

E-COM Endo Motor

INSTRUCTION MANUAL

CE 0197

Please read this manual before operating



GUILIN WOODPECKER MEDICAL INSTRUMENT CO., LTD.

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Preface

Guilin Woodpecker Medical Instrument Co., Ltd is a professional manufacturer researching, developing, and producing dental products. Woodpecker owns a sound quality control system. Guilin Woodpecker Medical Instrument Co., Ltd has two brands, Woodpecker and DTE. Its main products include Ultrasonic Scaler, Curing light, Apex locator, Ultrasurgery, Endo Motor, etc.

1 Product introduction

1.1 Product description

E-COM is mainly used in Endodontic treatment. During root canal preparation procedure, it is used to mold and clean the root canal.

Features:

- a) Wireless handpiece enables more convenient operation.
- b) Adopt real-time feedback technology and dynamic torque control, effectively preventing needle breakage.
- c) Wireless handpiece enables more convenient operation.
- d) Storage of 9 user-defined modes allows invocation at any time.

Under each mode, Continuous Rotation Mode, Reciprocating Motion Mode, and Reverse Rotation are for options.

1.2 Model and specification

E-COM

Please refer to packing list for device configurations.

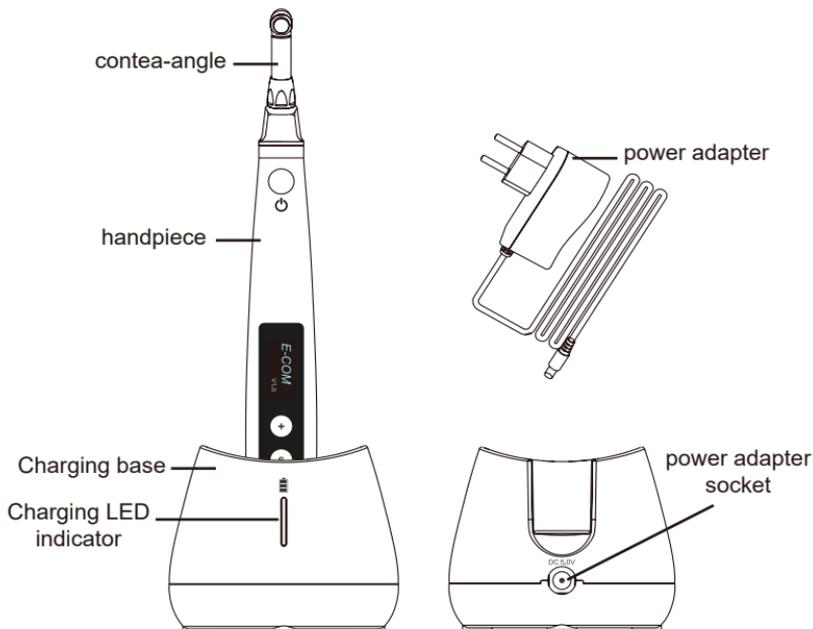
1.3 Scope of application

1.3.1 The device is suitable for root canal molding and cleaning in endodontic treatment.

1.3.2 The device must be operated in hospital and clinic by the qualified dentists.

1.4 Performance and composition

The device is composed of charging base, handpiece, contra-angle, and power adapter, etc.



1.5 Contraindication

Patients with implanted pacemakers (or other electrical equipment) who are warned not to use household appliances such as electric razors, hair dryers, etc. are not recommended to use this device.

1.6 Warnings

1.6.1 Please carefully read this Instruction Manual before first operation.

1.6.2 This device should be operated by professional and qualified dentist in qualified hospital or clinic.

1.6.3 Do not directly or indirectly place this device near heat source. Operate and store this device in reliable environment.

1.6.4 This device requires special precautions regarding electromagnetic compatibility (EMC) and must be in strict accordance with the EMC information for installation and use. Do not use this equipment especially in the vicinity of fluorescent lamps, radio transmitting

devices, remote control devices, handheld and mobile high-frequency communication devices.

1.6.5 Long time use of Reciprocating Motion Mode may result in handpiece overheat, thus it should be left to cool for use. If the handpiece is overheated frequently, please contact local distributor.

1.6.6 Please use the original contra-angle. Otherwise it will not be used or cause adverse consequences.

1.6.7 Please do not make any changes to the device. Any changes may violate safety regulations, causing harm to the patient. There will be no promises of any modification.

1.6.8 Please use original power adapter. Other power adapter will result in damage to lithium battery and control circuit.

1.6.9 The handpiece cannot be autoclaved. Use disinfectant of neutral pH value or ethyl alcohol to wipe its surface.

1.6.10 Before the contra-angle stopping rotating, do not press the push cover of contra-angle. Otherwise the contra-angle will be broken.

1.6.11 Before the handpiece stopping rotating, do not remove the contra-angle. Otherwise the contra-angle and the gear inside handpiece will be broken.

1.6.12 Please confirm whether the file is well installed and locked before starting the handpiece.

1.6.13 The file of Continuous Rotation Mode shall not be used under Reciprocating Motion Mode and vice versa.

1.6.14 Please set torque and speed as per the recommended specifications of file manufacturer.

1.6.15 The Continuous Rotation Mode matches continuous rotating files; the Reciprocating Motion Mode matches reciprocating files (i.e. WAVE ONE); the Reverse Rotation Mode is adopted to pick the continuous rotating files out while the file accidentally gets stuck in the root canal.

1.7 Device safety classification

1.7.1 Type of operation mode: Continuous operating device

1.7.2 Type of protection against electric shock: Class II equipment with internal power supply

1.7.3 Degree of protection against electric shock: BF type applied part

1.7.4 Degree of protection against harmful ingress of water: Ordinary equipment (IPX0)

1.7.5 Degree of safety application in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide: Equipment cannot be used in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide.

1.7.6 Applied part: contra-angle.

1.7.7 The contact duration of applied part: 1 to 10 minutes.

1.7.8 The temperature of the surface of applied part may reach 46.6°C.

1.8 Primary technical specifications

1.8.1 Battery

Lithium battery in handpiece: 3.6V /750mAh

1.8.2 Power adapter

Input: ~100V-240V 50Hz/60Hz 0.4A Max

Output: DC5V/1A

1.8.3 Torque: 0.6Ncm-5.0Ncm(6mNm ~ 50mNm)

1.8.4 Rotate speed: 100rpm~1000rpm

1.9 Environment parameters

1.9.1 Environment temperature: +5°C ~ +40°C

1.9.2 Relative humidity: 30% ~ 75%

1.9.3 Atmospheric pressure: 70kPa ~ 106kPa

2 Installation

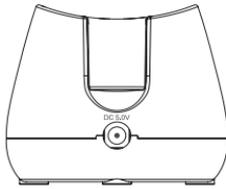
2.1 Basic accessories of product



Motor handpiece



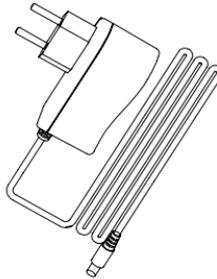
Contra-angle



Charging base



Lubricator



Power adapter

2.2 Instructions for contra-angle

2.2.1 The contra-angle adopts precision gear transmission, and the transmission ratio is 1: 1. The material for contra-angle is copper. (Model:CA001)

2.2.2 Before the first use and after treatments, please clean and disinfect contra-angle with disinfectant of neutral PH value. After disinfection, lubricate it with specific cleaning oil. Finally, sterilize it under high temperature and high pressure (134°C, 2.0bar~2.3bar (0.20MPa~0.23MPa)).

2.2.3 The contra-angle can only be used cooperatively with this device. Otherwise the contra-angle will be damaged.

2.2.4 The service life of contra-angle is ONE year. But as a result of different use frequency, operating time, and the treatment complexity, the real service lives are different.

2.3 Installation and removal of contra-angle

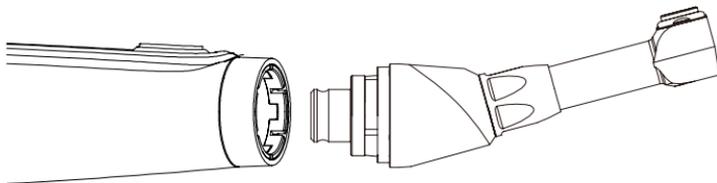
2.3.1 Installation

Align the positioning pin of contra-angle with the positioning hole

of handpiece, horizontally pushing the contra-angle. A click sound indicates that it is well installed. By aligning those three pins on contra-angle with those six holes on handpiece, the contra-angle can be installed in different angle. (As shown below)

2.3.2 Removal

Pull out the contra-angle horizontally when the motor handpiece does not start.



Warnings

- a) Before plugging in or pulling out contra-angle, please first stop the handpiece motor.
- b) After installation, please check and confirm that the contra-angle has been well installed.

2.4 Installation and removal of file

2.4.1 Installation of file

Before starting the device, plug the file into the hole of contra-angle head. While plugging, slightly screw the file with one hand, and press the push cover of contra-angle with another hand.

Warnings

Please use standard file. The maximum length of the file is 31mm. And the appropriate minimum length of file handle is 11mm with 2.334-2.35 mm handle diameter, which meet the requirements on Class I handle in ISO 1797-1 Standard.

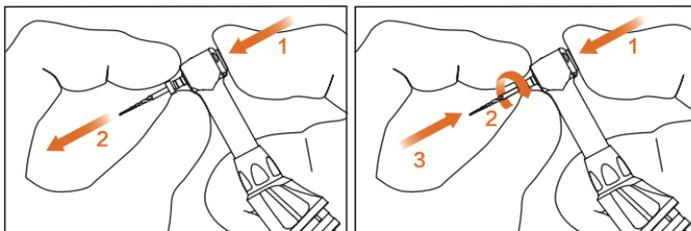
After plugging the file into contra-angle, let go the hand on push cover to assure that the file cannot be taken out.

2.4.2 Removal of file

Pressing the push cover, and then directly pull out the file.

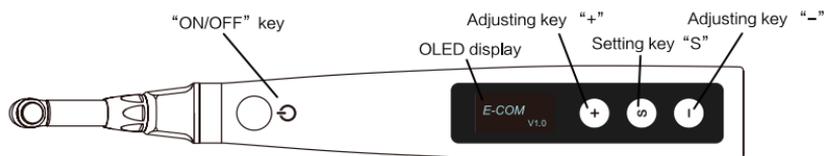
Warnings

- a) Before plugging and pulling out the file, the handpiece must be stopped.
- b) After the file is well installed, without pressing the push cover, the file should be firmly locked while slightly pulling the file.



3 Function and operation of product

3.1 Schematic drawing of handpiece



Schematic drawing of handpiece

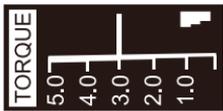
3.2 OLED display

<p>Labels: a (M1), b (Fwd icon), c (battery icon), d (300rpm), e (3.0Ncm)</p>	<p>a) Customized program sequence number 1-9, totally 9 programs</p> <p>b) Operation mode</p>
<p>Labels: f (W3-Pro .vt), g (Fwd), 350rpm, 1.5Ncm</p>	<p>c) Battery consumption</p> <p>d) Set speed</p> <p>e) Set torque</p>
<p>Labels: h (3.0), i (1.0)</p>	<p>f) File system</p> <p>g) Operation mode</p> <p>h) Torque setting</p> <p>i) Real-time torque</p>
<p>Labels: j (AP), k (RCM)</p>	<p>j) Set apical stop</p> <p>k) File position</p>

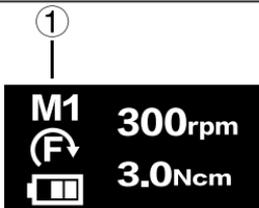
4 Operation instruction

4.1 Starting and Stopping

<p>a) Under the power off state of handpiece, press key, and then the handpiece will enter Standby mode.</p>	<p>Standby interface</p>
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<p>b) Under Standby mode, press  key, and then the handpiece will enter Operating mode.</p> <p> Note The handpiece motor cannot enter working state while it is in the base.</p> <p>c) Press the  key again, and then the handpiece backs to Standby mode.</p>	 <p>Continuous Rotation Mode interface</p>
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4.2 Selecting memory

<p>a) E-COM allows 9 memorizing programs. Under standby state, please press key  or  to switchover those memorizing programs. And the serial number will change correspondingly.</p>	
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4.3 Speed setting, torque setting, and operation mode setting

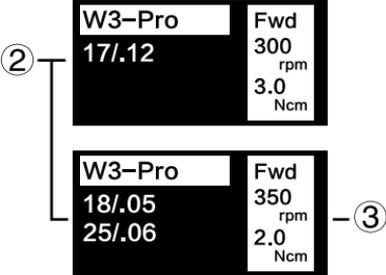
Under standby state, short press key  to enter speed setting, torque setting, and operation mode setting interfaces.

In setting interface, it will automatically back to Standby interface after 5s without operation. Press  key to enter Standby interface.

<p>Speed setting: In the Speed Setting Interface, press  to increase speed, press  to decrease speed, and long press to fast increase or fast decrease speed.</p>	
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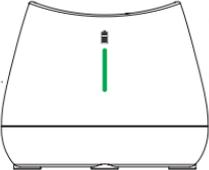
<p>Torque setting: In the Torque Setting Interface, press + to increase torque, press - to decrease torque, and long press to fast increase or fast decrease torque.</p>	<div data-bbox="567 151 824 278" style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Torque</p> <p>2.0 Ncm</p> </div>
<p>Operation Mode Setting: In the Operation Mode Setting Interface, press + key or - key to switch operation mode. Continuous Rotation Mode, Reverse Rotation Mode and Reciprocating Motion Mode are for options. There will be a tick indication while setting to Reverse Rotation Mode. Long press to realize fast modes handover.</p> <p> Note The speed and torque cannot be adjusted under Reciprocating Motion Mode.</p>	<div data-bbox="567 332 824 457" style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Direction</p> <p>Fwd</p> </div> <p style="text-align: center;">Continuous Rotation Mode</p> <div data-bbox="567 569 824 694" style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Direction</p> <p>Rev</p> </div> <p style="text-align: center;">Reverse Rotation Mode</p> <div data-bbox="567 807 824 931" style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Direction</p> <p>F+R</p> </div> <p style="text-align: center;">Reciprocating Motion Mode</p>

4.4 Preset programs

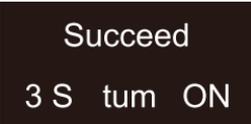
<p>Select the self-defining program that need to be replaced.</p>	
<p>Long press key S to get into the interface of file system. Press key + or key - to select needed file system. Press the key S to confirm, and press the ⏻ key to log out.</p>	
<p>Press key S to get into the interface of corresponding file system. Press key + or key - to select needed file model (②), the corresponding rotation direction, speed, and torque value (③). Press the key S to confirm, and press the ⏻ key to log out.</p>	
<p>After selecting the file system, the selected one will replace the former program.</p>	

4.5 Battery Charging

<p>If the battery icon turns into display that as the picture shown, it indicates that the battery capacity is very low. Please charge.</p>	
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<p>When the battery capacity is too low, the device may indicate “Low Battery!” and automatically power off.</p>	
<p>Connect the power adapter with the base. Confirm that it is well connected, and then place the handpiece into the base. If the indicator light on base turns yellow, it indicates that it is charging. If the indicator light on base turns green, it indicates that the battery capacity is enough, and there is no need to charge. After charging, please unplug the power adapter.</p> <p>⚠ Note Please use the original power adapter for charging.</p>	 <p>Yellow light Charging</p>  <p>Green light Battery capacity enough</p>

4.6 Contra-angle calibration setting

<p>After replacement of contra-angle, the contra-angle shall be calibrated before use. In Standby Interface, first long press setting key  and then long press  for 2s to enter Calibration Interface of contra-angle. After 15s's countdown, the interface of successful calibration will appear. Five more seconds later, it will switch to Standby Interface.</p>	 <p>Calibrating Wait 10 S</p> <p>Calibration Interface of Contra-angle</p>  <p>Succeed 3 S tum ON</p> <p>Interface of Successful Calibration</p>
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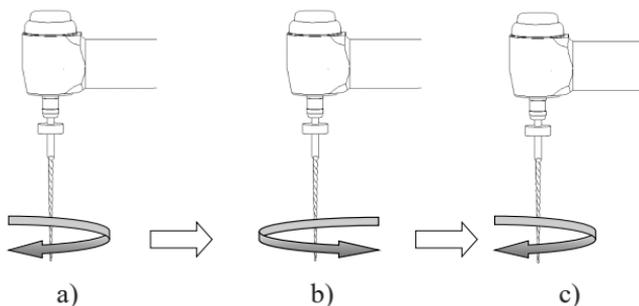
4.7 Power-off

In Standby Interface, the handpiece would automatically shut down

after 3 minutes without any button-pressing operation. The handpiece will also automatically shut down while it is put into the charging base. In Standby Interface, long press setting key , and then long press Adjusting key , finally the device will automatically shut down 2s later.

4.8 Protective function of automatic reverse

During operation, if the load value exceeds the preset torque value, the file rotation mode will automatically change to Reverse Mode. And the file would return to normal rotation mode when the load is below the preset torque value again.



a) Clockwise rotation

Load value is lower than preset torque value

b) Counterclockwise rotation

Load value is higher than preset torque value

c) Clockwise rotation

Load value is lower than preset torque value again



a) Protective function of automatic reverse is **ONLY** suitable for Continuous Rotation Mode.

b) This function is forbidden under Reciprocating Motion Mode and Reverse Rotation Mode.

c) When the handpiece battery indicator indicates a low battery capacity, the low battery capacity is insufficient to support the handpiece to reach the limit torque value, that is, the auto-reverse function will not work properly. Please charge it in time.

d) If the motor is under load all the time, the machine may stop automatically as a result of overheat protection. If it happens, turn off

the handpiece for a while until the temperature drops.

5 Oiling of contra-angle

Only the original oil injection nozzle can be used for oiling of contra-angle. After disinfection of contra-angle and before sterilization, oiling should be conducted under high pressure and high temperature.

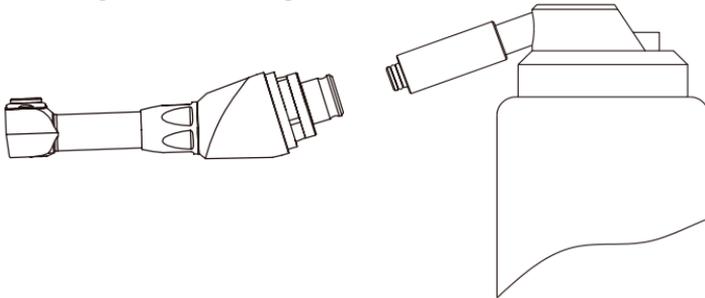
1. Firstly, screw the injecting nozzle into jet of oil bottle. (Around 10 circles)
2. Next, plug the nozzle into the end part of contra-angle, and then grease the contra-angle for 2-3s till the oil flow out of contra-angle head part.
3. Vertically place the end part of contra-angle or tilt the contra-angle to let go the redundant oil under gravity.

Warnings

Handpiece cannot be filled with oil.

Cautions

- a. To avoid the contra-angle from flying out for the pressure, use hand to safely hold the contra-angle while greasing.
- b. Do not use a swirling nozzle. Swing nozzle can only be used for injection of gas, not for oiling.



6 Cleaning and Sterilization

6.1 Foreword

For hygiene and sanitary safety purposes, the contra-angle must be cleaned and sterilized before each usage to prevent any contamination.

This concerns the first use, as well as all subsequent uses.

6.2 General recommendations

6.2.1 Use only a Medical multienzyme detergent (Protease, phospholipase, etc.) which is approved for its efficacy (VAH/DGHM-listing, CE marking, FDA and Health Canada approval) and in accordance with the DFU of the detergent manufacturer.

6.2.3 Do not place the contra-angle in a disinfectant solution or in an ultrasonic bath.

Do not use chloride detergent materials.

6.2.4 Do not use bleach or chloride disinfectant materials.

6.2.5 For your own safety, please wear personal protective equipment (gloves, glasses, mask).

6.2.6 The user is responsible for the sterility of the product for the first cycle and each further usage as well as for the usage of damaged or dirty instruments where applicable after sterility.

6.2.7 The water quality has to be convenient to the local regulations especially for the last rinsing step or with a washer-disinfector.

6.2.8 Do not sterilize the motor handpiece, the AC adapter or the charging base. After each use, all the objects that were in contact with infectious agents should be cleaned using towels impregnated with a detergent solution (a bactericidal, fungicidal and aldehyde free solution) approved by VAH/DGHM-listing, CE marking, FDA and Health Canada.

6.2.9 To sterilize the endodontic files, refer to the manufacturer's instructions for use.

6.2.10 The contra-angle needs to be lubricated after cleaning but before sterilization.

6.3 Step-by-Step Procedure

#	Operation	Operating Mode	Warning
1	Preparation	Remove the contra-angle from handpiece and charging base.	

2	Manual cleaning(Contra-angle, etc.)	For 5 minutes, rinse and brush under running deionized water (DI), or water that has this degree of purity (<38°C (100.4°F)). Remove any liquid residues (ultra-absorbent cloth, particle-free compressed air).	Use a cleaning tool (brush). In order to clean faster and more effective, use only a Medical multienzyme detergent (Protease, phospholipase, etc.) which is approved for its efficacy (VAH/DGHM-listing, CE marking, FDA and Health Canada approval) and follow instructions and observe concentrations given by the detergent manufacturer.
3	Automated Cleaning with washer-disinfector	Put the contra-angle into the washer disinfector (Ao value >3000 or, at least 5 min at 90°C/194°F)	<ul style="list-style-type: none"> - Avoid any contact between the contra-angle and any instruments, kits, supports or container. - Follow instructions and observe concentrations given by the manufacturer (see also general recommendations). - Use only approved washer-disinfector according to EN ISO 15883, maintain and calibrate it regularly. - Make sure contra-angle, is dry before moving to the next step.

4	Inspection	Inspect the contra-angle and sort out those with defects.	<ul style="list-style-type: none"> - Dirty contra-angle must be cleaned - Lubricate the contra-angle with an adequate spray before packaging.
5	Packaging	Pack the contra-angle in "Sterilization pouches".	<ul style="list-style-type: none"> - Check the validity period of the pouch given by the manufacturer to determine the shelf life. - Use packaging which is resistant to a temperature up to 141°C (286°F) and in accordance with EN ISO 11607.

6	Sterilization	Steam sterilization at 134°C, 2.0bar-2.3bar(0.20Mpa-0.23MPa), for 4 minutes.	<ul style="list-style-type: none"> - Use only autoclaves that are matching the requirements of EN 13060, EN 285. - Use a validated sterilization procedure according to ISO 17665. - Respect the maintenance procedure of the autoclave device given by the manufacturer. - Use only this recommended sterilization procedure. - Control the efficiency (packaging integrity, no humidity, color change of sterilization indicators, physico-chemical integrators, digital records of cycles parameters). - Maintain traceability of procedure records.
7	Storage	Keep the contra-angle in sterilization packaging in a dry and clean environment.	<ul style="list-style-type: none"> - Sterility cannot be guaranteed if packaging is open, damaged or wet. - Check the packaging and the contra-angle before using it (packaging integrity, no humidity and validity period).

7 Troubleshooting

Failure	Possible cause	Solutions
There is continuous beep sounds after starting the handpiece.	The continuous beep sound is indicating that the handpiece is under reverse rotation state.	Stop the handpiece and change the operating mode to Continuous Rotation Mode.
Contra-angle calibration failure.	1. Calibration failure caused by strong resistance of contra-angle.	1. Recalibration. 2. Clean the contra-angle, and recalibrate after oil injection.
After plugging the handpiece into charging base, the charging indicator does not light.	The power adapter is not well connected.	Check whether the power adapter is well connected.
After plugging the handpiece into charging base, the charging indicator does not turn to yellow.	1. The handpiece is not in place. 2. The handpiece is fully charged.	Plug the handpiece in place.
The time of endurance becomes shorter after charging.	Battery capacity becomes smaller.	Please contact local distributor or manufacturer.
The continuously rotating file is stuck at the root canal.	Incorrect specification setting. Too high load torque of file.	Choose Reverse Rotation Mode, start the handpiece, and take the file out.

8 Storage, maintenance and transportation

8.1 Storage

8.1.1 This equipment should be stored in a room where the relative humidity is 10% ~ 93%, atmospheric pressure is 70kPa to 106kPa, and the temperature is -20°C ~ +55°C.

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

melt some plastic.

8.1.3 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 PCB board.

8.2 Maintenance

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

8.2.2 Keep the equipment in a dry storage condition.

8.2.3 Do not throw, beat or shock the equipment.

8.2.4 Do not smear the equipment with pigments.

8.3 Transportation

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

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

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

9 Environmental protection

Please dispose according to the local laws.

10 After service

From the date this equipment has been sold, based on the warranty card, we will repair this equipment free of charge if there are quality problems. Please refer to the warranty card for the warranty period.

11 Symbol instruction

 **0197** CE marked product

 Ordinary equipment

 Date of manufacture

 Type BF applied part



Follow instructions for use



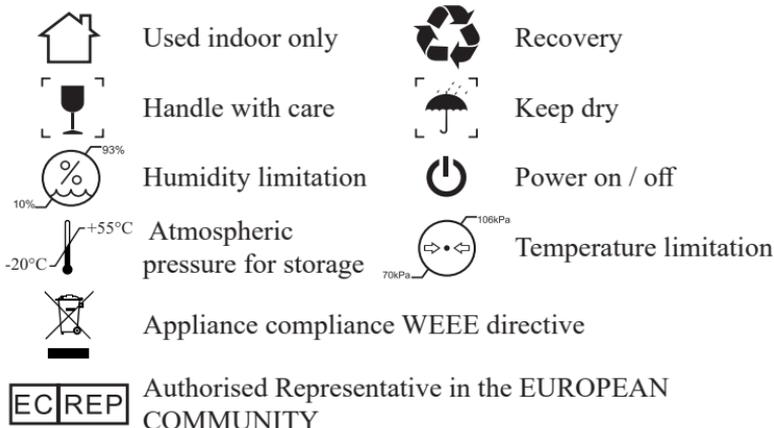
serial number



Manufacturer



Class II equipment



12 Statement

All rights of modifying the product are reserved to the manufacturer without further notice. The pictures are only for reference. The final interpretation rights belong to GUILIN WOODPECKER MEDICAL INSTRUMENT CO., LTD. The industrial design, inner structure, etc, have claimed for several patents by WOODPECKER, any copy or fake product must undertake legal responsibilities.

13 European authorized representative

 MedNet GmbH
Borkstrasse 10 · 48163 Muenster · Germany

14 EMC-Declaration of conformity

The device has been tested and homologated in accordance with EN 60601-1-2 for EMC. This does not guarantee in any way that this device will not be effected by electromagnetic interference Avoid using the device in high electromagnetic environment.

Technical Description Concerning Electromagnetic Emission

Table 1: Declaration - electromagnetic emissions

Guidance and manufacturer's declaration - electromagnetic emissions		
The model E-COM is intended for use in the electromagnetic environment specified below. The customer or the user of the model E-COM should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The model E-COM uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class B	The model E-COM is suitable for used in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Complies	

Technical Description Concerning Electromagnetic Immunity

Table 2: Guidance & Declaration - electromagnetic immunity

Guidance & Declaration — electromagnetic immunity			
The model E-COM is intended for use in the electromagnetic environment specified below. The customer or the user of the model E-COM should assure that It is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8kV contact ±2, ±4, ±8, ±15kV air	±8kV contact ±2, ±4, ±8, ±15kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2kV for power supply lines ±1kV for Input/output lines	±2kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.

Surge IEC 61000-4-5	$\pm 0.5, \pm 1\text{kV}$ line to line $\pm 0.5, \pm 1, \pm 2\text{kV}$ line to earth	$\pm 0.5, \pm 1\text{kV}$ line to line $\pm 0.5, \pm 1, \pm 2\text{kV}$ line to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % UT (>95% dip in UT.) for 0.5 cycle <5 % UT (>95% dip in UT.) for 1 cycle 70% UT (30% dip in UT) for 25 cycles <5% UT (>95 % dip in UT) for 250 cycles	<5 % UT (>95% dip in UT.) for 0.5 cycle <5 % UT (>95% dip in UT.) for 1 cycle 70% UT (30% dip in UT) for 25 cycles <5% UT (>95 % dip in UT) for 250 cycles	Mains power quality should be that of a typical commercial or hospital environment. If the user of the models E-Combine+ requires continued operation during power mains interruptions, it is recommended that the models E-Combine+ be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30A/m	30A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE UT is the a.c. mains voltage prior to application of the test level.			

Table 3: Guidance & Declaration - electromagnetic immunity concerning Conducted RF & Radiated RF

Guidance & Declaration - Electromagnetic immunity			
The model E-COM is intended for use in the electromagnetic environment specified below. The customer or the user of the models E-COM should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance

<p>Conducted RF IEC 61000-4-6 Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3</p>	<p>3 Vrms 150 kHz to 80 MHz 6 Vrms ISM frequency band 3 V/m 80 MHz to 2.7 GHz</p>	<p>3V 6V 3V/m</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the models E-COM, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d=1.2 \times P^{1/2}$ $d=2 \times P^{1/2}$ $d=1.2 \times P^{1/2}$ 80 MHz to 800 MHz $d=2.3 \times P^{1/2}$ 800 MHz to 2.7 GHz where P is the maximum output power rating of the transmitter In watts (W) according to the transmitter manufacturer and d Is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,a should be less than the compliance level in each frequency range.b Interference may occur In the vicinity of equipment marked with the following symbol:</p>
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NOTE 1 At 80 MHz end 800 MHz. the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the model E-COM is used exceeds the applicable RF compliance level above, the model E-Combine+ should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the model E-COM.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.

Table 4: Recommended separation distances between portable and mobile RF communications equipment and the model E-COM

Recommended separation distances between portable and mobile RF communications equipment and the model E-COM			
The model E-COM is intended for use in electromagnetic environment in which radiated RF disturbances is controlled. The customer or the user of the model E-COM can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the model E-COM as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150kHz to 80MHz $d=1.2 \times P^{1/2}$	80MHz to 800MHz $d=1.2 \times P^{1/2}$	800MHz to 2,7GHz $d=2.3 \times P^{1/2}$
0,01	0.12	0.12	0.23
0,1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) accordable to the transmitter manufacturer.			
NOTE 1 At 80 MHz and 800 MHz. the separation distance for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

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ZMN/WI-09-440 V1.0 - 20181114