

Proline[®]

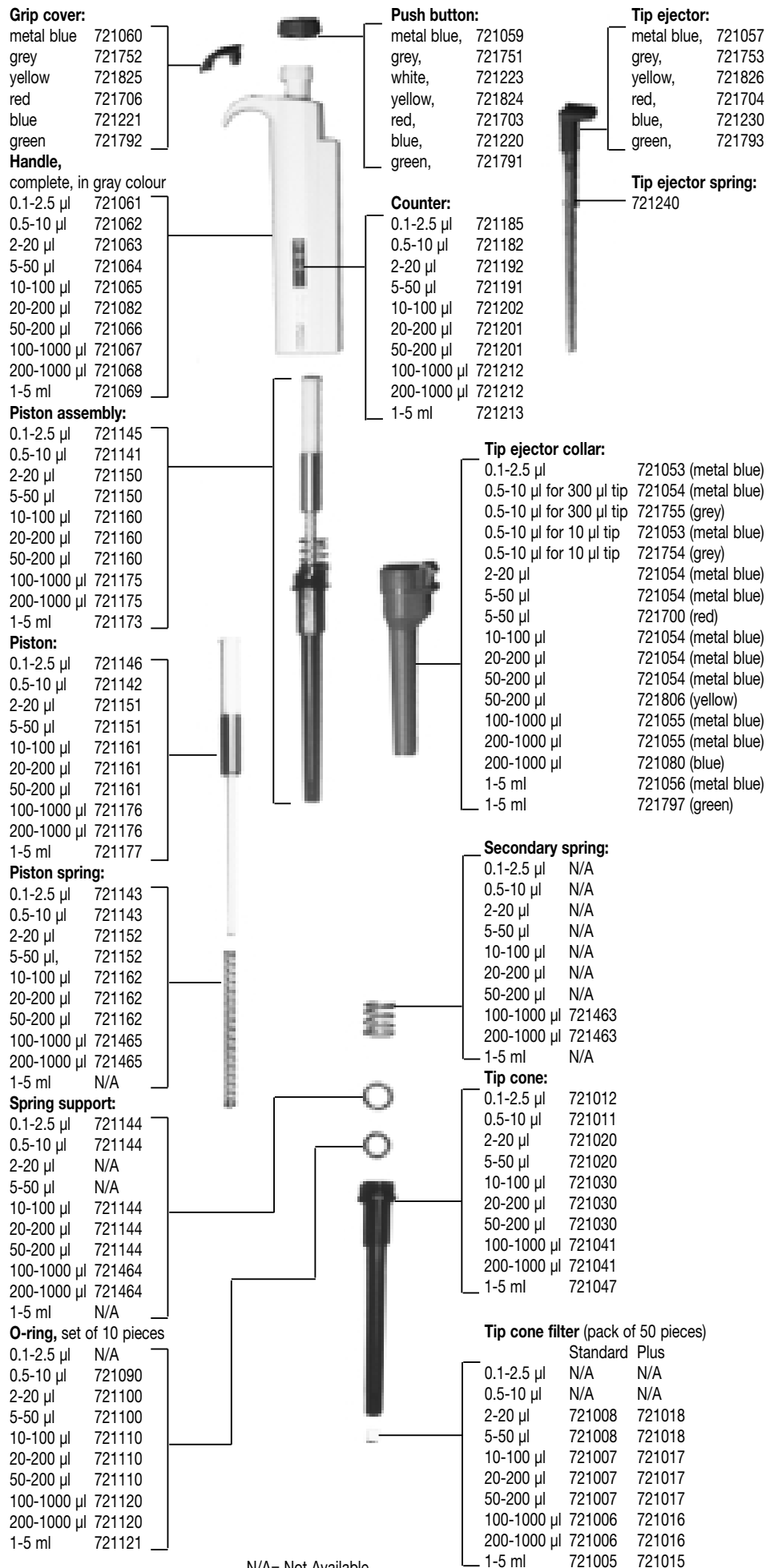
Käyttöohje
Bruksanvisning
Instruction Manual



BIOHIT



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N/A= Not Available

Grip cover:

metal blue,	721060
grey,	721752
yellow,	721825
red,	721706
blue,	721221

Push button:

metal blue,	721059
grey,	721751
yellow,	721824
red,	721703
blue,	721220

Tip ejector, complete:

metal blue,	721058
grey,	721758
yellow,	721862
red,	721828
blue,	721231

**Handle, complete,
in gray colour:**

4-channel:	
5-50 µl	721070
50-250 µl	721071
8-channel:	
0.5-10 µl	721072
5-50 µl	721073
50-300 µl	721075
12-channel:	
0.5-10 µl	721076
5-50 µl	721077
50-300 µl	721079

Tip ejector spring:

721240

Piston assembly:

0.5-10 µl	721276
5-50 µl	721271
50-250 µl	721272
50-300 µl	721278

Tip cone housing,

complete, in gray colour:

4-channel,	721677
8-channel,	721668
8-channel, 0.5-10 µl	721667
12-channel	721676
12-channel, 0.5-10 µl	721675

Tip ejector bar:

4-channel	721268
8-channel	721269
8-channel, 0.5-10 µl	721280
12-channel	721270
12-channel, 0.5-10 µl	721666

Piston:

0.5-10 µl	721296
5-50 µl	721297
50-250 µl	721298
50-300 µl	721298

Piston spring:

0.5-10 µl	721261
5-50 µl	721261
50-250 µl	721261
50-300 µl	721261

Spring support:

0.5-10 µl	721262
5-50 µl	721262
50-250 µl	721262
50-300 µl	721262

Elastomer:

0.5-10 µl	721300
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NOTE:

Coloured spare parts presented in these two pages are for the metal blue/gray Biohit Proline pipettors.

Spare part codes for the white handles and tip cone housings are in a separate spare part list, which can be ordered from Biohit subsidiaries or distributors.

Tip cone:

0.5-10 µl	721275
5-50 µl	721273
50-250 µl	721274
50-300 µl	721277

Tip cone filter (set of 50 pcs):

0.5-10 µl	N/A
5-50 µl	721014
50-300 µl	721014

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1. Your new Biohit Proline pipettor

Your new Biohit Proline hand-held pipettor is a general purpose pipettor, for the accurate and precise sampling and dispensing of liquid volumes. All Biohit Proline pipettors operate on the basis of the air displacement principle and use disposable tips.

The range of Biohit Proline pipettors cover a volume range from 0.1 µl to 5 ml.

1.1. Biohit Proline adjustable volume pipettors

Single channel pipettors:

Cat.No.	Volume Range	Increment	Tip	Safe-Cone Filters 50 pcs/bag	
				Standard	Plus
720005	0.1-2.5 µl	0.05 µl	10 µl	-	-
720000	0.5-10 µl	0.1 µl	10, 300 µl	-	-
720080	2-20 µl	0.5 µl	300 µl	721008	721018
720020	5-50 µl	0.5 µl	300, 350 µl	721008	721018
720050	10-100 µl	1 µl	300, 350 µl	721007	721017
720070	20-200 µl	1 µl	300, 350 µl	721007	721017
720030	50-200 µl	1 µl	300, 350 µl	721007	721017
720060	100-1000 µl	5 µl	1000 µl	721006	721016
720040	200-1000 µl	5 µl	1000 µl	721006	721016
720110	1000-5000 µl	50 µl	5000 µl	721005	721015

Multichannel pipettors:

Cat.No.	Volume Range	Increment	Tip	Safe-Cone Filters
				50 pcs/bag Standard
720120	4-ch 5-50 µl	0.5 µl	300, 350 µl, 350 µl 4 tip-band	721014
720130	4-ch 50-250 µl	5 µl	300, 350 µl, 350 µl 4 tip-band	721014
720210	8-ch 0.5-10 µl	0.1 µl	10 µl	-
720220	8-ch 5-50 µl	0.5 µl	300, 350 µl, 350 µl 4 tip-band	721014
720240	8-ch 50-300 µl	5 µl	350 µl, 350 µl 4 tip-band	721014
720310	12-ch 0.5-10 µl	0.1 µl	10 µl	-
720320	12-ch 5-50 µl	0.5 µl	300, 350 µl, 350 µl 4 tip-band	721014
720340	12-ch 50-300 µl	5 µl	350 µl, 350 µl 4 tip-band	721014

1.2. Biohit Proline fixed volume pipettors

Single channel pipettors:

Cat.No.	Volume Range	Tip	Safe-Cone Filters 50 pcs/bag	
			Standard	Plus
722001	5 µl	10, 300, 350 µl	-	-
722004	10 µl	10, 300, 350 µl	-	-
722010	20 µl	300, 350 µl	721008	721018
722015	25 µl	300, 350 µl	721008	721018
722020	50 µl	300, 350 µl	721008	721018
722025	100 µl	300, 350 µl	721007	721017
722030	200 µl	300, 350 µl	721007	721017
722035	250 µl	1000 µl	721006	721016
722040	500 µl	1000 µl	721006	721016
722045	1000 µl	1000 µl	721006	721016
722050	2000 µl	5000 µl	721005	721015
722055	5000 µl	5000 µl	721005	721015

1.3. H-sign (Konformitätsbescheinigung)

All Biohit Proline pipettors have been quality tested according to ISO 8655-6 and have received the H-sign (Konformitätsbescheinigung, DIN 12600) printed on the grip of each pipettor. The quality control according to ISO 8655 involves gravimetric testing of each pipettor with distilled water (grade 3, ISO 3696) at 22°C using the manufacturer's original tips.

1.4. Biohit Proline tips

The full range of Biohit pipettor tips are recommended for use with Biohit Proline pipettors. Biohit standard tips are made of virgin polypropylene. Biohit also offers a full range of filter tips. Biohit standard tips are available as bulk packages, space saving refill systems and autoclavable (121°C, 20 min, 1 atm) trays. Pre-sterilized tips in trays are also available. (Fig. 1.)

Fig. 1.



2. Unpacking

The Biohit Proline pipettor package contains the following items:

1. Pipettor
2. Calibration/Opening tool
3. Grease
4. Instructions for use
5. Pipettor holder
6. Tip
7. Identification stickers
8. Caps for colour coding (excludes fixed volume pipettors)
9. Filters (pipettors > 10 µl)
10. Performance certificate according to ISO 8655-6

3. Installing the pipettor holder

For convenience and safety always keep the pipettor vertically on its own holder when not in use. When installing the holder, please follow the instructions below:

1. Clean the shelf surface with ethanol.
2. Remove the protective paper from the adhesive tape
3. Install the holder as described in Figure 2A.
(Make sure the holder is pressed against the edge of the shelf.)
4. Place the pipettor onto the holder as shown in Figure 2B.

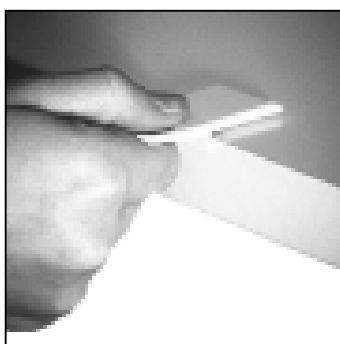


Fig. 2A

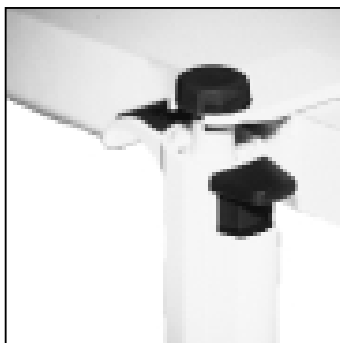


Fig. 2B

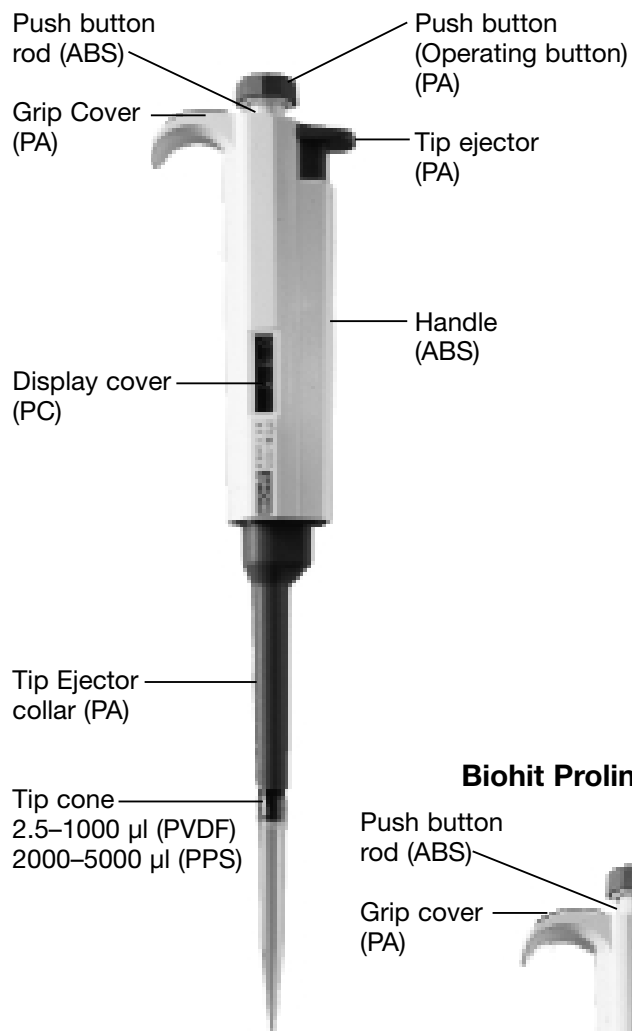


Fig. 3.

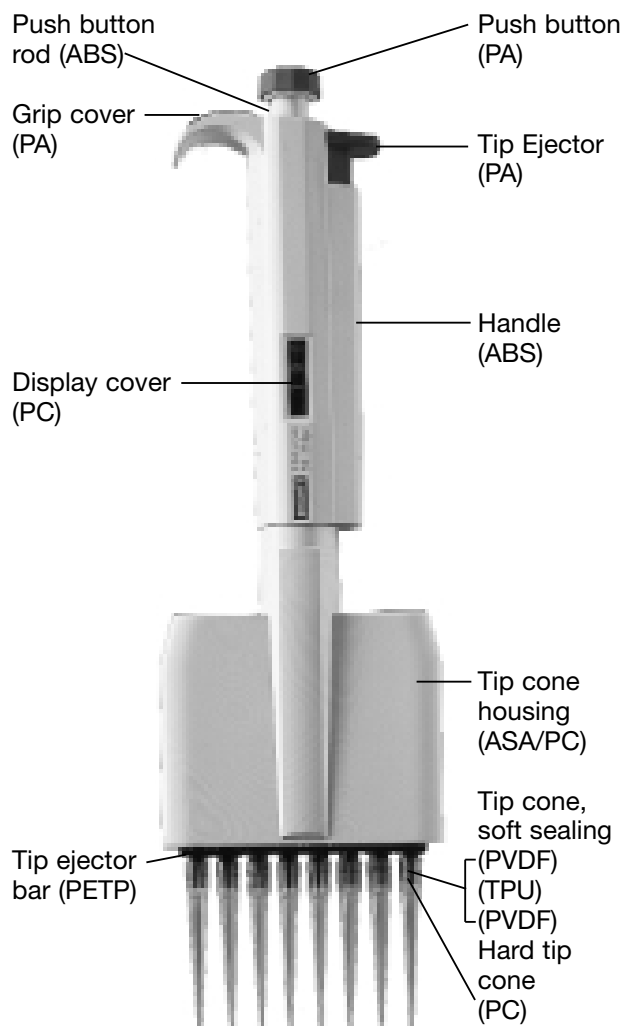
Note: An ergonomic, convenient carousel stand for 5 Biohit Proline pipettors is also available (Cat. No.721000) (Fig. 3).

4. Pipettor Materials

Biohit Proline Single Channel



Biohit Proline Multichannel



5. Operating the pipettor

5.1. Volume setting

The volume of the pipettor is clearly shown through the handle display window. The delivery volume (variable volume pipettors only) is set by turning the operating button clockwise or anticlockwise (Fig. 4). When setting the volume, please make sure that:

1. The desired delivery volume clicks into place.
2. The digits are completely visible in the display window.
3. The selected volume is within the pipettor's specified range.

Do not turn the operating button outside the volume range because it may jam the mechanism and damage the pipettor.

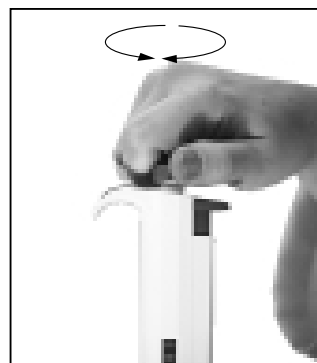


Fig. 4

5.2. Sealing and ejecting tips

Biohit Proline tips are recommended for use with Biohit Proline pipettors. Before fitting a tip ensure that the pipettor tip cone is clean. Press the tip on the cone of the pipettor firmly to ensure an airtight seal. The seal is tight when a visible sealing ring forms between the tip and the black tip cone (Fig. 5).

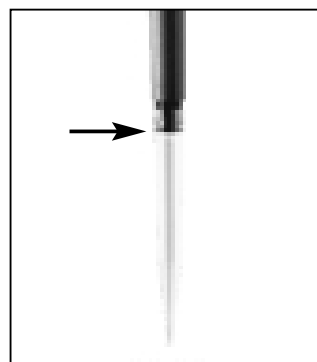


Fig. 5

Each Biohit Proline pipettor is fitted with a tip ejector to help eliminate the safety hazards associated with contamination. The tip ejector needs to be pressed firmly downwards to ensure proper tip ejection (Fig. 6). Make sure that the tip is disposed of into a suitable waste container.

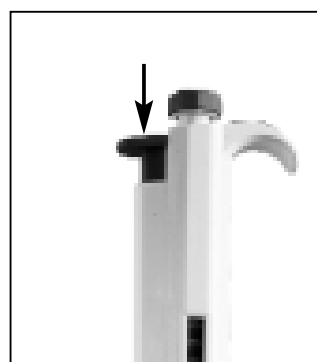


Fig. 6

5.3. Two-in-one pipettors

The Biohit Proline fixed volume pipettors 5 and 10 μl , and variable volume pipettors 0.5-10 μl can be used with both 10 μl and 300 μl tips. The pipettors are supplied with two ejector collars and are factory fitted with the ejector suitable for 10 μl tips. When using 300 μl tips, please change the ejector collar by following the instructions below (Fig 7):

1. Push the tip ejector down (1.).
2. Push the opening tool pin between the ejector bar and ejector collar to release the locking mechanism (2.).
3. Pull the ejector collar off (3.).
4. Install the 300 μl collar by pushing the collar locking pin into the ejector bar hole, keeping the tip ejector pushed down.
5. Release the tip ejector and test that it runs smoothly.

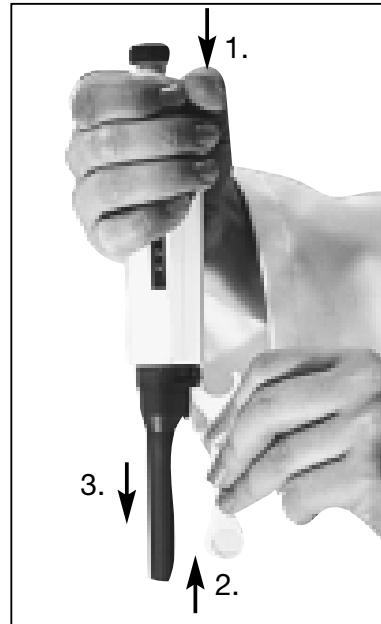


Fig. 7

5.4. Protective filters

The new tip cones of Biohit Proline pipettors ($>10 \mu\text{l}$) allow the use of a changeable filter as an option. The filter prevents liquids and aerosols from entering the pipettor. Two types of filters are available: a Safe-Cone Filter Standard and a Safe-Cone Filter Plus (see cat.no. in Chapter 1.1). Plus filters block the passage of liquids completely. The filters do not affect the calibration of the pipettor (Fig. 8).



Fig. 8

Note: Change the filter on the tip cone regularly (after 50-250 pipettings).

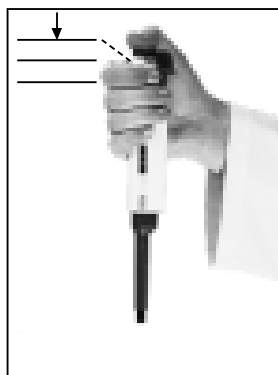
6. Pipetting techniques

1. Make sure that the pipettor, tips and the liquid are at the same temperature.
2. Make sure that the tip is firmly attached to the tip cone.
3. Hold the pipettor vertically when aspirating the liquid and place the tip only a few millimetres into the liquid.
4. Prerinse the tip before aspirating the liquid by filling and emptying the tip 5 times. This is important especially when dispensing liquids which have a viscosity and density different from water.
5. Always control the operating button movements with the thumb to ensure consistency.

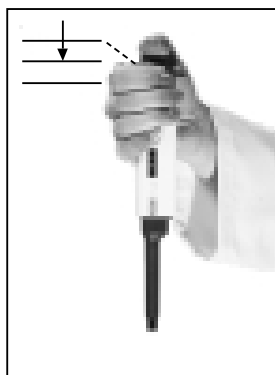
6.1. Forward pipetting

This technique employs the blow-out function ensuring complete delivery of the liquid.

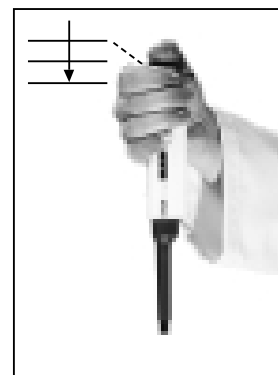
1. Depress the operating button to the first stop (Fig. 9B).
2. Place the tip(s) just under the surface of the liquid (2-3 mm) and smoothly release the operating button up to the starting position (Fig. 9A). Carefully withdraw the tip from the liquid, touching against the edge of the container to remove excess.
3. Liquid is dispensed by gently depressing the operating button to the first stop (Fig. 9B). After a short delay continue to depress the operating button to the second stop (= blow-out) (Fig 9C). This procedure will empty the tip(s) and ensure accurate delivery.
4. Release the operating button to the starting position (Fig. 9A). If necessary change the tip(s) and continue pipetting.



Starting position
Fig. 9A



First stop
Fig. 9B



Second stop
Fig. 9C

6.2. Reverse pipetting

A selected volume plus an excess is aspirated into the tip. The delivery is done without blow-out, and so the excess volume remains in the tip. The reverse technique is recommended for high viscosity, biological or foaming liquids, or very small volumes of liquid.

1. Depress the operating button all the way to the second stop (Fig. 9C). Place the tip(s) just under the surface of the liquid (2-3 mm) and smoothly release the operating button up to the starting position (Fig.9A).
2. Withdraw the tip(s) from the liquid touching against the edge of the container to remove excess.
3. Deliver the preset volume by smoothly depressing the operating button to the first stop (Fig. 9B). Hold the operating button at the first stop. The liquid that remains in the tip(s) should not be included in the delivery.
4. The remaining liquid should now be discarded with the tip(s) or delivered back into the container vessel.

7. Storage

When not in use it is recommended that your Biohit Proline pipettor is stored in a vertical position. See Installing the pipettor holder (Chapter 3).

8. Testing the performance and recalibration

It is recommended to check the performance of your Biohit Proline pipettors regularly (e.g. every 3 months) and always after in-house maintenance. However, the user should establish a regular testing routine for their pipettors with regard to accuracy requirements of the application, frequency of use, number of operators using the pipettor, nature of the liquid dispensed and the acceptable maximum permissible errors established by the user. (ISO 8655-1.)

8.1. Testing the performance

Performance testing should take place in a draught-free room at 15 – 30°C, constant to $\pm 0.5^{\circ}\text{C}$ and humidity above 50%. The pipettor, tips and the test water should have stood in the test room a sufficient time (at least 2 hours) to reach equilibrium with the room conditions. Use distilled or deionised water (grade 3, ISO 3696). Use an analytical balance with a readability of 0.01 mgs. (ISO 8655-6.)

Weighing

1. Adjust the desired test volume V_S .
2. Carefully fit the tip onto the tip cone.
3. Fill the tip with test water and expel to waste five times to reach a humidity equilibrium in the dead air volume.
4. Replace the tip. Pre-wet the tip by filling it once with test water and expel to waste.
5. Aspirate the test water, immersing the tip only 2-3 mm below the surface of the water. Keep the pipettor vertical.
6. Withdraw the pipettor vertically and touch the tip against the inside wall of the test water container.

7. Pipette the water into the weighing vessel, touching the tip against the inside wall of the vessel just above the liquid surface at an angle of 30° to 45°. Withdraw the pipettor by drawing the tip 8-10 mm along the inner wall of the weighing vessel.
8. Read the weight in mgs (m_i).
9. Repeat the test cycle until 10 measurements have been recorded.
10. Convert the recorded masses (m_i) to volumes (V_i)

$$V_i = m_i Z \quad Z = \text{correction factor (Table 1)}$$
11. Calculate the mean volume ($\bar{V}$) delivered:

$$\bar{V} = (\sum V_i)/10$$
12. For conformity evaluation calculate the systematic error e_s of the measurement:
in μl : $e_s = \bar{V} - V_s \quad V_s = \text{selected test volume}$
or in %: $e_s = 100 (\bar{V} - V_s)/V_s$
13. For conformity evaluation calculate the random error of the measurement:
as standard deviation $s = \sqrt{\frac{\sum (V_i - \bar{V})^2}{n - 1}} \quad n = \text{number of measurement (10)}$
or as coefficient of variation $CV = 100S/\bar{V}$
14. Compare the systematic error (inaccuracy) and random error (imprecision) with the values in the performance specifications (pages 48, 49), or the specifications of your own laboratory. If the results fall within the specifications, the pipettor is ready for use. Otherwise check both systematic and random errors and, when necessary, proceed to the recalibration procedure (Chapter 8.2).

Note: Systematic error (inaccuracy) is the difference between the dispensed volume and the selected test volume. Random error (imprecision) is the scatter of the dispensed volumes around the mean of the dispensed volume. (ISO 8655-1.)

Note: Biohit specifications are achieved in strictly controlled conditions (ISO 8655-6). The user should establish own specifications based on the field of use and the accuracy requirements placed on the pipettor (ISO8655-1).

Table 1

Temp. (°C)	Z-values ($\mu\text{l}/\text{mg}$):			
	Air Pressure (kPa)			
	95	100	101.3	105
20.0	1.0028	1.0028	1.0029	1.0029
20.5	1.0029	1.0029	1.0030	1.0030
21.0	1.0030	1.0031	1.0031	1.0031
21.5	1.0031	1.0032	1.0032	1.0032
22.0	1.0032	1.0033	1.0033	1.0033
22.5	1.0033	1.0034	1.0034	1.0034
23.0	1.0034	1.0035	1.0035	1.0036
23.5	1.0036	1.0036	1.0036	1.0037

Note: This method is based on ISO 8655.

8.2. Recalibration procedure

1. Place the calibration tool into the holes of the calibration adjustment lock (under the operating button) (Fig. 10).
2. Turn the adjustment lock anticlockwise to decrease and clockwise to increase the volume.
3. Repeat Performance test (Chapter 8.1.) procedure from step 1 until the pipetting results are correct.

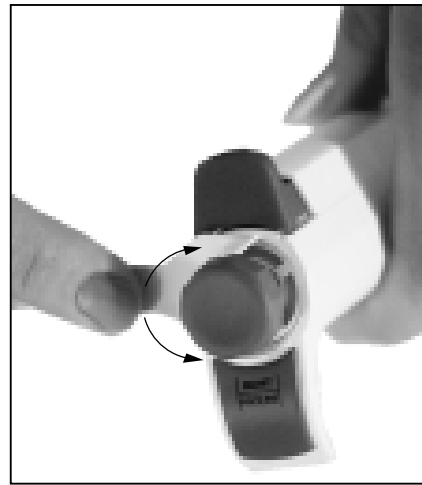


Fig. 10

9. Maintenance

To maintain the best results from your Biohit Proline pipettor each unit should be checked every day for cleanliness. Particular attention should be paid to the tip cone(s).

Biohit Proline pipettors have been designed for easy in-house service. However, Biohit also provides complete repair and recalibration service including a service report and performance certificate(s). Please return your pipettor to your local representative for repair or performance test/recalibration. Before returning please make sure that it is free from all contamination. Please advise our Service Representative of any hazardous materials which may have been used with your pipettor.

Note: Check the performance of your Biohit Proline pipettor regularly e.g. every 3 months and always after in-house service or maintenance.

9.1. Cleaning and decontaminating your pipettor

To clean and decontaminate your pipettor, lightly spray the outside of the pipettor with Biohit Proline Biocontrol decontamination solution (Cat. No. 724004, 5 l) or use ethanol. Wipe dry with a soft cloth or lint-free tissue. It is recommended to clean and decontaminate the tip cone regularly.

9.2. In-house maintenance

1. Hold down the tip ejector.
2. Place the tooth of the opening tool between the tip ejector and the tip ejector collar to release the locking mechanism (Fig. 11).
3. Carefully release the tip ejector and remove the tip ejector collar.
4. Place the wrench end of the opening tool over the tip cone, turning it anticlockwise. Do not use any other tools (Fig. 12). The 5 ml tip cone is removed by turning it anticlockwise without any tools (Fig. 13).
5. Remove the tip cone, piston, and spring. Remove the filter if fitted.
6. Place the tip cone, tip ejector, tip ejector collar, piston, O-ring, and spring into a beaker containing Biohit Proline Biocontrol and leave for at least 30 minutes to secure complete decontamination.
7. Remove the components from the beaker and rinse them with distilled water, then dry, preferably with warm air, for at least one hour.
8. Before replacing the tip cone it is recommended to grease the piston and O-ring slightly by using the silicone grease provided.
9. After reassembling press the operating button several times to ensure that the grease has spread evenly.
10. Check the pipettor calibration.

Note: Instead of Biocontrol you can use ethanol: Wipe the piston, the O-ring, and the tip cone with ethanol and a lint-free cloth.

Note: On models 720005, 720000, 722001 and 722004 ($\leq 10 \mu\text{l}$ pipettors) the O-ring cannot be accessed for maintenance.

Note: Excessive use of grease may jam the piston.

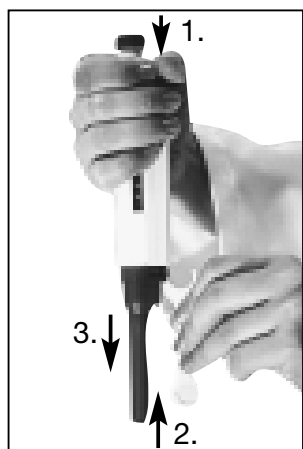


Fig. 11

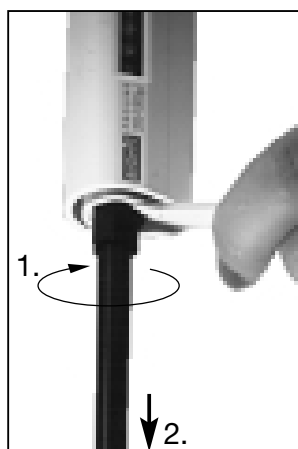


Fig. 12

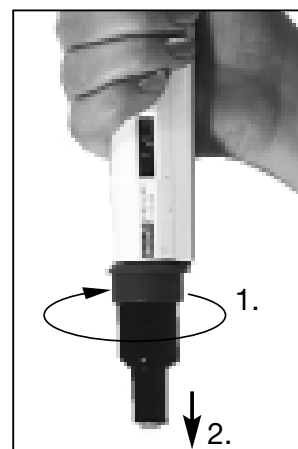


Fig. 13

10. Troubleshooting

Trouble	Possible cause	Solution
Droplets left inside the tip	Unsuitable tip	Use original Biohit tips
	Non-uniform wetting of the tip plastic	Attach new tip
Leakage or pipetted volume too small	Tip incorrectly attached	Attach firmly
	Unsuitable tip	Use original Biohit tips
	Foreign particles between tip and tip cone	Clean the tip cone, attach new tip
	Instrument contaminated	Clean and grease O-ring and piston, clean the tip cone (*)
	Insufficient amount of grease on piston and O-ring	Grease accordingly
	O-ring not correctly positioned or damaged	Change the O-ring
	Incorrect operation	Follow instructions carefully
	Calibration altered or unsuitable for the liquid	Recalibrate according to instructions
	Instrument damaged	Send for service
Push button jammed or moves erratically	Piston contaminated	Clean and grease O-ring and piston, clean the tip cone (*)
	Penetration of solvent vapours	Clean and grease O-ring and piston, clean the tip cone (*)
Pipettor blocked, aspirated volume too small	Liquid has penetrated tip cone and dried	Clean and grease O-ring and piston, clean the tip cone (*)
Tip ejector jammed or moves erratically	Tip cone and/or ejector collar contaminated	Clean the tip cone and the ejector collar (*)

(*) Clean with Biohit Proline Biocontrol or 75% ethanol.

11. Warranty information

Biohit Proline pipettors are covered by warranty for 3 years against defects in materials and workmanship. Should your Proline pipettor fail to function at any time, please contact your local Biohit representative.

ANY WARRANTY WILL, HOWEVER, BE DEEMED AS VOID IF FAULT IS FOUND TO HAVE BEEN CAUSED BY MALTREATMENT, MISUSE, UNAUTHORIZED MAINTENANCE OF SERVICE OR NEGLIGENCE OF REGULAR MAINTENANCE AND SERVICE, ACCIDENTAL DAMAGE, INCORRECT STORAGE OR USE OF THE PRODUCTS FOR OPERATIONS OUTSIDE THEIR SPECIFIED LIMITATIONS, OUTSIDE THEIR SPECIFICATIONS, CONTRARY TO THE INSTRUCTIONS GIVEN IN THIS MANUAL OR WITH OTHER THAN THE MANUFACTURER'S ORIGINAL TIPS.

Each Biohit Proline pipettor is tested before shipping by the manufacturer. The Biohit Quality Assurance Procedure guarantees that the Biohit Proline pipettor you have purchased is ready for use.

Specifications

Biohit Proline Single Channel Adjustable Volume Pipettors

Cat.No.	Volume range	Volume	Inaccuracy ±	Imprecision ±
720005	0.1-2.5 µl	2.5 µl 1.25 µl 0.25 µl	2.50% 3.00% 12.00%	2.00% 3.00% 6.00%
720000	0.5-10 µl	10 µl 5 µl 1 µl	1.00% 1.50% 2.50%	0.80% 1.50% 1.50%
700080	2-20 µl	20 µl 10 µl 2 µl	0.90% 1.20% 3.00%	0.40% 1.00% 2.00%
720020	5-50 µl	50 µl 25 µl 5 µl	0.60% 0.90% 2.00%	0.30% 0.60% 2.00%
700050	10-100 µl	100 µl 50 µl 10 µl	0.80% 1.00% 3.00%	0.15% 0.40% 1.50%
720070	20-200 µl	200 µl 100 µl 20 µl	0.60% 0.80% 3.00%	0.15% 0.30% 1.00%
720030	50-200 µl	200 µl 100 µl 50 µl	0.60% 0.80% 1.00%	0.15% 0.30% 0.40%
720060	100-1000 µl	1000 µl 500 µl 100 µl	0.60% 0.70% 2.00%	0.20% 0.25% 0.70%
720040	200-1000 µl	1000 µl 500 µl 200 µl	0.60% 0.70% 0.90%	0.20% 0.25% 0.30%
720110	1-5 ml	5 ml 2.5 ml 1 ml	0.50% 0.60% 0.70%	0.15% 0.30% 0.30%

Biohit Proline Multichannel Adjustable Volume Pipettors

Cat.No.	Volume range	Volume	Inaccuracy ±	Imprecision ±
720120	4-ch 5-50 µl	50 µl 25 µl 5 µl	1.00% 1.50% 3.00%	0.50% 1.00% 2.00%
720130	4-ch 50-250 µl	250 µl 125 µl 50 µl	0.70% 1.00% 1.50%	0.25% 0.50% 0.80%

Cat.No.	Volume range	Volume	Inaccuracy ±	Imprecision ±
720210	8-ch 0.5-10 µl	10 µl 5 µl 1 µl	1.50% 2.50% 4.00%	1.50% 2.50% 4.00%
720220	8-ch 5-50 µl	50 µl 25 µl 5 µl	1.00% 1.50% 3.00%	0.50% 1.00% 2.00%
720240	8-ch 50-300 µl	300 µl 150 µl 50 µl	0.70% 1.00% 1.50%	0.25% 0.50% 0.80%
720310	12-ch 0.5-10 µl	10 µl 5 µl 1 µl	1.50% 2.50% 4.00%	1.50% 2.50% 4.00%
720320	12-ch 5-50 µl	50 µl 25 µl 5 µl	1.00% 1.50% 3.00%	0.50% 1.00% 2.00%
720340	12-ch 50-300 µl	300 µl 150 µl 50 µl	0.70% 1.00% 1.50%	0.25% 0.50% 0.80%

Biohit Proline Fixed Volume Pipettors

Cat.No.	Volume range	Volume	Inaccuracy ±	Imprecision ±
722001	5 µl	5 µl	1.30%	1.20%
722004	10 µl	10 µl	0.80%	0.80%
722010	20 µl	20 µl	0.60%	0.50%
722015	25 µl	25 µl	0.50%	0.30%
722020	50 µl	50 µl	0.50%	0.30%
722025	100 µl	100 µl	0.50%	0.30%
722030	200 µl	200 µl	0.40%	0.20%
722035	250 µl	250 µl	0.40%	0.20%
722040	500 µl	500 µl	0.30%	0.20%
722045	1000 µl	1000 µl	0.30%	0.20%
722050	2000 µl	2000 µl	0.30%	0.15%
722055	5000 µl	5000 µl	0.30%	0.15%

Liquid: Distilled water (grade 3, ISO 3696)
 Reference temperature: 22°C. constant to ± 0.5°C
 Tested: According to ISO 8655 using original
 Biohit Proline tips