

BIOHIT



Instruction Manual
Bedienungsanleitung
Mode d'emploi
Manual de instrucciones
Instruzioni d'impiego





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1. INTENDED USE

This liquid handling device is designed and manufactured to be used with the IVD-product as an IVD-accessory and as a stand alone laboratory equipment.

2. BIOHIT *e*PET ELECTRONIC PIPETTE

Your new Biohit *e*PET electronic pipette offer a cost-effective electronic pipetting alternative by using a direct charging system which requires no charging stand. The self-calibrating, microprocessor-based system reduces the possibility for human error and instrument contamination by controlling all piston movements. Also selected models offer replaceable tip cone filters to help prevent contamination and damage.

Its light weight and ergonomic controls take the effort out of pipetting to help reduce the risk of repetitive strain injuries (RSI) that are common in manual pipetting. All *e*PET electronic pipettes operate on the air displacement principle and use disposable tips.

2.1. *e*PET single-channel electronic pipettes

Cat.No.	Volume Range	Increment	Biohit Tip
71052XET	0.2 - 10 µl	0.1 µl	10 µl
71001XET	5 - 100 µl	1 µl	300 µl, 350 µl
71002XET	50 - 1000 µl	5 µl	1000 µl
71004XET	50 - 1200 µl	5 µl	1200 µl
71050XET	100 - 5000µl	50 µl	5000 µl Plus

X: 0=Without AC-adaptor; 1=With universal AC-adaptor (Euro, USA/Jpn, UK and China plugs)

2.2. *e*PET multichannel electronic pipettes

Cat.No.	Channels	Volume Range	Increment	Biohit Tip
71020XET	8-Channel	0.2 - 10 µl	0.1 µl	10 µl
71021XET	8-Channel	5 - 100 µl	1 µl	300 µl, 350 µl
71022XET	8-Channel	25 - 250 µl	5 µl	350 µl
71080XET	8-Channel	50 - 1200 µl	10 µl	1200 µl

Cat.No.	Channels	Volume Range	Increment	Biohit Tip
71030XET	12-Channel	0.2 - 10 µl	0.1 µl	10 µl
71031XET	12-Channel	5 - 100 µl	1 µl	300 µl, 350 µl
71032XET	12-Channel	25 - 250 µl	5 µl	350 µl
71081XET	12-Channel	50 - 1200 µl	10 µl	1200 µl

X: 0=Without AC-adaptor; 1=With universal AC-adaptor (Euro, USA/Jpn, UK and China plugs)

2.3 Biohit Optifit tips

The full range of Biohit pipette tips are recommended for use with Biohit ePET pipettes. Biohit standard tips are made of virgin polypropylene. Biohit also offers a full range of Safetyspace 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 & PREPARING THE PIPETTE FOR USE

The pipette package contains the following items:

- Pipette
- Grease
- Filters and filter forceps (selected models see page 8)
- Instructions for use
- Performance certificate in accordance with ISO 8655-6
- AC/DC Adapter (functions as a recharging unit)

Make sure that all items are included and that no damage has occurred during shipment.

Note: The pipette can only be charged with the original AC/DC Adapter supplied with the pipette.

3.1. Biohit *e*PET Stands

A convenient carousel stand holds up to 5 *e*PET pipettes and a single-place stand one *e*PET pipette (Fig. 2 and 3.). These stands are just for the storage of the pipette. To recharge the pipette, the AC/DC adaptor must be manually plugged directly to the pipette.



Fig. 2.



Fig. 3.

Cat. No.	Product
710990	Carousel Stand
710999	1-place Stand

3.2. Electrical Specifications

Battery

- Rechargeable NiMH battery
- Charging time max 12 hours for empty battery

AC/DC Adaptor

- Input voltage and main plug according to local requirements
- Output voltage 9 VDC

3.3. Charging the Pipette

An ON/OFF switch is located at the top of the pipette (Fig. 4.). This switch protects the battery from discharging when the pipette is not in use and the pipette cannot be connected to the recharger unit.

1. Switch the pipette ON (the far left position) (Fig. 4.).
2. Simply connect the AC/DC adapter to a compatible AC outlet and to the pipette (Fig. 4.).



Fig. 4.



Fig. 5.

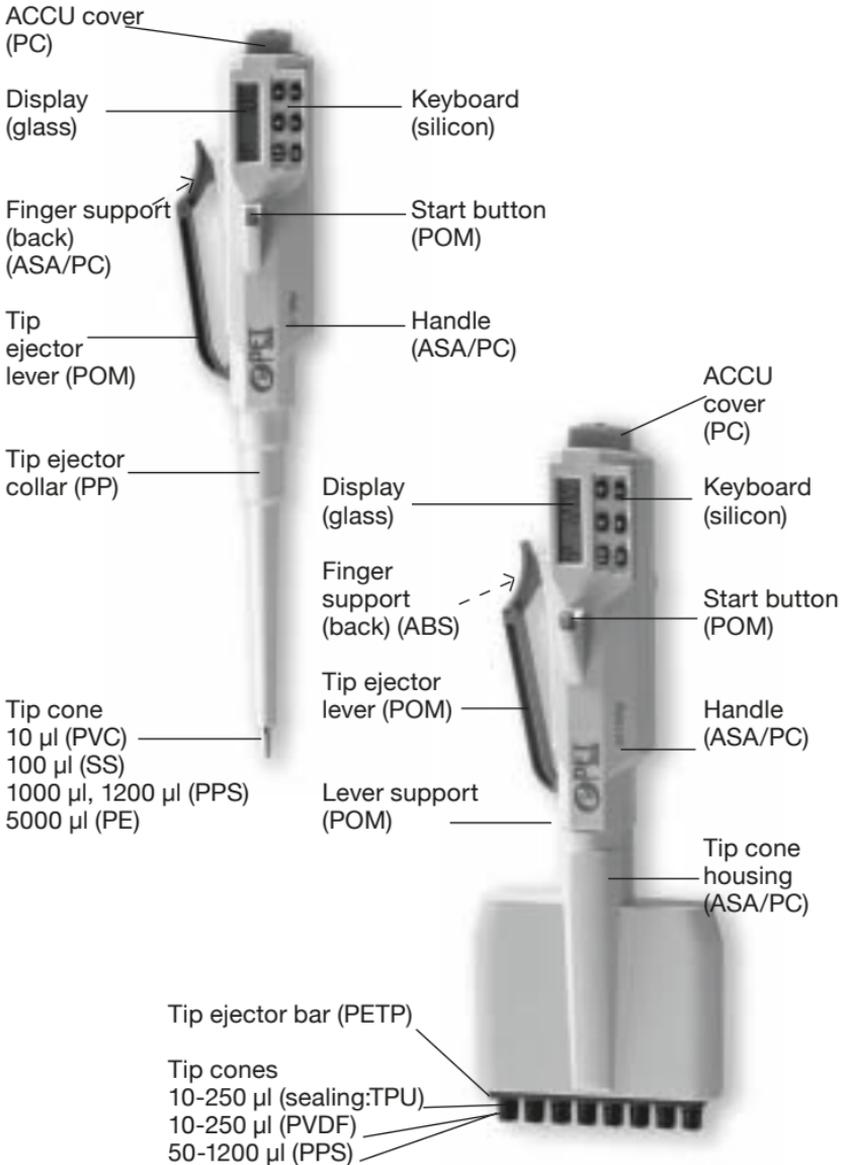
Note: The charging light will remain illuminated when properly connected to the AC/DC Adapter/Recharger unit (Fig. 5.).

3. If the pipettor is new or the battery is low keep the pipette connected to the charging unit for 12 hours to fully charge the pipette before continuing use.
4. Display shows . Press the START button twice and the pipette is ready for the default pipetting at maximum volume or for program changes.

Note: The pipette will charge in both the ON and OFF positions. Leave the pipette ON connected to the charging unit to retain user-selected settings as switching OFF will reset the unit to default settings.

Note: If the pipette is left in the ON position uncharged for several days, the display will be empty and there will be no response from the keyboard or START button, as the battery voltage will be below the operating level.

4. PIPETTE MATERIALS



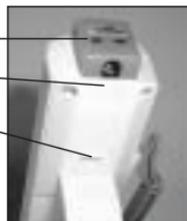
5. PIPETTE DESCRIPTION

The control and programming of the ePET electronic pipette are done using the keyboard and display shown in detail below.

5.1. Controls



Power Switch
Recharger Connection
Battery Compartment



- S▶** Changes speeds
- M** Moves to next Mode
- ▲** Increases volume or speed
- ▼** Decreases volume or speed
- E** Confirms setting changes
- *** Switches Mixing on - off

START BUTTON Triggers all mechanical operations

TIP EJECTOR LEVER Squeezed to remove pipette tip(s)

5.2. START Button

The START button triggers the aspiration and dispensing operations according to selected operating mode. Only a quick click is required to operate the button. If the START button is kept down, the piston will stop in the lowest position until the button is released. This feature is applicable to all modes of operation, except for multiple dispensing (d).

5.3. Direction Symbols

These symbols indicate the direction in which the piston moves upon pressing the START button. The small RIGHT ARROW in the display means that the next function is to aspirate the liquid. The small LEFT ARROW in turn indicates the dispensing function in accordance to the selected operating mode.

5.4. Display

The left display is the status indicator. It informs the user about parameters to be programmed, functions to be performed and the number of dispensings available.

The right display is used for programming and displaying the various volumes needed in different operating modes.

5.5. Sealing and Ejecting tips

Original Biohit Proline tips are recommended for use with Biohit *e*PET pipettes. Before fitting a tip make sure that the pipette tip cone is clean. Press the tip onto the cone of the pipette firmly to ensure an airtight seal. The seal is tight when a visible sealing ring forms between the tip and the tip cone (Fig. 6).



Fig. 6

Biohit *e*PET pipettes are designed for simple and light attachment and ejection of the tips. To eject the tip, simply place the pipette over the discard container and squeeze the tip ejector lever (Fig. 7).



Fig. 7

5.6. Optional Filters

The tip cones of select Biohit *e*PET electronic pipettes allow the use of a removable Safe Cone Filter as an option (Fig. 8.). The filter prevents liquids and liquid vapours from entering the pipette. The filter does not affect the calibration of the pipette. Biohit filter forceps should be used to avoid touching the dirty filters by hand.



Fig. 8

Cat.No.	Channels	Volume Range	Standard Filter	Plus Filter
71052XET	Single Channel	0.2 - 10 μ l	N/A	N/A
71001XET	Single Channel	5 - 100 μ l	N/A	N/A
71002XET	Single Channel	50 - 1000 μ l	721006	721016
71004XET	Single Channel	50 - 1200 μ l	721006	721016
71050XET	Single Channel	100 - 5000 μ l	721006	721016
71020XET	8-Channel	0.2 - 10 μ l	N/A	N/A
71021XET	8-Channel	5 - 100 μ l	721014	N/A
71022XET	8-Channel	25 - 250 μ l	721014	N/A
71080XET	8-Channel	50 - 1200 μ l	721006	721016
71030XET	12-Channel	0.2 - 10 μ l	N/A	N/A
71031XET	12-Channel	5 - 100 μ l	721014	N/A
71032XET	12-Channel	25 - 250 μ l	721014	N/A
71081XET	12-Channel	50 - 1200 μ l	721006	721016

X: 0=Without AC-adaptor; 1=With universal AC-adaptor (Euro, USA/Jpn, UK and China plugs)

6. PROGRAMMING THE PIPETTE

Programming is done using the six-button keyboard and the LC-display. There are three operating modes offering special functions and varying speeds for your selection.

6.1. Mode Selection and Mode Recall

1. Press **M** repeatedly to view the available modes of the pipette.
2. Press **E** when the desired mode is displayed. The pipette is ready for use in the mode selected.

Note: Mode can only be activated when the piston is in its home position (arrow right sign is lit), not in the middle of an aspiration or dispensing cycle.

6.2. Setting Speeds

1. Press **S** to display the current aspiration speed.
2. Press **▲** or **▼** until desired aspiration speed is displayed ("5" Fast and "1" Slow).
3. Press **E** to confirm speed selection. Display shows the current dispense speed.
4. Press **▲** or **▼** until desired dispense speed is displayed ("5" being Fast and "1" Slow).
5. Press **E** to confirm speed selection.

Note: The speed may not be changed in the middle of the aspiration or dispensing cycles.

Note: The default speed is 3 for all speed settings.

6.3. Pipetting Mode (P)

The pipette performs ordinary pipetting with blow-out.

1. Press **M** to display **P**.
2. Press **E** to confirm the mode change.
3. Select the desired pipetting volume by using  to increase, and  to decrease.

Note: When holding down  or , the volume display starts to scroll faster.

4. Press **E** to confirm selection.
5. Position the tip to aspirate and press the START button.
6. Position the tip to dispense. Press the START button. The tip is emptied with a blow-out and is ready for next pipetting.



Step 5.



Step 6.

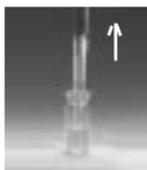
6.4. Multi-Dispensing Mode (d)

The pipette performs repetitive dispensings of a selected volume. During this operation, the desired volume plus and automatically selected excess volume is aspirated into the tip.

1. Press **M** to display **d**.
2. Press **E** to confirm the mode change.
3. Press  or  until the multi-dispense volume is displayed.
4. Press **E** to confirm selection.
5. Press  or  until the desired number of aliquots is displayed.

-
6. Press **E** to confirm selection.
 7. Position the tip to aspirate and press the START button. The * sign and ARROW LEFT are lit to indicate the reset function.
 8. Position the tip to discard priming excess and press the START button.
 9. To dispense, position the tip, press the START button and repeat until the cycle is complete.
 10. Finally, position the tip to discard any remaining excess and press the START button twice.

Note: Upon delivering the programmed volume, it is also possible to continue to aspirate and dispense the same volume without the empty function. To continue, keep the START button pressed down and within one second the direction of the arrow will change. Keeping the button down, place the tip into the liquid again and the sample is aspirated into the tip by releasing the START button.



Step 7.



Step 8.



Step 9.



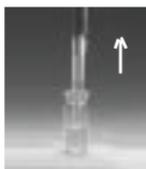
Step 10.

6.5. Diluting Mode (dd)

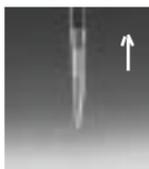
Two different solutions separated by an air gap are aspirated and then dispensed together with automatic blow-out. The purpose of the air gap is to avoid contamination when aspirating the second volume but it will not prevent the two liquids from mixing in the tip.

1. Press **M** to display **dd**.
2. Confirm the mode change by pressing **E**.
3. Select the desired diluent volume (volume 1) by using **▲** or **▼**.
4. Confirm by pressing **E**.

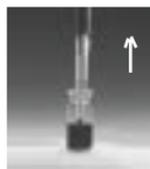
-
- Press  or  to select the sample volume (volume 2) on the display.
 - Press  to confirm selection.
 - Position the tip to aspirate volume 1 and then press the START button.
 - With the tip in the air press the START button again to aspirate an air gap.
 - Position the tip to aspirate volume 2 and press the START button.
 - Finally, position the tip to dispense and press the START button.



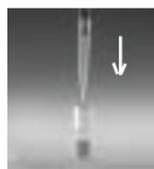
Step 7.



Step 8.



Step 9.



Step 10.

6.6. Mixing Mode with Pipetting or Diluting (*)

The piston is automatically moved up and down to mix the liquid in the delivery vessel. The mixing time is controlled by the START button.

- Use  to select either **P** or **dd** onto the display.
- Press  to switch on mixing. The display should read either **P*** or **dd***.

Note: Pressing  will alternately switch mixing on and off.

- Confirm the mode change by pressing .

For Pipetting:

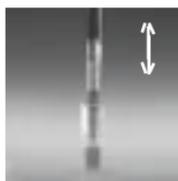
- Press  to increase, and  to decrease.
- Press  to confirm selection.
- Position the tip to aspirate and press START button.
- Position to dispense and press the START button .

For Diluting:

1. Select the desired diluent volume (volume 1) by using  or .
2. Confirm selection by pressing .
3. Press  or  to select the sample volume (volume 2) .
4. Confirm selection by pressing .
5. Position the tip to aspirate volume 1 and then press the START button.
6. With the tip in the air, press the START button to aspirate an air gap.
7. Position the tip to aspirate volume 2 and press the START button.
8. Finally, position the tip to dispense and press the START button.

To Mix:

1. Position the tip in the solution, then press and hold the START button. The mixing is done automatically as long as the START button is held down.
2. Position the tip to dispense. Press the START button twice.



Step 1.



Step 2.

Note: The mixing is done with about 70 % of the total volume.

7. PIPETTING RECOMMENDATIONS

By using the different operating modes and special functions, several different liquid handling procedures are made possible. Modes P and dd feature automatic blow-out and others leave an excess liquid in the tip. Follow recommendations below to ensure optimal performance.

7.1. Dispensing with Blow-out

The P and dd modes have an automatic blow-out function, followed by an immediate return of the piston to the "home" position. To avoid accidental aspiration of the liquid back into the tip, it is recommended that the dispensing is always done above the liquid surface.

By holding the START button down during dispensing the piston will stop in the lowest position. This allows the tip to be placed against the bottom or the wall of the container. Once the liquid is dispensed, the tip can be removed from the container and the START button released.

7.2. Dispensing without Blow-out

The pipette will not perform the blow-out function when using the d mode. Therefore, it is recommended that dispensing is always performed with the tip set against the wall or the bottom of the container. The use of the d mode is especially useful when pipetting small volumes or solutions that have a tendency to foam or have a high viscosity.

7.3. Other Recommendations

- Hold the pipette vertically and place the tip a few millimeters into the liquid when aspirating.
- Prerinse the tip by filling and emptying the tip five times. This is important when dispensing liquids which have a viscosity and density different from water or a temperature other than ambient.
- Check that the pipette, tip and liquid are at room temperature.
- Avoid contaminating the tip cone.
- Connect the pipette charging unit when the pipettor is not in use. Switch the pipette OFF when not in use if it is not connected to the charging unit.
- Never strike the tip cone against a tip tray when mounting tips as this can damage several internal components.
- Do not drop the pipette or AC/DC-adaptor as this may cause excessive shock.
- Avoid exposing the unit to extreme temperature changes, humidity and dust.
- Avoid rough handling. Moderate pressure is all that is required when using the keyboard or START-button.
- Avoid leaving the pipette on its side with liquid in the tip which might seep back into the mechanism.
- Always pipette against the inside wall of the receiving vessel. Remove the tip by drawing it up against the inside wall.
- Change the filter on the tip cone regularly (after 50 - 250 pipettings).

8. STORAGE

When not in use it is recommended that the pipette is stored on the stand in the ON position connected to the charging unit. The green charging light should illuminate.

9. PERFORMANCE TEST

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

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

1. Carefully fit the tip onto the tip cone.
2. Prewet the tip with test water by pipetting the selected volume 5 times.
3. Replace the tip and and prewet the new tip once.
4. Aspirate the test water, immersing the tip only 2-3 mm below the surface of the water and keeping the pipette vertical. Withdraw the pipette vertically and touch the tip against the side wall of the container.
5. Pipette the water into the weighing vessel, touching the tip against the inside wall just above the liquid surface at an angle of 30°-45°. Withdraw the pipette by drawing the tip 8-10 mm along the inner wall. Read the weight in mgs.
6. Repeat ten times and record each result.
7. Convert the recorded masses to volumes by multiplying the mass with the correction factor Z (at 22°C and 101.3 kPa: $Z=1.0033$).

Note: Users should establish their own performance specifications based on the field of use and the accuracy requirements set on the pipette (ISO 8655-1). This method is based on ISO 8655.

10. MAINTENANCE

Biohit ePET Electronic pipettes require regular cleaning to ensure trouble-free operation. Use a soft cloth lightly moistened with a Biohit Proline Biocontrol (cat.no. 724004, 5l) or mild detergent to clean the outer surface of the pipette. DO NOT AUTOCLAVE. Change the tip cone filter regularly.

Note: The pipette must be turned off prior to servicing!

10.1. In-house maintenance

1. Remove the tip ejector collar: Gently twist the tip ejector collar anti-clockwise and slide off.
2. Using Biohit Proline Biocontrol or ethanol and soft lint-free cloth, disinfect the tip ejector collar and the tip cone.
3. Unscrew, anti-clockwise, the tip cone and remove it, exposing the piston. The piston may stick to the tip cone, should this occur remove the piston with a pair of tweezers.
4. To avoid scratching the surface of the piston use Biohit Proline Biocontrol or ethanol and a lint-free tissue when cleaning the piston. Let the parts dry.

Note: For complete decontamination place the tip cone, tip ejector collar, piston, O-ring and spring into a beaker containing Biohit Proline Biocontrol and leave for at least 30 minutes, rinse the parts with distilled water, then dry preferably with warm air.

5. Grease the piston thinly with the grease provided. Do not use any other grease. Check that no lint or particles are on the surface of the piston. Avoid excess grease, especially at the bottom of the piston.
6. Reassemble the pipette by screwing the piston and tip cone in their places, replace the tip ejector collar allowing the ejector handle connection to snap into the attachment notch of the ejector collar. Replace the filter if fitted.
7. Test the pipette by pressing the START-button several times. Test the tip ejector operation.

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

10.2. Battery Replacement

If the battery does not hold a sufficient charge for proper operation of the pipette, follow these steps for replacement of the battery.

-
1. Switch the unit "OFF".
 2. Remove the top two screws on the back of the pipette and remove the battery cover (Fig. 9).
 3. Carefully remove the battery by lifting it straight out of the holder.
 4. Install the new NiMH-battery by pressing the positive (+) end against the contact spring at the bottom of the holder.
 5. Replace the cover and the screws. Do not overtighten the screws.
 6. Dispose of battery appropriately.



Fig. 9

11. TROUBLE-SHOOTING

Biohit *e*PET electronic pipettes have a built-in monitoring program to control the performance of each pipetting action. If the error message Er1 appears on the display, this means the pipette has been unable to perform the attempted action properly. If you receive the error message please do the following:

Note: As this procedure will empty the tip, it is recommended that you remove the tip before resetting the pipette.

1. Place the pipette in the charging stand for 15 minutes.
2. Clear the error message from the display by pressing **E**.
3. Press START button, which will set the pipette to its home position.

Occasional Er1 situations can be caused by electrical outlets that have been switched off or if the pipette has been in the OFF position during charging.

Repeated occurrence of the the Er1 message is caused by an internal error failing to complete the execution of the pipetting. The pipette will need to be returned to your local Biohit representative for repair.

Trouble	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 Tip incorrectly attached Unsuitable tip Foreign particles between tip and cone Instrument contaminated Insufficient amount of grease on piston and O-ring.	Attach new tip Attach firmly Use original tips Clean the tip cone, attach new tip Clean and grease piston and tip cone Grease accordingly
Pipette out of given specs	Instrument damaged	Send for service
Pipette blocked, aspirated volume too small	Liquid has penetrated tip cone and dried	Clean and grease piston and tip cone.
Tip ejector jammed or moves erratically	Tip cone contaminated	Remove ejector collar, clean with 75% ethanol
Continuous error message	Instrument damaged	Send for service

12. WARRANTY INFORMATION

Biohit *e*PET is covered by a warranty for two years against defects in material and workmanship (excluding the battery pack). Should your *e*PET fail to function according to specifications at any time, please contact your local Biohit representative immediately.

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

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

Each Biohit ePET is CE/IVD-marked, fulfilling the requirements of the EN 55014, 1993 / EN 55104, 1995 / ISO 13485:2003 and IVD Directive (98/79/EC).

13. RECYCLING INSTRUCTION (WEEE)



In compliance with European Directive, WEEE (2002/96EC) on waste and reducing of hazardous substances in electrical and electronic equipments, this device must not be recycled as unsorted municipal waste. Instead this device must be collected separately in accordance the local recycling regulations. The solid bar used in conjunction with the crossed-out wheeled bin indicates that the product was put on the European market

after 13 August 2005.

Notes

BIOHIT ePET SPARE PARTS:

- 711033 ACCU3-assembly, BPE , colour 131688
- 711192 Tip ejector assembly, BPE MCP, colour 131688
- 711201 Pico-board SC/MC 10
- 711202 Pico-board SC 100
- 711205 Pico-board SC 1000
- 711206 Pico-board SC 1200
- 711207 Pico-board SC 5000
- 711211 Pico-board MC 100
- 711212 Pico-board MC 250
- 711213 Pico-board MC 1200
- 711412 Tip ejector collar, E-Pet,SC, 5-100µl and 10-250, colour 131688
- 711412 Tip ejector collar, E-Pet,SC, 5-100µl and 10-250µl, colour 131688
- 711422 Tip ejector collar, E-Pet,SC, 10-500µl , colour 131688
- 711432 Tip ejector collar, E-Pet,SC, 50-1000µl , colour 131688
- 711462 Tip ejector collar, E-Pet,SC, 50-1200µl , colour 131688
- 711665 Tip cone housing, E-pet, MCP 8, colour 131688
- 711666 Tip cone housing, E-pet, MCP 8/10 colour 131688
- 711667 Tip cone housing, E-pet, MCP 8/1200 colour 131688
- 711676 Tip cone housing, E-pet, MCP 12/10 colour 131688
- 711677 Tip cone housing, E-pet, MCP 12/1200 colour 131688
- 711678 Tip cone housing, BPE MCP 12 and E-Pet, colour 131688
- 711852 Cover assembly, E-Pet 10, colour 131688
- 711863 Tip ejector collar, E-Pet,SC, 0.2-10µl, colour 131688
- 711892 Tip ejector assembly, BPE, SC, colour 131688
- 711915 Tip ejector collar, E-Pet,SC, 100-5000µl , colour 131688
- 712207 Bottom plate assembly, including battery cover, colour 131688
- 712208 Battery cover, BPE, colour 131688
- 712213 Cover assembly, E-Pet 1000, colour 131688
- 712214 Cover assembly, E-Pet 1200, colour 131688
- 712215 Cover assembly, E-Pet 5000, colour 131688
- 712216 Cover assembly, E-Pet , MCP 250, colour 131688
- 712217 Cover assembly, E-Pet 100, colour 131688
- 712218 Cover assembly, E-Pet 250, colour 131688
- 712221 Bottom plate assembly, E-pet, including battery cover, colour 131688
- 712222 Battery cover, E-pet, colour 131688
- 712682 Finger grip assembly, BPE, colour 13168

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