Eppendorf Xplorer®
Eppendorf Xplorer® plus

Operating manual

eppendorf

Further information can be found on the enclosed CD or on our website www.eppendorf.com.

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Eppendorf Xplorer® (plus) – Operating manual

Table of contents

1 Operating instructions

1.1 Using this manual

- Read this operating manual completely before using the device for the first time. Also observe the instructions for use of the accessories.
- This operating manual is part of the product. thus, must always be easily accessible.
- Enclose this operating manual when transferring the device to third parties.
- If this manual is lost, please request another one. The current version is available on our website: www.eppendorf.com.
- This operating manual applies to devices with software version 2.01.00 or higher.
- The operating manual in additional languages, adjusting instructions and additional information can be found on the Xplorer CD or on our website www.eppendorf.com.

1.2 Danger symbols and danger levels

1.2.1 Hazard icons

	**Biohazard**		**Explosion**
	**Electric shock**		**Toxic substances**
	**Hazard point**		**Material damage**

1.2.2 Degrees of danger

The safety instructions in this operating manual indicate the following degrees of danger:

DANGER	*Will* lead to severe injuries or death.
WARNING	*May* lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
▸	You are requested to perform an action.
1. 2.	Perform these actions in the sequence described.
•	List.
Text	Terms and key names from the software.
	References useful information.

1.4 Glossary

A

Air-cushion principle
An air cushion is located between the piston-cylinder system of the pipette and the liquid in the pipette tip. Moving the piston creates a vacuum and may lead to liquid being aspirated into the pipette tip. During the downward movement of the piston, the air cushion is pressed downwards and the liquid in the pipette tip is dispensed. Optimizing the piston stroke ensures that the stroke volume leads to the liquid volume shown in the display.

Pipettes in which the piston is brought into contact with the liquid to be dispensed are defined as positive-displacement pipettes.

B

Biopur
Eppendorf Biopur® is an Eppendorf AG purity level for consumables. In addition to the requirements for standard goods, e.g., precision, accuracy, wetting behavior and leak tightness, Biopur products also meet the highest standards when it comes to sterility and being free of ATP, PCR inhibitors, human and bacterial DNA, pyrogens, DNase and RNase.

Goods with the Biopur purity level are inspected and certified by an external laboratory.

Lot-specific certificates can be downloaded from our website: www.eppendorf.com.

Blow-out
Movement of the piston that dispenses the remaining liquid in the pipette tip after the pipetting step has been completed. When using normal pipetting, the liquid blow-out is part of the dispensing volume. When using reverse pipetting, blow-out is not part of the dispensing volume.

C

Cycle
Together, the piston movement upward (liquid aspiration) and piston movement downward (liquid dispensing) form a cycle.

F

Free jet dispensing
Dispensing steps without a pipette tip touching tube wall. If a drip forms on the pipette tip after free jet dispensing, this drip always belongs to the next dispensing step. We recommend completing a dispensing series using only the free jet method or wall dispensing method. Complete the reverse stroke in accordance with the dispensing series using either the free jet or wall dispensing method. Errors listed in the technical data were determined using the wall dispensing method.

I

Increment
Step size or resolution. For example, the volume can be increased or decreased in 0.01 mL increments for the volume selection on a 10 mL Xplorer pipette.

ISO 8655
The ISO 8655 standard defines, among other factors, limiting values (systematic error [accuracy] and random error [precision]) and the test procedure for dispensing devices.

M

Multivolume
The total of the remaining stroke and the reverse stroke.

N

Nominal volume
The maximum dispensing volume of a pipette. The nominal volume is also used as the name of a pipette. The term "nominal volume" comes from the ISO 8655 standard.

P

PCR clean
PCR clean is an Eppendorf AG purity level for consumables. In addition to the requirements for standard goods, e.g., precision, accuracy, wetting behavior and leak tightness, products with the PCR clean purity level also meet the highest standards when it comes to sterility and being free of human DNA, DNase, RNase and PCR inhibitors.

Goods with the PCR clean purity level are inspected and certified by an external laboratory.

Lot-specific certificates can be downloaded from our website: www.eppendorf.com.

PhysioCare Concept®
Products that carry the Eppendorf PhysioCare Concept logo feature optimized ergonomics and make operation as simple as possible, even with complex dispensing tasks. PhysioCare products can be easily serviced and cleaned. They are made of extremely light materials and require minimal operating force.

R

Rechargeable lithium-polymer battery
This rechargeable battery is a special version of the rechargeable lithium-ion battery. Like rechargeable lithium-ion batteries, rechargeable lithium-polymer-batteries have a very high charging capacity and a long service life. The special encapsulation of the rechargeable lithium-polymer-battery makes it lighter than rechargeable lithium-ion batteries.

Remaining stroke
After dispensing steps have been completed, any small quantities of residual liquid as safety reserves; this liquid will be dispensed as the remaining stroke. You can discard the liquid of the remaining stroke or reuse it.

Reverse stroke
After aspiration, the piston is moved into a defined position. Liquid is dispensed during this piston movement. The reverse stroke is not a dispensing step.

S

Sterile
Sterile is an Eppendorf AG purity level for consumables. In addition to the requirements for standard goods, e.g., precision, accuracy, wetting behavior and leak tightness, products with the Sterile purity level also meet the highest standards when it comes to sterility and being pyrogen-free.

V

Vapor pressure
This term refers to the pressure exerted by the vapor of a material (solid or liquid) in an enclosed container. The vapor is in equilibrium with the solid or liquid phase of the material. The vapor pressure increases when the temperature increases. Each pure liquid has a vapor pressure of 1013 hPa (mbar) at boiling point. Volume errors caused by high vapor pressure can be reduced by prewetting the tip.

Viscosity
Viscosity describes the viscidity of liquids and suspensions. Dynamic or absolute viscosity is now usually given in Pa · s or mPa · s. The unit P or cP is frequently found in older literature.
1 mPa · s corresponds to 1 cP.

At room temperature a 50% glycerin solution has a viscosity of approx. 6 mPa · s. As the glycerin concentration increases, viscosity increases considerably. Absolutely anhydrous glycerin has a viscosity of approx. 1480 mPa · s at room temperature.

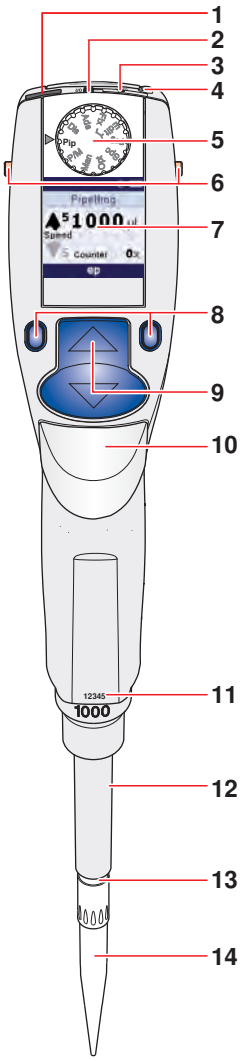
W

Wall dispensing
Liquid dispensing during which the pipette tip touches the tube inner wall. We recommend completing a dispensing series using only the free jet method or wall dispensing method.

2 Product description

2.1 Main illustration

2.1.1 Single-channel



1 USB port

Only for Eppendorf service.

2 ON switch

3 Reset key

4 Connector socket

For connecting the charging plug of an Eppendorf Xplorer power supply.

5 Selection dial

For setting an operating mode.

6 Charging contacts

Gold-plated contacts for loading and storage in a series 4880 charger stand or charger carousel.

7 Backlit color display

Switch the display off when it is not in use. The display automatically switches back on when the pipette is moved.

8 Softkeys

The assignment of the respective softkey is shown in the display footer.

9 Rocker

You can either press the rocker up or down. The rocker can either be used to trigger the piston movement or to scroll through the menu and change the values of parameters. The color of the rocker is different for the various volumes and matches the color of the trays for the suitable epT.I.P.S. pipette tips.

10 Ejector

Moves the ejector sleeve and ejects the pipette tip. After a filled pipette tip has been ejected, the piston returns to the basic position after a slight delay. This option can be switched off (see p. 42).

11 Serial number

12 Ejector sleeve

The ejector sleeve is marked with the nominal volume of the pipette.

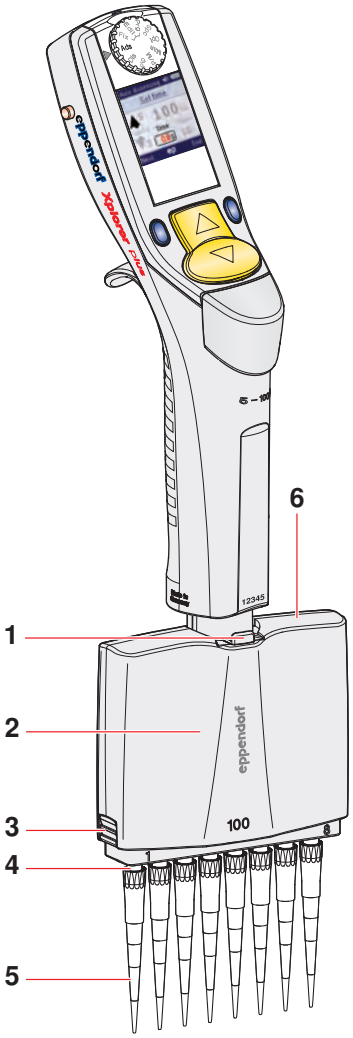
13 Spring-loaded tip cone

The spring loading action optimizes the force required for attaching and ejecting tips. The spring loading action is available for all Xplorer pipettes up to 1 000 µL.

14 Pipette tip

The Xplorer pipettes may only be used with the suitable pipette tip fitted. We recommend using epT.I.P.S.

2.1.2 Multi-channel



A description of the upper part can be found in the main illustration of the single-channel pipette (see p. 9).

1 Lever

The lever is used to release the multi-channel lower part.

2 Multi-channel lower part

The multi-channel lower part is autoclavable.

The multi-channel lower part is freely rotatable. It is not detached when rotated. The outer channels are marked with the numbers 1 and 8 (or 12).

The multi-channel version has a piston for each channel so that less than 8 or 12 tips can also be mounted.

You can open the multi-channel lower part in order to exchange or remove individual channels.

3 Latches, right and left

Unlock the cover plate (6) and internal ejector rail.

The 1 200 µL multi-channel lower part can be opened with a pin (see p. 58).

4 Spring-loaded tip cones for 10 µL, 100 µL and 300 µL

The spring loading action optimizes the force required for attaching and ejecting tips.

5 Pipette tips

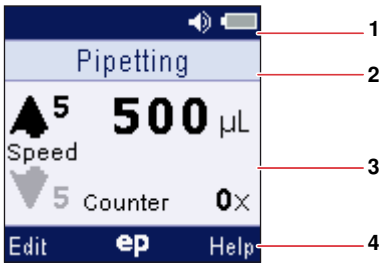
We recommend using epT.I.P.S.

6 Cover plate for 10 µL, 100 µL and 300 µL

Removable cover plate with internal ejector rail. The cover plate is opposite the side with the lever (1).

2.2 Display

The brightness of the display can be changed in the options (see p. 42). The display dims during usage intervals and switches off after a prolonged usage interval. Move the Xplorer pipette to switch the display back on.



1 Header	**2 Status line**
3 Main field	**4 Footer**

2.2.1 Header

Adjustment

The adjustment can be changed in the options. The adjustment is described separately (see p. 61). Detailed information can be found in a separate document on the CD and on our website: www.eppendorf.com.

If you have changed the factory settings, the symbol will be displayed to the left of the header. Additional symbols to the right indicate which adjustment is selected in the options.

1-point adjust.

Single-point adjustment by the user.

2-point adjust.

Two-point adjustment by the user.

3-point adjust.

Three-point adjustment by the user.

Glycerol 50%

Adjustment to liquid type 50 % glycerol.

Ethanol 75%

Adjustment to liquid type 75 % ethanol.

Altitude

Adjustment to an altitude other than 0 m above sea level.

epTIPS long

Adjustment to an epT.I.P.S. long.

Volume

The selected volume for the acoustic feedback can be set in the options (see p. 42).

If the volume has been set to *0*, no loudspeaker symbol is displayed.

Battery

Information on the charging capacity of the Li-polymer battery

Rechargeable battery fully charged.

Rechargeable battery partially discharged.

Rechargeable battery almost discharged. Rechargeable battery must be charged (see p. 17).

2.2.2 Status line

The selected operating mode is displayed here during operation. In edit mode, the name of the parameter to be edited is displayed.

2.2.3 Main field

All parameters of the operating mode are displayed simultaneously during dispensing. A black arrow ▼▲indicates the direction of the next piston movement.

In edit mode, the parameter to be edited is marked in red.

Some of the dispensing parameters in the main field include:

- Dispensing volume
- *Speed*: 8 speeds for aspiration and dispensing
- *Counter*: Number of conducted dispensing, optional setting in the **Pip** mode

An explanation of all dispensing parameters can be found in the "Setting parameters" chapter (see p. 22).

2.2.4 Footer

Assignment of the softkeys with variable functions.

Some of the softkeys in the footer are:

Edit	Open the edit mode.
Next	Select next parameter.
End	Exit the edit or help mode.
Help	Show help.
History	Display the last dispensing settings of the accessed mode (see p. 44).

The right softkey can be assigned to *Help* or *History*. If the right *Help* softkey is activated, the softkey can be used to display information on the selected operating mode. If the *History* softkey is activated, it can be used to call the most recently executed dispensings. The assignment of the softkey can be defined in the options (**Opt**). The softkey is assigned to *Help* when the Xplorer is delivered.

2.3 Delivery package

Quantity	Description
1	Eppendorf Xplorer
1	Rechargeable lithium-polymer battery
1	Power supply with power plug adapters
1	English/German operating manual Additional languages are available on the CD.
1	CD with operating manual in several languages, ordering information and additional documents
1	Short instructions in English Additional languages are available on the CD.
1	Locking ring for deactivating the spring loading action for ≤ 1 000 µL single-channel Eppendorf Xplorer pipettes
1	For multi-channel pipettes from 100 µL upwards: multi-channel tool for cutting the O-rings on the tip cones
1	Unlocking tool for opening the 1 200 µL multi-channel lower part
1	Pipette wrench for opening the lower part on 5 mL and 10 mL single-channel pipettes
2 or 3	Locking clip for lifting the spring loading on 8 or 12 channel lower parts with 10 µL, 100 µL and 300 µL nominal volumes.

2.4 Features

The Xplorer pipettes are motorized and electronically controlled piston-stroke pipettes designed to aspirate and dispense liquid volumes according to the air-displacement principle. The Xplorer pipette family includes single-channel and multi-channel pipettes (8 or 12 channels). Depending on the Xplorer pipette, you can dispense volumes ranging from 0.5 µL to 10 mL. The liquid is aspirated into a pipette tip which is attached to the Xplorer pipette.

The main control element of the Xplorer pipette is a rocker. The color of the rocker differs depending on the volume range of the Xplorer pipette. It has different functions during dispensing operations and in the dispensing parameter editing mode. The rocker can either be pressed up or down.

The lower parts of the Xplorer pipettes are autoclavable.

For all Xplorer pipettes from 10 µL to 1 000 µL nominal volumes, the tip cone responds with spring-loading action when a pipette tip is attached.

2.5 Warranty

In case of warranty claims, contact your local Eppendorf contractual partner. No warranty is provided for any damage due to misuse or if the upper part has been opened by unauthorized persons. The rechargeable lithium-polymer battery and all other wear parts are excluded from the warranty.

2.6 Materials

NOTICE!

Aggressive substances may damage the pipette, pipette tips and accessories.

- Check the chemical resistance before using organic solvents or aggressive chemicals.
- Observe the cleaning instructions (see *Cleaning on p. 51)*.

Components of the Xplorer pipette that can be accessed by the user are made of the following materials:

Component	Material
External surfaces of the upper part	• Improved polypropylene (PP) • Polycarbonate (PC) • Polycarbonate (PC), coated • Polycarbonate (PC), dyed • Gold plated
Exterior and interior of lower parts	• Improved polypropylene (PP) • Polyvinylidene fluoride (PVDF) • Polyetherimide (PEI) • Polyphenylene sulfide (PPS) • Polyetheretherketone (PEEK) • Polytetrafluoroethylene (PTFE) • Ethylene propylene diene rubber (EPDM) • Silicone • Steel (stainless steel and spring steel)

Pipette tip	Material
epT.I.P.S.	Polypropylene (PP)
epDualfilter T.I.P.S. filter	Polyethylene (PE)

3 Safety

3.1 Intended use

The Xplorer pipette is a lab device intended for dispensing liquids in the volume range from 0.5 µL to 10 mL, in combination with matching pipette tips. In vivo applications (applications in or on the human body) are not permitted.

The Xplorer pipette may only be operated by trained specialist staff. All users must have read the operating manual carefully and familiarized themselves with the device's mode of operation.

3.2 Warnings for intended use

DANGER!

Risk of explosion.

- Do not operate the device in areas where work is completed with explosive substances.
- Do not use this device to process any explosive or highly reactive substances.
- Do not use this device to process any substances which could create an explosive atmosphere.

WARNING!

Damage to health due to handling infectious liquids and pathogenic germs.

- When handling infectious liquids and pathogenic germs, observe the national regulations, the biological security level of your laboratory and the material safety data sheets and the manufacturer's application notes.
- Wear personal protective equipment.
- Follow the instructions regarding hygiene, cleaning and decontamination.
- For complete instructions regarding the handling of germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (Source: World Health Organization, current edition of the Laboratory Biosafety Manual).

WARNING!

Damage to health due to toxic, radioactive or aggressive chemicals.

- Wear personal protective equipment (PPE).
- Observe the national regulations for handling these substances.
- Observe the material safety data sheets and the manufacturer's application notes.

WARNING!

Personal injury caused by the incorrect handling of the rechargeable battery.

- Do not disassemble or modify the rechargeable battery.
- Never pierce, crush or throw the rechargeable battery.
- Only use the rechargeable battery in the Xplorer pipette.
- Do not touch leaky rechargeable batteries.
- Do not use any damaged rechargeable batteries.
- Dispose of damaged rechargeable batteries in accordance with legal regulations.

CAUTION!

Danger to people from careless use.

- Never point the opening of a Xplorer pipette fitted with pipette tip at yourself or anyone else.
- Only initiate dispensing if it is safe to do so.
- For all dispensing tasks, make sure that you are not endangering yourself or anyone else.

CAUTION!

Poor safety due to incorrect accessories and spare parts.

The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, functioning and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of incorrect or non-recommended accessories and spare parts or from the improper use of such equipment.

- Only use accessories and original spare parts recommended by Eppendorf.

NOTICE!

Damage to device from missing pipette tips.

- Only use the Xplorer pipette with fitted pipette tips.

NOTICE!

Carry-over, contamination and incorrect dispensing results due to the incorrect use of pipette tips.

The pipette tips are for single use only. Prolonged use can have a negative impact on dispensing tasks.

- Use the pipette tips only once.
- Do not use autoclaved ep Dualfilter T.I.P.S. for dispensing.

NOTICE!

Incorrect dispensing volume with special liquids and from temperature differences.

Solutions which differ greatly from water in terms of their physical data, or temperature differences between the pipette, pipette tip and liquid, can result in incorrect dispensing volumes.

- Avoid temperature differences between pipette, pipette tip and liquid.
- Check the dispensing volume and make sure that you can affirm all the questions listed in the general information.

NOTICE!

Damage to device from penetration of liquids.

- Do not deposit the Xplorer pipette with a filled pipette tip.
- Do not allow any liquids to penetrate the inside of the housing.
- If liquid has penetrated the inside of the housing, have the upper part of the Xplorer pipette repaired only by service partners of Eppendorf AG. Contact your responsible sales office before returning a product.

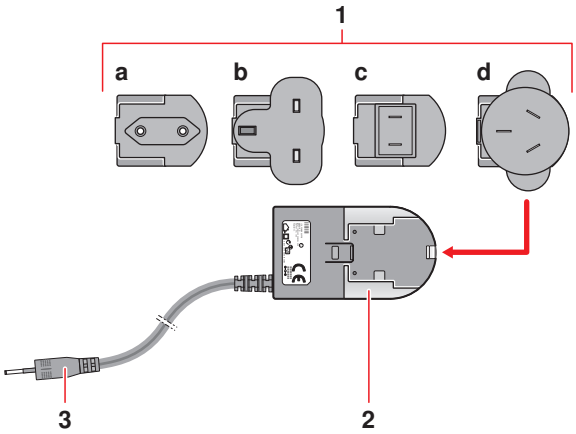
3.3 Information on product liability

In the following cases, the designated protection of the device may be compromised. Liability for any resulting property damage or personal injury is then transferred to the operator:

- The device is not used in accordance with the operating manual.
- The device is used outside of its intended use.
- The device is used with accessories or consumables which are not recommended by Eppendorf.
- The device is maintained or repaired by people not authorized by Eppendorf.
- The user makes unauthorized changes to the device.

4 Installation

4.1 Power supply assembly



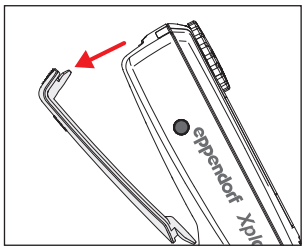
1 Power plug adapters
- **a** EU
- **b** United Kingdom
- **c** USA
- **d** Australia

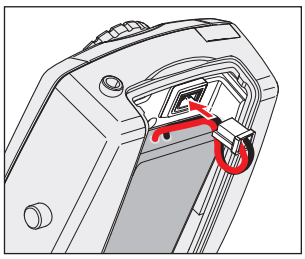
2 Power supply
3 Charging plug

- Fit the power plug adapter required for your power supply into the opening of the power supply. In the event of any doubt which power plug adapter should be used for the power supply unit, you should ask an electrician for advice.

4.2 Connect rechargeable lithium-polymer battery

The lithium polymer battery is already inserted in the battery compartment upon delivery.





1. Open the rechargeable battery compartment cover.
2. Connect the plug of the rechargeable lithium polymer battery to the connector socket.
3. Close the rechargeable battery compartment cover.

   On the Xplorer plus pipette, you will then be prompted to set the date and time (see p. 19).

4.3 Charging the rechargeable battery

WARNING!

Incorrect or damaged power supplies can lead to severe person injury or damage to the device.

Incorrect or damaged power supplies can cause electric shock or cause the device to overheat, catch fire, melt, short circuit or cause similar damage.

- Only use the supplied power supply for charging the device. The correct power supply unit is indicated via the Eppendorf logo and the device name on the power supply.
- Do not use a damaged power supply.

NOTICE!

Loss of full rechargeable battery charging capacity if charged incorrectly.

The supplied rechargeable battery is not charged completely. If the rechargeable battery is not charged completely before it is used for the first time, its charging capacity will remain permanently greatly reduced. The rechargeable battery will only achieve its full capacity after a few discharge/charge cycles.

- Charge the rechargeable battery for at least three hours before it is used for the first time.
- Do not charge the rechargeable battery in a hot location (>60 °C).
- Only charge the rechargeable battery using the supplied power supply.

For identification purposes, the power supply contains a sticker with the name of the compatible devices. The power supply is designed for the 100 V- 240 V range.

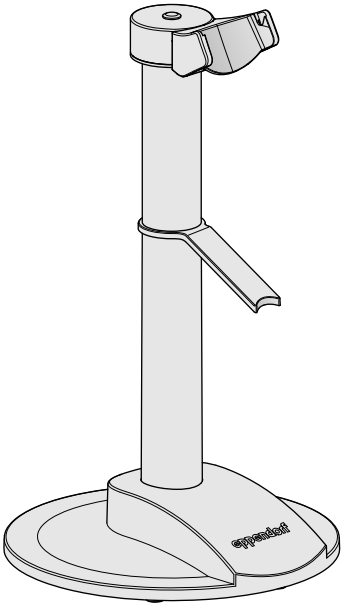
Recharging the rechargeable battery

1. Insert the assembled power supply (order number 4986 603.005) into a power outlet.
2. In the Xplorer pipette check whether a rechargeable battery is inserted and connected.
3. Insert the charging plug of the power supply into the connector socket of the Xplorer pipette. The display briefly shows the connection with the power supply. The charging process is indicated by a flashing rechargeable battery symbol in the display. If the rechargeable battery is almost completely discharged, the display will only switch on after a slight delay.
4. Switch on the **ON** switch to observe the charging process.

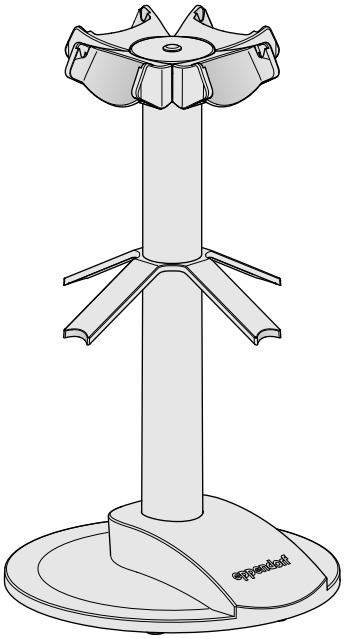
   The pipette can be charged in both switch settings.
5. Charge the rechargeable battery for at least three hours.

   The rechargeable battery will only achieve its full capacity after several discharge/charge cycles.

A 4880 series charger stand or charger carousel can also be used to store and charge single-channel and multi-channel Xplorer pipettes (see Ordering information on the Xplorer CD).



4880 charging stand

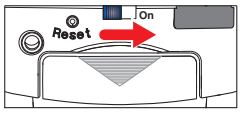


4880 charging carousel

5 Operation

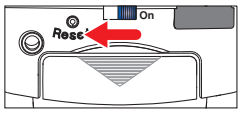
5.1 Switching the pipette on and off

When not in use, the switched on pipette automatically switches to the standby mode after a period of time. The pipette automatically switches back on when it is moved.



Power on

- Switch on the **ON** switch to turn on the pipette.



Power off

- Switch off the **ON** switch to turn off the pipette.

5.2 Setting the *Date* and *Time*

Xplorer plus Only available for the Xplorer plus pipettes

Set the *Date* and *Time* parameters during the initial start-up.

Requirement

- Battery connected (see p. 16).
- Battery charged (see p. 17).
- Pipette switched on (see p. 19).

1. Select *Date* or *Time* using the rocker.
2. Press the *Select* softkey.
3. Change the value using the rocker.
4. Press the *Next* softkey to change the field.
5. Press the *End* softkey to end the entry.
6. Change the second parameter in the same way.
7. Press the *End* softkey to end the entry.

To change the date and time at a later time, change the *Date and Time* parameter in the options (see p. 48).

5.3 Principle of operation

Every Xplorer pipette is equipped with various operating modes and a primary mode for configuring the Xplorer pipette. The adjustable parameters and operational procedures differ in the operating modes.

During operation, the piston in the pipette is moved according to how the rocker is actuated. When you press the rocker up, the piston in the pipette moves up. Liquid is aspirated into the attached pipette tip. When you press the rocker down, the piston in the pipette moves down. The liquid is dispensed into the pipette tip.

Press the *Edit* softkey to open the edit mode of the selected operating mode. Here, you can use the rocker to change the parameter that is outlined and marked red.

Special operating sequences with an electric pipette are possible with dispensing with the rocker. For example, you can cancel a piston movement in the **Dis**, **Pip** and **P/M** modes at any time by pressing the rocker in the other direction. You can cancel the piston movement in the **Ads** and **Man** modes by releasing the depressed rocker. After the piston has been stopped, you can continue the aspiration or dispensing process by pressing the rocker in the corresponding direction.

If the piston is in the basic position, you can repeat the blow-out (*Blow*) at any time by pressing the rocker down.

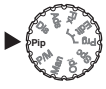
The pipette software is available in several languages. To change the language, change the *Language* parameter in the options (see p. 47).

5.4 Selecting the operating mode

You can set the desired operating mode using the selection dial.

The following operating modes are available:

Selection dial	Mode	Xplorer	Xplorer plus
Ads	Auto dispensing Dispensing partial volumes in a defined interval	●	●
Dis	Dispensing Dispensing uniform partial volumes	●	●
Pip	Pipetting Aspiration and dispensing of liquid	●	●
P/M	Pipetting and Mixing Pipetting with freely selected mixing volume	●	●
Man	Manual pipetting Aspiration and dispensing when the rocker is held pressed down	●	●
Opt	Options Making settings and changing the adjustment	●	●
Spc	Multiple aspiration Aspiration of uniform partial volumes and combined dispensing (reverse dispensing)		●
	Diluting For diluting a sample or reagent		●
	Sequential dispensing Functions like dispensing mode with a fixed sequence of various volumes		●
	Reverse pipetting Functions like the pipetting mode, but in reverse order		●
	Sequential pipetting For creating pipetting series with various volumes		●
Prg	Program Execute saved dispensings		●
Edit	Editing Procedure programs and pipettings with fixed volumes		●
Fix	Pipetting with fixed volumes Procedure pipettings with fixed volumes.		●



▸ To select an operating mode, turn the selection dial to the selected mode.

***Xplorer** plus*	Only available for the Xplorer plus pipette

If you have selected the **Spc** operating mode:

1. Use the rocker to select the required operating mode from the list.
2. Press the *Select* softkey.

5.5 Setting the parameter (edit mode)

Requirement

- Pipette switched on (see p. 19)
- Operating mode selected (see p. 21)

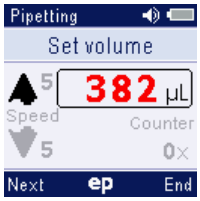
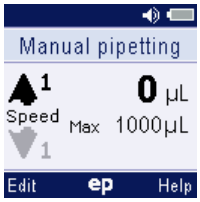
Change the parameters as follows:

1. Press the *Edit* softkey to open the edit mode.
2. Press the *Next* softkey to go to the next dispensing parameter.
3. Change the dispensing parameter marked in the display with the rocker.
4. Press the *End* softkey to save the changes, to exit the edit mode and to continue with dispensing.

If you want to cancel editing without saving the changes made, briefly turn the selection dial to another mode.

You can change the *Speed*, *Time*, *Cycles* and *Counter* parameters during the dispensing.

▸ Press the *Edit* softkey during the execution.

Set volume Aspiration and dispensing volume. You can change the speed that the Xplorer pipette uses to change the volume under the *Rocker setting* parameter in the options.	
Set max. volume Maximum aspiration and dispensing volume. The set value appears after editing in the display next to *Max*.	
Set volume/step Volume per dispensing step. The maximum number of aspiration steps (*Steps*) will be displayed when the *Set volume/step* is changed.	
Aspiration speed Aspiration speed 8 levels are available. The higher the numerical value, the higher the speed. *Aspiration speed* will be automatically and approximately used for the blow-out (*Blow*).	

Dispensing speed

Dispensing speed

8 levels are available. The higher the numerical value, the higher the speed.

Dispensing speed will be automatically and approximately used for the blow-out (Blow).

Set time

Interval between the dispensing step (0.1 s to 10 s).

Number of steps

Number of dispensing steps

The available number of dispensing steps depends on the setting for *Set volume/step* and is automatically set to the maximum number when *Set volume/step* is edited.

Under steps 1/5 in the "Sequential dispensing" mode, the selected number of dispensing steps will be displayed to the right, and the dispensing step for the displayed volume will be shown at the left.

Set counter

The counter counts the number of dispensing operations performed. The numerical value of the counter is increased by *1* when the piston reaches the basic position after dispensing.

If the piston is in the basic position, you can alternatively set the counter to *0* by turning the selection dial forward or backward.

You can switch the counter on and off in the Options.

Mixing volume

The mixing volume used after pipetting. If you change the pipetting volume under *Set volume*, the mixing volume changes accordingly.

Mixing cycles

1 to *99* mixing cycles can be set for the mixing volume. The mixing cycles are counted down to *0*. If you keep the rocker pressed down during mixing, after *0* has been reached, mixing is continued until the rocker is released. If you press the rocker up during mixing, the mixing process is stopped.

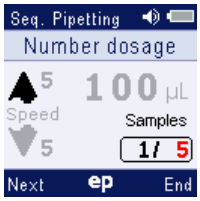
The mixing speed matches the selected speed for aspiration and dispensing.

Set sample vol.

Volume of the sample or reagent

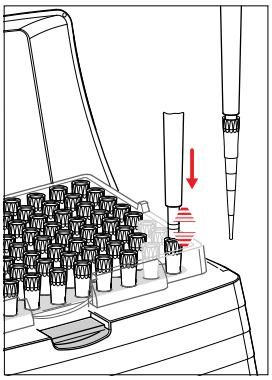
The maximum potential diluent volume will be automatically set if the volume of the sample is changed.

***Xplorer** plus*

Set air volume Volume of the air bubble The maximum potential diluent volume will be automatically set if the volume of the air bubble is changed. ***Xplorer** plus*	
Set diluent vol. Volume of the dilution solution (diluent) The maximum potential diluent volume will be automatically set if the volume of the sample or the air bubble is changed. ***Xplorer** plus*	
No. dosage Number of executed dispensings. A maximum of 10 steps are available. The selected number of dispensings will be shown in red under *Samples* 1/ 5at the right of the display. The active dispensing step will be activated by the number at the left. ***Xplorer** plus*	

5.6 Using pipette tips

The liquid to be dispensed is aspirated into pipette tips. We recommend using epT.I.P.S. epT.I.P.S. pipette tips, which are available with various degrees of purity, with and without filters and as special tips. We recommend using special epT.I.P.S. LoRetention tips with liquids that have a lower surface tension than water (e.g., due to a wetting agent in the liquid).



The pipette is only functional if a pipette tip has been attached. You can either attach the pipette tip by hand or directly insert the end of the pipette into a tip held in the tip storage box. If attaching a pipette tip by hand, it must be handled in a way that prevents contamination and heating of the pipette tip.

The color of the rocker of the Xplorer pipette matches the color of the epT.I.P.S. tray.

- Fit the suitable pipette tip(s) on the tip cone, applying light pressure.

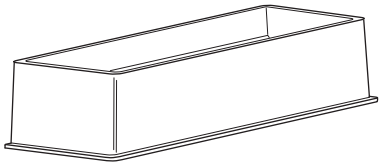
The pipette tip is securely fitted to the tip cone when it responds with spring-loaded action (exceptions: no spring loading action with 5 mL and 10 mL single-channel pipettes and with 1 200 µL multi-channel pipettes).

You can deactivate the spring loading action of the tip cone on single-channel pipettes.

5.7 Tips for correct pipetting

To achieve the highest precision and accuracy, we recommend observing the following hints:

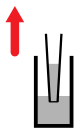
5.7.1 Preparation



Reagent reservoir Tip-Tub

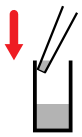
- Always place the liquid in a suitable tube. For multi-channel pipettes, we recommend reagent reservoir Tip-Tub as a liquid reservoir. The liquid and the pipette should have approximately the same temperature.
- Use epT.I.P.S. To minimize residual moisture in the tip after dispensing, LoRetention for solutions containing surfactants.
- Use ep Dualfilter T.I.P.S. to prevent aerosol contamination in the tip.
- Use the pipette tips only once.
- Check whether the set aspiration and dispensing speeds are suitable for the liquid. The blow-out (Blow) will be conducted at approximately the same speeds.

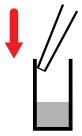
5.7.2 Aspirating liquid



1. Wet the new pipette tip by aspirating and dispensing the liquid to be pipetted one to three times.
2. Vertically immerse the pipette tip into the liquid approx. 4 mm during aspiration.
3. Press the rocker up to aspirate liquid. Maintain the immersion depth, to ensure no air is accidentally aspirated.
4. For large volumes, keep the pipette tips in the liquid for approx. 3 seconds after aspiration.
5. After aspiration, slowly pull the pipette tip out of the liquid.
6. Wipe the pipette tip slowly against the tube wall to ensure that no outer wetting remains on the pipette tip.

5.7.3 Dispensing liquid





1. When dispensing liquid, place the pipette tip at a slight angle against the wall of the tube.
2. Press the rocker down to dispense the liquid.
3. After dispensing, wait until no more liquid is dispensed.
4. Press the rocker down again to trigger the blow-out (Blow).

The following information applies especially to high viscous solutions:

- During the blow-out (Blow), keep the rocker pressed down if the liquid is flowing out at a slow rate to ensure that the liquid can securely flow out. If you keep the rocker pressed during the blow-out (Blow), the piston in the pipette will remain at its lowest position.
- Wipe any outer wetting against the wall of the tube while holding the rocker pressed down.
- Leave the dispensing vessel with the rocker pressed down. The rocker may only be released outside of the dispensing vessel. The piston will only move to its basic position after the rocker has been released.
- Press the rocker down again to repeat the blow-out (Blow) as necessary.

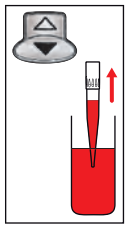
Stopping the piston movement

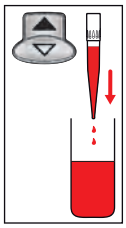
Pressing the rocker in the other direction when the piston is still moving will stop the piston movement. You can then move the piston either up or down by pressing the rocker in the corresponding direction. Pressing the rocker up will abort a mixing process.

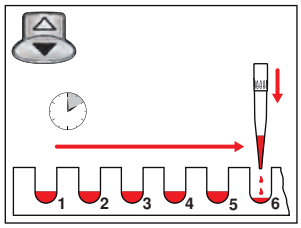
Operating modes with the rocker pressed down: in the **Man** mode, the ongoing piston movement is immediately stopped by releasing the rocker. In the **Ads** mode, an ongoing dispensing step is completed after the rocker is released. The next dispensing step is only performed when the rocker is pressed accordingly.

5.8 Automatic dispensing (Ads dial setting)

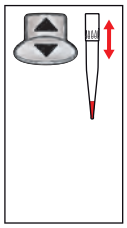
In the *Auto dispensing* (**Ads**) mode, aspirate liquid and dispense it in uniform partial volumes in selected time intervals. The reverse stroke and remaining stroke are triggered before or after the dispensing steps. These additional volumes may result in volume limits when using filter tips (see p. 43).


Aspiration


Reverse stroke



Auto dispensing


Aspirate or empty

Requirement

- Pipette switched on (see p. 19)
- *Auto dispensing* (**Ads**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
   Then follow the instructions in the display.
2. Press the rocker down to trigger the reverse stroke.
3. Keep the rocker pressed for the duration of dispensing. After the first dispensing step, the following dispensing steps are triggered with the displayed time interval (*Time*).

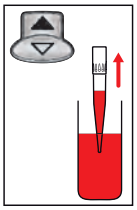
- Press the *Empty* softkey to cancel dispensing. The tip is completely emptied.
- When you release the rocker, an ongoing dispensing operation is still being completed. The display shows the possible dispensings under *Steps*. Press the rocker again to continue dispensing.

After dispensing, decide whether the residual liquid should be dispensed or liquid should be aspirated again.

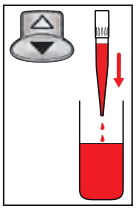
- **Liquid aspiration**: press the rocker up once.
- **Liquid dispensing**: press the rocker down twice.

5.9 Dispensing (Dis dial setting)

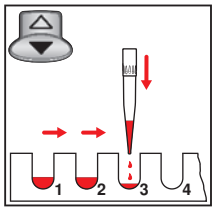
In the *Dispensing* (**Dis**) mode, liquid is aspirated and individually dispensed in uniform partial volumes. The reverse stroke and remaining stroke are triggered before or after the dispensing steps. These additional volumes may result in volume limits when using filter tips (see p. 43).



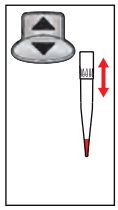
Aspiration



Reverse stroke



Dispensing



Aspirate or empty

Requirement

- Pipette switched on (see p. 19)
- *Dispensing* (**Dis**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
2. Press the rocker down to trigger the reverse stroke.
3. Press the rocker down again for each dispensing operation. The display indicates the remaining dispensing steps under *Steps*.

After dispensing, decide whether the residual liquid should be dispensed or liquid should be aspirated again.

- **Liquid aspiration**: press the rocker up once.
- **Liquid dispensing**: press the rocker down twice.

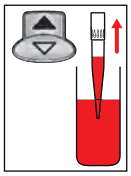
- Press the *Empty* softkey to cancel dispensing. The tip is completely emptied.
- Press the rocker up to stop a current dispensing of a large dispensing volume.

- Free jet dispensing may be used to dispense aqueous solutions with a volume of approximately 20 µL or more. We recommend wall dispensing for dispensing aqueous solutions with a smaller volume.
- Select level *8* for the *Speed* parameter when using use free jet dispensing and if the geometry of the dispensing tube permits this action.
- If you dispense liquid in the free jet, the reverse stroke must also be dispensed in the free jet. If a drop then forms on the pipette tip, it is included in the first dispensing volume.
- For wall dispensing, trigger the reverse stroke with the pipette tips on the tube inner wall.
- During dispensing, do not switch between free jet dispensing and wall dispensing.

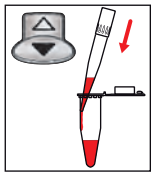
5.10 Pipetting (Pip dial setting)

5.10.1 Standard pipetting

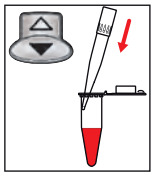
Aspirate a liquid and then dispense it again in the *Pipetting* (**Pip**) mode. The blow-out can be performed manually or automatically using the dispensing step.



Aspiration



Dispensing



Blow-out

Requirement

- Pipette switched on (see p. 19)
- *Pipetting* (**Pip**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
2. Press the rocker down to dispense the liquid.

   If dispensing and blow-out (Blow) are carried out in a single step, hold the rocker pressed down during dispensing.
3. If you keep the rocker pressed during the blow-out (Blow), the piston moves to the lowest position and remains there until the rocker is released.

Hold the rocker pressed down to trigger dispensing and blow-out (Blow) in a single step.

Dispense the liquid against the tube inner wall if you are determining the systematic and random errors.

If you only hold the rocker pressed down during the blow-out (Blow) after dispensing, the piston remains in the lowest position. The piston will only return to the basic position after the rocker has been released. This presents the following advantages:

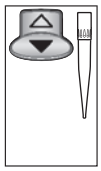
- If you pipette liquid that drains slowly, you can allow this liquid to flow out.
- You can immerse the pipette tip in the target liquid to prevent unintentional aspiration.

- You can trigger the blow-out (Blow) any time the piston is in the basic position. Press the rocker down.
- Press the rocker in the opposite direction if you would like to stop aspiration or dispensing while it is in progress. The display shows the volume present in the pipette tip after the respective operation has been stopped. You can then continue with liquid aspiration or dispensing.
- The number of dispensing steps performed can be counted with a counter (*Counter*). The counter can be activated (*Counter*) if desired (see p. 42).

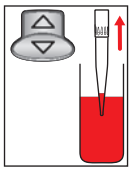
5.10.2 Reverse pipetting

Reverse pipetting is advantageous for plasma, serum and other liquids with a high protein content. Reverse pipetting is not necessary for pipetting aqueous solutions. By using the blow-out, more liquid is aspirated with reverse pipetting than with standard pipetting. These additional volumes may result in volume limits when using filter tips (see p. 43). During dispensing, the blow-out (Blow) does not belong to the dispensing volume.

Xplorer plus Use the *Rev. Pipetting* operating mode for the Xplorer plus pipette (see p. 37).

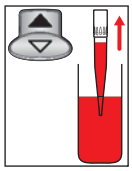


Keep the rocker pressed down

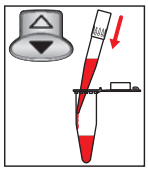


Release the rocker

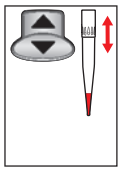
Aspirate blow-out



Aspiration



Dispensing



Aspirate or empty

Requirement

- Pipette switched on (see p. 19)
- *Pipetting* (**Pip**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Keep the rocker pressed down.
2. Immerse the pipette tip in the liquid.
3. Release the rocker to aspirate the blow-out.
4. Press the rocker up to aspirate the dispensing volume.
5. Place the pipette tip on the wall of the target tube.
6. Press the rocker down to dispense the liquid.
7. Remove the pipette tip from the destination tube. Residual liquid remains in the tip.

There are two courses of further action:

Aspirate the same liquid from the same reservoir tube

▸ Press the rocker up to aspirate the same liquid. The residual liquid in the tip is used for further processing.

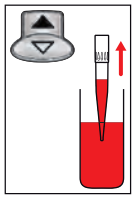
Dispense a different liquid

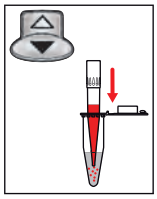
1. Press the rocker up to discard the residual liquid in the tip.
2. Press the ejector to eject the pipette tip.

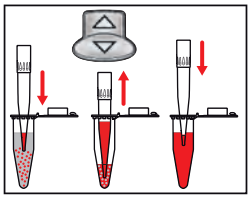
Use a new pipette tip for the next dispensing operation.

5.11 Pipetting and mixing (P/M dial setting)

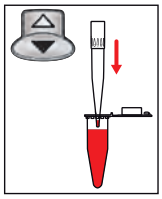
Aspirate a liquid and then dispense it again in the *Pipetting+Mix* (**P**/**M**) mode. Afterwards, an adjustable number of mixing cycles is automatically triggered. The mixing cycles can be continued as often as required.


Aspiration


Dispensing


Release the rocker

Auto mixing


Blow-out

Requirement

- Pipette switched on (see p. 19)
- *Pipetting+Mix* (**P**/**M**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
2. Press the rocker down to dispense the liquid and start the selected mixing cycle.

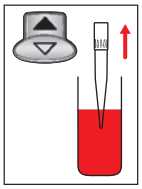
   The mixing cycles shown under *Cycles* in the main field of the display are reduced by *1* with each cycle.
3. After the mixing process, press the rocker down to trigger the blow-out (Blow).

   If you keep the rocker pressed during the blow-out, the piston moves to the lowest position and remains there until the rocker is released.

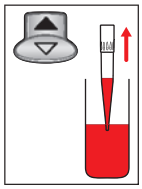
- Press the rocker down to stop the aspiration.
- Press the rocker up to stop the dispensing or current mixing cycle.
- Hold the rocker pressed down during the mixing cycles to conduct an unlimited number of mixing cycles. The current mixing cycle will still be completed after the rocker has been released.

5.12 Manual pipetting (Man dial setting)

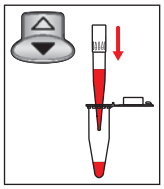
In the *Manual Pipetting* (**Man**) mode, use the Xplorer pipette like a manual dispenser. The maximum aspiration volume can be limited if required. Aspiration can be stopped or continued, or the direction can be changed, as often as required.



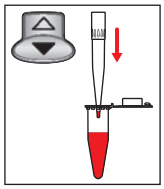
Aspiration



Aspiration



Dispensing



Blow-out

You can set a maximum aspiration volume using the *Set max. volume* parameter. The maximum aspiration volume will be displayed during the dispensing (*Max*).

Requirement

- Pipette switched on (see p. 19)
- *Manual Pipetting* (**Man**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. To aspirate or dispense liquid, press the rocker up or hold it pressed down. The piston movement stops when the rocker is released.

   The display shows the liquid volume in the pipette tip.

2. If the piston is in the basic position, you can trigger the blow-out (Blow) any time by pressing the rocker down.

   If you keep the rocker pressed during the blow-out (Blow), the piston moves to the lowest position and remains there until the rocker is released.

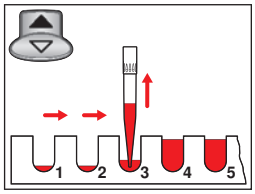
5.13 Special operating modes

The Xplorer plus pipette also features 5 additional special operating modes (see p. 21). If you have never worked with the Xplorer pipette, we recommend becoming familiar with one of the simple operating mode first, e.g., *Pipetting* or *Dispensing*. If you turn the selection dial to the **Spc** dial setting, the special operating modes will be shown in a selection list in the display.

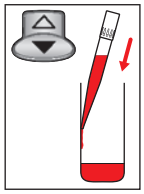
5.13.1 Multiple aspiration (Aspirate) (Spc dial setting)

Xplorer plus Only available for the Xplorer plus pipette

A specific volume will be aspirated in the *Multi-Aspirate* mode several times. All of the liquid will be dispensed after the aspiration. The *Multi-Aspirate* mode is the opposite of the dispensing mode.



Aspirating partial volumes


Dispensing

Requirement

- Pipette switched on (see p. 19)
- *Multi-Aspirate* (**Spc**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

The *Set volume/step* parameter determines the volume to be aspirated for each step. The maximum number of aspiration steps (*Steps*) will be displayed when the *Set volume/step* is set.

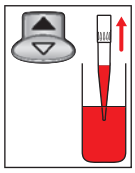
1. For every aspiration, press the rocker up to aspirate liquid.
   The following message appears in the display after the aspiration has been completed:*Piston is in top position! Press rocker down!*
2. Press the rocker down to dispense all of the liquid.
3. Press the rocker down again to trigger the blow-out (*Blow*).
4. If the piston is back in the basic position: press the *Back* softkey to exit the mode.

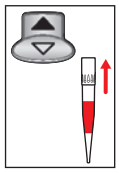
5.13.2 Diluting (Spc dial setting)

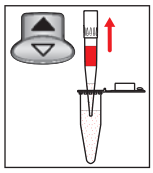
Xplorer plus Only available for the Xplorer plus pipette

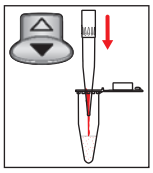
Two different liquids are aspirated in the *Diluting* mode. These liquids are separated by an air bubble. The *Diluting* mode is suitable for diluting samples and reagents using an appropriate dilution solution (diluent). First, the diluent is aspirated, then the air bubble, and finally the sample or reagent.

Because both liquids are aspirated in a single pipette tip, the sample or reagent may be slightly contaminated by the dilution solution.


Diluent


Aspirating the air bubble


Aspiration of the sample or reagent


Dispensing

Requirement

- Pipette switched on (see p. 19)
- *Diluting* (**Spc**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

For execution, the parameter sequence is carried out in the reverse order of the editing process. The next volume to be aspirated will be shown in the display with a border around it.

1. Press the rocker up to aspirate the diluent.
2. Press the rocker up to aspirate the air bubble.
3. Press the rocker up to aspirate the sample or reagent.
4. Press the rocker down to dispense all of the liquid.
5. Press the rocker down to trigger the blow-out *Blow*.
6. If the piston is in the basic position: press the *Back* softkey to exit the mode.

Set a high value for the *Dispensing speed* parameter to achieve a good mixture for the dispensing.

To create a very high mixture, you can enter the "Diluting" mode with the Pipetting and Mixing mode (P/M) as the program (see p. 39).

Examples:

Required auxiliary aids:

- Xplorer plus with a nominal volume of 1 000 µL
- Dispensing tube (1.5 mL)

Example 1 - total volume 500 µL, dilution 1:10

- Diluent: 450 µL
- Air bubble: 300 µL - 500 µL
- Sample or reagent: 50 µL

Example 2 - total volume 900 µL, dilution 1:10

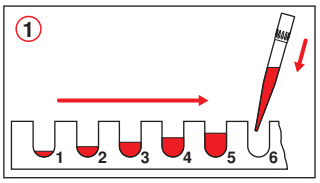
- Diluent: 810 µL
- Air bubble: 100 µL
- Sample or reagent: 90 µL

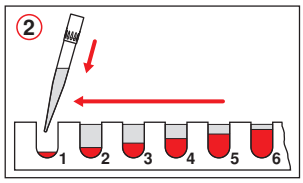
Example 3 - total volume 1 000 µL, dilution 1:10

- Diluent: 900 µL
- Air bubble: 0 µL
- Sample or reagent: 100 µL

5.13.3 Sequential dispensing (Spc dial setting)

Xplorer plus	Only available for the Xplorer plus pipette
	Up to 10 different volumes can be dispensed in the *Seq. Dispensing* mode. The sum of the dispensing volumes may not exceed the pipette tip filling volume. This mode is well suited for dilution series. The *Seq. Pipetting* mode is also well suited for dilution series. To conduct a dilution series, dispense two different liquids in the opposite direction. This allows you to achieve different dilutions with the same volume per tube.
ℹ	If the sum of the dispensing volumes exceeds the volume of the pipette tip: create a program and execute the mode several times in a row.





Requirement

- Pipette switched on (see p. 19)
- *Seq. Dispensing* (**Spc**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
2. Press the rocker down to execute the reverse stroke.
3. Press the rocker down for each dispensing step.
4. If the piston is in the basic position: press the *Back* softkey to exit the mode.

Example

Required auxiliary aids:

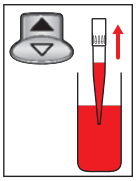
- Xplorer plus with a nominal volume of 300 µL
- 4 dispensing tubes (200 µL)

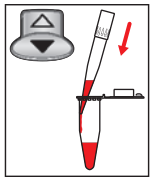
	Tube 1	**Tube 2**	**Tube 3**	**Tube 4**
Volume/step ➡	30 µL	60 µL	90 µL	120 µL
Volume/step ⬅	120 µL	90 µL	60 µL	30 µL
Dilution 1+X	1+4	1+1.5	1+0.67	1+0.25
Dilution 1:Y	1:5	1:2.5	1:1.67	1:1.25
Tube sum	150 µL	150 µL	150 µL	150 µL

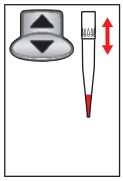
5.13.4 Reverse pipetting (Spc dial setting)

Xplorer plus Only available for the Xplorer plus pipette

The *Rev. Pipetting* mode is well suited for plasma, serums and other liquids with a high protein content. The *Pipetting* mode is also well suited for aqueous solutions (see p. 29). The *Rev. Pipetting* mode is also well suited for solutions containing wetting agents, in order to minimize the formation of foam during dispensing in the target tube. The liquid is aspirated using blow-out (*Blow*). The blow-out is not part of the dispensing volume and may not be dispensed into the target tube. If you use the same liquid again, the blow-out may remain in the tip. If you use a different liquid, discard the blow-out and the pipette tip.


Aspiration


Dispensing


Aspirate or empty

Requirement

- Pipette switched on (see p. 19)
- *Rev. Pipetting* (**Spc**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate the blow-out and the liquid to be dispensed.

   The aspiration of the dispensing volume and blow-out will be displayed under the dispensing volume with the label *+ Blow* ▲.

2. Press the rocker down to dispense the liquid.

   The piston returns to the basic position. Liquid remains in the tip after the dispensing volume has been dispensed.

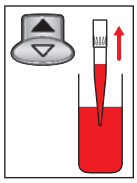
   - Press the rocker up to aspirate the same liquid.
   - Press the rocker down to end the pipetting and discard the blow-out (*Blow*).

If necessary, activate the *Counter* setting in the (see p. 42)options to count the executed dispensings using the pedometer.

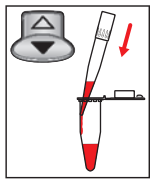
5.13.5 Sequential pipetting (Spc dial setting)

Xplorer plus Only available for the Xplorer plus pipette

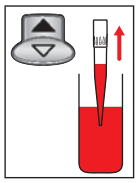
In the *Seq. Pipetting* mode, a maximum of 10 different pipetting volumes are dispensed in a fixed sequence. This mode is well suited for dilution series. The *Seq. Dispensing* mode is also well suited for dilution series. The random error (precision) and systematic error (accuracy) are better for pipetting than with dispensing. The *Seq. Pipetting* mode offers more flexibility with the volume selection than the *Seq. Dispensing* mode.



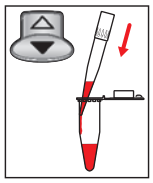
Aspiration



Dispensing



Aspiration



Dispensing

Requirement

- Pipette switched on (see p. 19)
- *Seq. Pipetting* (**Spc**) operating mode selected (see p. 33)
- Parameters set (see p. 22)
- Pipette tip attached (see p. 24)

1. Press the rocker up to aspirate liquid.
2. Press the rocker down to dispense the liquid.
3. Press the rocker downward after the dispensing to execute the blow-out (*Blow*).
4. If the piston is in the basic position: press the *Back* softkey to exit the mode.

- After each dispensing, you can repeat the blow-out (*Blow*) as many times as you would like by pressing the rocker down.
- Observe the information on the blow-out (*Blow*) (see p. 29).

5.14 Program (Prg dial setting)

Xplorer plus Only available for the Xplorer plus pipette

Previously stored programs can be executed in the *Program* (**Prg**) operating mode. Programs consist of 1-4 combined operating modes in a defined sequence. Up to 10 different programs can be created (see *Editing (Edit dial setting) on p. 39)*.

Requirement

- Pipette switched on (see p. 19)
- *Program* (**Prg**) operating mode selected (see p. 33)
- Program created (see p. 39)
- Pipette tip attached (see p. 24)

1. Select the program using the rocker.
2. Press the *Select* softkey.
   The execution of the program depends on the operating modes used.

The blow-out (*Blow*) must always be executed In the "Pipetting" mode.

5.15 Editing (Edit dial setting)

Xplorer plus Only available for the Xplorer plus pipette

Programs and pipettings with fixed volumes can be created and edited in the *Edit* mode. Stored programs can be executed in the *Program* (**Prg**) mode. Stored programs with fixed volumes can be stored in the *Fixed volumes* (**Fix**) mode. If necessary, programs and pipettings with fixed volumes can be password protected using the *Pswrd. protection* option.

Requirement

- Pipette switched on (see p. 19)
- **Edit** operating mode selected (see p. 33)

1. Selected the required option using the rocker.
2. Press the *Select* softkey.
   The next steps are described in the following subchapters.

5.15.1 *Pswrd. protection*

You can protect the *Edit* mode using a four-digit, numerical password. This prevents stored programs and pipettings from being changed. The passwords for the *Edit* mode and *Adjustment* option may vary. The password can be changed or deactivated after it has been entered. If you lose your password, please contact Eppendorf AG Application Support to request a temporary (*Master key*) password. Have your pipette ready during your phone call with Application Support. Or you can trigger an *Initial reset*; all stored data is lost during an *Initial reset*. The Xplorer plus pipette will be reset to the factory settings.

If you lose the password for the *Edit* mode, you will not be able to change any programs or pipettings with fixed volume.

1. Press the rocker upward to activate the password protection.
   ON appears in the display.
2. Press the *Select* softkey.
3. Use the rocker to select the digit.
4. Press the *Next* softkey to switch to the next field.
5. Enter data in all of the fields.
6. Press the *Save* softkey to save the password.
7. Reenter the password after completing the saving procedure. Press the *Enter* softkey.
   Password protection is now active.

5.15.2 *Fixed volume*

Creating a new pipetting

1. Select the *New fixed volume* entry using the rocker.
   The parameters of the most recently used pipetting will be displayed when the *New fixed volume* entry is opened. Up to 10 fixed volumes can be saved.
2. Press the *Edit* softkey.
3. Change the parameters as you did in the *Pipetting* mode.
4. Press the *Save* softkey.
   The saved pipetting now appears in the *Fixed volumes* (**Fix**) operating mode with dispensing volume, aspiration speed and dispensing speed (see p. 42).

Changing saved pipettings

1. Select the pipetting using the rocker.
2. Press the *Select* softkey.
3. Select the *Edit* option.
4. Press the *Select* softkey.

5.15.3 *Programm*

Creating a new program

1. Select the *New program* entry using the rocker. Up to 10 programs can be saved.

   You will be prompted to name the program. You can enter a name with a maximum of six characters.

The program name cannot be changed later. Copy the program to change the name. You will be prompted to enter a new name. Then delete the original program.

2. Select the characters using the rocker.
3. Press the *Next* softkey to switch to the next field.
4. Press the *Save* softkey to save the name.
5. Select the first operating mode. All operating modes except *Manual Pipetting* are available.
6. Press the *Edit* softkey.
7. Change the parameters of the mode as usual (see p. 22).
8. Press the *Save* softkey.

   A list with all of the previously saved program modes appears.

   - Press the *Next* softkey to add another mode. A program can contain up to 4 modes.
   - Press the *Save* softkey to save the program. The saved program now appears in the *Program* (**Prg**) operating mode (see p. 39).

Changing the saved program

Requirement

To change the mode of a program, the program needs to be saved first.

1. Select a saved program from the list.
2. Press the *Select* softkey.

Select the *Copy* option to create a program based on another program. You must then enter a name for the copied program. If you only want to change the name of a program, select the *Copy* option.

3. Select the *Edit* option.
4. Press the *Select* softkey.
   - Select the *Edit mode* option to change a program mode.
   - Select the *Insert mode* option to add a mode to the program.
   - Select the *Delete mode* option to delete a program mode.

5.16 Pipetting with fixed volume (Fix dial setting)

Xplorer plus Only available for the Xplorer plus pipette

Previously stored programs with fixed volumes can be executed in the *Fixed volumes* (**Fix**) mode. Up to 10 different pipettings can be created (see *Editing (Edit dial setting) on p. 39)*. 3 fixed volumes are predefined upon delivery:

- 10 % of the nominal volume
- 50 % of the nominal volume
- 100 % of the nominal volume

The aspiration speed ▲and dispensing speed ▼are displayed to the right of the fixed volume.

Requirement

- Pipette switched on (see p. 19)
- *Fixed volumes* (**Fix**) operating mode selected (see p. 42)
- Pipetting with fixed volume created (see p. 39)
- Pipette tip attached (see p. 24)

1. Select the pipetting using the rocker.
2. Press the *Select* softkey.
3. Press the rocker up to aspirate liquid.
4. Press the rocker down to dispense the liquid.
5. Press the rocker downward after the dispensing to execute the blow-out (*Blow*).

5.17 *Option* (Opt dial setting)

You can set the following options, which apply to all operating modes in the *Option* mode.

Requirement

- Pipette switched on (see p. 19)
- *Option* operating mode selected (see p. 33)

1. Select the option using the rocker.
2. Press the *Select* softkey to open the option.
3. Change the option using the rocker.
4. Press the *End* or *Back* softkey to exit the option.
5. Turn the selection dial to an operating mode to exit the options and to continue with dispensing operations.

▶ Press the *Help* softkey to display information on the selected option.

5.17.1 *General help*

This describes the elementary steps for all modes. This option does not contain any adjustable parameters. The help texts in the Xplorer are not a substitute for reading the operating manual.

5.17.2 *Volume limit*

This limits the aspiration volume in all dispensing modes.

- After a volume limit has been set, a note will be shown in the display when the **Pip**, **P/M** and **Man** operating modes are edited and when the volume limit has been reached. In this mode, too large dispensing volumes will be automatically reduced to the defined volume limit. The number of potential dispensing steps will be automatically limited in the **Dis** and **Ads** modes.
- If the corresponding volume is above the defined volume limit, saved dispensing can no longer be executed under *History* and under the **Spc**, **Prg** and **Fix** modes. The volume can be changed in the corresponding mode or the **Edit** mode.

Use the volume limit in the following cases:

- For strongly foaming solutions in order to prevent contamination of the tip cone or the protection filter.
- When using ep Dualfilter T.I.P.S. in the **Ads**, **Dis** and **Pip** modes (reverse pipetting) and the Xplorer plus *Rev. Pipetting* mode. For these three versions, there is a risk of the liquid coming into contact with the dualfilter because of the additional volumes during aspiration.
- For pipette tips or filter tips whose aspiration volume is smaller than the nominal volume of the Xplorer pipette.

ep Dualfilter T.I.P.S.	**Volume limit**	
	Ads/Dis	**Reverse pipetting**
10 µL	Not required	Not required
100 µL	Not required	Not required
200 µL	Not required	Not required
300 µl	270 µL	260 µL
1 000 µL	Not required	950 µL
1 250 µL Long*	Not required	1 130 µL
5 mL	4.9 mL	4.6 mL**
10 mL*	9.75 mL	8.5 mL**
	* When using these filter tips we recommend using the *epTIPS long* adjustment to increase the accuracy of dispensing. The specified volume limit only applies to the changed adjustment. ** We also recommend this volume limit for "Reverse Pipetting" when using 5 mL and 10 mL epT.I.P.S. without filter.	

Other volume limits may apply when using filter tips from other manufacturers. The volume limit differs depending on the tip geometry and the position of the filter in the tip.

The volume limit is dependent on the additional aspirated volumes of the Xplorer pipette. On the Xplorer the individual nominal volumes result in different additional volumes.

Xplorer Single-channel and multi-channel	Additional aspiration volumes	
	Ads/Dis	Reverse pipetting
10 µL	Approx. 0.6 µL	Approx. 2 µL
100 µL	Approx. 7 µL	Approx. 20 µL
300 µl	Approx. 20 µL	Approx. 60 µL
1 000 µL	Approx. 65 µL	Approx. 200 µL
1 200 µL	Approx. 140 µL	Approx. 220 µL
5 mL	Approx. 0.3 mL	Approx. 1 mL
10 mL	Approx. 0.55 mL	Approx. 1.8 mL

5.17.3 *Counter*

The counter provides information on the dispensing operations performed in the **Pip** mode. You can switch the counter on and off using the rocker. After you select the **Pip** mode, an activated counter shows *0*. The value can be changed in the **Pip** mode.

5.17.4 *Ejector reset*

When (*ON*) is activated, the piston moves to the basic position when a filled pipette tip is ejected.

CAUTION!

Unintended dispensing when the *Ejector reset* option is activated.

- When working with a removed ejector sleeve, set the *Ejector reset* option to *OFF* to prevent unintentional dispensing from the pipette tip in case the ejector is accidentally pressed.

5.17.5 *History*

If you activate the *History* option, the *History* softkey will be activated instead of the *Help* softkey for most of the operating modes. The last 10 dispensing settings of the active mode can be accessed using the *History* softkey. The dispensing steps appear in chronological order. Dispensing settings will only be stored if the *History* option is activated.

5.17.6 *Rocker setting*

The change speed of the volume in the editing mode can be adjusted to suit your needs. 8 levels are available (1 = slow, 8 = very fast). Level 5 is set upon delivery.

5.17.7 *Sound level*

You can change the sound volume of the acoustic signals. At *0* volume, the sound is switched off and the symbol will not be displayed.

5.17.8 *Brightness*

The display brightness can be adjusted to meet your needs.

5.17.9 *Adjustment*

- Changing the adjustment will change the dispensing volume and affect the accuracy of the Xplorer pipette! Carry out a gravimetric test of the adjustment.
- Every Xplorer pipette whose adjustment has been changed must be marked with a clearly visible label that indicates the type of change made. This ensures that other users will be informed of the changes to the adjustment, in addition to the information provided in the header of the display.
- You can overwrite a selected adjustment by selecting another adjustment. The applicable symbols for the new adjustment will be shown in the display header (see p. 10).
- For the Xplorer plus, the adjustment can be protected with a password (see *Pswrd. protection on p. 47)*.

Instructions on performing the adjustment can be found in the *Adjustment* document on the Xplorer CD.

The adjustment of the Xplorer pipette can be changed to suit your needs. If you have disabled the factory settings, the ✓ symbol and at least one additional symbol appear in the display header. Before changing an adjustment, make sure to read the chapters "Display" (see p. 10)and "General information about adjustment" (see p. 61).

The following adjustments can be selected:

- *Factory settings*

  Resets the adjustment to the factory setting.

- Liquid type: *Ethanol 75%*

  The factory setting is changed by a factor in order to allow 75% ethanol to be dispensed with higher accuracy. The internally used factor takes into account the density and the following work technique in the **Pip** mode:

  1. Wet the tip with liquid three times at room temperature. Hold the Xplorer pipette in an upright position. Avoid outer wetting during dispensing.
  2. Use speed level 5 (standard setting) for aspiration and dispensing.
  3. Dispense liquid against the tube wall of the destination tube.
  4. Trigger a blow-out (Blow) approx. 2 seconds after dispensing. Then eject the tip.

- Liquid type: *Glycerol 50%*

  The factory setting is changed by a factor in order to allow 50% glycerol to be dispensed with higher accuracy. The internally used factor takes into account the density of the 50% glycerol and the same work technique as described previously for *Ethanol 75%* in the **Pip** mode.

- *epTIPS long*

  In addition to the "standard tips", a second longer tip is available for most Xplorer pipettes. When *epTIPS long* is selected, the tip geometry of this longer tip is taken into account in the internal volume calculation. This reduces the systematic error of dispensing when using these tips.

Xplorer Nominal volume Volume range	Color code Xplorer rocker	The adjustment for epTIPS long applies only to		
		Color code epT.I.P.S.	Model epT.I.P.S.	Length epT.I.P.S.
10 µL 0.5 - 10 µL	medium gray	light gray	20 µL Long	46 mm
100 µL 5 - 100 µL	yellow	orange	300 µl	55 mm
300 µL 15 - 300 µL	orange	not available		
1 000 µL 50 - 1 000 µL	blue	dark green	1 250 µL Long	103 mm
1 200 µL 50 - 1 200 µL	green	dark green	1 250 µL Long	103 mm
5 mL 0.25 – 5 mL	purple	not available		
10 mL 0.5 – 10 mL	turquoise	turquoise	10 mL Long	243 mm

You can select volumes ≤0.2 mL for the 5 mL Xplorer. No technical data has been specified for the 0.2 mL – 0.5 mL volume range.

The epT.I.P.S. specified here are also available as epDualfilter T.I.P.S.

- *Altitude*

  The aspiration volume of a piston-stroke pipette is reduced at increased altitudes, which entail a fall in air pressure. The average air pressure at the corresponding height is used to correct the stroke. The altitude can be selected in 250 m (820 ft) increments. 5 000 m is the maximum altitude that can be selected.

  The Xplorer pipette is set to an altitude of 0 m upon delivery. This is the factory setting.

The liquid type (*Ethanol 75%* or *Glycerol 50%*), *epTIPS long* and *Altitude* options can be combined.

For the following adjustments, you must know the exact density of the solution to be dispensed. The recording of the weighing results requires the use of a fine balance with a high resolution. Dispensing operations under 10 µL require a balance with a resolution of 0.001 mg. An existing 1-3 point adjustment can be changed.

- *1-point adjust.*

  After you enter the density, selected volume and corresponding weighing results, the Xplorer pipette will determine a correction factor. The factor is only correct for the selected volume and the selected work technique. However, the factor is used for the entire volume range of the Xplorer pipette. You must carry out a gravimetric test to check the validity of the factor.

- *2-point adjust.*

  After you enter the density, two different volumes and the corresponding weighing result, the Xplorer pipette will determine a correction factor. The factor is only correct for the selected volume range and the selected work technique. However, the factor is used for the entire volume range of the Xplorer pipette, i.e., below and above the two measuring points as well. You must carry out a gravimetric test to check the validity of the factor.

- *3-point adjust.*

  After you enter the density, three different volumes and the corresponding weighing results, the Xplorer pipette determines two correction factors. The factors are correct from measuring point to measuring point in the selected volume regions and for the selected work technique. The respective factor is, however, also used below and above the first or third measuring point. You must carry out a gravimetric test to check the validity of the factors.

You must gravimetrically check each Xplorer pipette whose factory setting has been changed by selection or by performing the above-mentioned adjustments. This is the only way to ensure that the selected adjustment meets requirements regarding errors.

Pswrd. protection

Xplorer *plus* Only available for the Xplorer plus pipette

For the Xplorer plus, the adjustment can be protected with a four-digit numeric password. The passwords for the *Edit* mode and *Adjustment* option may vary. The password can be changed or deactivated after it has been entered. Please contact Eppendorf AG Application Support or conduct a reset if you lose the password.

The adjustment can no longer be changed if the password has been lost.

1. Press the rocker upward to activate the password protection.
   ON appears in the display.
2. Press the *Select* softkey.
3. Use the rocker to select the digit.
4. Press the *Next* softkey to switch to the next field.
5. Enter data in all of the fields.
6. Press the *Save* softkey to save the password.
7. Reenter the password after completing the saving procedure. Press the *Enter* softkey.
   Password protection is now active.

5.17.10 *Language*

▸ Mark a language in the selection list with the rocker.
The selected language is only activated after the completion of the language selection.

When selecting a language, the softkeys and the language selection list are always in English. This makes it easier to return to the desired language if you select an unknown language by mistake.

5.17.11 *Personalization*

You can use the rocker to select letters and numbers to personalize the pipette. The selected personalization will be displayed after the pipette has been activated from sleep mode or after the reset. When the Xplorer pipette is delivered, it is personalized as *My Xplorer*.

5.17.12 *Service*

The options listed here are not needed during normal routine use. A selection list offers the following service options:

- *Software version*: Display of the software that is valid for this Xplorer.
- *Parameter ver.*: Display of the applicable data record for this Xplorer. The data record is different for the various volumes.
- *Initial reset*: After a security query, the pipette will be reset to factory settings and all entries will be reset to the "default values". This type of reset may be useful when transferring the Xplorer pipette to another workstation.

The *Initial reset* function can also be executed if the *Pswrd. protection* option is active. Please contact Eppendorf AG Application Support if you would like to remove the password protection without losing saved settings and programs. You will receive a *Master key* and additional information on how to proceed.

- *Check procedure*: For service personnel only. Not released for general use.
- *Software update*: For service personnel only.
- *USB*: For service personnel only.

5.17.13 *Service interval*

Xplorer plus Only available for the Xplorer plus pipette

If the *Service interval* option is activated, the pipette will remind you about the required maintenance or repeating the gravimetric test. You can set the reminder for a specific time or after a specific number of cycles. The display shows the following options after *Time interval* or *Cycles interval* has been selected:

- *Last service*
- *Next service*
- *Set interval*
- *Reset*

For the *Set interval* parameter, set the required interval. If you would not like to use the *Service interval* option, set the parameter value to *0*. The interval will be reset when the reset function is triggered. If the pipette should start counting at a specific initial value, enter the value under *Set interval* and then select *Reset*. You can view the last time a reset was triggered for the executed maintenance under *Last service* You can view when the next maintenance needs to be executed under *Next service*. If the interval has elapsed up to 90 %, the pipette shows the next required maintenance in the display. Monitoring of the interval time and the interval cycles function independently of each other. If you activate the interval time and interval cycles, you will receive a maintenance reminder for both settings. A reset may be required after the maintenance and the gravimetric test.

5.17.14 *Date and Time*

Xplorer plus Only available for the Xplorer plus pipette

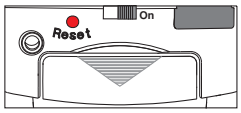
You can set the date and time of the pipette.

▸ Select and change the parameter as described above (see p. 19).

6 Troubleshooting

6.1 Reset

The pipette will be reset to the initial state during the reset. Your saved settings are not lost.



- Press the **Reset** key using a pipette tip or another pointed object.
  The personalization and software version will be shown in the display during the reset.

You will be prompted to press the rocker down in the display. Make sure that any liquid in the pipette tip is dispensed correctly. Then, you need to confirm the *Date and Time*.

6.2 Error search

Symptom	Possible cause	Solution
Display dark	• Pipette switched off. • The rechargeable battery is not connected. • The rechargeable battery is discharged. • Battery defective.	▸ Connect the rechargeable battery ▸ Switch on the Xplorer pipette. ▸ Load the Xplorer pipette. ▸ Replace the battery. **Note:** If the rechargeable battery is almost completely discharged, the display will only switch on after a short charging time.
Liquid is dripping from the tip and/or the dispensed volume is incorrect.	The pipette tip is loose or does not fit correctly.	▸ Attach the tip firmly. ▸ Use epT.I.P.S.
	Liquid with high vapor pressure and/or different density.	▸ Wet the tip several times and adjust the pipette for the liquid used.
	Pipetted too quickly.	▸ Set a lower speed.
	Tip withdrawn from the liquid too early or too quickly.	▸ Withdraw the tip from the liquid slowly and with a time delay (of about 3 seconds for large volumes) after aspiration.
	Liquid dispensed without blow-out in **Pip** mode.	▸ Trigger blow-out after dispensing has been completed during standard pipetting applications.
	The piston is contaminated or damaged.	▸ Clean the piston, relubricate slightly and/or replace.
	The tip cone is damaged.	▸ Replace the lower part or channel.
	The O-rings of the tip cones are damaged.	▸ Replace the O-rings (only 100 µL, 300 µL, 1 200 µL multi-channel).
Liquid flows unevenly into or out of the tip.	• The tip is damaged The piston is contaminated • The seal is contaminated. • The pipette is blocked.	▸ Use a new tip ▸ Clean the lower part. ▸ 5 mL and 10 mL sizes: replace the protection filter.
Display shows the ✓ symbol.	The pipette has been adjusted for another liquid.	▸ Check whether the adjustment selected in the options is correct and change it if necessary.

Symptom	Possible cause	Solution
No spring loading action of the tip cone when taking up pipette tips.	Spring-loading action is blocked by a locking ring.	▸ Remove the locking ring again.
	Use a 5 mL or 10 mL single-channel pipette or 1 200 µL multi-channel pipette.	No remedy. The tip cone of these sizes do not have spring loading action.
	The rechargeable battery is heavily discharged.	Confirm the message with the *OK* softkey. Complete the dispensing operation as quickly as possible and charge the rechargeable battery for 3 hours. You can continue dispensing with the power supply connected. Then charge for an additional 3 hours.
	The rechargeable battery is almost completely discharged. The remaining rechargeable battery capacity is only sufficient for displaying the information to the left. Dispensing cannot performed.	The rechargeable battery must be charged for at least 15 minutes before further use. A charging time of 3 hours is recommended.
The following message appears briefly before the aspiration: *Selected volume not possible with stored adjustment!*	A factor that was determined during the Xplorer adjustment leads to a very high stroke increase. This high stroke increase limits the dispensing volume.	▸ Confirm the error message with the *OK* softkey. The situation can only be remedied by changing the adjustment. ▸ Make sure that you are authorized to carry out the adjustment.
The following message appears briefly for the selected volume: *Volume limit XXXX µL/mL*	The *Volume limit* option was used to limit the volume to the displayed value.	1. Make sure that you are authorized to change the *Volume limit* option. 2. Move the selection dial to **Opt**. 3. Select the *Volume limit* option.
Password incorrect	• Password for the *Edit* mode and the *Adjustment* option have been mixed up. • Password forgotten	▸ Enter the correct password. ▸ Perform reset. ▸ Contact Eppendorf AG Application Support and request a *Master key*.

Regularly check the precision and accuracy of the Xplorer pipette to prevent dispensing errors. You can use the "PICASO" software, version 2.3.18 or higher, to determine the maximum permissible systematic and random errors. If the pipette is used at a location with an extremely high altitude, it must be adjusted to the ambient air pressure (see *Adjustment on p. 45)*.

You can find an SOP (Standard Operation Procedure) for the test on our website: www.eppendorf.com or on the Xplorer CD.

7 Maintenance

- All single and multi-channel lower parts are wear parts. Clean them after contamination, use of aggressive chemicals and/or heavy stress. If the lower parts are worn or damaged, replace the respective parts.
- Faulty dispensing results are sometimes due to lack of maintenance.

7.1 Cleaning

NOTICE!

Damage to device from unsuitable cleaning fluids or sharp or pointed objects

Unsuitable cleaning fluids can damage the display, surfaces and printing.

- Never use corrosive cleaning fluids, strong solvents or abrasive polishes.
- Check the compatibility with the materials used.
- Do not use acetone to clean the Xplorer pipette.
- Do not use sharp objects to clean the Xplorer pipette.

Remove any contamination on the outside of the Xplorer pipette as follows:

- Wet a cloth with a mild cleaning fluid and water and remove the contamination.
- To remove heavy contamination resulting from liquid penetration, disassemble the lower part of the pipette (see *Xplorer pipette disassembly and assembly on p. 53)*and clean it with demineralized water.

Relubricate the piston sealing rings after contamination, use of aggressive chemicals and/or heavy stress. Remove the old grease before relubricating.

7.2 Sterilizing or disinfecting the pipette

NOTICE!

Damage to device from incorrect handling.

- Only autoclave the lower part of the Xplorer pipette.
- Do not use any additional disinfectants, decontamination agents or sodium hypochlorite when autoclaving the lower part.
- When autoclaving the lower part, make sure that the temperature does not exceed 121 °C.
- Before using disinfecting agents or decontaminating agents, test for material compatibility and check the manufacturer's instructions about chemical resistance. Consider also the material of the pipette.

7.2.1 Autoclaving

All Xplorer lower parts are steam autoclavable.

Before autoclaving

1. Remove any contamination from the exterior and in the lower part (see *Xplorer pipette disassembly and assembly on p. 53)*.
2. If you remove grease, only relubricate the piston seal slightly with the grease specified in the ordering information (see the Xplorer CD).

Procedure

Follow the operating manual of the autoclave manufacturer.

1. Autoclave at 121 °C, 20 minutes, 1 bar pressure.
2. Put the lower part into the autoclave in such a way to ensure that the temperature at the lower part does not exceed 121 °C.
3. You can put the lower part into the autoclave as a whole unit or as individual parts.
4. Make sure that no parts of disassembled lower parts are confused during subsequent assembly (recommendation: use a plastic beaker for each lower part).

After autoclaving

1. Cool the lower part down to room temperature and leave to dry. The piston does not need to be greased following autoclaving.
2. Carry out a gravimetric test to check that the Xplorer pipette is functioning.

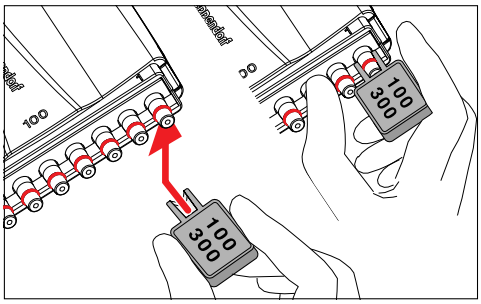
7.2.2 Disinfection

1. Carefully wipe off the outer surfaces with disinfectant, DNA/RNA decontamination agents or 70% isopropanol.
2. You can wipe the outside of the tip cone and the ejector sleeve with a sodium hypochlorite solution of 4%.
3. After the exposure time of the sodium hypochlorite solution has elapsed, thoroughly remove it using demineralized water.

7.3 Replacing O-rings

The 100 µL, 300 µL and 1 200 µL multi-channel lower parts are equipped with O-rings. These are wear parts. Replace old, worn or damaged O-rings. Defective O-rings result in the incorrect positioning of the tips and in dispensing errors.

7.3.1 Removing the O-ring



1. Push the opening of the O-ring tool (included in the delivery package) against the tip cone from the side so that the sharp edge in the opening of the O-ring tool is positioned on top of the o-ring. Do not slide the O-ring tool onto the cone! The figure shows the O-ring tool for 100 µL and 300 µL. A separate O-ring tool is available for 1 200 µL.
2. Supporting the O-ring tool with your thumb, push it firmly against the tip cone.
   This O-ring is cut in one place.
3. Remove the O-ring tool and the O-ring from the tip cone.

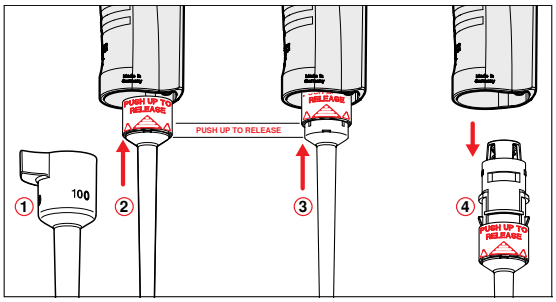
7.3.2 Mounting a new O-ring

1. Fit the mounting aid (shortened pipette tip, included in the delivery package of the O-rings) on the tip cone.
2. Push the new O-ring over the tip onto the tip cone.
3. Check that the pipette tips are correctly positioned. Ensure that the tips are tightly sealed and properly aligned.

7.4 Xplorer pipette disassembly and assembly

7.4.1 Single-channel up to 1 000 µL

Removing the lower part



1. Keep the ejector pressed and remove the ejector sleeve ①.
2. ② and ③: On the lower part, slide the ring marked "**PUSH UP TO RELEASE**" up by about 5 mm until the lower part comes off.
3. ④: Remove the lower part from the upper part.

Deactivating spring loading

For the following dispensing tasks, it may be helpful to deactivate the spring loading action of the tip cone.

- A pipette tip is to be used for a long period.
- The pipette tip is slightly bent during dispensing.

Deactivating this action may also be helpful for pipette tips that are not designed for the Eppendorf pipette tip cone.

Single-channel pipettes

The spring loading action of the tip cone can be deactivated by installing the locking ring. The locking ring is included in the delivery package.

1. Push the black locking ring onto the lower part from the top by slightly squeezing the clamps on the lower part.
2. Insert the lower part into the upper part until it audibly engages.
3. Keep the ejector pressed. The ejector rod protrudes from the upper part.
4. Fit the ejector sleeve onto the ejector rod. If correctly fitted, it will engage slightly.

Remove the locking ring to reactivate the spring loading action.

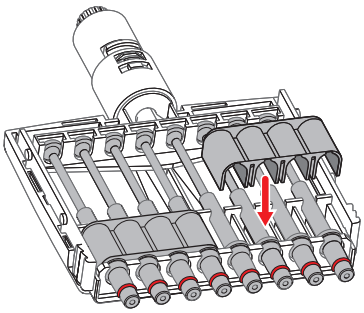
Multi-channel pipettes

The spring loading of the tip cones can be deactivated in the 10 µL, 100 µL and 300 µL multi-channel lower parts by installing 2-3 locking clips. The locking clips are part of the delivery package.

Requirement

- Multi-channel lower part is open and has been removed from the upper part (see p. 57)
- Channels removed (see p. 57)

1. Remove the spring from the channels.
2. Insert the channels without the springs.

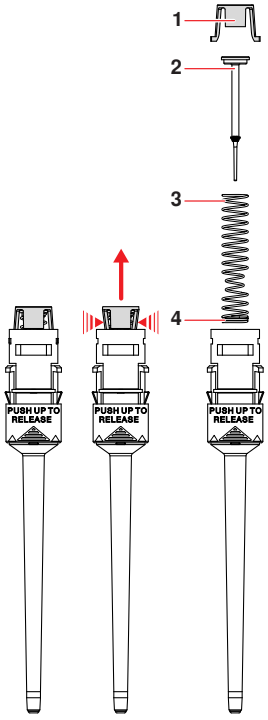


3. Firmly press the locking clips onto the channels.
4. Assemble the pipette (see p. 58).

Opening and assembling the lower part (≤1 000 µL)

To avoid confusion of parts, only disassemble and assemble one pipette at a time.

The piston must be in its basic position before separating the lower and upper part. If necessary, press the rocker down to move the piston to its basic position.



Opening the lower part:

1. Push the stop pins together slightly on the piston mount (1).
2. Remove the piston mount.
3. Remove the piston (2) and the piston spring (3). The piston is under spring tension. The appearance of pistons and piston springs will vary for the individual volume versions.

Assembling the lower part:

1. Carefully guide the piston and the piston spring into the cylinder. Make sure that the piston is guided correctly in the piston spring and the cylinder. There must not be any perceptible resistance. **Stop pushing as soon as any resistance is felt** This may indicate that the piston is not positioned correctly in the cylinder. There is a risk of bending the piston if too much force is applied. Carefully pull out the piston and repeat the process correctly. In the case of piston springs with double windings (4), these windings must point downwards.
2. Keep the piston and the piston spring pressed.
3. Keep the stop pins on the piston mount pressed with the other hand.
4. Mount the piston mount so that the two locking mechanisms engage in their retainers.
5. Gently press a pipette tip against the inserted piston. The piston must move down in the cylinder without any noticeable resistance.

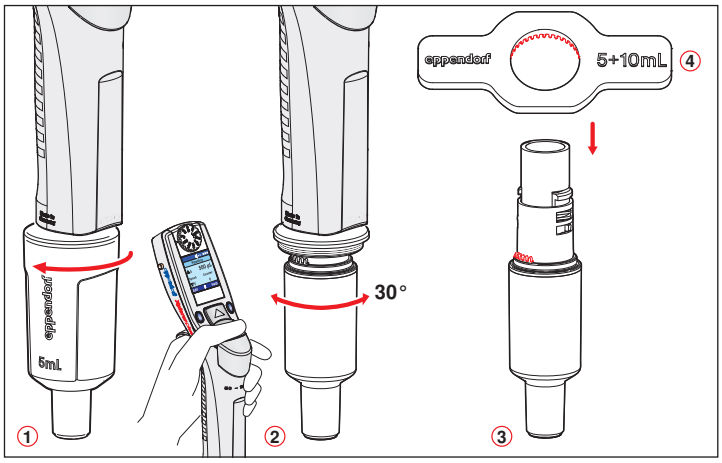
Installing the lower part and ejector sleeve:

1. Insert the lower part into the upper part until it audibly engages.
2. Set the maximum volume and move the rocker up and down several times. There should not be any unusual running noises.
3. Keep the ejector pressed. The ejector rod protrudes from the upper part.
4. Fit the ejector sleeve onto the ejector rod. If correctly fitted, it will engage slightly.
5. Carry out a gravimetric test of the systematic and random error.

This test ensures that no parts were confused during assembly and that the pipette has been assembled correctly.

7.4.2 5 mL and 10 mL single-channel

The piston must be in its basic position before separating the lower and upper part. Press the rocker down to move the piston to its basic position.



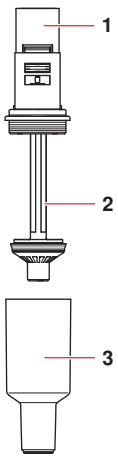
1. ①: Unscrew the ejector sleeve.
2. ②: Keep the ejector pressed and turn the lower part to the left or right by approximately 30°. Pull the lower part down to cancel the magnetic coupling of the lower part.

   The lower part is separated from the upper part.
3. ③: Open the lower part: fit the pipette key ④(included in the delivery package) onto the lower part. Hold the cylinder and unscrew it from the lower part.

   The cylinder with the tip cone is separated from the upper part of the lower part. The upper part of the lower part and the piston cannot be disassembled any further.

   See the next figure.

The lower part consists of the following:



1 Upper part of the lower part
2 Piston (with seal)

Piston rod with magnet (covered here by 1 "Upper part of the lower part")
3 Cylinder and tip cone

The assembly is performed in reverse order. Make sure that the magnet on the piston in the lower part is coupled with the magnet on the spindle in the upper part. After the assembly:

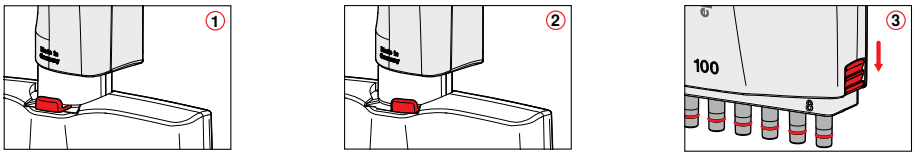
- Carry out a gravimetric test of the systematic and random error.

  This test ensures that no parts were confused during assembly and that the pipette has been assembled correctly.

For replacing an ejector sleeve, the 5 mL and 10 mL sizes are delivered with an ejector sleeve and ejector carrier. The lower part must be removed in order to install a new ejector carrier.

7.4.3 Multi-channel

Loosen and open the 10 µL, 100 µL and 300 µL multi-channel lower part



1. ① and ②: Slide the lever on the lower part to the left or right. Pull the lower part down to cancel the magnetic coupling of the lower part to the upper part.

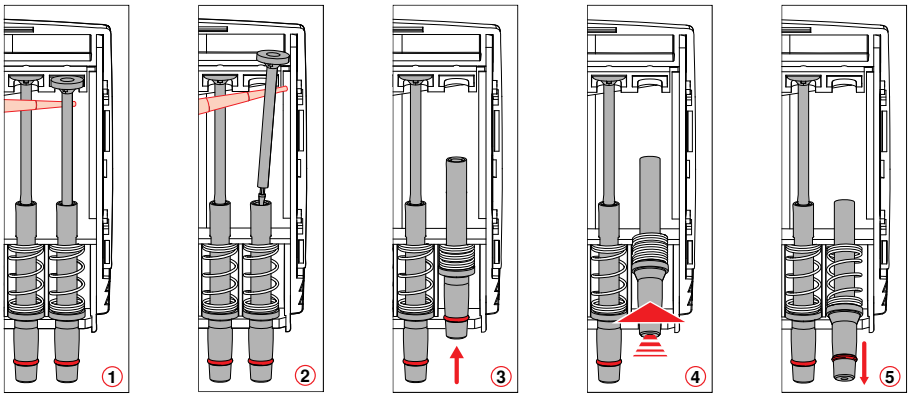
   This separates the lower part from the upper part so that it can be removed.
2. Put down the lower part with the lever facing downwards.
3. ③: Slide the two latches (right and left at the side) down using a coin.

   The lower part is still lying on the table with the lever facing downwards.
4. Remove the cover panel facing upwards with the integrated ejector rail.

Do **not** remove the ejector rail from the cover panel. The spring for the ejector rail may accidentally come off and get lost in this step.

Removing and installing channels

Channels must only be removed and installed if the multi-channel lower part is separated from the upper part! The channels in the lower parts consist of piston, cylinder and spring. The channels for 100 µL and 300 µL are equipped with an O-ring at the tip cone (see *Replacing O-rings on p. 52)*.



1. ① and ②: Position a pipette tip under the piston and carefully take the piston off the upper rail.
2. Carefully pull the piston out in an upward direction. **Do not bend the piston.**
3. Hold the tip cone at the lower end and push it upwards slightly ③.

   This compresses the spring.
4. ④: Lift the tip cone slightly and release it from the lower rail.
5. ⑤: Relax the spring by letting the tip cone slide back again above the lower rail.
6. Remove the tip cone, along with the cylinder and spring, from the upper rail.

   Before installation, slide the piston into the cylinder. Install the channels in reverse order.

Assembling the 10 - 300 µL multi-channel pipette

1. Fit the cover plate with the integrated ejector.
2. Push the latches upwards.
3. To mount, push the lower part into the upper part until it audibly engages.

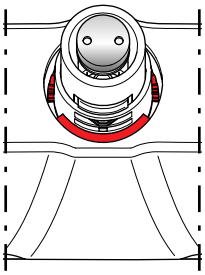
   Make sure that the magnet on the piston actuator in the lower part is coupled with the magnet on the spindle in the upper part (see p. 59).
4. Carry out a gravimetric test of the systematic and random error (see p. 63).

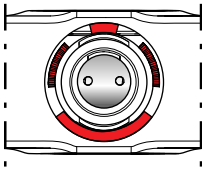
   This test ensures that no parts were confused during assembly and that the pipette has been assembled correctly.

Loosening and opening the 1 200 µL multi-channel

The method of loosening the 1 200 µL lower part matches that of loosening the 5 mL or 10 mL lower parts.

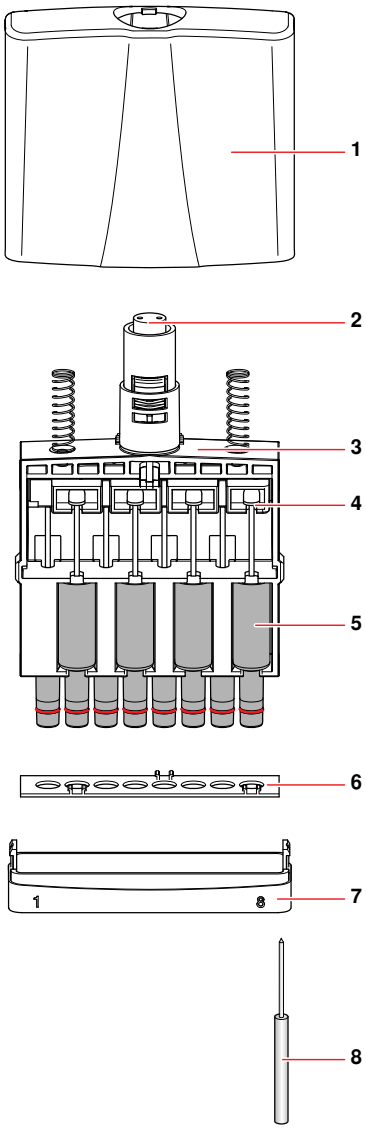
1. The piston must be in its basic position before loosening the lower part. Press the rocker down to move the piston into its basic position.
2. With the ejector pressed down, turn the lower part by approximately 30° and pull down to cancel the magnetic coupling. This releases the lower part from the upper part.





3. View the detached lower part from above. For this, slide the housing case down. Note the exact position of the red marked parts. **The red marked stops on the housing case and the red marked teeth on the inner part are adjacent.** If the stops and teeth are on top of each other after assembly, the housing case has been attached incorrectly.

Removing and installing 1 200 µL channels



1 Housing case
2 Piston actuator
3 Inner part
4 Piston rod in the guiding rail of the piston actuator
5 Channel, consisting of a piston, a cylinder and a tip cone
6 Fixing strip
7 Base plate
8 Unlocking tool for 1 200 µL lower part

Only disassemble the channels when the upper part is detached from the lower part.

1. Press the unlocking tool as far as it will go into the base plate.

   The base plate can now be detached by pulling gently at the side - at the side with the unlocking tool inserted. This loosens the base plate on the other side. Remove the base plate.
2. Take the inner part out of the housing case.
3. Loosen the fixing strip from the inner part. To do this, push the fixing strip away from the inner part in the area near the three fixing strip catches on the inner part.
4. Have a close look at the channel arrangement in the inner part. Four channels are accessible from each side. The tip cone of the channels is eccentric to the cylinder. The channels on the opposite side are therefore positioned "mirror-inverted". Ensure that the channels are inserted so that they are aligned in the center again during subsequent assembly.
5. Completely press down the guiding rail for the piston rods. Press the piston rod lightly out of the guiding rail and remove the channels.

6. Before installation, slide the piston into the cylinder. Install the channels in reverse order in accordance with the previously mentioned instructions. After installing the channels, carefully push the guiding rail with the piston rods upwards to ensure that the magnetic coupling of the lower and upper part can be safely reestablished.
7. Insert the reassembled lower part into the upper part. The lower part automatically snaps into the upper part on insertion. Make sure that the magnet on the piston actuator in the lower part is coupled with the magnet on the spindle in the upper part.
8. Carry out a gravimetric test of the systematic and random error (see p. 63).

   This test ensures that no parts were confused during assembly and that the pipette has been assembled correctly.

7.5 Maintenance

We recommend that you have all maintenance and servicing carried out by Eppendorf AG or Eppendorf service partners. No warranty is provided for any damage due to misuse or if the device has been opened by unauthorized persons.

8 General information on adjustment

NOTICE!

Incorrect dispensing volume with special liquids and from temperature differences.

Solutions which differ greatly from water in terms of their physical data, or temperature differences between the pipette, pipette tip and liquid, can result in incorrect dispensing volumes.

- Avoid temperature differences between pipette, pipette tip and liquid.
- Check the dispensing volume and make sure that you can affirm all the questions listed in the general information.

The random and systematic errors determined before delivery can be found in the enclosed **Eppendorf Certificate**. If the factory settings are superseded by a different adjustment, the **Eppendorf Certificate** is no longer valid. If you reset the adjustment to the factory settings, the random and systematic errors determined before delivery and the enclosed **Eppendorf Certificate** are once again valid.

The Xplorer pipette was calibrated before delivery and tested with double distilled water according to ISO 8655.

Changing the adjustment of the Xplorer pipette is sometimes recommended for solutions with a density, viscosity, surface tension and/or vapor pressure that vary greatly from that of water If the density of an aqueous solution changes by approximately ±10%, e.g., due to the salt concentration, the volume changes by approximately ±0.2%. This statement does not apply if other relevant properties of the liquid also change.

If the pipette is used at extremely high altitudes, it must be calibrated to the ambient air pressure. At 1 000 m above sea level, the volume error of a 100 µL pipette is about –0.3%.

Changing the adjustment can improve the dispensing accuracy (systematic error) when using tips that have a very different geometry than standard tips.

You can cancel a modified adjustment using simple steps.

Changes to the adjustment do not affect the precision (random error) of the dispensing. The precision (random error) can be improved by replacing worn parts. Furthermore, handling has a strong influence on the precision (random error).

Before the adjustment is changed, the existing adjustment must be checked in the factory settings using distilled water.

The actual volume can be checked by weighing:

$$\text{Actual volume} = \frac{\text{Mean value of the weighings}}{\text{Density liquids at weighing temperature}}$$

The density of distilled water is Approx. 0.9982 mg/µL at 20 °C and 0.9965 mg/µL at 27 °C.

If the set volume corresponds to the actual volume, no correction is necessary.

If there is a difference between the actual volume and the set volume of distilled water, please check the following:

- Is there any liquid dripping from the tip?
- Is the pipette tip fitted leak-proof?

Adequate leak tightness is ensured when no drop is formed at the pipette tip after aspiration of the nominal volume with distilled water and a waiting time of approx. 15 s. Hold the pipette vertically, without touching the pipette tip. Prewet the pipette tip several times.

- Is the tip cone undamaged?
- Are the piston and the cylinder leak-proof?

- Does the temperature of the pipetted liquid correspond to:
  - The temperature of the device?
  - The ambient air temperature?
- Is the weighing location free from drafts?
- Does the work method and pipetting speed permit complete aspiration and dispensing of the liquid?
- Has the correct numerical value for "Density liquids at weighing temperature" been used for the calculation of the actual volume?
- Is the set volume correct?
- For very small volumes (<10 µL): is the fine balance sufficiently sensitive (balance resolution: 0.001 mg)?
- Were original epT.I.P.S pipette tips used for testing?

The pipette tip which must be used as the test tip for checking technical data is listed in the "Technical data" chapter in the operating manual.

No adjustment changes are allowed unless you can answer all the questions with "yes".

In all other cases, the problems associated with the questions answered with "no" must be eliminated. If the problem is remedied by exchanging a complete lower part or other parts that have an effect on the volume, proper assembly must be verified by carrying out a gravimetric test. The systematic and random errors which must be met are listed in the technical data.

If you would like to conduct a 1-3 point adjustment for a liquid other than water on the Xplorer, the items listed above should also be precisely observed when determining the balance results. In particular, please note that the density of the test liquid must be precisely determined at the test temperature. The density is dependent on the temperature. The use of an incorrect density will lead to an incorrect volume calculation.

The execution of the adjustment is described in the *Adjustment* document on the Xplorer CD.

Furthermore, use the specifications in the *Standard Operating Procedure for Pipettes* document on the Xplorer CD as the foundation for determining the weighing results and errors.

9 Technical data

9.1 Eppendorf Xplorer single-channel

Model Increment	Test tip epT.I.P.S. Color code Volume range Length	Testing volume	Error limits Eppendorf AG			
			Error			
			Systematic error		Random error	
			± %	± µL	± %	± µL
0.5 - 10 µL Increment: 0.01 µL	medium gray 0.1 - 20 µL 40 mm	1 µL	±2.5	± 0.025	±1.8	± 0.018
		5 µL	±1.5	±0.075	±0.8	±0.04
		10 µL	±1.0	±0.1	±0.4	±0.04
5 - 100 µL Increment: 0.1 µL	yellow 2 - 200 µL 53 mm	10 µL	±2.0	±0.2	±1.0	±0.1
		50 µL	±1.0	±0.5	±0.3	±0.15
		100 µL	±0.8	±0.8	±0.2	±0.2
15 - 300 µL Increment: 0.2 µL	orange 15 - 300 µL 55 mm	30 µL	±2.5	±0.75	± 0.7	± 0.21
		150 µL	±1.0	±1.5	±0.3	± 0.45
		300 µL	±0.6	±1.8	±0.2	±0.6
50 - 1 000 µL Increment: 1 µL	blue 50 - 1 000 µL 71 mm	100 µL	±3.0	±3.0	±0.6	±0.6
		500 µL	±1.0	±5.0	±0.2	± 1
		1 000 µL	±0.6	±6.0	±0.2	± 2
0.25 – 5 mL Increment: 0.005 mL	purple 0.1 –5 mL 120 mm	0.5 mL	±3.0	± 15.0	±0.6	± 3
		2.5 mL	±1.2	±30.0	±0.25	± 6.25
		5 mL	±0.6	±30.0	±0.15	± 7.5
0.5 – 10 mL Increment: 0.01 mL	turquoise 1 –10 mL 165 mm	1 mL	±3.0	±30.0	± 0.60	±6.0
		5 mL	±0.8	± 40.0	± 0.20	± 10.0
		10 mL	±0.6	± 60.0	±0.15	± 15.0

You can select a volume of up to 0.20 mL for the 5 mL Xplorer pipette. For the 0.2 mL – 0.5 mL volume range, handling has a strong influence on the achievable random errors.

9.2 Eppendorf Xplorer multi-channel

The technical data applies to both the 8-channel and 12-channel pipettes.

Model Increment	Test tip epT.I.P.S. Color code Volume range Length	Testing volume	Error limits Eppendorf AG			
			Error			
			Systematic error		Random error	
			± %	± µL	± %	± µL
0.5 - 10 µL Increment: 0.01 µL	medium gray 0.1 - 20 µL 40 mm	1 µL	±5.0	± 0.05	±3.0	± 0.03
		5 µL	±3.0	±0.15	±1.5	±0.075
		10 µL	±2.0	±0.2	±0.8	± 0.08
5 - 100 µL Increment: 0.1 µL	yellow 2 - 200 µL 53 mm	10 µL	±2.0	±0.2	±2.0	±0.2
		50 µL	±1.0	±0.5	±0.8	±0.4
		100 µL	±0.8	±0.8	±0.25	±0.25
15 - 300 µL Increment: 0.2 µL	orange 15 - 300 µL 55 mm	30 µL	±2.5	±0.75	±1.0	±0.3
		150 µL	±1.0	±1.5	±0.5	±0.75
		300 µL	±0.6	±1.8	±0.25	±0.75
50 - 1 200 µL Increment: 1 µL	green 50 - 1 250 µL 76 mm	120 µL	±6.0	± 7.2	± 0.9	± 1.08
		600 µL	± 2.7	± 16.2	±0.4	± 2.4
		1 200 µL	±1.2	± 14.2	±0.3	± 3.6

9.3 Test conditions

The errors specified apply only when the epT.I.P.S. pipette tips. Test conditions and test evaluation in compliance with ISO 8655, Part 6. Test using a standardized fine balance with a moisture trap.

- Check the volumes in the **Pip** mode; keep the rocker pressed during the blow-out (Blow)
- Set speed level: 5
- Number of determinations: 10
- Use of water in accordance with ISO 3696
- Test at 20 °C - 25 °C ± 0.5 °C
- Dispensing against the tube wall

Rechargeable battery	
Type:	Lithium polymer battery
Capacity:	750 mAh/3.7 V
Charging time:	Approx. 3 hours
Number of dispensing operations:	Approx. 1400 in the Pip mode with fully charged battery and average dispensing speed with a single-channel version ≤1 000 µL in continuous operation
Weight:	Approx. 20 g

Power supply	
Type:	Power supply for Xplorer, Multipette/Repeater stream/ Xstream with plug-in power plug adapters
Input voltage:	100 V to 240 V ±10% 50/60 Hz
Output voltage:	5 V, 1 A

Xplorer	
Operating temperature:	+5 to +40 °C
Air humidity during operation:	10 to 95% rel. humidity
Storage temperature:	-5 to +45 °C
Air humidity during storage:	10 to 95% rel. humidity
Weight without rechargeable battery, without pipette tip:	100 µL single-channel approx.: 135 g (0.30 lb) 100 µL eight-channel approx.: 213 g (0.47 lb)

9.4 Speed table for Xplorer single-channel

The following speed table applies to Xplorer pipettes starting with software version 2.01.00.

Speed level	10 µL	100 µL	300 µl	1 000 µl	5 mL	10 mL
(Speed)	Time [sec]	Time [sec]	Time [sec]	Time [sec]	Time [sec]	Time [sec]
1	12.0	12.0	12.0	12.0	12.0	12.0
2	8.0	8.0	8.0	8.0	8.0	8.0
3	4.0	4.0	4.0	4.0	6.0	6.0
4	2.8	2.8	2.8	2.8	4.8	4.8
5	2.2	2.2	2.2	2.2	3.6	3.6
6	1.6	1.6	1.6	1.6	3.2	3.2
7	1.2	1.2	1.2	1.2	2.8	2.8
8	0.9	0.9	0.9	0.9	2.6	2.6

You can select a volume of up to 0.20 mL for the 5 mL Xplorer pipette. For the 0.2 mL – 0.5 mL volume range, handling has a strong influence on the achievable random errors.

9.5 Speed table for Xplorer multi-channel

The following speed table applies to Xplorer pipettes starting with software version 2.01.00.

Speed level	10 µL	100 µL	300 µl	1 200 µL
(Speed)	Time [sec]	Time [sec]	Time [sec]	Time [sec]
1	12.0	12.0	12.0	12.0
2	8.0	8.0	8.0	8.0
3	4.0	4.0	4.0	4.0
4	2.8	2.8	2.8	2.8
5	2.2	2.2	2.2	2.2
6	1.6	1.6	1.6	1.6
7	1.2	1.2	1.2	1.2
8	0.9	0.9	0.9	1.0

10 Ordering Information

The ordering information can be found on the CD for the Xplorer pipette.

11 Transport, storage and disposal

11.1 Decontamination before shipment

If you wish to return the pipette to Eppendorf AG or an Eppendorf AG service partner to be checked or repaired, please note the following:

CAUTION!

Use of a contaminated device may result in personal injuries and damage to the device.

- Clean and decontaminate the Xplorer pipette before shipping or storage according to the cleaning instructions.

Hazardous substances are:

- solutions presenting a hazard to health
- potentially infectious agents
- organic solvents and reagents
- radioactive substances
- proteins presenting a hazard to health
- DNA

1. Please note the information in the document "Decontamination certificate for product returns". It is available in PDF format on our homepage www.eppendorf.com or on the enclosed CD.
2. Enter the serial number of the Xplorer pipette in the decontamination certificate.
3. Enclose the fully-completed decontamination certificate for returned goods with the Xplorer pipette.

11.2 Storage

NOTICE!

Damage to device due to inserted rechargeable battery during storage.

- Remove the rechargeable battery from the Xplorer pipette if you do not intended to use the Xplorer pipette for an extended period.

	Air temperature	Relative humidity	Atmospheric pressure
In transport packaging	-25 °C – 55 °C	10 % – 95 %	70 kPa – 106 kPa
Without transport packaging	-5 °C – 45 °C	10 % – 95 %	70 kPa – 106 kPa

11.3 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. They are marked with the following symbol to indicate this:

As disposal regulations may differ from country to country within the EU, please contact your supplier if necessary.

WARNING!

Risk of explosion and fire due to overheated accumulators and batteries.

- Do not heat accumulators and batteries to over 80 °C and do not throw them into fires.

Disposing of accumulators and batteries

Do not dispose of accumulators and batteries as household waste. Dispose of accumulators and batteries according to the locally applicable legal regulations.

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EG-Konformitätserklärung
EC Conformity Declaration

Das bezeichnete Produkt entspricht den einschlägigen grundlegenden Anforderungen der aufgeführten EG-Richtlinien und Normen. Bei einer nicht mit uns abgestimmten Änderung des Produktes oder einer nicht bestimmungsgemäßen Anwendung verliert diese Erklärung ihre Gültigkeit.

The product named below fulfills the relevant fundamental requirements of the EC directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Produktbezeichnung, Product name:

Eppendorf Xplorer®, Eppendorf Xplorer® plus

incl. Netzteil / including charging adapter

Produkttyp, Product type:

elektronische Pipette / electronic pipette

Einschlägige EG-Richtlinien/Normen, Relevant EC directives/standards:

2006/95/EG, EN 61010-1 EN ISO 8655-2

2004/108/EG, EN 55011/B, EN 61326-1, EN 61000-6-1

2011/65/EU

H.-G. Kühl

Vorstand, Board of Management:

Projektmanagement, Project Management:

30.01.2012

Hamburg, Date:

ISO CERTIFIED 9001

eppendorf

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