mLINE®

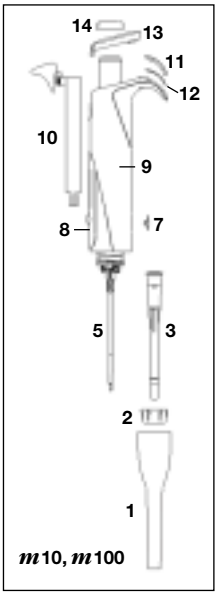
Käyttöhje

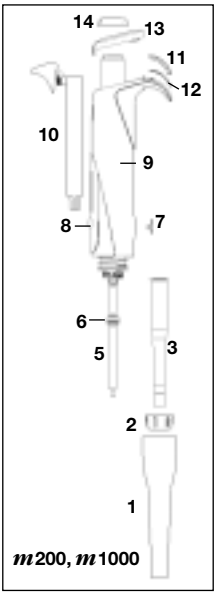
Bruksanvisning

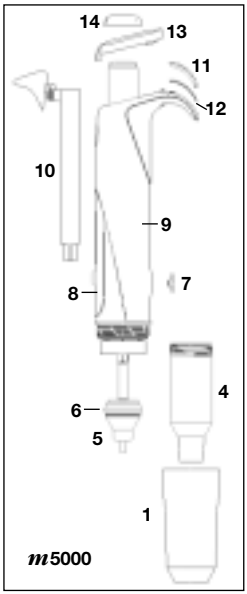
Instruction Manual

BIOHIT

BIOHIT mLINE®







	Varaosat	Reservdelar	Spare Parts
1	Kärjenpoistajan holkki	Spetsavkastarhylsa	Tip ejector collar
2	Kärkikartion pidike	Spetskonens hållare	Tip cone holder
3	Kärkikartio	Spetskon	Tip cone complete
4	Kärkikartiosylinteri	Spetskoncylinder	Tip cone cylinder
5	Mäntä	Kolv	Piston
6	Männän tiiviste	Kolvens tätningsställe	Piston seal
7	Kalibrointimutterin kansi	Kalibreringsmutterns lock	Calibration nut cover
8	Näyttö	Display	Display
9	Kädensija	Handtag	Handle
10	Kärjenpoistajan painike	Spetsavkastare	Tip ejector
11	ID-ikkuna	ID-fönster	ID window
12	ID-tarra	ID-etikett	ID tag
13	Kädensijan kaulus	Handtagskrage	Handle collar
14	Hattu (5 värin setti)	Hatt (5 olika färger)	Cap (set of 5 colours)

	*m*10	*m*100	*m*200	*m*1000	*m*5000
1	726051	726052	726052	726053	726054
2	726041	726041	726041	726042	N/A
3	731084	731081	731083	726039	N/A
4	N/A	N/A	N/A	N/A	726038
5	731076	726034	726035	726036	726037
6	N/A	N/A	726031	726032	726033
7	726006	726006	726006	726006	726006
8	726022	726026	726027	726028	726029
9	726012	726016	726017	726018	726019
10	726005	726005	726005	726005	726005
11	726004	726004	726004	726004	726004
12	726003	726003	726003	726003	726003
13	726002	726002	726002	726002	726002
14	726001	726001	726001	726001	726001

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1. Product description

Your new Biohit *m*LINE is an autoclavable air displacement pipettor. The attractive and ergonomical design of the *m*LINE pipettor together with its very low pipetting forces reduce the risk of repetitive strain injuries (RSI)[1]. The pipettor is designed for both right- and left-handed use.

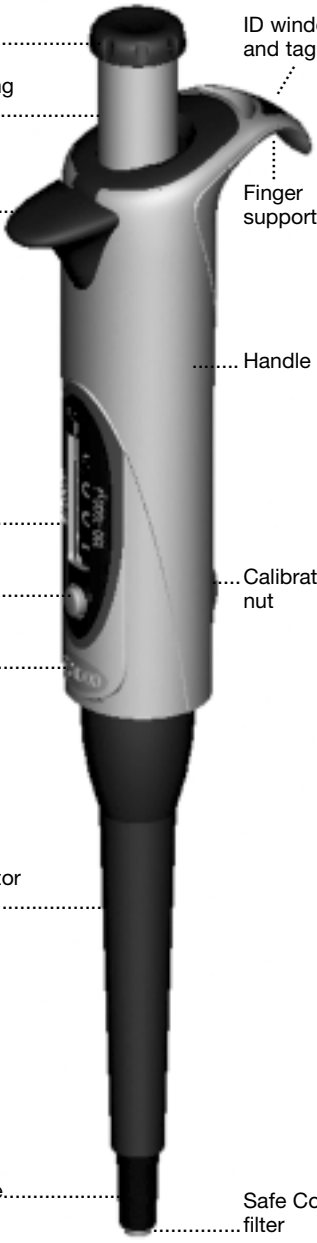
The special tip cone design of the pipettor offers the possibility to use replaceable Safe-Cone filters to help prevent the contamination and damage of the pipettor. The operating button of the *m*LINE allows safe and easy filter ejection. The pipettor uses disposable tips.

Biohit *m*LINE adjustable single-channel pipettors

Cat. No	Colour Code	Volume Range	Increment	Tip	Safe Cone filters 50 pcs/bag	
					Standard	Plus
725020	Grey	0.5 - 10.0 µl	0.01 µl	10	N/A	N/A
725050	Yellow	10 - 100 µl	0.1 µl	300,350	721007	721017
725060	Yellow	20 - 200 µl	0.2 µl	300, 350	721007	721017
725070	Blue	100 - 1000 µl	1 µl	1000	721006	721016
725080	Green	500 - 5000 µl	10 µl	5000	721005	721015

[1] **Note:** It is knowledge that prolonged pipetting can cause RSI. The manufacturer is not responsible for RSI or any related diseases caused by prolonged pipetting.

Pipettor Description



2. Biohit tips

The full range of Biohit pipettor tips are recommended for use with Biohit *m*LINE 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.

3. Unpacking

The Biohit *m*LINE pipettor package contains the following items:

1. Pipettor
2. Tip
3. Caps for colour coding
4. Calibration tool (also tube and ID window opener)
5. Pipettor holder
6. Identification tags
7. Safe-Cone filters (pipettors >10 µl)
8. Grease
9. Instruction manual
10. Performance certification in accordance with ISO 8655-6

Please check that all items are included and that no damage has occurred during shipment.

4. Personal identification

Each Biohit *m*LINE pipettor can be identified with a tag located under the ID window which is placed on the finger support.

1. Remove the ID window by using the calibration tool (Chapter 6.).
2. Remove the tag and mark the identifying information on it.
3. Position the tag on place and clip the window back into place.

5. Pipettor holder and carousel stand

For convenience and safety always keep the pipettor vertically on its own holder or carousel stand when not in use.

Cat.No.	Product
725600	Biohit *m*LINE Carousel Stand
725610	Biohit *m*LINE Pipettor Holder

5.1. Installing the pipettor holder

1. Clean the shelf surface with ethanol.
2. Remove the protective paper from the adhesive tape.
3. Install the holder by pressing it against the edge of the shelf (Fig. 2).
4. Place the pipettor onto the holder.

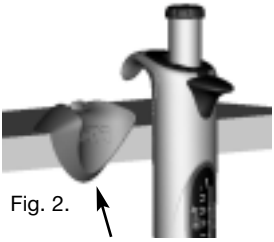


Fig. 2.

5.2. Carousel stand

A convenient and ergonomical Carousel Stand (Fig. 3) for six Biohit *m*LINE pipettors is also available.

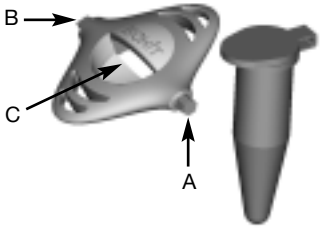
Fig. 3.

6. Calibration tool (also tube and ID window opener)

The calibration tool is designed for the following purposes (Fig. 4):

1. Tool for recalibration (A).
2. Opening tool for the ID window and lid of the calibration nut (B).
3. Opening tool for the tubes (C).

Fig. 4.



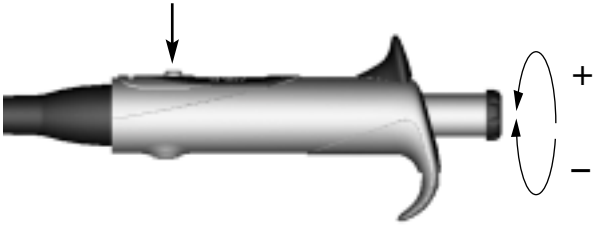
7. Operating the pipettor

7.1. Setting the volume

The volume of the pipettor is clearly shown through the display. The volume setting is carried out with the following steps (Fig. 5):

1. Press the volume lock and hold it down.
2. Set the volume by rotating the operating button (clockwise to decrease the volume and counterclockwise to increase).
3. Release the volume lock.

Fig. 5 Volume Lock



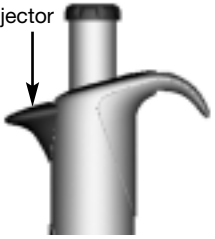
Note: Do not rotate the operating button without pressing down the volume lock. Do not rotate the operating button outside the volume range of the pipettor (Chapter. 1.)

7.2. Sealing and ejecting tips

To ensure the maximum accuracy and precision Biohit tips are recommended to be used with ***m***LINE pipettors. Before fitting a tip ensure that the pipettor tip cone is clean. Press the tip on the tip cone of the pipettor. The pipettor is provided with a spring loaded tip cone for optimal sealing.

Eject the tip by pressing the tip ejector with your thumb (Fig. 6). Make sure that the tip is disposed into a suitable waste container.

Fig. 6. Tip ejector



Note: If the tip is pressed too hard the tip cone yields and, as a result, the counter and operating button moves.

7.3. Protective tip cone filters and filter ejection

The tip cone design of the Biohit *m*LINE pipettors (> 10 µl) allows the use of Biohit Safe-Cone filters in the tip cones. These removable filters prevent liquids and aerosols from entering the pipettor and, thus, protects the pipettor from contamination and damage.

The Safe-Cone filters are available as Standard or Plus versions. It is recommended to use the Standard filter for general applications and the Plus filter for more demanding applications such as cell culture, bacterial and virological work and molecular biology. Filters need to be changed regularly. The interval for filter changing is application dependant but the recommendation is to change the filter daily (after 50 – 250 pipetting cycles) and always in case of over-aspiration. (See Chapter 1 for ordering information.)

The Safe-Cone filters can be removed with the unique filter ejector without touching the filters by hand. Remove the operating button cap and eject the filter by pressing the operating button down (Fig. 7). Make sure that the filter is disposed into a suitable waste container. Clean the tip cone if needed and put the new filter in place.

Fig. 7.

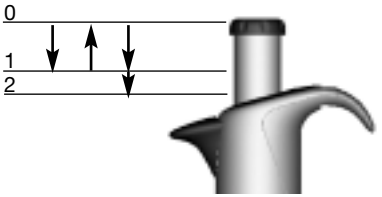
8. Pipetting techniques

Two basic pipetting techniques, forward and reverse pipetting, are associated with *m*LINE pipettors. **Forward pipetting** is the most common used pipetting technique. The technique employs the blow-out function ensuring complete delivery of the liquid. **Reverse pipetting** is recommended for highly viscous, biological or foaming liquids, or very small volumes of liquid. A selected volume plus an excess is aspirated into the tip. The delivery is done without blow-out, and, thus, the excess volume remains in the tip. The reverse technique also facilitates the **repeated delivery** of the same volume.

8.1. Forward pipetting (Fig. 8)

1. Fit the tip onto the pipettor tip cone.
2. Press the operating button to the first stop.
3. Place the tip just under the surface of the liquid (2-3 mm) and smoothly release the operating button up to the starting position. Wait one second. Carefully withdraw the tip from the liquid, touching against the edge of the container to remove excess from the outside of the tip.
4. Dispense the liquid by pressing the operating button to the first stop. After a short delay press the operating button to the second stop. This action will empty the tip.

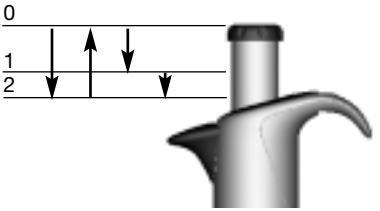
Fig. 8.



8.2. Reverse pipetting (Fig. 9)

1. Fit the tip onto the pipettor tip cone.
2. Press the operating button all the way to the second stop.
3. Place the tip just under the surface of the liquid (2–3 mm) and smoothly release the operating button up to the starting position.
4. Withdraw the tip from the liquid touching against the edge of the container to remove excess.
5. Press the operating button smoothly to the first stop to deliver the present volume. Hold the operating button at the first stop. The liquid that remains in the tip should not be included in the delivery.
6. Discard the remaining liquid by pressing the operating button to the second stop.

Fig. 9.



8.3. Repetitive reverse technique

1. Follow the reverse technique steps 1 to 5.
2. Continue pipetting by repeating steps 3 to 5 as long as needed.
3. Finally discard the remaining liquid by pressing the operating button to the second stop.

9. Recommendations for good pipetting

- Make sure that the tip is firmly attached to the tip cone.
- Hold the pipettor vertically when aspirating the liquid and place the tip only a few millimeters into the liquid.
- Always control the operating button slowly and smoothly.
- Pre-rinse the tip before aspirating the liquid by filling and emptying the tip for three to five times. This is important especially when pipetting liquids with a viscosity and density greater than water or liquids with high vapor pressure (e.g. ethanol).
- Check that the pipettor, tip and liquid are at the same temperature.
- When pipetting liquids with temperatures different to the ambient temperature change the tip after each pipetting. Do not pre-rinse the tip.
- To avoid contamination, do not rest the pipettor on its side especially with the tip attached.
- Change the tip cone filter regularly (recommendation after 50 – 250 pipetting cycles).
- Never strike the tip cone against the tip tray when mounting the tip as this can damage the pipettor.
- Avoid rough handling and do not drop the pipettor.
- Avoid exposing the unit to extreme temperature changes, humidity and dust (operating temperature from 15ºC to 40ºC).

10. Maintenance

Biohit *m*LINE pipettors have been designed for easy in-house service. If the pipettor is used daily it is recommended to clean/decontaminate and check the performance of the pipettor every three months. Biohit also provides complete repair and recalibration service for your pipettor including a service report and performance certificate.

Note: Please make sure that the pipettor has been decontaminated before you send it to us or your local representative. Please advise if any hazardous material has been used with your pipettor.

Note: The use of the tip cone filters may prolong the interval of the service. Change the filters regularly.

Note: It is recommended to always use gloves when cleaning the pipettor.

10.1. Daily cleaning of the outer surface of the pipettor

Your Biohit *m*LINE pipettor should be checked every day for cleanliness. To clean and decontaminate the outer surface of your pipettor use Biohit Proline, Biocontrol (Cat.no. 724004, 5 litres) and a soft lint-free cloth. It is also possible to use ethanol (70%), isopropanol (60%) or a mild detergent as a cleaning agent.
Gently clean the surface of the pipettor with moistened cloth and wipe dry. Pay special attention to the tip cone. Change the tip cone filter if needed (Chapter 7.3.)

10.2. Cleaning and decontaminating the lower part of the pipettor

If your pipettor is in daily use it is recommended to clean/decontaminate and grease the pipettor every three months. To clean and decontaminate the lower parts of the pipettor follow these steps:

Disassembling and cleaning (see the pictures under the cover page):

1. Eject the tip cone filter (if fitted, Chapter 7.3.)
2. Unscrew the tip ejector collar (1) counterclockwise and remove it.
3. Pipettors *m*10, *m*100, *m*200, *m*1000:
   Unscrew the tip cone holder (2) counterclockwise and carefully remove it with the tip cone (3).

   Pipettor *m*5000:
   Unscrew the tip cone cylinder (4) counterclockwise and remove it.
4. Clean the tip ejector collar, the tip cone holder, the tip cone (cylinder) and the piston (5) with Biohit Proline, Biocontrol, ethanol (70%), isopropanol (60%) or mild detergent and soft lint-free cloth.
5. Clean the interior of the tip ejector collar and the tip cone (cylinder) with a cotton swab. Be careful with the pipettors *m*10 and *m*100 so that the seal inside the tip cone will not damage.
6. Rinse the parts with distilled water if needed and let the parts dry.

7. Pipettors ***m***10 *and* ***m***100:
   Put a thin layer of grease on the piston (5).

   Pipettors ***m***200 *and* ***m***1000:
   Put a thin layer of grease around the seal (6).

   Pipettor ***m***5000:
   Put a thin layer of grease on the seal (6) and the interior of the tip cone cylinder (4).

Note: Avoid excess grease. Use only the grease provided with the pipettor.

Note: Before reassembling check that no lint or particles are on the surface of the piston.

Decontamination:

For complete decontamination of the lower parts place the tip ejector collar (1), tip cone holder (2), tip cone (3) and tip cone cylinder (4) (only the model ***m***5000) into a beaker containing Biohit Proline, Biocontrol and leave for at least 30 minutes. Wipe the piston with Biohit Proline, Biocontrol and the lint-free cloth. Rinse the parts with distilled or sterile water. Let the parts dry. Grease the piston and seal according to the instructions given earlier in this chapter.

Reassembling:

1. Pipettors ***m***10, ***m***100, ***m***200, ***m***1000:
   Carefully place the tip cone (3) on the piston and attach it by screwing the tip cone holder (2) clockwise.

   Pipettor ***m***5000:
   Carefully place the tip cone cylinder (4) on the piston and screw clockwise.
   Make sure that the tip cone (cylinder) is properly tightened. Avoid over tightening.
2. Attach the tip ejector collar (1) by screwing it clockwise.
3. Place the new tip cone filter on its place.
4. Press the operating button several times to ensure that the grease has spread evenly.
5. Check the performance of the pipettor.

Note: It is always necessary to check the performance of the pipettor after in-house service or maintenance.

10.3. Sterilization of the pipettor

The entire ***m***LINE pipettor can be sterilized by steam autoclaving at 121°C, (252°F), 1 atm for 20 minutes. Remove the tip cone filter (if fitted, Chapter 7.3). Put the pipettor into the sterilization bag and place it into the autoclave. After autoclaving the pipettor must be cooled down and left to dry overnight before use. It is recommended to check the performance of the pipettor after every autoclaving. It is also recommended to grease the piston/seal of the pipettor after every 10 autoclaving.

11. Testing the performance and recalibration

It is recommended to check the performance of your Biohit *m*LINE 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.)

11.1. Testing the performance

Performance testing should take place in a draught-free room at 15 – 30°C, constant to +/- 0.5°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)

    $V_i = m_i Z$ $\qquad$ Z = correction factor (Table 1)
11. Calculate the mean volume ($\overline{V}$) delivered:
    $\overline{V} = (\sum V_i)/10$
12. For conformity evaluation calculate the systematic error e_s of the measurement:
    in µl: $e_s = \overline{V} - V_s$ $\qquad$ V_s = selected test volume

    or in %: $e_s = 100\ (\overline{V} - V_s)/V_s$
13. For conformity evaluation calculate the random error of the measurement:

    as standard deviation $s = \sqrt{\frac{\sum(V_i - \overline{V})^2}{n-1}}$ $\qquad$ n = number of measurement (10)

    or as coefficient of variation $CV = 100s/\overline{V}$

14. Compare the systematic error (inaccuracy) and random error (imprecision) with the values in the performance specifications - (Chapter 14.) 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 11.2).

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

Z-values (µl/mg):				
Temp. (°C)	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.

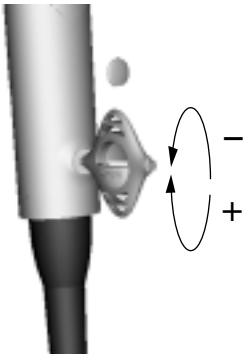
11.2. Recalibration

The calibration of your *m*LINE pipettor has been factory checked and certified at 22°C using grade 3 distilled water according to ISO 3696. The calibration is based on ISO 8655-6: Gravimetric test method for volumetric instruments. The pipettor's specifications are guaranteed only with genuine Biohit tips. If you find the pipettor to be inaccurate after performance testing, please follow the instructions below:

1. Remove the lid of the calibration nut, located at the backside of the handle, with the aid of the calibration tool (Fig. 10).
2. Place the hexagonal head of the calibration tool into the hole of the calibration nut.
3. Turn the adjustment lock counterclockwise to decrease and clockwise to increase the volume.
4. Repeat testing the performance procedure (Chapter 11.1.). Continue until the results are correct.

Note: Biohit offers accredited calibration service. Please contact your local Biohit representative for further information.

Fig. 10.



12. Trouble shooting

Symptom	Possible cause	Solution
Droplets left inside the tip	Unsuitable tip	Use original tips
Leakage or pipetted volume too small	Non-uniform wetting of the plastic	Attach new tip
	Tip incorrectly attached	Attach firmly
	Unsuitable tip	Use original tips
	Foreign particles between tip and tip cone	Clean the tip cone, attach new tip
	Tip cone holder incorrectly tightened	Tighten the tip cone holder
	Pipettor damaged	Return to your Biohit service representative for servicing
Pipettor out of established specifications	Incorrect operation	Follow instructions
	Unsuitable tip	Use original tips
	Calibration altered	Recalibrate
Operating button jammed or moves erratically	Liquid has penetrated tip cone and dried	Clean and grease the piston/seal and the tip cone
	Safe Cone filter has been contaminated	Change filter
	Insufficient amount of grease on a piston and seal	Grease accordingly
Tip ejector jammed or moves erratically	Tip ejector collar has been contaminated	Remove and clean the ejector collar and tip cone

13. Warranty information

The Biohit *m*LINE pipettors are covered by warranty for 3 years against defects in materials and workmanship. Should your *m*LINE 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 *m*LINE pipettor is tested before shipping by the manufacturer. The Biohit Quality Assurance Procedure guarantees that the Biohit *m*LINE pipettor you have purchased is ready for use.

Each Biohit *m*LINE pipettor is CE marked.

14. Performance specifications

The manufacturer's specifications below are guaranteed only when the manufacturer's original tips are used. The manufacturer's specifications below should be used as guidelines when establishing your own performance specifications in accordance with ISO 8655.

Biohit *m*LINE adjustable volume pipettors

Cat. No.	Channels	Volume Range	Test Volume	Inaccuracy	Precision
725020	1-ch	0.5 – 10 µl	10 µl	1.00 %	0.60 %
			5 µl	1.50 %	1.00 %
			1 µl	2.50 %	1.50 %
			0.5 µl	5.00 %	4.00 %
725050	1-ch	10 - 100 µl	100 µl	0.80 %	0.15 %
			50 µl	1.00 %	0.40 %
			10 µl	2.00 %	1.00 %
725060	1-ch	20 – 200 µl	200 µl	0.60 %	0.15 %
			100 µl	0.80 %	0.30 %
			20 µl	2.00 %	0.80 %
725070	1-ch	100 – 1000 µl	1000 µl	0.60 %	0.20 %
			500 µl	0.70 %	0.25 %
			100 µl	1.50 %	0.70 %
725080	1-ch	500 - 5000 µl	5000 µl	0.50 %	0.15 %
			2500 µl	0.60 %	0.30 %
			500 µl	1.50 %	0.60 %