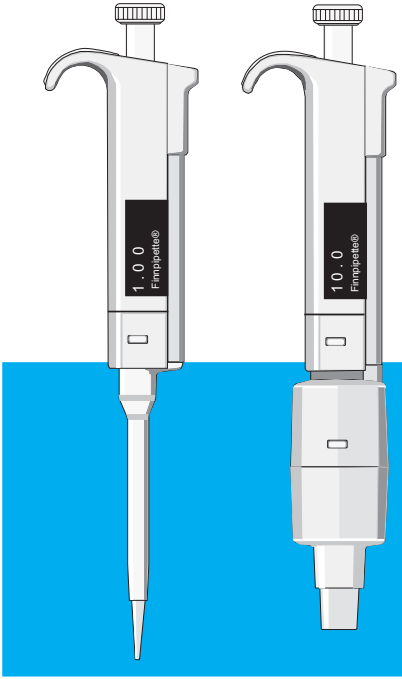
Finnpipette® Digital

Instructions for Use
Bedienungsanleitung
Guide d´utilisation et d´entretien
Instrucciones de uso
取扱説明書



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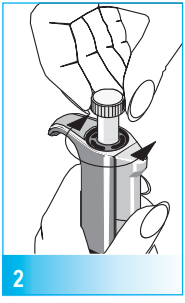
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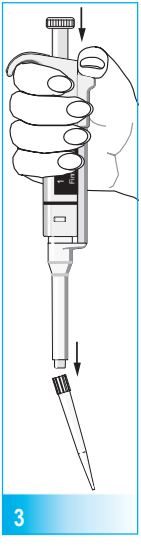
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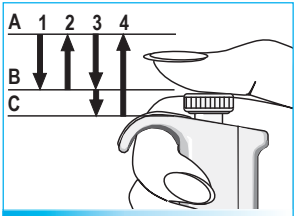

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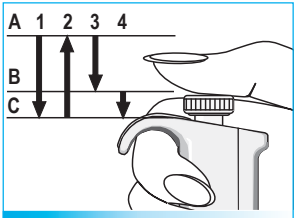

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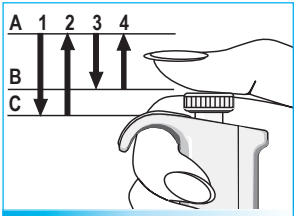

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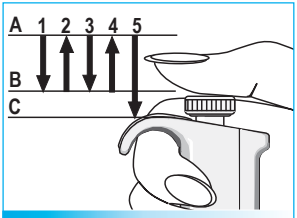

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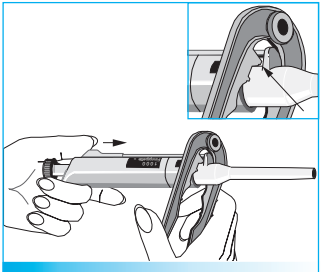
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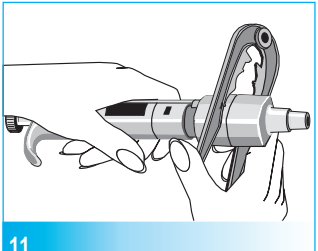
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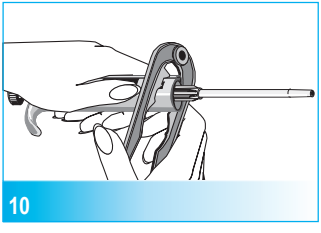
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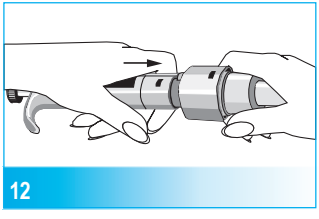
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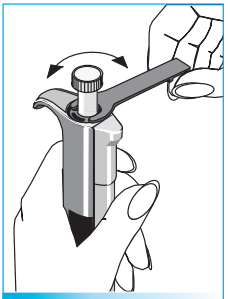

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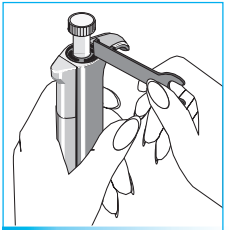

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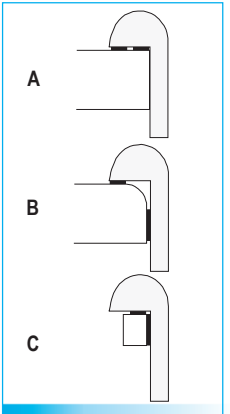

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PRODUCT DESCRIPTION

The Finnpipette Digital is an autoclavable digital pipette. It operates on the air displacement principle (i.e. an air interface) and uses detachable, disposable tips.

The adjusted delivery volume is displayed digitally on a readout window on the handle The eleven different models of Finnpipette Digital pipettes cover a volume range from 0.2 µl to 10 ml.

Order No.	Volume Range	Finntip
4500000	0.2 µl to 2 µl	10
4500010	0.5 µl to 10 µl	10
4500020	0.5 µl to 10 µl	250 Universal, 200 Ext
4500080	2 µl to 20 µl	250 Universal, 300, 200 Ext
4500100	5 µl to 50 µl	250 Universal, 300, 200 Ext
4500110	10 µl to 100 µl	250 Universal, 300, 200 Ext
4500090	20 µl to 200 µl	250 Universal, 300, 200 Ext
4500120	100 µl to 1000 µl	1000,1000 Ext
4500050	200 µl to 1000 µl	1000
4500060	1 ml to 5 ml	5 ml
4500070	2 ml to 10 ml	10 ml

1 DIGITAL DISPLAY

The adjusted delivery volume is clearly indicated in the large digital display on the handle.

RAW MATERIALS

The Finnpipette Digital is made of mechanically durable and chemically resistant materials which allow repeated autoclaving of the complete pipette at 121°C.

DESCRIPTION OF TIPS

Finntips are recommended for use with the Finnpipette Digital.
They are made of natural colour polypropylene, generally regarded as the only contamination free material suitable for tips. Finntips are also autoclavable (121°C).

PIPETTE OPERATION

SETTING THE DELIVERY VOLUME

2 1. Set the delivery volume using the push button on the top of the pipette. To increase the delivery volume, turn the push button counterclockwise. To decrease the delivery volume, turn it clockwise.
2. Make sure that the desired delivery volume clicks into place and that the digits are
1 completely visible in the display window.
3. Do not set volumes outside the pipette´s specified volume range.
Using excessive force to turn the push button outside the range may jam the mechanism and eventually damage the pipette.

TIP EJECTION 3

To help eliminate the risk of contamination, each pipette is fitted with a tip ejectorsystem. The tip ejector system consists of a soft-touch tip ejector and specially designed gearing mechanism. To release the tip, point the pipette at suitable waste receptacle and press the tip ejector with your thumb.

SAFETY LABEL 13

You can mark the pipette application your initials the calibration date, etc.on the safety label Remove the clear plastic window on the edge closest to the push button (use the service tool that comes with the pipette, or a screwdriver). Mark the adhesive label with a felt-tipped or other pen and snap the window back in place.

SHELF HANGER 14

You can attach the pipette shelf hanger on a counter, pipette stand or anywhere where you want to hang your pipette.
Clean the area where you plan to attach the shelf hanger. Apply two stickers to the underside of the shelf hanger. Press the shelf hanger firmly into place -- on a shelf, countertop or pipette stand. To use, hang the grippy finger rest on the shelf hanger.

PIPETTING TECHNIQUES

Push and release the push button slowly at all times particularly when working with high viscosity liquids. Never allow the push button to snap back.
Make sure that the tip is firmly attached to the tip cone.
Check for foreign particles in the tip.
Before you begin your actual pipetting work, fill and empty the tip 2-3 times with the solution that you will be pipetting. Hold the pipette in an upright position while aspirating liquid. The grippy should rest on your index finger. Make sure that the tips, pipette and solution are at the same temperature.

Figures 4-7:
A = Ready position
B = First stop
C = Second stop

FORWARD TECHNIQUE 4

Fill a clean reagent reservoir with the liquid to be dispensed.
1 Depress the push button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm and slowly release the push button. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second, continue to depress the push button all the way to the second stop. This action will empty the tip.
4. Release the push button to the ready position.If necessary, change the tip and continue pipetting.

REVERSE TECHNIQUE 5

The reverse technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volumes.Fill a clean reagent reservoir with the liquid to be dispensed.
1. Depress the push button all the way to the second stop.

2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm, and slowly release the push button.
   This action will fill the tip. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. The remaining liquid should either be discarded with the tip or pipetted back into the container.

6 REPETITIVE TECHNIQUE

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume. Fill a clean reagent reservoir with the liquid to be dispensed.

1. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm, and slowly release the push button. This action will fill the tip. Withdraw the tipfrom the liquid touching against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. Continue pipetting by repeating steps 2 and 3.

7 PIPETTING WHOLE BLOOD

(deproteinization in blood glucose determination, for example)
Use steps 1 and 2 of the forward technique to fill the tip with blood.
Wipe the tip carefully with a dry clean tissue.

1. Immerse the tip into the reagent and depress the push button to the first stop, making sure the tip is well below the surface.
2. Release the push button slowly to the ready position. This will fill the tip. Keep the tip in the solution.
3. Depress the push button to the first stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the push button all the way to the second stop to completely empty the tip.

CALIBRATION

All Finnpipettes are factory calibrated and adjusted to give the volumes as specified with distilled or deionized water. Normally, the pipettes do not need adjustment, but they are constructed to permit recalibration and adjustment for liquids of different temperature and viscosity.

DEVICE REQUIREMENTS AND TEST CONDITIONS

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of the pipette:

Volume range	readable graduation
under 10 µl	0.00 1mg
10-100 µl	0.01 mg
above 100 µl	0.1 mg

Test liquid: Water, distilled or deionized, “grade 3” water conforming ISO 3696. Tests are done in a draft-free room at a constant (±0.5°C) temperature of water, pipette and air between 15°C to 30°C. The relative humidity must be above 55%. Especially with volumes under 50µl the air humidity should be as high as possible to reduce the effect of evaporation loss.Special accessories, such as the evaporation trap, are recommended.

CHECKING THE CALIBRATION

The pipette is checked with the maximum volume (nominal volume) and with the minimum volume or 10% of maximum volume, whichever is higher. E.g. Finnpipette 0.5-10 µl is tested at 10 µl and 1 µl. A new tip is first pre-wetted 3-5 times and a series of ten pipettings are done with both volumes. A pipette is always adjusted for delivery (Ex) of the selected volume. Measuring volumes taken from balance is not allowed. If the calculated results are in the limits, the calibration of the pipette is correct.

Procedure:

1. Do 10 pipettings with the minimum volume.
2. Do 10 pipettings with the maximum volume.
3. Calculate the accuracy (A) and precision (cv) of both series.
4. Compare the results to the limits in the Table 1.

If the results are in the limits of Table 1, then the calibration of the pipette is correct. Otherwise the pipette must be adjusted and checked again.

Range	Volume	Accuracy		Precision	
	µl	µl	%	s.d. µl	cv%
0,2-2 µl	2	±0.050	±2.5	0.040	2.0
	0.2	±0.024	±12.0	0.020	10.0
0,5-10 µl	10	±0.100	±1.0	0.050	0.5
	1	±0.025	±2.5	0.020	2.0
0,5-10 µl	10	±0.100	±1.0	0.080	0.8
	1	±0.035	±3.5	0.030	3.0
2-20 µl	20	±0.200	±1.0	0.080	0.4
	2	±0.060	±3.0	0.030	1.5
5-50 µl	50	±0.30	±0.6	0.15	0.3
	5	±0.15	±3.0	0.13	2.5
10-100 µl	100	±0.80	±0.8	0.20	0.2
	10	±0.30	±3.0	0.10	1.0
20-200 µl	200	±1.20	±0.6	0.40	0.2
	20	±0.36	±1.8	0.14	0.7
200-1000 µl	1000	±6.00	±0.6	2.00	0.2
	200	±1.80	±0.9	0.60	0.3
100-1000 µl	1000	±6.00	±0.6	2.00	0.2
	100	±1.00	±1.0	0.60	0.6
1-5 ml	5000	±25.0	±0.5	10.0	0.2
	1000	±8.0	±0.8	3.0	0.3
2-10 ml	10000	±50.0	±0.5	20.0	0.2
	2000	±20.0	±1.0	6.0	0.3

ADJUSTMENT 8

Adjustment is done with the service tool.

1. Place the service tool into the openings of the calibration nut at the top of the handle.
2. Turn the service tool clockwise to increase, or counterclockwise to decrease the volume.
3. After adjustment check the calibration according to the instructions above.

FORMULAS FOR CALCULATING RESULTS

Conversion of mass to volume

V = (w + e) x Z

V = volume (µl)
w = weight (mg)
e = evaporation loss (mg)
Z = conversion factor for mg/µl conversion

Evaporation loss can be significant with low volumes. To determine mass loss, dispense water to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds (e.g. 6mg = 0.2mg/s).

Compare this to the pipetting time from tareing to reading. Typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2mg/s) in this example. If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary.
The factor Z is for converting the weight of the water to volume at test temperature and pressure. A typical value is 1.0032µl/mg at 22°C and 95 kPa. See the conversion table on page 47.

Accuracy (systematic error)
Accuracy is the difference between the dispensed volume and the selected volume of a pipette.
$A = \bar{V} - V_0$
A = accuracy
$\bar{V}$ = mean volume
V_0 = nominal volume

Accuracy can be expressed as a relative value: **$A\% = 100\% \times A / V_0$**

Precision (random error)
Precision refers to the repeatability of the pipettings. It is expressed as standard deviation (s) or coefficient of variation (cv)

$$S = \sqrt{\frac{\sum_{i=1}^{n} (V_i - \bar{V})^2}{n-1}}$$

s = standards deviation
$\bar{v}$ = mean volume
n = number of measurements
cv is the relative value of standard deviation.
cv = 100% x s / $\bar{v}$

MAINTENANCE

When the Finnpipette Digital is not in use, make sure it is stored in an upright position. We recommend a Finnpipette stand for this purpose.

SHORT-TERM CHECKING

The pipette should be checked at the beginning of each day for dust and dirt on the outside surfaces of the pipette.
Particular attention should be paid to the tip cone. No other solvents except 70 % ethanol should be used to clean the pipette.

LONG-TERM MAINTENANCE

If the pipette is used daily it should be checked every three months. The servicing procedure starts with the disassembly of the pipette.

DISASSEMBLING 0.2-50 µl PIPETTES

9 1. Press the tip ejector.
2. Insert the maintenance pliers under the ejector bar to release the tip ejector.
10 3. Remove the tip cone by pressing with maintenance pliers.
4. Pull out the piston and the spring.
5. Keep the tip cone vertically and push out with piston the rest of the piston assembly. Then keep the tip cone upside down and tap all parts from tip cone. Remember keep all parts in order on table for reassembly.
6. Clean the piston, the piston spring and the O-rings with a dry napless cloth.

7. Check the tip cone for foreign particles.
8. Grease the cleaned parts with the lubricant that comes with the pipette.
9. Reassemble the pipette components.
   All 0.2-50 µl: First, slide the spring 14, spring support 15 and tube 16 back on the piston. Compress the spring with fingers by pressing piston and spring support 15 agains eachother. 15
   5-50 µl: Slide bigger O-ring 17, smaller O-ring 18, spring support 19 (sharp edges against spring) and small spring 20 on the piston.
   0.5-10 µl: First slide O-ring tube 17 (larger hole first), bigger O-ring 18, smaller O-ring 19 and O-ring support 20 on the piston. Then slide small spring 21, spring support 22 (sharp edges against spring) and O-ring 22 on the O-ring support 20.
   0.2-2 µl: First slide O-ring tube 17 (larger hole first) and sealing combination 18 on the piston. Then slide small spring 19, spring support 20 (sharp edges against spring) and O-ring 21 on the sealing combination 18.
   All 0.2-50 µl: Carefully slide the entire assembly into the tip cone and release your fingers.
10. With the push button depressed all the way carefully attach the tip cone to the handle so that the adapter opening is on the tip ejector side. Do not bend the thin piston wire when assembling. Press in the snap joints.
11. Assemble the tip ejector and check the calibration according to the instructions.

DISASSEMBLING 50-1000 µl PIPETTES

1. Press the tip ejector. 9
2. Insert the pliers under the ejector bar to release the tip ejector.
3. Remove the tip cone using the maintenance pliers. 10
4. Pull out the piston.
5. Remove the O-ring, O-ring support and spring from the tip cone.
6. Clean the piston, the piston spring and the O-ring with a dry napless cloth.
7. Check the cylinder for foreign particles.
8. Grease the cleaned parts with the lubricant that comes with the pipette.
9. Slide parts over the piston pressing down the large spring. Attach the tip cone to the handle so that the adapter opening is on the tip ejector side, and press in the snap joints.
10. Check the calibration according to the instructions.

DISASSEMBLING 1-10 ml PIPETTES

1. Press the tip ejector. 9
2. Insert the pliers under the ejector bar to release the tip ejector.
3. Remove the part 2 from part 1 of the tip ejector using the maintenance pliers to release the snap joint. 11
4. Remove the cylinder by pressing part 1 of the tip ejector firmly towards the cylinder. This action releases the snap joint so you can remove the cylinder. 12
5. Clean the O-ring and cylinder. Regrease the O-ring ang the cylinder.
6. Assemble the parts in the opposite order of disassembly. All joints are snap fit and can be pushed together by hand. Be careful not to bend the pipette during assembly because this could damage the snap joints or the piston.
7. Check the calibration according to the instructions.

STERILIZATION

The entire pipette can be sterilized by autoclaving it at 121°C (252°F) (minimum 20 minutes). No special preparations are needed for autoclaving. You can use steam sterilization bags if needed.
After autoclaving the pipette must be cooled to room temperature for at least two hours. Before pipetting, make sure that the pipette is dry. We recommend that you check the calibration of 0.5-1000 µl pipettes after every 25th sterilization cycle and of 1-10 ml pipettes after every 10th sterilization cycle.

TROUBLE SHOOTING

The table below lists possible problems and their solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached	Attach firmly
	Foreign particles between tip and tip cone	Clean tip cones attach new tips
	Foreign particles between the piston, the O-ring and the cylinder	Clean and grease O-ring and cylinder.
	Insufficient amount of grease on cylinder and O-ring	Grease accordingly
	O-ring damaged	Change the O-ring
Inaccurate dispensing	Incorrect operation	Follow instructions carefully
	Tip incorrectly attached	Attach firmly
	Calibration altered: caused by misuse, for example	Recalibrate according to instructions
Inaccurate dispensing with certain liquids	Unsuitable calibration. High viscosity liquids may require recalibration.	Recalibrate with the liquids in question.

PACKAGE

The Finnpipette Digital is shipped in a specially designed package containing the following items:

1. The Finnpipette
2. Service tool
3. Maintenance pliers
4. Finntip sample
5. Tube of grease
6. Instruction manual
7. Calibration certificate
8. Shelf hanger
9. Two stickers

CAUTION!

The Finnpipette is designed to allow easy in-lab service. If you would prefer to have us or your local representative service your pipette, please make sure that the pipette has been decontaminated before you send it to us. Please note that the postal authorities in your country may prohibit or restrict the shipment of contaminated material by mail.

CONVERSION TABLE

Value of the conversion factor Z (µl/mg), as a function of temperature and pressure, for distilled water.

UMRECHNUNGSTABELLE

Wert des Umrechnungsfaktors Z (µl/mg als eine Funktion von Temperatur und Luftdruck bei destilliertem Wasser.

TABLEAU DE CONVERSION

Valeurs du facteur de conversion (µl/mg), en fonction de la température et de la pression, pour l'eau distillée.

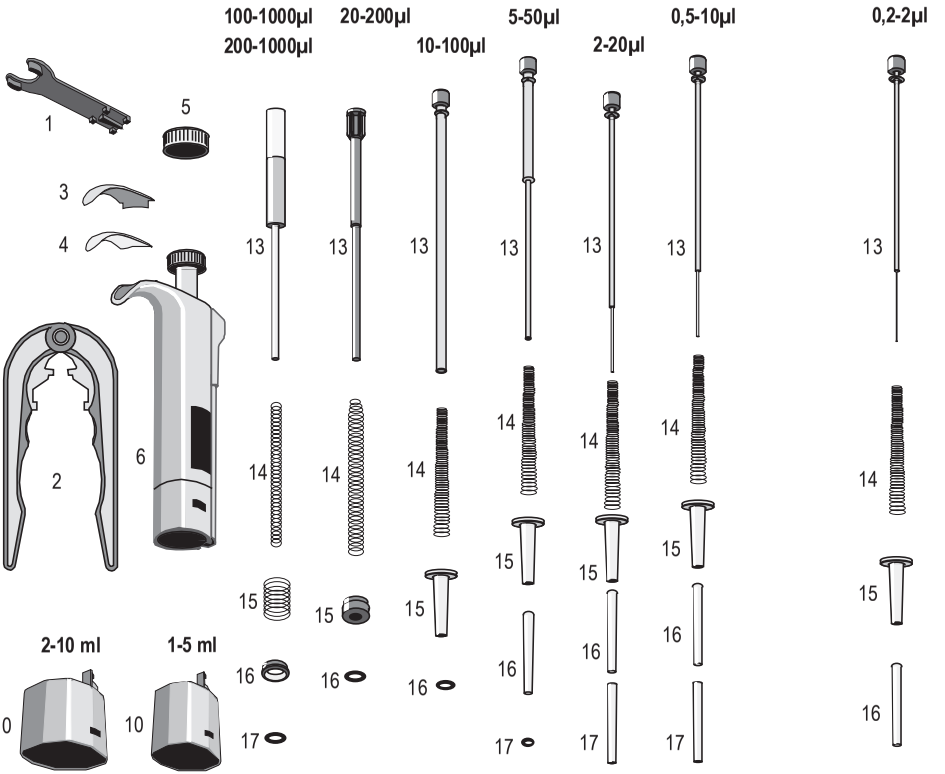
TABLA DE CONVERSION

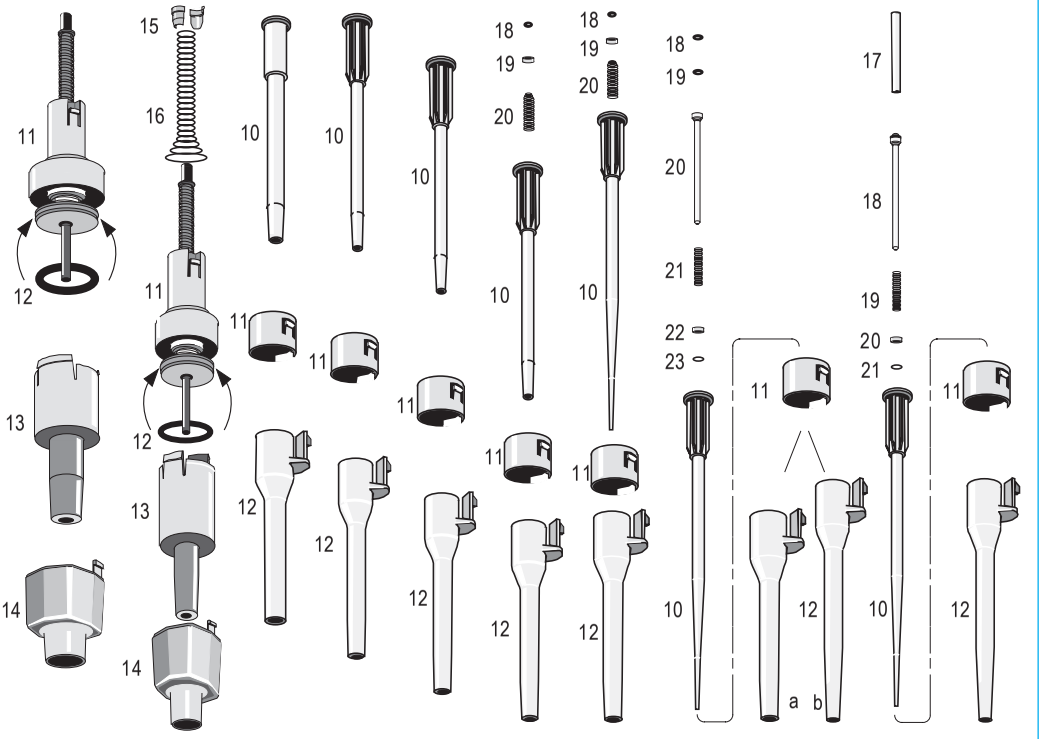
Valor del factor de conversión Z (µl/mg) para agua destilada en función de la presión y la temperatura.

変換表

下表に，温度と気圧の関数である変換係数 Z（μl/mg）の蒸留水での値を示します。

Temperature °C	Air pressure hPA (mbar)					
	800	853	907	960	1013	1067
15	1.0018	1.0018	1.0019	1.0019	1.0020	1.0020
15.5	1.0018	1.0018	1.0019	1.0020	1.0020	1.0021
16	1.0019	1.0020	1.0020	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0022	1.0022	1.0023
17	1.0021	1.0021	1.0022	1.0022	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024
18	1.0022	1.0023	1.0024	1.0024	1.0025	1.0025
18.5	1.0023	1.0024	1.0025	1.0025	1.0026	1.0026
19	1.0024	1.0025	1.0025	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0028	1.0028
20	1.0026	1.0027	1.0027	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0030	1.0030
21	1.0028	1.0029	1.0030	1.0030	1.0031	1.0031
21.5	1.0030	1.0030	1.0031	1.0031	1.0032	1.0032
22	1.0031	1.0031	1.0032	1.0032	1.0033	1.0033
22.5	1.0032	1.0032	1.0033	1.0033	1.0034	1.0035
23	1.0033	1.0033	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0037
24	1.0035	1.0036	1.0036	1.0037	1.0038	1.0038
24.5	1.0037	1.0037	1.0038	1.0038	1.0039	1.0039
25	1.0038	1.0038	1.0039	1.0039	1.0040	1.0041
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0042
26	1.0040	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0042	1.0043	1.0043	1.0044	1.0045
27	1.0043	1.0044	1.0044	1.0045	1.0045	1.0046
27.5	1.0044	1.0045	1.0046	1.0046	1.0047	1.0047
28	1.0046	1.0046	1.0047	1.0048	1.0048	1.0049
28.5	1.0047	1.0048	1.0048	1.0049	1.0050	1.0050
29	1.0049	1.0049	1.0050	1.0050	1.0051	1.0052
29.5	1.0050	1.0051	1.0051	1.0052	1.0052	1.0053
30	1.0052	1.0052	1.0053	1.0053	1.0054	1.0055


100-1000µl
200-1000µl
20-200µl
10-100µl
5-50µl
2-20µl
0,5-10µl
0,2-2µl
1
2
3
4
5
6
13
14
15
16
17
2-10 ml
1-5 ml
10
10


11
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a
b
17
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11
12

SPARE PARTS
ERSATZTEILE
PIECES DETACHEES
PIEZAS DE RECAMBIO
部品及び付属品

15 Figure 15 lists spare parts and reorder numbers
Abbildung 15 zeigt ersatzteile und bestellungsnummer
Voir sur figure N° 15 la liste des pièces détachées et leurs références
La Figura 15 muestra una lista de piezas de recambio
図 15及び下表に部品及び付属品と注文番号を示しました。

All

1. 10593480
2. 2900510
3. 10593050
4. 1527200

2-10 ml

5. 10592550
6. 2205800
10. 10593190
11. 2205850
12. 1033050
13. 10593440
14. 10593200

1-5 ml

5. 10592540
6. 2205790
10. 10593150
11. 2205840
12. 1030230
13. 10593130
14. 10593160
15. 1058180
16. 1131940

100-1000 µl / 200-1000 µl

5. 10592530
6. 2206640 / **100µl**
6. 2205780 / **200µl**
10. 10593410
11. 10593080
12. 10593100
13. 10589450
14. 1130560
15. 1130550
16. 1054260
17. 1030020

20-200µl

5. 10592520
6. 2206620
10. 10593420
11. 10593080
12. 10593110
13. 1053840
14. 1130510
15. 1053860
16. 1030160

10-100µl

5. 10592520
6. 2206630
10. 10593620
11. 10593080
12. 10593110
13. 2206600
14. 1131810
15. 10593340
16. 1030510

5-50µl

5. 10592510
6. 2207220
10. 10593430
11. 10593080
12. 10593110
13. 2206430
14. 1131810
15. 10593340
16. 10593330
17. 1030500
18. 1033060
19. 10593500
20. 1132000

2-20 µl

5. 10592510
6. 2206610
10. 10593090
11. 10593080
12. 10593110
13. 2206440
14. 1131810
15. 10593340
16. 10593330
17. 10593320
18. 1033110
19. 10593360
20. 1132120

0,5-10 µl

5. 10592500
6. 2205750
10. 10593090
11. 10593080
12. a 10593110
12. b 10593120
13. 2205710
14. 1131810
15. 10593340
16. 10593330
17. 10593310
18. 1030170
19. 1030060
20. 10593290
21. 1131800
22. 10593360
23. 1030170

0,2-2 µl

5. 10592560
6. 2205740
10. 10593090
11. 10593080
12. 10593120
13. 2205700
14. 1131810
15. 10593340
16. 10593330
17. 10593300
18. 2205730
19. 1131800
20. 10593360
21. 1030170

Shelf hanger
Pipetten-Aufhänger
Support-Pipette pour étagère
Soporte colgador
シェルフハンガー

2206040

TIP ORDERING INFORMATION
BESTELLUNG VON FINNTIPS
POUR COMMANDER LES CONES FINNTIPS
INFORMACION PARA PEDIDOS DE PUNTAS
チップオーダーィンフォメーション

Code	Finntip	Volume	Qty
9400310	10	0,2-10µl	1000/bag
9400300	10	0,2-10µl	10x96/rack
9400130	200 Ext	5-200µl	10x96/rack
9400260	250 Univ.	0,5-300µl	10x96/rack
9401250	300	5-300µl	10x96/rack
9401070	1000	100-1000µl	200/box
9401110	1000	100-1000µl	10x96/rack
9402060	5 ml	1-5ml	5x24/rack
9402160	10 ml	2-10ml	5x24/rack