

Repeater[®] Plus Pipette

Instruction Manual

Mode d'emploi

Manual de Instrucciones



eppendorf

Repeater[®] Plus Pipette

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US-Patent-No.: 4.406.170
5.591.408
5.620.660
5.620.661

DES.PAT.: Combitip Plus 0.1 mL 384, 163
Combitip Plus 2.5 mL 384, 162
Combitip Plus 10 mL 387, 426

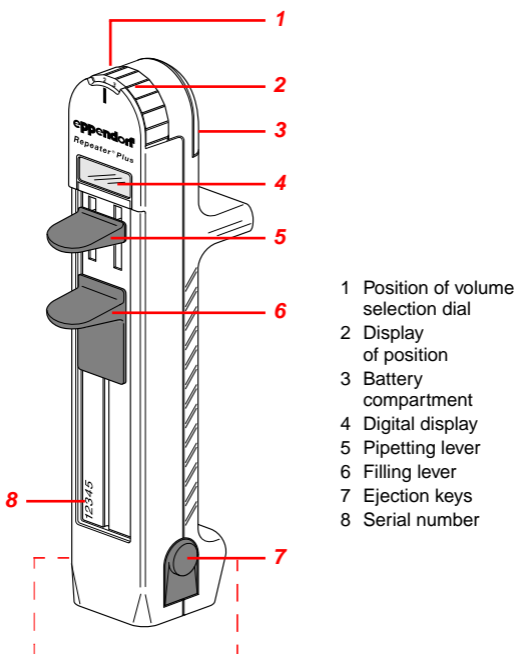


Fig. 1: Repeater® Plus with Operating Controls

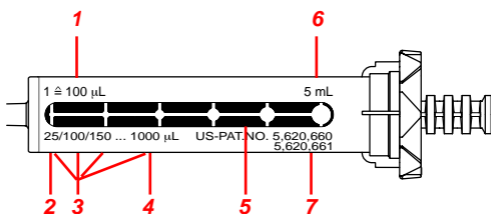


Fig. 2: Reference Markings on Combipip® Plus Tips

- 1 Volume to be dispensed at position 1 on the volume selection dial (Fig. 1–3)
- 2 The smallest volume to be dispensed (position 0.5 on the volume selection dial)
- 3 The step sequence of volumes dispensed if dial setting is increased from 0.5
- 4 The largest volume to be dispensed (position 10 on the volume selection dial) with
- 5 Graduation scale
- 6 Maximum filling capacity
- 7 US patent numbers

Fig. 1:

Repeater® Plus®
et ses éléments fonctionnels

- 1 Molette de sélection du volume
- 2 Cadran de position
- 3 Emplacement de la pile
- 4 Cadran d'affichage
- 5 Levier distributeur
- 6 Levier de remplissage
- 7 Boutons éjecteur
- 8 Numéro de série

Fig. 2:

Empreinte sur
le Combitip® Plus

- 1 Volume de dosage en position 1 de la molette (fig. 1–3)
- 2 Volume minimum distribuable (position 0,5 de la molette)
- 3 Ordre des incréments dépendant de la position de la molette
- 4 Volume maximum distribuable (position 10 de la molette) avec
- 5 Echelle stylisée
- 6 Volume de remplissage maximum (volume nominal)
- 7 Numéros de brevet pour les USA

Fig. 1:

Repeater® Plus
con componentes de manejo

- 1 Selector de volúmenes
- 2 Pantalla dos posiciones
- 3 Alojamiento de la batería
- 4 Pantalla digital
- 5 Palanca de dosificación
- 6 Palanca de llenado
- 7 Teclas de expulsión
- 8 Número de serie

Fig. 2:

Impresión sobre
el Combitip® Plus

- 1 Volumen de dosificación a la posición 1 del selector de volúmenes (Fig. 1–3)
- 2 Volumen de dosificación mínimo (posición 0,5 del selector de volúmenes)
- 3 Serie de pasos de los volúmenes dependiente de la posición del selector de volúmenes
- 4 Volumen de dosificación mayor (posición 10 del selector de)
- 5 Escala estilizada
- 6 Volumen de llenado mayor (volumen nominal)
- 7 Números de patente por los USA

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1 Safety precautions and applicational limitations

- **Before** using the Repeater Plus for the first time, please read the complete operating manual.
- The Repeater Plus is a functional unit only after a Combitip Plus has been inserted.
- When inserting Combitips, do **not** press the ejection key.
- When emptying the Combitip by pressing down the filling lever, always hold it vertically over a vessel to prevent splashing.
- Eject the Combitip only when the filling lever has been pushed down **completely**.
- Do not use the Repeater Plus with liquids which attack the materials ABS, ASA, PBT, PC, POM and PPS.
- It is **essential** to observe the limitations governing the stability of the materials of the Repeater Plus and to consider the chemical compatibility of the reagents used.
- To verify the suitability of the Repeater with regard to the application or the reagent used, please contact your Eppendorf distributor, Brinkmann Instruments, Inc.
- The recommended operating temperature for the Repeater is between +4 °C and +40 °C. Do not operate the device outside this temperature range.
- Do not allow **any** liquid to enter into the Repeater Plus.
- Please use only original Eppendorf accessories.

2 Design principle

(Please open the fold-out pages at the front and back of this manual)

The Repeater Plus forms a dispensing system for repetitive pipetting when used in conjunction with Eppendorf Combitip Plus Tips. A supply of liquid is aspirated into the Combitip Plus and then dispensed step by step.

The built-in electronics of the device automatically recognize

- the Combitip Plus inserted
- the position of the volume selection dial (Fig. 1–2)

and the current pipetting volume appears in the display.

Using the volume selection dial, 20 different volumes can be selected for each Combitip Plus (dial setting: 0.5..1.....10).

The smallest pipetting volume of each Combitip Plus Tip can be dispensed a maximum of 100 times. The largest pipetting volume can be dispensed a maximum of 5 times (see table on page 18).

Note: Detailed operating instructions can be found in Section 4, "Operation".

Inserting the Combitip Plus Tip

- See Fig. 3.

Filling the Combitip Plus Tip

- Immerse the tip of the Combitip Plus into the liquid.
- Slide the filling lever slowly upwards (Fig. 1–6).

Pipetting

- Press down the pipetting lever (Fig. 1–5).
- **The first stroke must be discarded.**

Ejecting the Combitip Plus

- Slide the filling lever down to the lowest position.
- Press both ejection keys simultaneously (Fig. 1–7).

3 Technical data

	Systematic measurement deviation (Inaccuracy)	Random measurement deviation (Imprecision; CV)
Combitip Plus 0.1 mL (beige piston)		
2 µL	±1.6 %	≤ 3.0 %
20 µL	± 1.0 %	≤ 2.0 %
Combitip Plus 0.2 mL (blue piston)		
4 µL	± 1.3 %	≤ 2.0 %
40 µL	± 0.8 %	≤ 1.5 %
Combitip Plus 0.5 mL		
10 µL	± 0.9 %	≤ 1.5 %
100 µL	± 0.8 %	≤ 0.6 %
Combitip Plus 1 mL		
20 µL	± 0.9 %	≤ 0.9 %
200 µL	± 0.6 %	≤ 0.4 %
Combitip Plus 2.5 mL		
50 µL	± 0.8 %	≤ 0.8 %
500 µL	± 0.5 %	≤ 0.3 %
Combitip Plus 5 mL		
100 µL	± 0.6 %	≤ 0,6 %
1000 µL	± 0.5 %	≤ 0,25 %
Combitip Plus 10 mL		
200 µL	± 0.5 %	≤ 0,6 %
2000 µL	± 0.5 %	≤ 0,25 %
Combitip Plus 25 mL		
500 µL	± 0.4 %	≤ 0,6 %
5000 µL	± 0.3 %	≤ 0,25 %
Combitip Plus 50 mL		
1000 µL	± 0.3 %	≤ 0,5 %
10000 µL	± 0.3 %	≤ 0,25 %

Test conditions in accordance with ISO 8655

Liquid: Bidistilled water, degassed in accordance with DAB

Reference temperature: 15 – 30 °C, constant to ± 0.5 °C, with Original Eppendorf Combitip Plus Tips

Technical specifications subject to change!

4 Mode of operation

(Please open the fold-out cover at the front and back of this manual)

4.1 Combitip Plus Tip

The Repeater[®] Plus does not become a functional dispensing unit until a Combitip[®] Plus Tip has been inserted.

Combitip Plus Tips can also be used in the original Repeater Pipette, Model 4780.

Nine different Combitip Plus Tip sizes are available (see the volume table on the next page).

An adapter must be used to insert 25 mL and 50 mL Combitip Plus Tip. The adapter is connected to the Combitip Plus Tip using a bayonet joint before the Combitip Plus is inserted into the Repeater. This adapter is reusable.

4.2 Operation

Selecting the Combitip Plus Tip

- The volume table on the next page can be used for the selection of volumes and of Combitips Plus.
- The volume which appears in the digital display (Fig. 1–4) is obtained from the position of the volume selection dial (Fig. 1–2) and the size of the Combitip Plus.
The Repeater Plus can be used even in the event of an electronics failure or when the battery is run-down (see "Notes" on page 20).
- The desired volume can be set rapidly by turning the volume setting dial (Fig. 1-1). The volume setting dial must click firmly into the position selected. The maximum setting for the volume selection dial is position 10.

Note: When position 10/position 0.5 has been reached, do **not** rotate the volume setting dial beyond these positions. Rotate the volume setting dial in the other direction.

Volume table for using Combិតip® Plus Tips with the Repeater® Plus:

(The positions and dispensing steps which are marked in red are based on Combិតip Plus Tips used with the Repeater, Model 4780)

Position of the volume selection dial (Fig. 1-2):		0.5	1/1	1.5	2/2	2.5	3/3	3.5	4/4	4.5	5/5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	
Maximum number of dispensing steps:		100	50/48	33	25/23	20	16/15	14	12/11	11	10/8	9	8	7	7	6	6	5	5	5	5	5
Combិតip Plus with the following volumes:																						
0.1 ml	1µl	2µl	3µl	4µl	5µl	6µl	7µl	8µl	9µl	10µl	11µl	12µl	13µl	14µl	15µl	16µl	17µl	18µl	19µl	20µl	20µl	20µl
0.2 ml	2µl	4µl	6µl	8µl	10µl	12µl	14µl	16µl	18µl	20µl	22µl	24µl	26µl	28µl	30µl	32µl	34µl	36µl	38µl	40µl	40µl	40µl
0.5 ml	5µl	10µl	15µl	20µl	25µl	30µl	35µl	40µl	45µl	50µl	55µl	60µl	65µl	70µl	75µl	80µl	85µl	90µl	95µl	100µl	100µl	100µl
1.0 ml	10µl	20µl	30µl	40µl	50µl	60µl	70µl	80µl	90µl	100µl	110µl	120µl	130µl	140µl	150µl	160µl	170µl	180µl	190µl	200µl	200µl	200µl
2.5 ml	25µl	50µl	75µl	100µl	125µl	150µl	175µl	200µl	225µl	250µl	275µl	300µl	325µl	350µl	375µl	400µl	425µl	450µl	475µl	500µl	500µl	500µl
5 ml	50µl	100µl	150µl	200µl	250µl	300µl	350µl	400µl	450µl	500µl	550µl	600µl	650µl	700µl	750µl	800µl	850µl	900µl	950µl	1.0ml	1.0ml	1.0ml
10 ml	100µl	200µl	300µl	400µl	500µl	600µl	700µl	800µl	900µl	1.0ml	1.1ml	1.2ml	1.3ml	1.4ml	1.5ml	1.6ml	1.7ml	1.8ml	1.9ml	2.0ml	2.0ml	2.0ml
25 ml*	250µl	500µl	750µl	1.0ml	1.25ml	1.5ml	1.75ml	2.0ml	2.25ml	2.5ml	2.75ml	3.0ml	3.25ml	3.5ml	3.75ml	4.0ml	4.25ml	4.5ml	4.75ml	5.0ml	5.0ml	5.0ml
50 ml*	500µl	1.0ml	1.5ml	2.0ml	2.5ml	3.0ml	3.5ml	4.0ml	4.5ml	5.0ml	5.5ml	6.0ml	6.5ml	7.0ml	7.5ml	8.0ml	8.5ml	9.0ml	9.5ml	10ml	10ml	10ml

* 25 mL and 50 mL Combិតips Plus must be used with the supplied adapter.

Inserting the Combitip Plus Tip

- Push the filling lever down **completely** and hold down (see Fig. 3).
Reminder: Do not press ejection keys while inserting tip.
- Push the Combitip Plus Tip into the Repeater Plus from below. The Combitip Plus will click into place.
- When inserting a Combitip Plus directly from the rack (see Fig. 4), push the filling lever down **completely** and hold down.

The volume which would be dispensed in accordance with the size of Combitip Plus inserted and the position of the volume selection dial appears in the display.

- Select the volume by turning the dial.
The volume selected appears in the display.

Note: When small volumes are set (position 4, 5 or lower), the operating path of the pipetting lever is reduced automatically. Rotating the selection dial alters the position of the pipetting lever, which reduces the amount of strain placed on the thumb during dispensing.

Filling the Combitip Plus Tip

- Immerse the tip of the Combitip Plus into the liquid. Slide the filling lever **slowly** upwards to the stop (Fig. 1–6).
The display flashes, which means that the Repeater Plus is **not yet ready for operation!**
The first dispensing step must be discarded.
This first step is independent of the position of the dial. It is not a measured volume and prepares the system for the dispensing series to follow:
- Before executing the first stroke, wipe the tip with fiber-free material and hold it against the inside of a vessel.
- Press the pipetting lever once (Fig. 1–5) and discard the liquid.
- The display stops flashing and shows the pipetting volume.

The Repeater Plus is now ready for operation.
The full number of dispensing steps are now available.

Pipetting

- Hold the tip of the Combitip Plus against the inside of a vessel.
Execute the stroke of the pipetting lever (Fig. 1–5).

If there is not enough liquid to pipette the volume selected for the last dispensing step, the residual stroke lock prevents an insufficient amount from being pipetted. **After the Combitip has been refilled, please discard the first step (see page 19)!**

Ejecting the Combitip Plus Tip

When the Combitip Plus is ejected, the filling lever **must** be in the lowest position:

- Hold the Combitip over vessel and empty the rest of the liquid by sliding down the filling lever into the lowest position.
- Hold the Repeater Plus over a vessel.
- Press both ejection keys simultaneously (Fig. 1–7). The Combitip Plus (25 mL and 50 mL Combitip Plus includes adapter) is released automatically from the Repeater Plus.
The display is no longer lit up.
- For 25 mL and 50 mL Combitips:
Unscrew the reusable adapter from the combitip and store in a safe place.

Notes

Filling the Combitip Plus Tip

- The filling lever should be pushed upwards slowly and smoothly.
Failure to do so can result in excessive vacuum, which can cause tiny bubbles to accumulate in the liquid and thus lead to pipetting inaccuracies.
If a large air bubble enters 10, 25 and 50 mL Combitips Plus, drips may form after every dispensing step when the volume dial is set to > 5.
- A small air bubble in the upper cylinder has no effect on dispensing accuracy.
- If the Combitip Plus is not filled completely, the display does not flash. In this case, the **first volume which is pipetted** must be discarded before the actual dispensing process begins.

Setting the volume in the event of an electronics failure or run-down battery

- The volume setting dial has 20 positions. Positions 1–10 are denoted by figures. The intermediate positions (as well as position 0.5) are indicated by a dot (•).
- The correct position of the dial is obtained by dividing the desired volume by the volume for position 1, which is printed on the Combitip Plus (see Fig. 2–1: "1= . . μL ").

Example for the 5 mL Combitip:

- Volume for position 1: 100 μL
- Desired pipetting volume: 200 μL
Calculation: $200 \div 100 = \mathbf{2}$
Position to be set: 2
- Desired dispensing volume: 750 μL
Calculation: $750 \div 100 = \mathbf{7.5}$
Position to be set: • between 7 and 8
- Desired pipetting volume: 50 μL
Calculation: $50 \div 100 = \mathbf{0.5}$
Position to be set: • in front of 1

4.3 Replacing the battery

- Open the battery compartment (Fig. 1–3) by sliding off the lid.
- Wipe the new battery with a soft, dry cloth and insert into the battery compartment, making sure that the positive pole and the labelling are facing upwards. Dispose of the old battery in accordance with environmental regulations.

If no new battery is available, it is possible to continue working with the Repeater Plus (volume setting: see above).

Battery lifetime: at least two years

When the battery symbol appears, it is possible to continue work supported by electronics for approximately two weeks.

5 Maintenance / Cleaning

The Repeater Plus can be cleaned using a soft cloth softened with soap solution or disinfected with 60 % isopropanol.

Do not allow any liquid to enter into the device.

If a problem cannot be eliminated with the aid of the recommendations in this manual (see Sec. 6), please return the Repeater Plus to your Eppendorf distributor, Brinkmann Instruments, Inc.

6 Troubleshooting

Error	Cause	Solution
Battery symbol appears.	<ul style="list-style-type: none">– Battery is running down.	<ul style="list-style-type: none">– Replace the battery within the next two weeks.
Display blank.	<ul style="list-style-type: none">– No Combipip Plus has been inserted.– Battery is run down.– Battery has been inserted incorrectly.– Electronics are defective.	<ul style="list-style-type: none">– Replace the Combipip Plus.– Insert a new battery (see Sec. 4.3).– Insert the battery correctly, making sure that the positive pole is visible.– Operation and volume selection are possible without the electronics (Sec. 4.2).– Send in the Repeater Plus for repair.
Air bubble increases in size; liquid cannot be aspirated.	<ul style="list-style-type: none">– Combipip Plus is leaking.	<ul style="list-style-type: none">– Replace the Combipip Plus.
Poor accuracy/precision values.	<ul style="list-style-type: none">– Combipip Plus is leaking.– Liquid contains air bubbles.	<ul style="list-style-type: none">– Replace the Combipip Plus.– Aspirate the liquid slowly and evenly.– Use degassed liquid.
Displays S 2	<ul style="list-style-type: none">– Pipetting stroke has not been executed completely.– Volume selection dial has not locked into position.	<ul style="list-style-type: none">– Use the entire path of the pipetting lever.– Lock the volume selection dial into position.
Displays C 2 C 4 C 6	<ul style="list-style-type: none">– Rim of the Combipip Plus barrel or the Combipip mounting of the Repeater Plus is not clean.– Combipip Plus is not positioned correctly in the mounting (i.e. is not straight).– Combipip sensor is defective.	<ul style="list-style-type: none">– Wipe with a moist cloth or use a new Combipip Plus.– Insert the Combipip Plus correctly without touching the ejection key.– Send in the Repeater Plus for repair.

7 Ordering information

Repeater Plus	22 26 020-1
Carousel stand, incl. 6 pipette supports	22 44 490-5
Multi adapter for carousel stand	22 45 529-0
Repeater Plus wallmount	22 26 059-9

Combitip Plus Tips, standard

bag of 100	
0.1 mL (beige piston)	22 26 595-4
0.2 mL (blue piston)	22 26 600-4
0.5 mL	22 26 610-1
1 mL	22 26 620-9
2.5 mL	22 26 630-6
5.0 mL	22 26 640-3
10 mL	22 26 650-1
25 mL*	22 26 655-1
50 mL*	22 26 660-8

* Adapter Plus (autoclavable)
required (1 only):

for 25 mL Combitip Plus, dark blue	22 26 699-1
for 50 mL Combitip Plus, charcoal	22 26 670-5

Sterile Combitip Plus Tips

Ten bags of 10	
0.1 mL (beige piston)	22 26 700-1
0.2 mL (blue piston)	22 26 710-8
0.5 mL	22 26 720-5
1 mL	22 26 730-2
2.5 mL	22 26 740-0
5.0 mL	22 26 750-7
10 mL	22 26 760-4
50 mL**	22 26 770-1
Combitip Plus Tip Assortment Pack	22 26 662-4

Eppendorf Biopur Combitip Plus Tips

individually sealed; sterile, pyrogen-free,
DNA-free, RNase-free, ATP-free;

bag of 100	
0.1 mL (beige piston)	22 49 600-0
0.2 mL (blue piston)	22 49 602-6
0.5 mL	22 49 604-2
1 mL	22 49 606-9
2.5 mL	22 49 608-5
5.0 mL	22 49 610-7
10 mL	22 49 612-3
25 mL**	22 49 613-1
50 mL**	22 49 614-0

** Adapter Plus from Eppendorf Biopur required,
individually sealed (set of 7):

for 25 mL Combitip Plus, dark blue	22 49 615-8
for 50 mL Combitip Plus, charcoal	22 49 616-6

Combitip Mounting Rack	22 26 800-7
3 V battery	22 26 911-1

Caution: Please use the recommended accessories only. Using disposables and spare parts which we have not recommended can reduce the safety, precision, accuracy and service life of the pipette. We do not honor any warranty or accept responsibility fro damage resulting from such action.

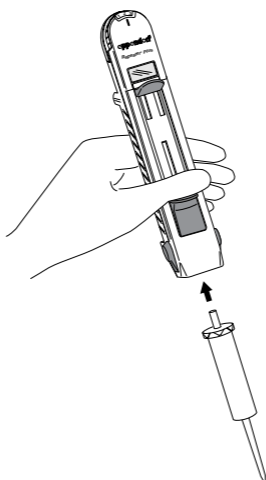


Fig. 3: Inserting the Combipip[®] Plus
Mise en place du Combipip[®] Plus
Colocación del Combipip[®] Plus

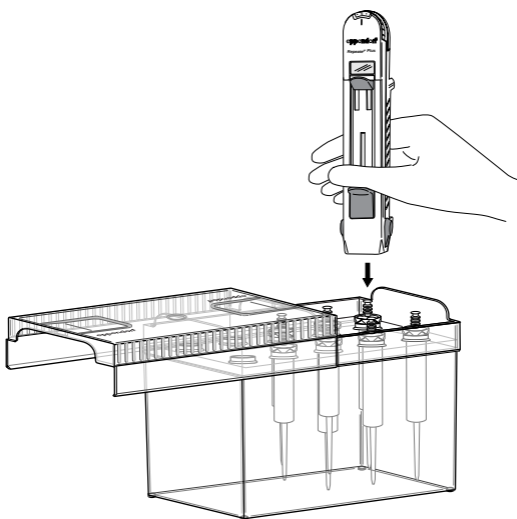


Fig. 4: Removing the Combipip[®] Plus from the rack
Enlèvement du Combipip[®] Plus du rack
Toma del Combipip[®] Plus del rack