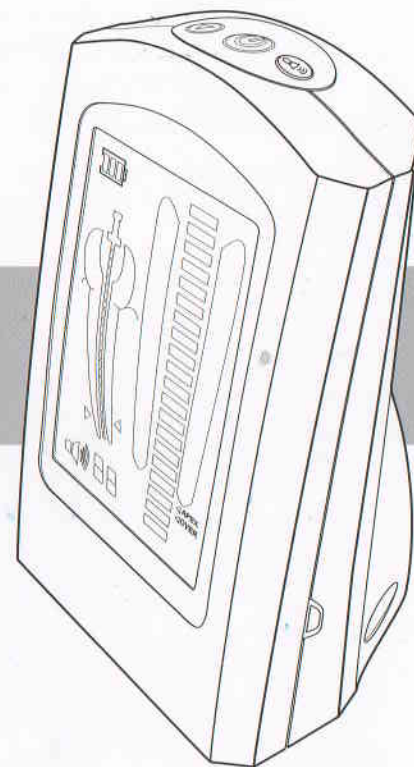


**Instruction Manual for
Apex locator**



Please read this manual before operating.

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1 Introduction

1.1 Description of the device

Apex locator is a supporting equipment of the endodontic treatment, through the measurement of the length of apical teeth, help the dentist to finish the endodontic treatment.

Features of the device:

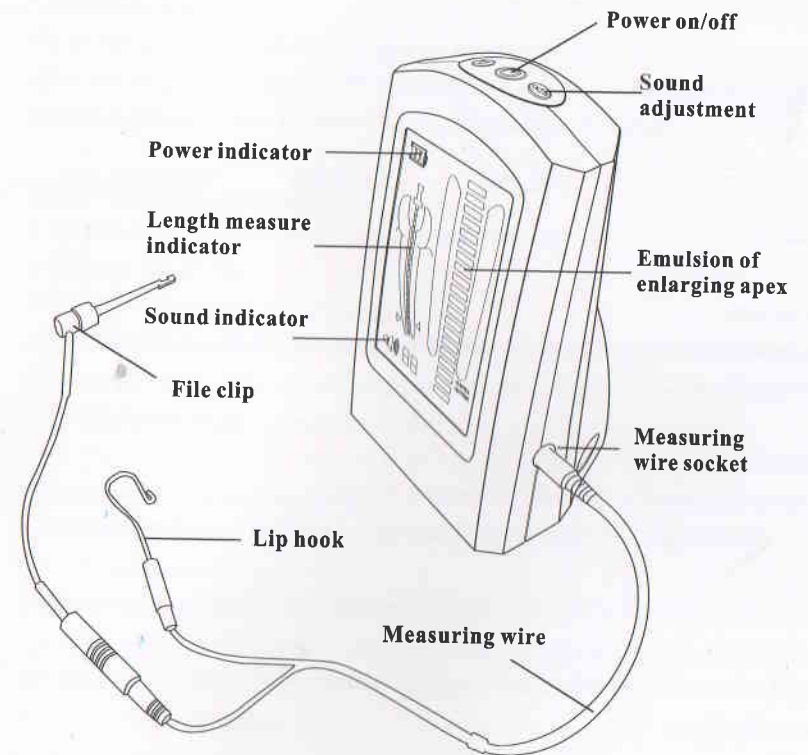
- Equipped with clear bright LCD, clear image and different color indicate the trajectory of the file clearly.
- Based on advanced multiple frequency network impedance measurement technology and automatic calibrating ensures the measurements are accurate.
- The File clip, Lip hook and Measuring file can be autoclaved under the high temperature and high pressure. Avoiding cross infection effectively.

1.2 Dimensions

85mm (length) × 74mm (width) × 121mm (height)

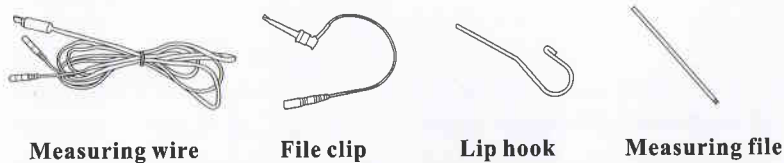
1.3 Components

1.3.1 Picture of the main unit.



Picture 1

1.3.2 Pictures of the main accessories



Picture 2

1.4 Structure

Apex locator is composed of main unit, measuring wire, lip hooks, file clip, measuring file, etc..

1.5 Intended use

This equipment applies to the measurements below:

- 1.5.1 Measurement of pulpitis, pulp necrosis, periapical periodontitis and tooth length.
- 1.5.2 Measurement of the tooth length measurement before restoration of post crown.
- 1.5.3 Measurement of the tooth length measurement of transplantation and re-transplantation.

1.6 Contraindication

We do not advise the use of apex locator on patients fitted with pacemakers (or other electrical equipment) or on those patients who was advised not to use the electric equipment (like electric shaver, electric blower) for safety reasons.

1.7 The classification of the device

- 1.7.1 Internal power device (4 alkaline batteries)
- 1.7.2 Type BF device
- 1.7.3 Water proofness: Non-waterproof
- 1.7.4 Device not suitable for being used in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- 1.7.5 Operation mode: Continous operation

1.8 The main technical specifications

- 1.8.1 Power: 4 pieces AAA batteries
- 1.8.2 Power consumption: $\leq 0.5W$
- 1.8.3 Screen: 3.2" LCD
- 1.8.4 Buzzer alert: The buzzer will alert when the endo file is less than 2mm to the apex.
- 1.8.5 Operation condition
 - a) Used indoor only
 - b) Environment temperature: $+5^{\circ}C \sim +40^{\circ}C$

c) Relative humidity: $\leq 80\%$.

d) Atmosphere pressure: 70kPa~106kPa

1.8.6 Application: measuring wire, measuring file, file clip, lip hook

2 Notice of installing and using the device

2.1 Please read the instruction manual carefully before the operation.

2.2 The file clip, lip hook and measuring file are reusable. Please make sure they are autoclaved under high pressure and high temperature before each operation. The endo files should not be used more than 3 times.

2.2 As a safety precaution in order to avoid over-instrumentation, it is recommended to proceed as follows: place the file onto an endodontic ruler, where the apex locator screen indicates '00'. Subtract 0.5-1 mm from the measured file length as the Working Length.

2.3 The scale indication on the apex locator screen does not represent a distinct length or distance in mm or other linear units. It simply indicates the measuring file progression towards the apex foramen.

2.4 If the screen bar graph suddenly makes a large movement or immediate display 'OVER' in the upper part of the canal, continue slightly towards the apex so the signal returns to normal.

2.5 In order to prevent leakage or interference between the root canal and resulting in inaccurate measurements, dry the access cavity with a cotton pellet or air-blower

before each use.

2.6 In order to confirm the file clip and measuring wire makes good contact, test the wire connecting before each use(See 3.2.3).

2.7 Power Supply: 4 pcs of 1.5V LR03 battery. Please change them when their voltage is not enough to support the equipment. Notice: Please handle the batteries according to the local laws.

2.8 The batteries must be taken out for storage when the device is not used for a long time.

2.9 Please use original components, the components made by other company may cause inaccurate measurement or un-measurable.

2.10 Avoid the connection between the outside and inside liquid of endodontic during measuring in order to avoid the measuring difference.

2.11 Keep endo file and file clip away from any other metal or instruments.

2.12 To ensure that short circuits do not impair the measurements, be particularly careful with patients fitted with metal crowns or bridges. Please confirm the wetness of the endo to ensure the reliability of the measuring. If it is confirmed that the endo file hasn't reached the apex yet the data showed on the apex locator is too low, please check whether the endo is too dry and confirm it with X-ray.

2.13 This device have electromagnetic interference, the patient or doctor who with a heart pace maker are forbidden to use this device and the device is susceptible to other device which produces electromagnetic interference. The operation under such environment should be cautious. ..

2.14 The guarantee is valid for normal usage conditions. Any disassembly will render the guarantee void, the professionals of manufacturer company will offer the repair service during in guarantee period.

2.15 Any modification will render the guarantee void and may cause harm to the patient.

3 Installation of the device

3.1 Battery installation

Attention: As batteries are not installed on delivery, you need to remove the battery cover and install four AAA alkaline batteries.

3.1.1 Hold the shell, and push the button at the bottom of the device toward the LCD screen. [Picture 3 (a)]

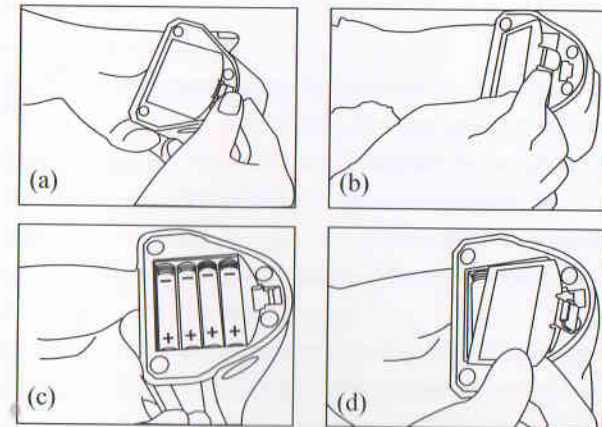
3.1.2 Push the battery cover and take it away from the unit. [Picture 3 (b)]

3.1.3 Install four AAA alkaline batteries correctly according to the battery polarity labeled on the shell. [Picture 3 (c)]

Attention:

Do not invert the anode(+) and cathode (-).

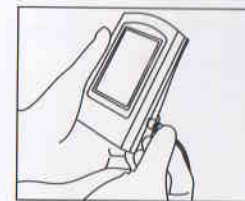
3.1.4 Install the battery cover by pressing its convex part to the concave part of the device. [Picture 3 (d)]



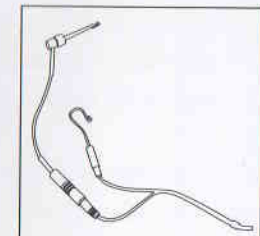
Picture 3

3.2 The Connection of the Measuring Wire

3.2.1 Insert the plug of the measuring wire into the right side socket of the unit. [Picture 4]



Picture 4



Picture 5

Attention:

- a) Please be careful to use the device, keep it stable and avoid hit. Incautious use will lead to the damage or the failure of the machine.
- b) Measurement can not be proceeded without the complete insertion of the plug.
- c) Be sure not to hit the plug. Keep the device away.

3.2.2 Insert the file clip and lip hook respectively into the two sockets of the measuring wire. [Picture 5]

Attention:

Be sure not to pull the wire when inserting or pulling out the the measuring wire and the file clip. [Picture 6(a)]

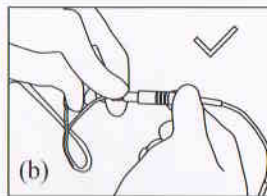
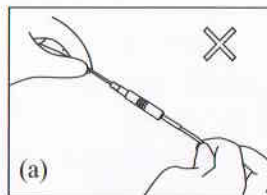
Correct operation showed as in picture 6(b).

3.2.3 Test the wire connecting (Test before each use)

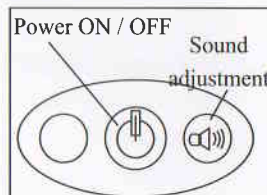
- a) Press the power switch. Make sure the scene of measuring the length of the root canal displayed on the LCD screen.

The device will shutdown automatically after 5 minutes without operation. [Picture 7]

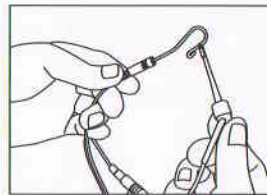
- b) Make sure if the plug of the measuring wire is



Picture 6



Picture 7



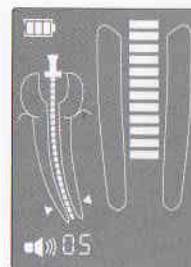
Picture 8

inserted into the socket correctly.

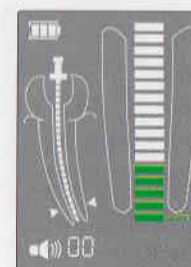
- c) Make sure if the file clip and lip hook are connected well to the measuring wire.
- d) Make the lip hook touch the bent wire of the file clip [as showed in picture 8] to confirm all the instruction bars are displayed on the LCD screen and static display the digital '-3', otherwise, it means that the file clip or the measuring wire damaged, should be replaced. [as showed in picture 9(c)]

3.2.4 Explanations on the interfaces displayed

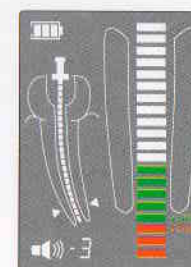
- a) The screen displays the front region of the apical foramen by instruction bars. Please refer to the white region as showed. [Picture 9(a)]
- b) The file has gone to the position near by the apical foramen when the green bars displayed. [Picture 9(b)]
- c) The file has exceeded the apical foramen when the red bars displayed. A continuous beep sound will be generated at the same time [Picture 9(c)].



Picture 9(a)



Picture 9(b)



Picture 9(c)

4 Product function and operation

4.1 Usage requirements

Apex locator should be precise, repeatable, and easy to operate. The following requirements are necessary besides the proper operation method.

4.1.1 The operation should according to the manual.

4.1.2 The dentists should have the knowledge of teeth position and average length and the skill to operate the device.

4.1.3 A fully exposed access cavity to show the pulpal cabin.

4.1.4 A X-ray photo to show the whole length and root canal of the teeth.

4.1.5 The endo file should not be too big or too small to avoid cutting through the apical foramen.

4.1.6 Mark an anatomized symbol on the diseased tooth and memorize it on the case history. This symbol should be marked on the health bridge or on the tooth filled integrated. The position of the mark should be on the incisal edge of the anterior tooth or on the spire of the molars. For those bridge that's broken obviously, this symbol should be on the tooth surface supported by the dentin instead of on the suspended enamel.

4.1.7 The acute inflammation surrounding the apex has been gone and the infected material has been cleaned. It is also necessary to get rid of the pulp and necrosis tissue.

4.1.8 The following cases are not suited for a normal measurement:

a) The size of the root similar to the size of apical foramen.

In this case, the measurement result of the length of the root canal will be shorter than its real because of the hypoplasia of the root [Picture 10].

b) Bleeding or the blood overflow from the apical foramen.

In this case, the blood will overflow from the root canal and reaches gingival that the blood and the gingival will be on a conducting state which will cause an inaccurate result while measuring. The measurement can be continued when the bleeding is stopped [Picture 11].

c) The tooth crown is broken

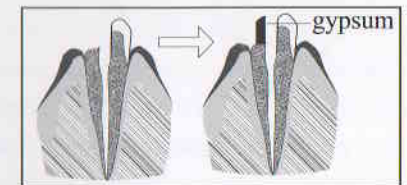
The tissue of the gingival may reach the cavity of the endo hole at the broken point which will cause inaccurate because of the electronic conduction. The measurement can be continued when the crown is fixed by gypsum or other insulators [Picture 12].



Picture 10



Picture 11



Picture 12

d) There is a crack on the tooth root

In this case, the crack may cause the electric leakage which will affect the

accuracy of measurement [Picture 13].

e) A retreatment to an endo which was filled with condensation

Clean the remaining material in the root

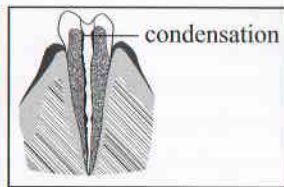
canal and fill it with little normal saline before a measurement [Picture 14].

f) There is a metal crown which has connected to the gingival.

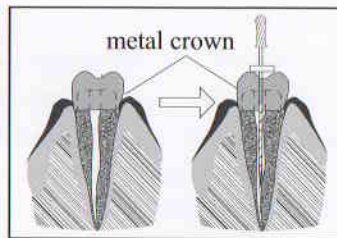
It will cause an inaccurate when the endo file touches metal crown [Picture 15].



Picture 13



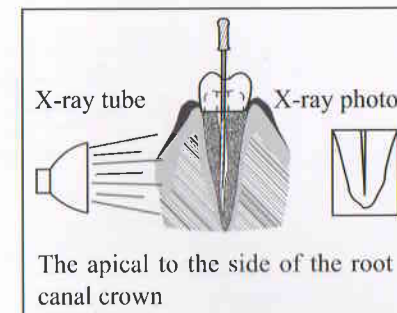
Picture 14



Picture 15

Sometimes, the results of the Apex Locator and X-rays are not meet each other, which is neither the machine is not normal, nor the photo is incorrect taken. The actual position of the apical foramen is different from the anatomical one, it is very common that the apical foramen slightly to the side of the root canal crowns. In this case, according to the shooting angle as the following picture showed, it will cause the illusion that the front tip of the root canal haven't reached the canal tip. [Picture 16]

(Since of the angle of X-rays, sometimes it can't take photo of the apical foramen properly, so it can't show the accurate position of the apical foramen.)



Picture 16

4.2 Instruction

4.2.1 Insert the plug of measuring wire into the socket in the side of main unit.

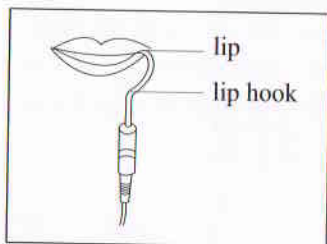
Turn it on. The battery is on the left of screen.

4.2.2 The equipment is in the normal condition. The equipment shuts down after 5 minutes without use.

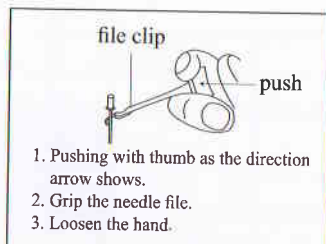
4.2.3 The volume is adjustable. Please press the volume bottom for a setting.

4.2.4 Hang the lip hook on the lip, make sure it contact the oral mucosa as a reference electrode [Picture 17].

4.2.5 Clip the file with file clip, approach to the apex, then there will be continuous alarm when the distance is less than 2mm [Picture 18].



Picture 17



Picture 18

1. Pushing with thumb as the direction arrow shows.
2. Grip the needle file.
3. Loosen the hand.

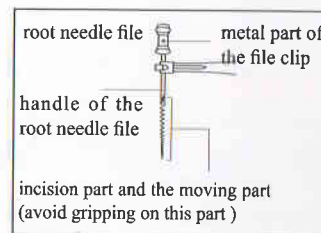
Attention:

a) When grip the root canal with a needle file, please grip the upper of the metal part (near the root canal at the needle handle). If you grip the lower part (blade or moving part), it will wear the metal part of the file folder and the resin part. [Picture 19]

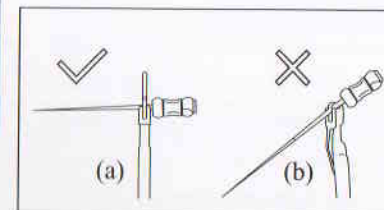
b) When measure the length of root canal, please don't use the metal needle file. If you operate the device without the dentistry glove, it will cause leakage phenomenon and result of measurement is inaccurate. Therefore, please use the resin needle file and remember don't touch the metal part with finger.

c) Please don't use the worn file clip, and it will make the result of measurement inaccurate.

d) Please reference the [Picture 20(a)] to grip the needle file. If as [Picture 20(b)], it can't properly measure the length of the root canal due to the improper force, and the front of the root canal pin is easy to wear.

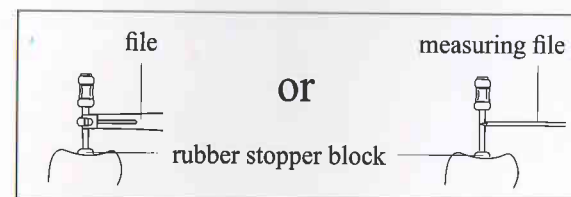


Picture 19



Picture 20

4.2.6 When the file reaches the apex, adjust the rubber piece set on the endo file to the reference point (incisal edge or fossa edge), then pull out the endo file, measure the length between the top of the file and the rubber piece, and this is the working length of the tooth. It also can use the measuring instead of file clip, when it is inconvenient to measure the back teeth [Picture 21].



Picture 21

4.2.7 The components that touch body must be autoclaved under high temperature and high pressure. The shell and measuring wire should be cleaned by 75% alcohol.

5 Trouble shooting

Phenomena of troubles	Possible cause	Solutions
No power and no signal on the screen after the power on.	1. If the battery is placed correctly? 2. If the battery is empty?	1. Re-install the batteries; 2. Replace the batteries by new ones.
The length of the root canal cannot be measured.	1. If the measuring wire is connected correctly? 2. If the measuring wire is broken?	Confirm the measuring wire is plugged firmly, link the lip hook with the file clip to check if the measuring wire is broken.
No sound of alarm.	If the volume is set at "mute"?	Adjust the sound level.

Phenomena of troubles	Possible cause	Solutions
Display not steady while measuring: the measurement result is rather longer or shorter; numerical display irregular.	If the connection between the lip hook and the oral mucosa is ok?	Make sure the lip hook has contacted the oral mucosa at a good position.
	Is there a blood/saliva overflowing, glued to the crown?	Blood, liquid overflow from the root canal, glued to the crown or the tooth neck, will cause short-circuit then cause the in-normal phenomena. Cleaning the blood and the liquid.

Phenomena of troubles	Possible cause	Solutions
Display not steady while measuring: the measurement result is rather longer or shorter; numerical display irregular.	If the root canal is filled with blood, liquid?	Once the endo needle contact the surface of the root canal which fill with blood, liquid, it will display "OVER" immediately. In this case, push the needle to the apical root canal, then the display will be normal, you can measure the length of the root canal correctly.
	If there is liquid, scrap on the tooth surface?	Cleaning the tooth surface.
	If the endo needle contact the gums?	The LCD will display "OVER" if the endo needle contact the gums.
	If there is still have pulp in the root canal?	If there is much pulp left in the root canal, the root canal length can't be measured correctly.
	If the needle touched the metal repaired material?	Once the needle touched the metal repaired material, current measurement from the gums to the periodontal tissue loss, the screen will display "OVER".
	If the adjacent surface has caries?	Current measurement flow from caries of the adjacent surface to gums, then the root canal length can't be measured correctly.

Phenomena of troubles	Possible cause	Solutions
Display not steady while measuring: the measurement result is rather longer or shorter; numerical display irregular.	Whether there is collateral or the tooth root is broken?	Once the needle reached the collateral or the broken part of the tooth root, current measurement will overflow from periodontal ligament, it display "OVER".
	Is it because in addition to the top pulp chamber, low tooth crown? Or there are residues left?	Use rubber dam to prevent the current flow to gums.
	Are there cysts apical?	If there has cysts, the length of root canal can't be measured accurately.
	Whether the file clip is not clean or broken?	Cleaning the file clip by alcohol, or replace it.
	Whether the measuring wire is broken or poor contact?	Contact the both end of the measuring wire directly, it display "-3".

Phenomena of troubles	Possible cause	Solutions
The length measurement indicator only full display near narrow part of the apical.	Whether the root canal is occlusion?	The display will be normal after penetrating the narrow part of apical.
	If the root canal is too dry?	Wet the endo with Hydrogen peroxide or NaCl.
	If the endo file is too small for a large root canal?	Replace the current endo file with a larger one.

* If all above measures do not work, please contact us.

6 Cleaning and sterilization

6.1 The main unit and the measuring wire can be disinfected with alcohol cotton or disinfected cloth.

6.2 Do not use potent chemical, cleaning agent, etc. to clean the equipment. It will cause damage to the main unit and the measuring wire.

6.3 The file clip, lip hook and measuring file should be autoclaved under high pressure (0.22MPa) and high temperature (135°C) before each operation.

6.4 The Measuring wire cannot be autoclaved.

7 Storage, maintenance and transportation

7.1 Storage

7.1.1 This equipment should be stored in a room where the relative humidity is $\leq 80\%$, atmospheric pressure is 70kPa~106kPa, and the temperature is $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$.

7.1.2 Avoid the storage in a too hot condition. High temperature will shorten the life of electronic components, damage battery, reshape or melt some plastic.

7.1.3 Avoid the storage in a too cold condition. Otherwise, when the temperature of the equipment increases to a normal level, there will be dew that will possibly damage pc board.

7.2 Maintenance

7.2.1 This device do not include accessories for repair usage, the repair should be carried out by authorized person or authorized after service center.

7.2.2 Keep the equipment in a dry storage condition.

7.2.3 Do not throw, beat or shock the equipment.

7.2.4 Do not smear the equipment with pigments.

7.3 Transportation

7.3.1 Excessive impact and shake should be prevented in transportation. Lay it carefully and lightly and don't invert it.

7.3.2 Don't put it together with dangerous goods during transportation.

7.3.3 Avoid solarization and getting wet in rain and snow during transportation.


8 Environmental protection

There is no harmful factor in this product. You can deal with it based on the local law.

9 After service

From the date this equipment has been sold, base on the warranty card, we will repair this equipment free of charge if it has quality problems, please refer to the warranty card for the warranty period.

10 Symbol instructions

 Date of manufacture

 Manufacturer

IPX0 Ordinary equipment

 Used indoor only

 Power on / off

 Type BF applied part

 Recovery

 Keep dry


 Handle with care

 Sound adjustment

 SN serial number

 Humidity limitation

 Temperature limitation

 Atmospheric pressure for storage

 Consult the accompanying documents

 Appliance compliance WEEE directive

11 Statement

There is not any harmful element in this equipment. It can be disposed of according to the local laws. We reserve the rights to alter the design, the technology and fitting parts, instruction manual and packaging without further notice. If there is any discrepancy between the picture and the real product, please refer to the real product.

