Figure 5b: Dispensing components which can be used with the ***Dil*** function

5.7. Manual mode (***Manu*** function):

Aspirating and dispensing any amount of liquid.

Figure 6a (back fold-back cover):

For numbers 1), 2) and 4), see Section 5.1.1.

3a)	***Rel.Vol.*** parameter:	Volume aspirated/dispensed, based on a selectable zero position of the piston position.
3b)	Piston position ***SUM***:	Volume aspirated = For Combitips: the volume between the piston base and the "***Zero Position***", see Section 6.1; For pipetting adapters: the volume between the piston base and the ***Pip home position***, see Section 6.2.
5)	Aspirating:	The ⏶ key lights up; hold down the key for as long as liquid is to be aspirated.
6)	Dispensing:	The ⏶ key lights up; liquid is dispensed for as long as the key is held down.

After liquid has been aspirated, the parameter Rel.Vol. = 0 can be set by pressing the ***Manu*** key. During subsequent dispensing, the volume ***dispensed*** appears in the display, marked with a minus sign.

When Combitips are used in the manual mode, the relaxation stroke does not occur (see Section 6.1). To allow the ***exact*** measurement of an aspirating/dispensing volume when using Combitips or ***pipetting adapters***, the piston must be moved slightly in the dispensing direction by pressing the dispensing/aspirating key. The piston is thus moved to the aspirating or dispensing position. Then set ***Rel.Vol.*** = 0. The exact amount of liquid subsequently dispensed/aspirated appears in the display.

Note: When Combitips are used, the ***Disp*** function can be selected from the ***Manu*** function at any position of the piston without Reset having to be carried out.

This enables an unknown amount of liquid to be aspirated into a Combitip and the volume (aspirated volume – remaining stroke volume) to be dispensed in as many steps as desired. For remaining stroke volume, see Section 6.1).

Fig. 6b: Dispensing components which can be used with the ***Manu*** function

6 Useful information

The following information will improve your knowledge of the functions and options available with EDOS.

6.1 Liquid transfer with a Combitip

Using a Combitip and the Eppendorf Multipette®, you can dispense according to a method which is tried and tested throughout the world (see Fig. IX).

When inserting a Combitip into the dispensing unit, the piston mounting is moved downwards by pressing the ***R*** key and the piston of the Combitip is pushed completely into the cylinder. Liquid is then aspirated into the Combitip from this "Zero Position" (see Fig. IXa).

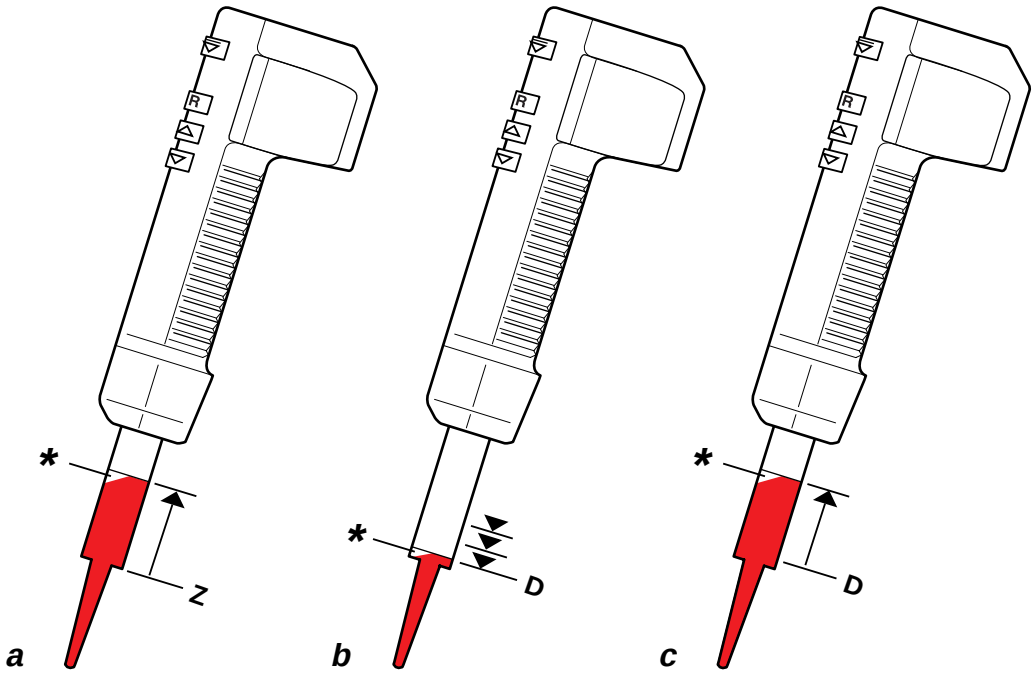


Fig. IX

After aspiration there is ***always*** a small air bubble below the base of the piston because the contour of the piston base never completely fills out the contour of the cylinder base (The * in Fig. IX represents an air bubble).

This air bubble does not affect dispensing precision.

However, this air bubble would cause dispensing errors if the piston were pushed down completely to the base of the piston and an aliquot of air instead of liquid were dispensed.

This is prevented by the ***residual stroke lock*** of the Multipette® and EDOS. The last 1/52 of the Combitip volume is not utilized and the piston of the Combitip is prevented from moving deeper than the ***Disp home position*** by pressing the ▼ key (Fig. IXb).

To continue dispensing, the Combitip is filled from the ***Disp home position*** (Fig. IXc).

After liquid has been aspirated, the piston always executes a so-called ***relaxation stroke*** of 1 mm, which is equivalent to 1/52 of the length of the Combitip. The piston moves 1 mm past the point calculated for liquid aspiration and then back to the point again. This is necessary to bring the piston mounting into contact with the dispensing spindle before the downward movement. This relaxation stroke corresponds to the first dispensing step to be discarded when dispensing with the Multipette.

6.2 Liquid transfer with the Pip 1000, Pip 100, Plp 10, Multi 1200, Multi 300 and Multi 50 pipetting adapters

When using these dispensing components, proceed as with manual pipettes with blow-out.

Before the dispensing component has been inserted, part of the stroke distance must be "reserved" for ***blow out*** and ***tip ejection*** before liquid is aspirated. The piston mounting therefore moves automatically from the "Zero Position" to the ***Pip home position***.

From the ***Pip*** home position, the ***blow-out position*** below is reached by pressing the ▼ key.

With EDOS, blow-out is activated and executed in the same way as with a manual pipette. After the ▼ key on the dispensing grip has been pressed, the piston of the pipetting adapter moves down to the blow-out position and does not move back until the ▼ key has been released.

Blow-out must be carried out with all functions executed using pipette adapters. This is necessary not only to dispense residual liquid from the pipette tip, but also to position the piston for subsequent aspiration (The only exception to this is the ***Manu*** function, for which blow-out is not necessary).

When ***dispensing*** with multi-channel adapters (Multi 50, 300 and 1200), a ***relaxation stroke*** is necessary prior to the first dispensing step (this relaxation stroke is executed automatically by EDOS).

6.3 Controlling the piston movement, Reset

6.3.1 Stopping piston movement with the Pip, Mix and Dil functions

By pressing the ***R*** key briefly, the upward/downward movement of the piston can be interrupted (emergency stop function). Reset must then be executed by pressing the ***R*** key.

6.3.2 Stopping piston movement with the Disp function

With the ***Disp*** function, the ***aspiration*** and ***dispensing*** of liquid can be interrupted by pressing the ***R*** key. A Reset is not necessary. A dispensing step which has been discontinued by pressing the ***R*** key is not counted. The calculations of the piston movements necessary for the required dispensings are based on the current position of the piston.

Liquid aspiration can be interrupted by pressing the ▲ key briefly. Aspiration continues when the same key is pressed again.

6.3.3 Stopping piston movement with the Titr and Manu functions

With the ***Titr*** and ***Manu*** functions, the piston only moves for as long as the ▲ ▼ keys are held down.

To compensate for this change of direction (see Section 6.1), the piston must be moved forwards slightly in the dispensing direction.

6.3.4. Reset function

Reset (executed by pressing the ***R*** key) has the following functions:

- Moving the piston mounting down to the "Zero Position" to enable dispensing components to be inserted
- Interrupting a dispensing process
- Defining the Zero Point of the dispensing spindle in the dispensing grip by orientation on a calibration point. This guarantees accurate dispensing.

Reset is required when:

- The device is switched on
- A dispensing component is exchanged
- A new function is selected or a function is interrupted (see 6.3.1 + 6.3.2).

6.4 Speed of piston movement

Setting a medium speed (four blocks) means:

- For pipetting adapters: a speed of movement which is the same as that during normal handling of manual pipettes.
- For Combitips larger than 1.0 ml: liquid movement which allows aqueous solutions to be dispensed in free jet with exact drip separation. To ensure that the technical data is upheld (see Section 13), the Combitip in general must be held against the inside of the cup.

When pipetting viscous liquids, it is appropriate to use high speeds. With the ***Mix*** function, low speeds are more suitable.

Reset is carried out at the dispensing speed set.

After pressing the ***R*** key, (pipetting with pipetting adapters), tips are ejected at a fixed, non-adjustable speed.

6.5 Entering parameters during execution of a function, new start of repeat counting, new start of volume measurement

When a function is being executed, the values for the ***Speed*** parameter can be modified as soon as the piston stops moving.

During the ***Disp*** function, new values for the ***Volume*** and ***Repeat*** parameters can be entered at any time when the piston is at a standstill, regardless of the position of the piston.

With the ***Pip***, ***Mix*** and ***Dil*** functions, new values can only be entered for the ***Volume*** and ***Repeats*** parameters if the piston of the dispensing component is in the Pip or Disp home position (see Section 6.1 and 6.2).

The ***Repeat count begins again***:

- After a volume value or a repeat number has been modified
- After a function key (***Disp, Pip, Mix, Dil, Titr, Manu***) has been pressed.

Volume measurement begins again:

- With the ***Titr*** and ***Manu*** functions: after "Mode" and "Enter" have been pressed. The ***Titr. Vol.*** and ***Rel. Vol.*** parameters are set to 0.

Setting another dispensing component results in:

- The set of parameter values last entered for this dispensing component appearing in the display
- A prompt to execute Reset.

6.6 Acoustic signals

One long tone denotes the end of a dispensing sequence.

Two consecutive tones serve as a warning signal (e.g. if the wrong key has been pressed).

The acoustic signals can be switched off (see Section 8).

Every time a key is pressed on the control unit or on the dispensing grip, a tone of confirmation can be heard when "Key click" is switched on (see Section 8).

6.7 Comments

The status of the device is described by comments which appear in the bottom line of the display field on the left:

Finished!	A sequence with a preselected repeat number is finished.
Multi finished!	A ***Multi Dispense*** sequence is finished.
Zero Position	The piston is pushed completely into the dispensing component.
Resetting	Reset is executed.
Blowing out	Blow-out is executed.
Select new item!	The command line is activated.
Press Reset!	After the device has been switched on After a new dispensing component has been After the piston movement has been stopped by pressing the ***R*** key.

See Section 9 for additional comments.

7 Storing and selecting the programs

It is possible to store and call up 30 parameter sets for each function (***Disp, Pip, Mix, Dil, Titr, Manu***). The memory spaces are numbered from 1 to 30. A two-digit code number can also be allocated to the groups with memory space numbers 1 – 10, 11 – 20, 21 – 30, and must then be entered when programs are stored. The number of a memory space group is valid for all functions (i.e. a maximum of three numbers are allocated). It is thus impossible to accidentally overwrite programs.

The code number 00 signifies an unprotected memory space group.

The main memory of the control unit also retains the set of parameter values last entered for each function and each dispensing part, even after the device has been switched off.

7.1 Storing a program

A function which has been selected and which has appeared in the display with the desired parameter values can be stored as follows:

Key sequence on the control unit:		Meaning:
1)	***Pgm***	Selects the sub-program ***Pgm*** with the sub-command line ***Pgm***.
2)	◀ ▶ ***Cursor keys***	Marks ***Store***.
3)	Enter	Activates the memory numbering.
4)	◀ ▲ ▼ ▶ ***Cursor keys***	Enters the memory number in the bottom line of the display.
5)	Enter	If the program memory position is protected, "Access code?" appears. The code number must be entered using the cursor keys. If the memory position is not protected (code number = 00), step 5) is skipped.
6)	Enter	"Overwrite? Press MODE to Cancel" appears.
7)	Enter	Stores the set of parameter values under the memory number. A two-second comment "No. # stored!" appears, and the user returns to 1).

If the appropriate function key is pressed (***Disp, Pip, Mix, Titr, Dil, Manu***), EDOS returns to the work area with the function selected.

7.2 Selecting a set of parameter values

Key sequence on the control unit:		Meaning:
1)	***Pgm***	Selects the sub-program ***Pgm*** with the sub-command list ***Pgm***. ***Recall*** is marked.
2)	Enter	Activates the memory number.
2)	◀ ▶ ***Cursor keys***	Selects the function.
4)	▲ ▼ ***Cursor keys***	Enters the memory number in the bottom line of the display.
5)	Enter	Selects the set of parameter values in the display. "Nr # recalled!" appears for two seconds.

After the function has been selected, EDOS returns automatically to the work area to allow the function to be executed immediately.

7.3 Access

The three code numbers for the memory groups 1 – 10, 11 – 20, 21 – 30 can be selected in advance via the sub-program Access:

Key sequence on the control unit:		Meaning:
1)	***Pgm***	Selects the sub-program ***Pgm*** with the sub-command list ***Pgm***.
2)	◀ ▶ ***Cursor keys***	Marks ***Access***.
3)	Enter	Activates the code field for the first memory group. A two-digit code number can be entered. If ***Enter*** is pressed repeatedly, the fields are activated in succession to allow the code number to be entered.

If ***Mode*** is pressed, the command line is activated. One of the sub-programs (Recall, Store, Access) can be selected using the cursor keys and activated by pressing Enter.

If the function keys (***Disp, Pip, Mix, Titr, Dil, Manu***) are pressed, EDOS returns to the work area of the function selected.

8 Options

After the ***Opt*** function has been activated, the following parameters can be selected (use the ◀▶ keys, press ***Enter***):

Beep: Switches the beeper on and off (with the Up/Down cursor keys).
After the beeper has been switched on, Key click can be switched on/off. If Key click is selected, an acoustic signal is heard every time a key is pressed on the control unit or when the piston has reached a target position.

Calib: With this calibration factor, the piston stroke can be corrected if liquids with a viscosity and density different to that of water are used.

For this purpose, the volume of the liquid dispensed should be determined gravimetrically as follows: Divide the weight of the liquid by its density. Divide the expected nominal value of the liquid volume by the volume calculated, and then use this ratio as a calibration factor.

Remote: With this parameter, the serial interface for remote control of the device can be set.

Exit: By selecting and confirming Exit, the user can go up to the next display level in the command line. The cursor always moves to the position where it last left the display.

AutDisp: Switches the Auto Dispense function on and off. Selects the time interval between two automatic dispensings (see Section 5.2.4).

If ***Mode*** is pressed, the command line is activated. One of the sub-programs (Exit, Beep, Calib, Remote, AutDisp) can be selected using the cursor keys and activated by pressing Enter.

9 Troubleshooting

Error message / Error	*Cause*	*Solution*
Dispensing component cannot be inserted.	Contaminated or defective dispensing component attachment in dispensing grip.	Contact Service.*
Dispensing component cannot be removed.	Defective electronics/mechanics in dispensing component attachment.	With message "Eject manually" displayed, press the reset button at the dispensing grip. Contact Service.* When using Combitips: remove cylinder full of liquid: Move the cylinder back and forth to loosen the cylinder rim from the locking position. Remove the cylinder over a waste vessel.
Combitip drips.	– Leaking Combitip.	Exchange Combitip.
Pipette tip drips.	– Loose-fitting tip on nose cone of pipetting adapter.	Press on tip tightly.
	– Incorrect pipette tip.	Use original Eppendorf tip.
	– Loose nose cone of pipetting adapter.	Repair or replace nose cone. See "EDOS pipetting adapter".
	– Piston sealing and piston damaged.	Replace piston sealing/piston. See "EDOS pipetting adapter".
Error message ***Fill!***	– ▼ pressed despite insufficient amount of dispensing liquid.	Aspirate liquid again.
Error message ***Is full***	– ▲ pressed although Combitip/ pipette tip is full.	Press ▼ to dispense liquid.
Error message ***Press down!***	– ▲ pressed although blow-out must be performed.	Perform blow-out.
Error message ***Use another tip!***	– Function cannot be performed with the dispensing component selected.	Insert suitable dispensing component.
Error message ***Remove Tip!***	– Function cannot be performed with the dispensing component selected.	Insert suitable dispensing component.
Error message ***Tip code ERROR***	– Defective Combitip sensor or defective Combitip.	Insert another Combitip. If this solution is unsuccessful, contact Service.*
Error message ***VOLUME-ERROR, STEPPER-ERROR***	– Error in motor step counting (dispensing component jammed, liquid too viscous).	Contact Service.*
Error message ***GRIP EE-ERROR Grip Cal-ERROR EE-Alloc-ERROR EEPROM-ERROR*** Continuous beeping.	– Electronics error.	Contact Service.*

* General note:
If errors occur, switch off EDOS to reset error message. If error recurs after the device has been switched on again, contact Service.

10 Safety precautions and applicational limitations

EDOS can dispense all liquids with a viscosity not exceeding approximately 500 mPa s. Aqueous solutions can also be dispensed using pipetting adapters. It is advisable to use Combitips when dispensing liquids with a high vapor pressure or with a viscosity considerably higher than that of water. The viscosity and dispensing speed increases in inverse proportion to the size of Combitip used. When dispensing liquids with a high vapor pressure (e.g. hexane), it is advisable to use the solvent vapor to saturate the air bubble in the Combitip by aspirating and dispensing liquid several times. The liquid can then be dispensed with exact drip separation.

Please note that even light contact with a key on the dispensing grip can activate a dispensing process. Handle the device with care when dispensing toxic or inflammable liquids or liquids containing bacteria (use the rest for the dispensing grip). A safe working environment must also be guaranteed (flue, laboratory conforming to safety regulations). Extensive instructions on handling bacteria or biological material are defined in national and international regulations.

11 Accessories

See Section 13 for the order numbers of accessories.

11.1 Foot switch

The device functions can be activated with this feature by applying foot pressure:

- Left key: Moves piston upwards.
- Right key: Moves piston downwards.
- Left and right key simultaneously: Executes Reset.

The foot switch is connected to EDOS via the nine-pin plug on the left.

11.2 Extension cable for the dispensing grip

Extends the dispensing grip cable by 1.50 m.

11.3 Tension release

The dispensing grip can be hung on a sealing spring fastened to the laboratory ceiling. Fatigue-free series dispensing can then be carried out.

11.4 EDOS Remote control

All functions can be iniated via serial interface. A documentation of the serial remote control, a demo program and further information will be available on the Eppendorf hompage: http://www.eppendorf.com mid 2001.

12 Maintenance, cleaning and spare parts

The device is maintenance-free. Use diluted rinsing or soap solutions to clean all plastic parts. Alcohol-based disinfectants which have a long-term effect on the plexiglass cover of the display must not be used. Wipe the cover carefully after cleaning the device.

Ensure that no liquid enters the attachment for the dispensing components at the lower end of the dispensing grip.

See: "EDOS pipetting adapter" for information on cleaning and maintenance of the pipetting adapter and the multi-channel adapter.

13 Technical data

⚠ This section contains a summary of specifications for reference temperature and adjustment.

All relevant dispensing components comply with the requirements of the DIN 12650 regulation.

See the fold-back cover at the front of this manual for specifications for inaccuracy and imprecision of EDOS.

The abbreviations used signify the following:
Vol. = Volume
Max No.Steps = Largest number of dispensing steps.
1/10 max.Vol., 1/2 max.Vol. = Fractions of the largest volume, ***max.Vol.***

For Multi 50, 300 and 1200, the number of possible dispensing steps can be found in brackets.

For Pip 10, 100, 1000, Multi 50, 300 and 1200, the data applies to pipetted volumes; for Combitips, it applies to dispensed volumes.

Liquid:	Bidistilled water
Reference temperature:	20–25 °C, constant to ±0.5 °C.
Number of determinations:	15, in accordance with DIN 12650 with original Eppendorf pipette tips.
Power supply:	230 V / 50 Hz/60 Hz 115 V / 60 Hz 100 V / 50 Hz/60 Hz
Power requirement:	20 W
Fuses for device:	for 230 V 0.2 A for 115 V 0.4 A for 100 V 0.5 A

Technical specifications subject to change!

Delivery package:

1 control unit
1 dispensing grip
1 rest for the dispensing grip
1 main power cable
1 set of fuses
1 instruction manual with conformity assurance document

14 Ordering information

EDOS complete	230 V / 50 Hz/60 Hz	5222 000.019
	115 V / 60 Hz	5222 000.027
	100 V / 50 Hz/60 Hz	5222 000.035
EDOS dispensing grip		5222 000.018
Pipetting adapter	Pip 100 – 1000 µl	5222 521.000
Pipetting adapter	Pip 10 – 100 µl	5222 511.005
Pipetting adapter	Pip 0.5 – 10 µl	5222 501.000
Pipetting adapter	Multi 50 – 1200 µl	5222 560.006
Pipetting adapter	Multi 30 – 300 µl	5222 550.000
Pipetting adapter	Multi 5 – 50 µl	5222 540.005
Extension cable for dispensing grip		5221 000.228
Tension release for dispensing grip		5222 570.001
EDOS Foot switch		5221 000.244
Set of fuses for	EDOS 230 V	5221 502.002
	EDOS 115 V	5221 503.009
	EDOS 100 V	5221 504.005
Silicone grease		0013 063.010

Combitips and Pipette tips

(The packaging units stated represent the minimum ordering quantity).

Combitip plus

Minimum ordering quantity:
bag of 100

0.1 ml (beige piston)	0030 069.200
0.2 ml (blue piston)	0030 069.218
0.5 ml	0030 069.226
1 ml	0030 069.234
2.5 ml	0030 069.242
5.0 ml	0030 069.250
10 ml	0030 069.269
25 ml*	0030 069.293
50 ml**	0030 069.277

* 25 ml Adapter plus required,
navy blue, autoclavable (1 only) 0030 069.528

** 50 ml Adapter plus required,
anthracite, autoclavable (1 only) 0030 069.161

Combitip plus assortment pack
(Five tips of each size
and one 50 ml adapter and one 25 ml adapter) 0030 069.285

Eppendorf Biopur Combitips plus,
individually sealed; sterile, pyrogen-free,
DNA-free, RNase-free, ATP-free
Minimum ordering quantity: 100

0.1 ml (beige piston)	0030 069.404
0.2 ml (blue piston)	0030 069.412
0.5 ml	0030 069.420
1 ml	0030 069.439
2.5 ml	0030 069.447
5.0 ml	0030 069.455
10 ml	0030 069.463
25 ml*	0030 069.390
50 ml**	0030 069.471

* 25 ml Eppendorf Biopur Adapter plus
required, (set of 7) 0030 069.498

** 50 ml Eppendorf Biopur adapter plus
required, (set of 7) 0030 069.480

Standartips, in bags, 1000 tips:

20 µl for Pip 10	0030 001.168
100 µl	0030 003.004
1,000 µl	0030 015.002

Euroset
1 Eurobox, autoclavable, plus 7 x 96 Eurotips in racks:

20 µl Euroset for Pip 10	0030 063.651
100 µl Euroset	0030 063.660
1,000 µl Euroset	0030 063.678

1 Eurobox, autoclavable, plus 7 x 48 Eurotips in racks:
2.5 ml Euroset 0030 063.694

Eurotips in racks, 10 x 96 = 960 tips:

20 µl Eurotips for Pip 10	0030 063.600
100 µl Eurotips	0030 063.619
1,000 µl Eurotips	0030 063.627

Euroboxes
1 Eurobox plus 96 Eurotips

20 µl for Pip 10	0030 063.880
100 µl	0030 063.899
1,000 µl	0030 063.902

Eppendorf Biopur pipette tips,
sterile, pyrogen-free, DNA-free, RNase-free, ATP-free,
in boxes, 5 x 96 = 480 tips

20 µl for Pip 10	0030 065.506
100 µl	0030 065.514
1,000 µl	0030 065.522

Eppendorf Biopur pipette tips, individually wrapped,
1 set = 100 tips

100 µl	0030 001.303
1,000 µl	0030 001.311

Filtertips, sterile
in boxes, 5 x 96 = 480 tips

10 µl	0030 067.002
100 µl	0030 067.010
1,000 µl	0030 067.037

Caution:
Please only use the accessories recommended by Eppendorf. Using disposables which we have not recommended can reduce the precision, accuracy and life of EDOS. We do not honor any warranty or accept any responsibility for damage resulting from such action.

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B 5222 900.028-01/0301
Printed in Germany

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