

## 1. Introduction

The Eppendorf Repeater 4780 is a hand held device for repetitive pipettings. Up to 48 pipettings of the same sample may be accomplished with a single filling. This eliminates filling the pipette with reagent for every single pipetting operation and results in a considerable reduction in time and expense.

Special syringes, available in different sizes, called "Eppendorf Combipips", allow pipetting of any one of 22 volumes between 10 µl and 5 ml.

The working unit consists of the Repeater and the Combipip, a reusable plastic reservoir which locks into the bottom of the Repeater.

Five different volumes may be dispensed per Combipip. The filling volume is determined by the capacity of the Combipip. The pipetting volume is set by the volume selection dial on the Repeater.

An incorporated "residual stroke lock" prevents incorrect pipetting of the final step.

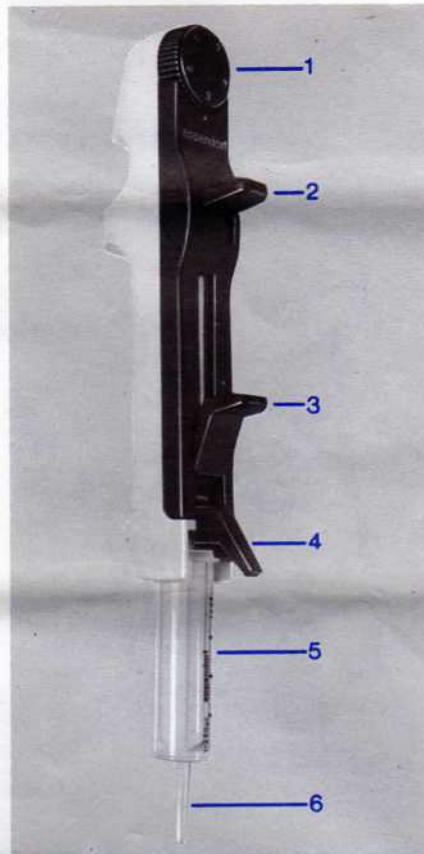


Figure 2: Repeater with Combipip

### Repeater 4780

- (1) Volume selection dial  
To determine the pipetting volume, the dial setting (1 - 5) is multiplied by the minimum pipetting volume of the Combipip.
- (2) Pipetting lever  
The volume is pipetted by pressing the pipetting lever down until it stops.
- (3) Filling lever  
The combipip is filled by sliding this lever upwards.
- (4) Locking clamp  
Serves to clamp the Combipip firmly into the Repeater.
- (5) Combipip
- (6) Cone

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## 2. Volume selection and choice of Combipip

Pipetting volume															µl	ml						Combipip
10	20	25	30	40	50	75	100	125	150	200	250	300	400	500								
48	23		15	11	8																	0.5 ml
1	2		3	4	5																	1.25 ml
		48			23	15	11	8														2.5 ml
		1			2	3	4	5														5.0 ml
					48		23		15	11	8	5										12.5 ml
					1		2		3	4	5											50.0 ml
							48			23	15	11	8	5								
										48	1			23	15	11	8	5				
															48	1		23	15	11	8	
																	48	1	23	15	11	8
																			48	1	23	15
																					48	1
																						48

Figure 3: Volume table

For repetitive pipetting of a particular volume, e. g., 100 µl:

- Look for the desired volume in the upper horizontal line.
- Below you will find the number of pipetting steps together with the appropriate setting of the volume selection dial (blue colored).
- The column at the right provides the corresponding Combipips.

The volume table shows the possibility to dispense 100 µl with 3 different Combipips.



Number of repetitive pipettings

Position of dial setting

With one filling, an 1.25 ml Combipip, a dial setting of 4 you achieve 11 pipettings, the 2.5 ml Combipip set to 2 allows 23 pipettings and Combipip 5.0 ml, position 1 offers 48 pipettings.

Better precision is achieved, using Combipips of small capacity with a high dial setting, than with Combipips of large capacity with low dial setting.

## Additional information

### Combitip

Combitips are reusable for pipetting the same sample during the same day of operation. However, it is recommended to use a new Combitip for each new days work and when changing reagents.

The minimum pipetting volume (1) and the maximum filling capacity (2) is given on the Combitip.

The scale facilitates drawing off partial quantities and permits you to estimate the amount of liquid still available for operation.

### Setting the Repeater

The volume to be pipetted is obtained by multiplying the set number on the volume selection dial by the minimum pipetting volume of the Combitip.

e. g. Combitip 12.5 ml,  
minimum volume = 250 µl,  
setting 4 = 4 x 250 =  
pipetted volume 1000 µl.

### Number of pipetting steps

The correlation between the set position with the volume selection dial and the number of pipettings reads as follows:

Position	Number of pipettings
1	48
2	23
3	15
4	11
5	8

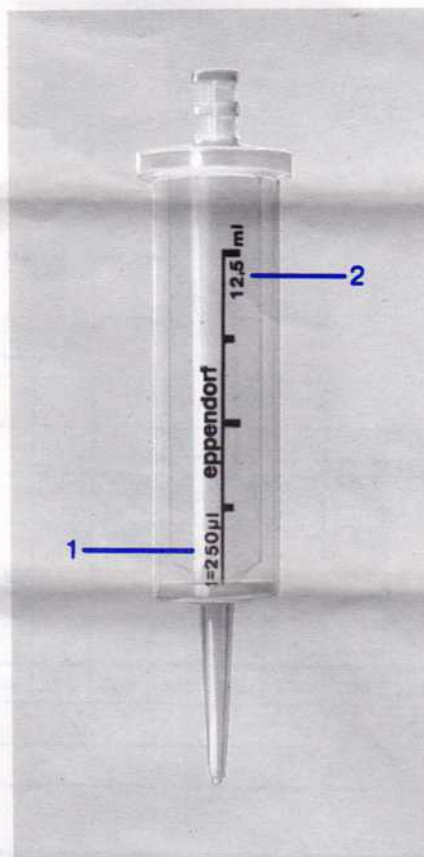


Figure 4: Combitip

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## 3. Inserting the Combitip

- Slide the filling lever (see Fig. 5, 1) down until it stops.
- Raise the locking clamp (see Fig. 5, 2) upwards.
- Insert the Combitip until it clicks into position (see Fig. 5).
- Be sure the filling lever is completely down and close the locking clamp (see Fig. 6).

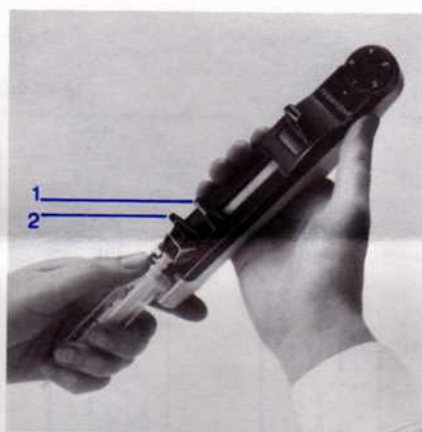


Figure 5: Inserting the combitip



Figure 6: Clamping the Combitip in position

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#### Combitip 50 ml

**Note:** An adapter is necessary to insert the 50 ml Combitip in the Repeater. 50 ml Combitips are as easy to use as smaller-sized Combitips. You only have to regard the following simple steps:

1. Secure the adapter on the Combitip by turning it clockwise to the stop. The system is ready to be inserted in the Repeater.
2. The reusable adapter is simply removed: just turn it counter-clockwise.

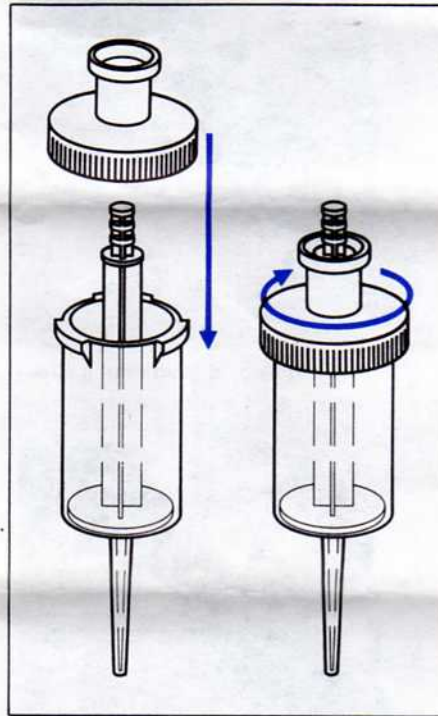


Figure 7:

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#### 4. Filling the Combitip

It is recommended to use a yellow Eppendorf pipette tip with the Combitips (particularly the 2.5, 1.25 and 0.5 ml sizes). A pipette tip need **not** be used with the other Combitips.

- Immerse the cone or tip (Fig. 2.6) into the liquid.
- Fill by **slowly** sliding the filling lever upwards (refer to Fig. 8a, 8b).
- For all Combitips, reject the first pipetting step. The Repeater is now ready for operation.

#### Additional information

Do not slide the filling lever upwards too quickly. This could lead to excessive low-pressure, thereby allowing tiny air bubbles to accumulate in the liquid, which could lead to pipetting inaccuracies.

The **first pipetting step must be rejected** in order to release pressure from the pipetting system after filling and in order to prepare the system for precise pipetting.

Do not worry about any little bubbles in the upper cylinder chamber beneath the piston as they do not affect precise pipetting. This is because the final pipetting step is not pipetted due to the residual stroke lock.

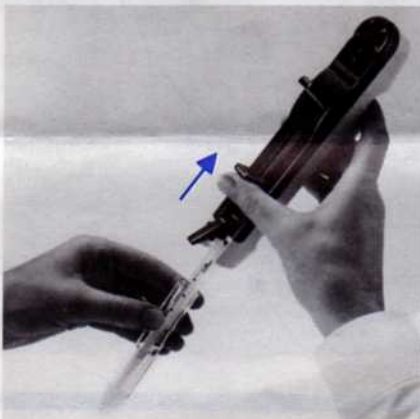
Filling the Repeater from narrow-necked vessels is facilitated by attaching a pipette tip. This also makes pipetting of smaller volumes more precise.

It is better to use the one-handed filling method (refer to Fig. 8b) when drawing off from small vessels, as the vessel may be held with the other hand.

The Combitip need not always be completely filled. The partial quantities filled may be read off on the scale.



Figure 8a: Filling with both hands



## 5. Pipetting

- Check the volume selection dial.
- Wipe off the Combitip cone or pipette tip with lint-free paper if necessary.
- Hold the cone or tip so that it touches the inner side of the vessel.
- Pipette the reagent by depressing the pipetting lever (refer to Fig. 2.2) until it stops (refer to Fig. 9).

### Additional information

Pipetting with the 5.0 and 12.5 ml Combitips is normally carried out without a tip. When pipetting into narrow vessels, a tip may be attached.

**Never** attach a tip, when working with the 50 ml Combitip.

When changing the reagent, we recommend that you use a new Combitip as this avoids errors due to carryover and also time-consuming cleaning operations.

An incorporated residual stroke lock prevents pipetting of the final step, thereby eliminating incorrect pipetting.

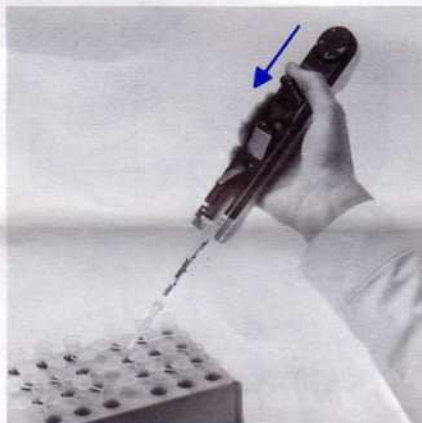


Figure 9: Pipetting

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## 6. Removing the Combitip

- Hold the Repeater over a beaker.
- Depress the filling lever slowly downwards to the stop to empty the Combitip completely.
- Raise the locking clamp upwards.
- Press your thumb against the side of the Repeater and remove the Combitip (refer to Fig. 10).
- When using the 50 ml Combitip the reusable adapter is simply removed by turning it counter-clockwise.

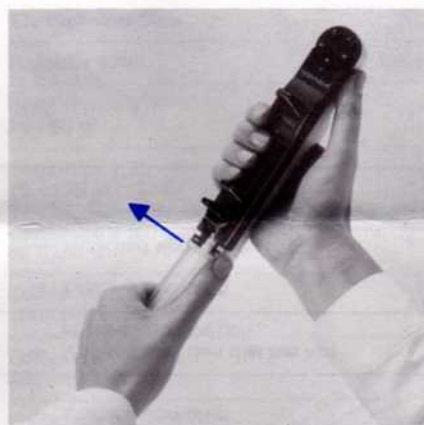


Figure 10: Removing the Combitip

## 7. Safety notes and limits of application

When removing Combitips please note the following:

- Do not touch the outlet (aggressive solutions!).
- When emptying, do not squirt the liquid around. The liquid stream could endanger laboratory staff.

In case of highly viscous solutions, we cannot guarantee that the Combitips will remain leakproof. Before using such reagents, please check whether pipetting inaccuracies occur (dripping).

The Repeater may be laid down partially filled, however, in some cases the liquid may leak out of the Combitip. For this reason, you should always use the stand to store filled Repeaters.

## 8. Troubleshooting

Error	Cause	Solution
Combitip cannot be inserted	<ul style="list-style-type: none"> <li>Filling lever: not fully in the down position, therefore, locking clamp cannot be completely raised.</li> <li>Combitip piston incompletely inserted.</li> </ul>	<ul style="list-style-type: none"> <li>Depress the filling lever fully downwards and raise the locking clamp as far as it will go.</li> <li>Slide the piston properly in position.</li> </ul>
Impossible to fully lift filling lever	<ul style="list-style-type: none"> <li>Locking clamp incompletely depressed.</li> </ul>	<ul style="list-style-type: none"> <li>Completely depress the locking clamp.</li> </ul>
Excessive number of air bubbles when filling the Combitip.	<ul style="list-style-type: none"> <li>Filling lever slightly lifted before dipping into the liquid.</li> <li>Leaking Combitip</li> </ul>	<ul style="list-style-type: none"> <li>Draw up some solution and then eject it (using filling lever). Only then should the Combitip be completely filled.</li> <li>Replace the Combitip with a new one.</li> </ul>
Indefinite pipetting volume	<ul style="list-style-type: none"> <li>Volume selection dial has not clicked into position.</li> </ul>	<ul style="list-style-type: none"> <li>Click volume selection dial into position.</li> </ul>
Dripping Combitip	<ul style="list-style-type: none"> <li>Leaking Combitip</li> <li>Attached tip is loose</li> </ul>	<ul style="list-style-type: none"> <li>Replace the Combitip with a new one</li> <li>Use more force to attach the tip</li> </ul>
Repeater clamping, resp. does not function		<ul style="list-style-type: none"> <li>Send in Repeater for repair.</li> </ul>

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## 9. Maintenance and Service

### 9.1 Maintenance

Dirty Repeaters should be cleaned with warm water or isopropyl alcohol.

Apart from this, the Repeater is completely maintenance-free.

**In no case should the individual sections of the Repeater be unscrewed!**

### 9.2 Service

If the problem cannot be solved with the aid of the suggestions mentioned here, we suggest that the Repeater should be returned to your Eppendorf distributor for repair or replacement.

## 10. Ordering Information

Repeater 4780	22 26 000-6
Repeater stand	22 26 060-0
0.5 ml Combitip, 100 per case	22 26 100-2
1.25 ml Combitip, 100 per case	22 26 110-0
2.5 ml Combitip, 100 per case	22 26 120-7
5.0 ml Combitip, 100 per case	22 26 130-4
12.5 ml Combitip, 100 per case	22 26 140-1
50 ml Combitip, 100 per case	22 26 150-9
Adapter, for 50 ml Combitip, 1 each	22 26 152-5
Yellow pipette tips, bulk packed, 1000 per case	22 35 130-3
Yellow pipette tips	

## 11. Technical Data

Repeater 4780	Inaccuracy %	Imprecision %
Combitips 0.5 ml 10 - 50 µl	± 1.5	± 1.0 to ± 0.6
Combitips 1.25 ml 25 - 125 µl	± 1.2	± 0.8 to ± 0.5
Combitips 2.5 ml 50 - 250 µl	± 1.0	± 0.6 to ± 0.4
Combitips 5.0 ml 100 - 500 µl	± 0.8	± 0.5 to ± 0.3
Combitips 12.5 ml 250 - 1250 µl	± 0.7	± 0.5 to ± 0.2
Combitips 50.0 ml 1 - 5 ml	± 1.0	± 0.5

The data for 0.5, 1.25 and 2.5 ml Combitips are based on a method whereby yellow Eppendorf pipette tips were attached.

Measuring conditions: water, approx. 20° C.

Subject to technical alteration!