Multifunctional Endo Motor
Instruction Manual



Smart Motor +



Smart Motor

Guangzhou RebornEndo Medical Instrument Co., Ltd.

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1 Product Description

1.1 product introduction

Multifunctional Endo Motor (Smart Motor/Smart Motor+) is a medical device for dentists to perform endodontic treatment. It can be used as a Endo Motor for preparation and enlargement of root canals, or device for measuring canal length. It can be used to enlarge the canals while monitoring the position of the file tip inside the canal. It can be only used by professional dentist in hospital or dental clinics in accordance with national regulations.

The main features of the devices Smart Motor/Smart Motor+ are:

No.	Features	Models
1	Intelligent matrix anti-interference apex locating algorithm, realizing the root canal length measurement and root canal preparation in one device.	Smart Motor, Smart Motor+
2	10 customized memory program modes, under which user can set different combination of rotation speed, torque and rotation direction. All-around meet the needs of treatment on common root canal and complex root canal.	Smart Motor, Smart Motor+
3	360 degrees rotation of contra angle. All-around meet the needs of of root canal treatment in different positions.	Smart Motor, Smart Motor+
4	Real-time response technology has a dynamic control over the output torque of the motor, which can avoid file breakage effectively.	Smart Motor, Smart Motor+
5	Intelligent SGP mode can effectively eliminate the resistance in the root canal and avoid side through of the root canal.	Smart Motor+
6	Built-in AIC automatic adaptive algorithm system. No need to set any parameters in the Automatic AI root canal preparation mode.	Smart Motor+
7	Bluetooth-network that sharing root canal treatment information with mobile devices with bluetooth function.	Smart Motor+

1.2 Model and Specification

Model: Smart Motor, Smart Motor+.

Product Size：212mm*26mm*26mm.

Product Weight：148g

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1.3 Performance and composition

The instrument (Smart Motor, Smart Motor+) is composed of motor handpiece, contra angle, bracket, file clip, lip hook, touch probe, measuring wire, power adapter, battery, etc.

1.4 Scope Of Application

The device can be used for preparation and enlargement of root canals, or device for measuring canal length.

It can only be used by professional dentists in hospital environment, clinic in accordance with national regulations.

1.5 Contraindications

1.5.1 The doctor must wear dental gloves while operating the instrument.

1.5.2 Do not start or use the device during charging.

1.5.3 The main unit cannot be sterilized under high temperature. The surface of the main unit can be cleaned by alcohol.

1.5.4 Do not use or store the device under high temperature, to avoid short circuit or color change of the device caused by high temperature.

1.5.5 The device is electronic products and non water-proof.

1.5.6 Please use the original power adapter to avoid short circuit.

1.5.7 It is forbidden to use this instrument in the following situations:

1) Patients or operators with cardiac pacemakers or other implantable electronic devices.
2) Hemophilia patients.
3) Patients with heart disease, pregnant women and small children.

1.6 Warning

This section contains descriptions of serious side effects and potential safety risks for the product itself and users/patients. Please read the following warning clauses before use:

1.6.1 The instrument can only be used by professional dentists in accordance with national regulations. Please read the instruction manual carefully before the first use.

1.6.2 The instrument can only be used in designated places and cannot be used outdoors.

1.6.3 It is forbidden to expose the instrument directly or indirectly to a heat source. The instrument must be operated and stored in a safe environment.

1.6.4 It is forbidden to use it under conditions with flammable anesthetic

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mixtures.

1.6.5 Do not immerse it in liquid.

1.6.6 Only suitable for original accessories and contra-angle, or the instrument can not work or cause bad consequences.

1.6.7 Do not use damaged or defective instruments.

1.6.8 Do not carry out any repairs or modifications without authorization. In case of failure, please contact your local distributor but do not ask unauthorized personnel to repair.

1.6.9 Do not connect the instrument to or combine with other devices or systems not manufactured by the manufacturer of the instrument.

1.6.10 Do not use the instrument as part of other devices or systems not manufactured by the manufacturer of the device.

1.6.11 The instrument complies with electromagnetic compatibility standards, but it is still necessary to prevent possible risks caused by electromagnetic interference.

1.6.12 Please check whether the parts of instrument is intact after opening the package, and install it if there is no missing part. In case of defects, please provide information to your local distributor within 24 hours upon receipt of the equipment regarding any transport damage or missing parts.

1.6.13 The root canal length measurement test stop position (showing number “00”) is the anatomic apical foramen. As a safety measure, 0.5mm-1mm is subtracted from the measured length as the working length of the root canal clinically.

1.6.14 The scale and number on the screen do not represent a definite length or distance. A decrease in the number simply means that the file is moving toward the root tip.

1.6.15 The instrument requires special precautions regarding electromagnetic compatibility (EMC), and must be installed and used in strict compliance with the EMC information. Do not use this instrument especially in the vicinity of fluorescent lamps, radio transmitting devices, remote control devices, handheld and mobile high frequency communication devices. The instrument complies with electromagnetic compatibility standards, but risks caused by possible electromagnetic interference should still be cautioned.

1.6.16 To prevent error of measurement caused by liquid from contacting the gingiva or the mutual interference between adjacent root canals, the pulp opening must be dried with a cotton ball before measurement.

1.6.17 The size of the file must comply with the root canal. Or the digital display on the screen will be unstable if use smaller files for large root canal measurement.

1.6.18 The wire connection test (ref. 5.2) must be performed before each measurement of root canal length, to make sure there is good connection between file clip and measuring wire.

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1.6.19 Do not remove or disassemble the battery without authorization, otherwise, it may cause short circuit or electrolyte leakage.

1.7 Instrument 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: B 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.

1.8 The Main Technical Parameters

1.8.1 Lithium battery：3.7V/ 1500mAh

1.8.2 Power Adapter：

Input： ~ 100V-240V 50Hz/60Hz 0.5A

Output：DC 5V/ 2A

1.8.3 Speed range：100-1000rpm

1.8.4 Torque range：0.4~5.0 N.cm

1.8.5 Adapter fuse: T2AL250V

1.8.6 The shaft of the instrument used with the contra-angle handpiece conforms to YY/T 0967, type 1 rod, with a diameter of 2.35mm, a minimum matching length of 9mm, and a maximum total length of the bur 33mm. The gear ratio is 16:1.

1.8.7 Environment parameters:

1）Environment temperature: 0 ~ 40℃

2）Relative Humidity:10 ~ 85%RH

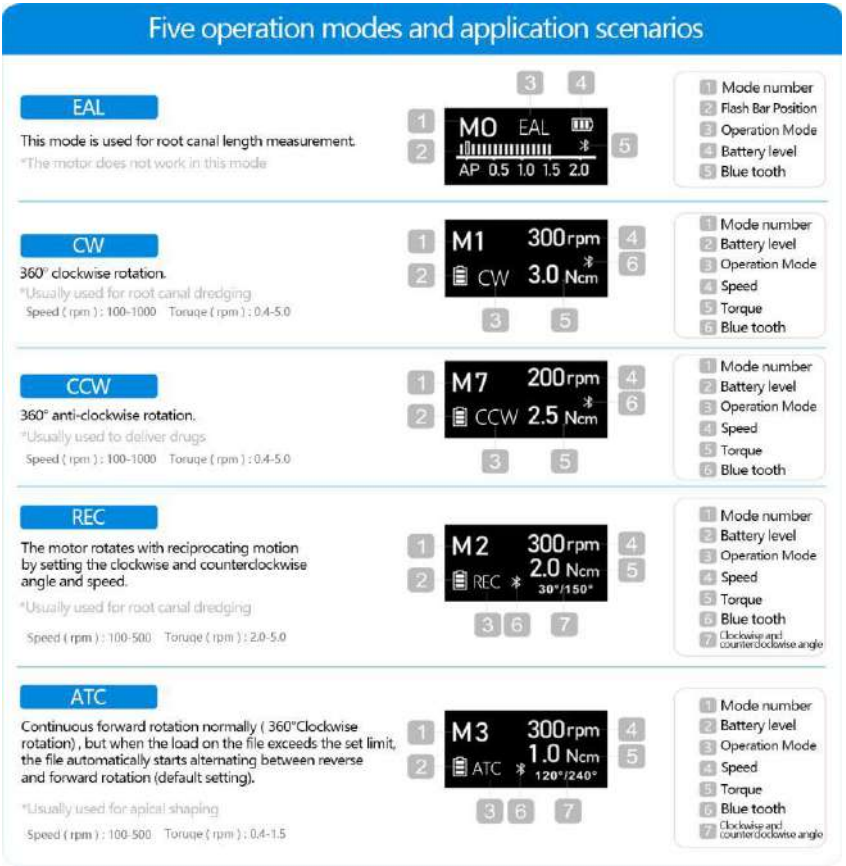
3）Atmospheric pressure:70kPa ~ 106kPa

2 Operation Mode And Memory Mode

2.1 Five Operation Modes

The instrument provides 5 operation modes, which can be operated and used according to the user's expected needs. The 5 operation modes and application scenarios are：

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2.2 Memory Mode

2.2.1 Self-defined Mode & Preset File-parameter Mode

This instrument is designed with 10 memory modes (M0-M9) .

M0 to M9 memory mode with default setting can complete a whole treatment of root canal. Almost all canals can be treated with the default settings of the memory mode M0 to M3.

Memory mode	Main uses with default setting	Operation mode	Applicable scene	Default speed (rpm)	Default torque（Ncm）
M0	Canal measurement	EAL	Apex locating	—	—
M1	Shape the upper part of the cana	CW	Custom memory programs for root canal preparation, and parameters can be set	300	3.0

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			and adjusted for each custom memory program.		
M2	Root canal preparation custom program	REC	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	300	2.0
M3	Root canal preparation custom program	ATC	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	300	1.0
M4	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	250	1.5
M5	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	250	2.0
M6	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	300	1.5
M7	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	300	2.0
M8	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	350	1.5
M9	Root canal preparation custom program	CW	Custom memory programs for root canal preparation, and parameters can be set and adjusted for each custom memory program.	350	2.0

The instrument has 2 preset file-parameter modes: M10-M11.

M10-M11, the extensible preset file-parameter modes, are used to store file parameters of mainstream brands by a cloud storage system, which is convenient for users to call and store parameters upon their needs. Press the Left-Right Switch key “<” or “>” to switch the memory program in the standby state.

M12 is SGP (T-mode), please refer to 2.2.2 in this manual for details. (Only apply to Smart Motor+)

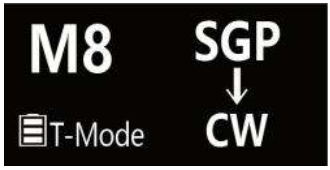
M13 is AIC automatic preparation mode, please refer to 2.2.3 in this

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manual for details. (Only apply to Smart Motor+)

2.2.2 SGP（T-Mode）

T-Mode is only available for Smart Motor+：



The working state in first stage of T-Mode (SGP stage): The file is rotating in the equal SGP angle reciprocating mode according to the preset SGP speed. When the file passed the step, press the main switch key to run into the second stage.

The working state in the second stage of T-Mode: The file start to work in preset rotating mode to eliminate the resistance in the canal. Only applicable to M12 mode of the device.

2.2.3 AIC Full Automatic function (Only available for Smart Motor +)



The AIC function is a complete Automatic mode. It is built in a set of AIC automatic intelligent adaptive system algorithm. Operator can use the AIC function without setting parameters. The AIC function is suitable for 360 ° continuous rotary file at low speed with CW/CCW. This function is only effective in the state of endo preparation accompany with apex locating.

When the file keeps 360° continuous rotation, the instrument can intelligently analyze and automatically adjust the rotation mode, speed and torque according to the resistance of the file in the root canal. Different root canal conditions and the position from the apical point can be automatically measured. The AIC function meets the requirements of safe and efficient root canal shaping. Built-in Root canal measuring system and Apical Action of the file at the root apex, and no need to switch the program.

The AIC function only applies to M13 mode, used for endo preparation accompany with apex locating. Before entering M13 AIC mode, the connection of measurement wire needs to be checked. Insert the lip hook into the socket at the white end of the measuring line, and contact the lip hook with the file on the contra-angle. If the connection loop is smooth, the screen will automatically jump to the display screen showing in the right figure, and the AIC automatic preparation can be performed. If the connection loop is blocked, it cannot jump to the display screen in the right figure. Please Check whether the connection of the measuring wire is intact.

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2.2.4 The way to call preset parameters of file

M0-M9： Press and hold the S key for 2 seconds, call the parameters of mainstream brands motor files (include RebornEndo R3 series motor file) for selection. The system will store the selected file parameters in M11.

M10： Press and hold the S key for 2 seconds, call the parameters of RebornEndo R3 series motor file for selection. The system will store the selected file parameters in M10.

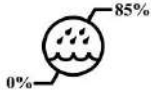
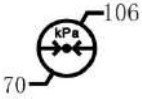
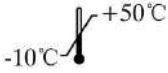
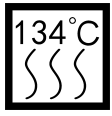
M11 (the extensible preset file-parameter mode)： Press and hold the S key for 2 seconds, call the parameters of main brands motor file (include RebornEndo R3 series file and other mainstream brands files) for selection. The system will store the selected file parameters in the current mode program.

Note:

The parameters stored by default are for reference only. The specific parameter setting must be set based on the actual clinical operation, combined with the actual root canal environment, and the recommended value of the file manufacturer, etc. Users need to adjust appropriate parameters and operation modes according to the actual situation.

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3 Symbol instruction

	Power Switching button		Volume Modulation
	Registered trademark		Indoor Use Only
	Direct Current		Cautions! Refer to attached documents
	Class II Equipment		B type applied part
	Recycled		Keep Dry
	Fragile products		Humidity limit for storage: 0% ~ 85%
	Atmospheric pressure for storage: 70kPa—106kPa		Temperature limit for storage: -10°C ~ +50°C
	Refer To The Instruction Manual Before Use		134°C disinfection and sterilization
	Dispose of waste products and accessories in accordance with the "Waste Electronic Equipment (WEEE) Directive (2002/96/EC)"		Please refer to the Instruction Manual

4 Product Identification

4.1 Parts Identification and Operation Interface



4.2 Components and Accessories



Contra Angle



Silicone sleeve



Battery



Adapter



lip hook



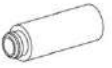
Probe



File Clip



Measuring wire



Oil filling nozzle

5 Operation

5.1 Before Use

5.1.1 Product Installation

a）Installation of Contra Angle

Align the locating pin of the contra-angle with the positioning slot on the motor handpiece，and push the contra-angle horizontally to the motor handpiece. A “click” sound indicates that the installation is in place. The contra-angle can be rotated 360° freely to adapt the root canal of different positions, and it is convenient to watch the screen during operating.

Gently pull the contra-angle to ensure that it is firmly installed. If it is not firmly installed, it may cause unpredictable rotation or the contra-angle may come off. what's worse, it may hurt the patient.

Please clean and disinfect the contra-angle with common neutral disinfectant before the first use and after each use. Then please maintain the contra-angle by filling special cleaning oil. After that, conduct high temperature autoclaved sterilization at 134 ℃ and pressure of 2.0bar ~2.3bar(0.20MPa ~0.23Mpa) on the contra-angle.

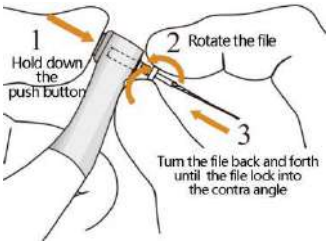
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b）Installation and Removal of file

Installation of file: Before starting the instrument, plug the file into the hole of contra angle head.

The procedure is as follows: Hold down the push button on the contra angle and insert the file. Turn the file back and forth until it lines up with interior latch groove and slips into place. Release the button to lock the file into the contra angle.

Removal of file: Hold down the push button on the contra angle to release the internal bayonet, and gently pull out and remove the root canal file.



Warning：

a) Make sure the motor has stopped before removing and inserting the file.

b)Be careful when removing files to avoid injury to fingers.

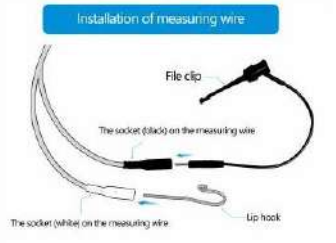
c)Removing files without holding the push button will damage the chuck of contra angle.

c）Installation of measuring wire

Connect the measuring wire to the motor handpiece. Line up the measuring wire plug with the notch at the back of the motor and push it in completely.

Connect the file clip and lip hook to the socket of the measuring wire separately.

Note: In the root canal measurement mode (EAL), the file clip and lip hook can be connected to any end of the measuring wire. While in the mode of endo preparation accompany with apex locating, the lip hook can only be connected to the white end socket of the measuring wire.



d）Battery Charging

The device can be charged in two ways:

① By host：Plug the DC end of the adapter cable into the charging port of the host, and charge the device directly.

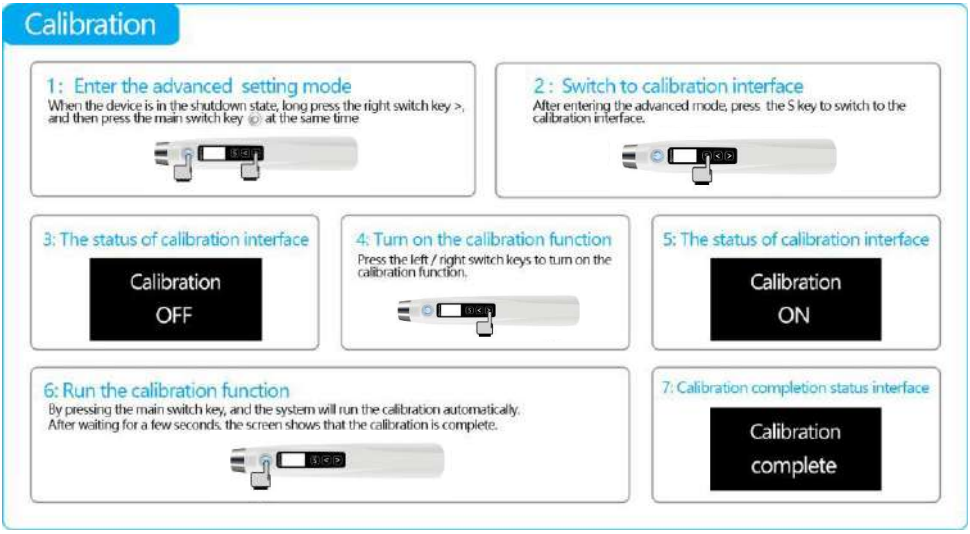
② By charger：Plug the DC end of the adapter cable into the the charger, and plug the other end into a power outlet. The Ready LED (green) will light up.

Put the motor handpiece all the way into the battery charger. The Ready LED (green) will go out and the Charge LED (orange) will light up and start charging the motor handpiece.

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When the battery is fully charged, the Charge LED (orange) goes out and the Ready LED (green) will light up.

5.1.2 Calibration



After calibration, operator can press the main switch key ⏻ or wait for several second, then the instrument will automatically return to the standby screen.

Note：

Calibrate the instrument in the following 2 cases:

•The contra angle has been replaced.

•The instrument is restored to the factory default value.

5.2 In use

5.2.1 Operation of self-defined Mode

Enter the standby statement

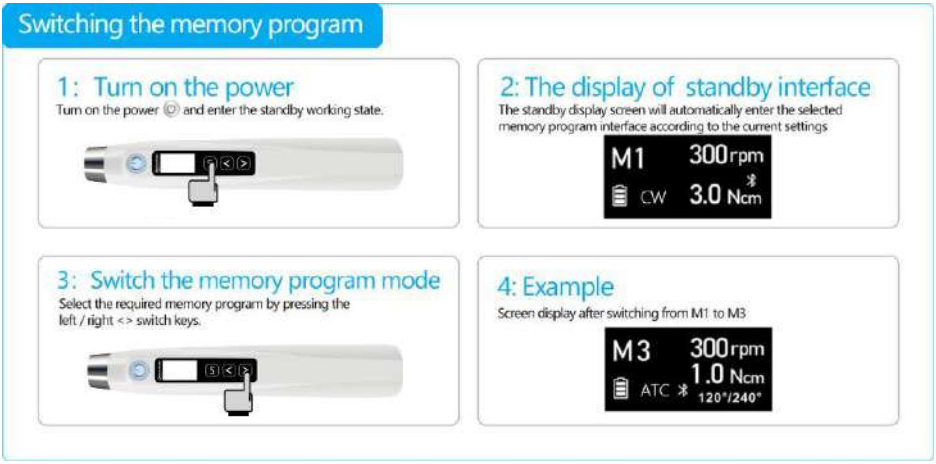
Press the main switch key ⏻ to turn on the instrument. The standby screen display is in English language by default.

Language set



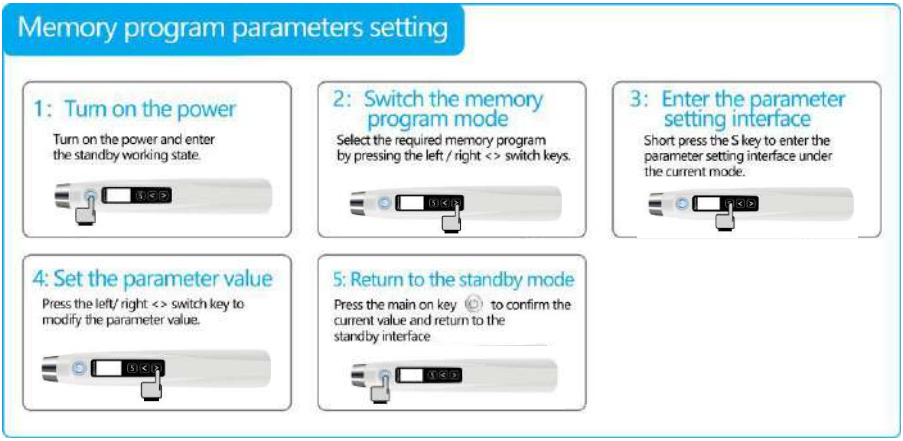
- ❖ The language version can be shifted between Chinese and English.
- ❖ The operator can press and hold the S key for more than 4 seconds to enter the language switching interface and switch the language version.
- ❖ In the shutdown state, hold the Right Shift Key”>”, and then press the main switch button ⏻ at the same time to enter the interface of advanced settings for switching language.

Memory program Set



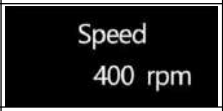
Set memory parameters

The parameters of the instrument can be set in the case of no load condition. Parameters include speed, torque, forward rotation angle, reverse rotation angle, apical action, etc. All parameters must be set according to the file parameters to ensure that all parameters are appropriate before motor starts. Otherwise there may be a risk of instrument separation.



Operator can switch the parameter settings by short pressing S key under each memory program. Parameter categories are as follows:

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Parameter category	Display screen	Parameter setting
Operation Mode		Five operation modes of Endo Motor for preparation and apex locating: EAL、CW、CCW、REC、ATC
Speed		CW、CCW：100~1000 rpm REC、 ATC/AIC：100~500 rpm
Torque Limit		CW：0.4~5.0 N.cm CCW：0.4~5.0 N.cm REC：2.0~5.0 N.cm ATC/AIC：0.4~1.5 N.cm
Apical Action		Reverse / Stop / OFF/ OAS
Auto Start		ON / OFF Apply to CW, CCW, REC, ATC/AIC
Auto Stop		ON / OFF Apply to CW, CCW, REC, ATC/AIC
Flash Bar Position		Apply to EAL、CW、CCW、REC、ATC/AIC
Apical Slow Down		ON / OFF Apply to CW, CCW, REC, ATC/AIC
SGP Angle (Only apply to Smart Motor+)		Only activating in T-Mode. In T-mode, the SGP Angle adjustment range is 30°~370°.
SGP Speed (Only apply to Smart Motor+)		Only activating in T-Mode. In T-mode, the SGP speed range is 100~500rpm
Preset Mode (Only apply to Smart Motor+)		Only activating in T-Mode. It has 4 preset modes : CW, CCW, REC, ATC.

Entering the parameter setting interface, operator can press the '< ' 、 '> ' key to change the parameters.

Start the working state

After the parameter setting is completed, the equipment will automatically enter the standby working state. At this time, operator can start equipment motor by pressing the main key ⏻ on the host.

When it is in the state of endo preparation accompany with apex locating and the “Auto Start” function is turned on, the endo file will automatically rotate when it get into the root canal.

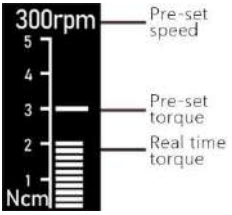


Fig. Press the main key



Fig. Auto Start

After starting the motor, the torque display bars in the screen will display the real-time torque value as in the right figure.



Bluetooth connection status (Only apply to Smart Motor+)

The instrument has a built-in Bluetooth connection function. It can realize the data exchange between various dental medical devices with Bluetooth connection function produced by the instrument manufacturer. Meanwhile, the Bluetooth data can be shared between the instrument and other terminal devices(such as mobile phone) through the Bluetooth app provided by the instruments manufacturer.

The Bluetooth connection function is enabled as follows:



Enter advanced mode settings interface according to chapter 5.2.3 of this manual. Then find the Bluetooth function opening interface as in the left figure.

The Bluetooth function can be turned on or turned off by pressing the key ‘<’ or ‘>’.

When the Bluetooth function is turned on, the Bluetooth icon will appear on each memory mode interface：

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Meanwhile, the advanced mode setting also provides the MAC address of the Bluetooth function of the instrument. It is convenient for other devices to identify the Bluetooth address when searching the Bluetooth connection of the instrument.

Apex Locating function



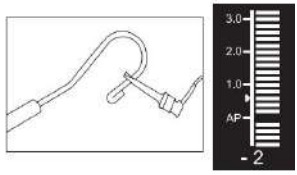
* M0 is the Apex Locating mode by default. It is necessary to connect the measuring wire with the file clip and the lip hook, and place the lip hook in the corner of the patient's mouth.

* When using Apex Locating function: Either socket of the measuring wire can be connected with file clip or lip hook.
* When using Endo preparation accompany with apex locating function : Connect the file clip plug into the black end socket on the measuring wire and the lip hook to the white end socket on the measuring wire.

Connect the file clip with the file needle, and set the Doctor's reference point value on the flash bar position. Slowly push the file into the root canal and recognize the position by observing the cursor progress on the display screen and hearing the prompt tone. Move the rubber gasket on file to the dental crown reference point (edge of cutting or fossa) while the file reach the preset position of the flash bar. Pull out the root canal file and measure the length from the tip of the root canal file to the rubber gasket, which is the working length of the root canal.

Power off the device upon the finish of apex locating. M0 mode is the EAL mode by default. Operator can change the setting of operation mode to CW, CCW, REC, ATC according to the operator's habits.

Remark: Connection testing before each use of root canal measurement is required. Contact the file clip onto lip hook and check if all the flash bars are fully displayed. otherwise, the measuring wire or file clip should be replaced.



Endo preparation accompany with apex locating function

Under CW/CCW/REC/ATC working mode, the device can be used for Endo preparation and apex locating at the same time, by connecting the measuring wire with lip hook and hanging it at any corner of the patient's mouth.

This instruction manual describes the use of endo preparation accompany with apex location function under M1 memory programs. The use of endo preparation accompany with apex location function under other memory programs can be performed by referring to the operation of M1.

A) Connection of root canal measuring wire

Insert the plug of the measuring wire into the socket at the back of the instrument. Line up the measuring wire plug with the notch at the back of the motor and push it in completely.

Connect the lip hook to the white connector end of the measuring wire without reverse connection. Hang the lip hook at the corner of patient's mouth by contacting the oral mucosa as a reference electrode. Insert the Motor file into the contra-angle as the other reference electrode.



Fig: connect the lip hook to the white end of the measuring wire and keep the black socket idle if using the function of endo preparation accompany with apex locating.

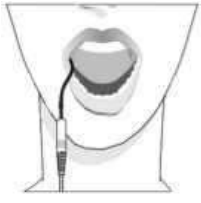


Fig: Place the lip hook at the corner of the patient's mouth as a reference electrode.

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B) Power on and enter M1 memory program

Press the main power key ⏻ to start the instrument and enter the standby state. Press left or right switch key “<” or “>” to switch to M1 memory program.

C) Set the routine parameters of M1 memory program

General parameters includes: Operation Mode, Speed, Torque Limit, etc. Press the function selection key “S” to switch to each parameter setting under this mode.

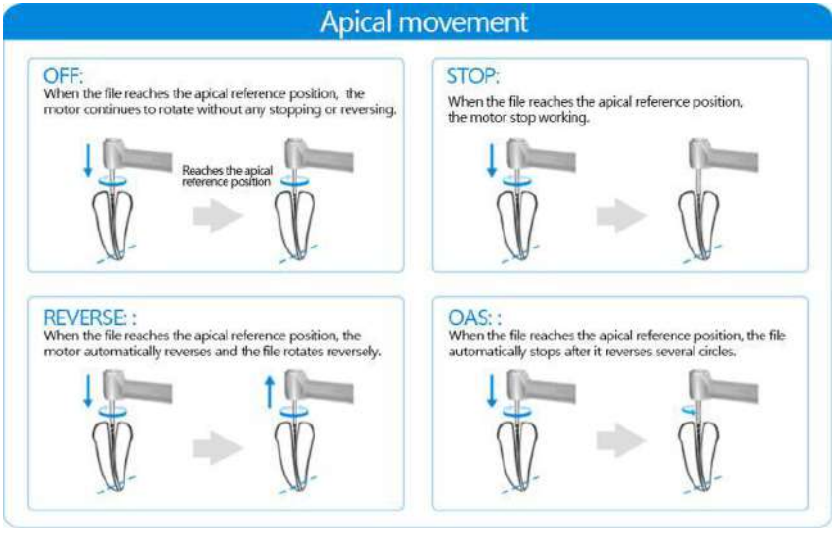
D) Set the significant parameters of the combined function of preparation and measurement.

The parameters of the function of endo preparation accompany with apex locating are as follows: Apical Action, Auto Start, Auto Stop, Flash Bar Position, Apical Slow Down. Settings of these parameters allow the instrument to optimally perform root canal preparation as well as apical locating.

Note: The connection test must be carried out each time before endo preparation accompany with apex locating, to ensure that the file clip is in good contact with the measuring wire. Clamp the file clip to the lip hook and the flash bar will be fully displayed. Otherwise, either the measuring wire or the file clip need to be changed.

Apical action

Actions triggered automatically when the file tip reaches the reference point inside the canal as determined by the Flash Bar position.



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Auto start

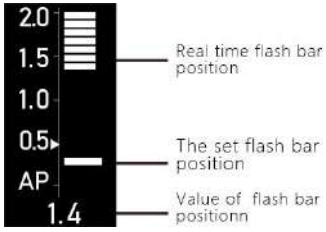
This function is only effective in the mode of endo preparation accompany with apex locating. The motor will start automatically when the file enters the root canal after turning on the “Auto Start” function. While the motor will not start automatically when the file enters the root canal after turning off the “Auto Start” function. At this time, operator can only start and stop the motor by pressing the main switch .

Auto stop

This function is only effective in the mode of endo preparation accompany with apex locating. The motor will stop automatically when the file is pulled out of the root canal after turning on the “Auto Stop” function. While the motor will not stop automatically when the file is pulled out of the root canal after turning off the “Auto Stop” function. At this time, operator can only stop the motor by pressing the main switch .

Flash bar position

The position of the flash bar represents the position of the apical reference point where various apical actions are triggered.
The scale and digital indication on the device screen do not represent a certain length or distance. The reduction of the number simply means that the root canal file moves towards the apex.



Apical slow down

When the root canal file approaches the physiological apex position, the motor rotation speed will automatically slow down.

Turn on the function of “Apical slow down”: the motor will automatically slow down near the apex position.

Turn off the function of “Apical slow down”: the motor will not slow down near the apex position.

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Root Canals not suitable for Endodontic Measurement

Root Canals not suitable for Electric Measurement

Accurate measurement cannot be obtained with the root canal conditions shown below.

Root canal with a large apical foramen

Root canal that has an exceptionally large apical foramen due to a lesion or incomplete development cannot be accurately measured. The results may show shorter measurement than the actual length.



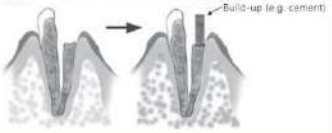
Root canal with blood overflowing from the opening

If blood overflows from the opening of the root canal and contacts the gums, this will result in electrical leakage and an accurate measurement cannot be obtained. Wait for bleeding to stop completely. Clean the inside and opening of the canal throughly to get rid of all blood, and then make a measurement.



Broken crown

If the crown is broken and a section of the gingival tissue intrudes into the cavity surrounding the canal opening, contact between the gingival tissue and the file will result in electrical leakage and an accurate measurement cannot be obtained. In thiscase, build up the tooth with a suitable material to insulate the gingival tissue.



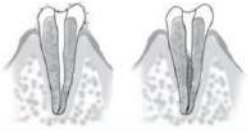
Extremely dry canal

If the canal is extremely dry, the meter may not move until it is quite close to the apex. In this case, try moistening the canal with oiydol or saline.



Cutting debris on tooth Pulp inside canal

Thoroughly remove all cutting debris on the tooth.
Thoroughly remove all the pulp inside the canal. Otherwise an accurate measurement cannot be obtained.



Caries touching the gums

In this case, electrical leakage through the caries infected area to the gums will make it impossible to obtain an accurate measurement.



Fractured tooth Leakage through a branch canal

Fractured tooth will cause electrical leakage and an accurate measurement cannot be obtained.A branch canal will also cause electrical leakage.



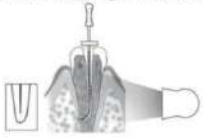
Re-treatment of a root filled with gutta-percha

The gutta-percha must be completely re-moved to eliminate its insulating effect. After removing the gutta-percha, pass a small file all the way through the apical foramen and then put a little saline in the canal,but do not let it overflow the canal opening.



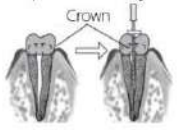
Endo Motor Reading and Radiography

An X-ray image might not show the apex correctly depending on the angle of the X-ray beam, and the location of the apex might seem to be other than it really is.



Crown or metal prosthesis touching gingival tissue

Accurate measurement cannot be obtained if the file touches a metal prosthesis that is touching gingival tissue. In this case, widen the opening at the top of the crown so that the file will not touch the metal prosthesis before taking a measurement.



Stop working of the motor

When the root canal motor is rotating, it can be stopped by pressing the main switch⏻.



When the device run at the status of endo preparation accompany with apex locating, the motor can stop automatically once the file is pulled out of the root canal if the “Auto Stop” function is turned on.

POWER OFF

Firstly press and hold the S key and then press the main switch ⏻ key to turn off the power and stop operation.



5.2.2 Preset file-parameter mode

The interface of preset file-parameter mode:

- Switch memory program after startup as described in Chapter 5.2.1. When the screen switched to M10 memory program, and operator continue to switch the subsequent memory program, the preset file memory program M10-M11 will appear.
- The screen will display as left figure when switch to M10 memory program.

Operator can press “S” key to select file parameters if RebornEndo file is used, and the selected file parameters will be stored under current interface of M10. (M10 is for RebornEndo file only, while M11 is for all the mainstream brand files.)

- The screen will switch to the interface of M10 memory program if there is no operation for 3seconds. The file parameters of M10 memory program are used for the R3 series files specifically produced by the manufacturer of this instrument.
- The screen display of M10 will be displayed as left figure.

M10-M11 are preset file-parameter memory programs. Press the “S” key for 2s to select the file type. The optional file-parameter database includes not only the R3 series files produced by the manufacturer of this instrument, but also

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all the other file models of mainstream file producers. The selected file parameters will be stored under current memory program interface.

Note:

① The file-parameter database under M10 memory program is only for R3 series files produced by the manufacturer of this instrument.

② The file-parameter database under M0-M9 memory program is for all the mainstream files parameters, including the R3 series files produced by the manufacturer of this instrument.

③ Press the “S” key for 2s under M0-M9 memory program to select the file model, and the display screen will automatically store the parameters of the selected file model and shift to M11 memory program.

5.2.3 Advanced mode setting



Press the S key in sequence to alternately display different advanced setting function interfaces:

Advanced setting function	Interface style	Function description
Software Version		The software version number is displayed on the advanced settings page： R-Smart P-X0.Y0.Z0.A01 Please contact the manufacturer for a version upgrade.
Dominant Hand		Set left or right habitual hands, When switching to the left-handed habit, the display interface will rotate 180°, which is convenient for the left-handed operator to observe the displayed content.

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Beeper Volume	Beeper Volume 3	Adjust the volume. The volume level can be set as 0, 1, 2, 3.
Restore Default	Restore Default OFF	On/off factory default setting After turning on the “Restore Default”, all parameters will be overwritten by the default parameters. The system will remind you once the restoration is complete.
Auto Standby Scr	Auto Standby Scr . 60 sec	Automatic return function, can automatically return to the main screen display in 5-60s
Start Up Memory	Satrtup Memory Last	Be used to set the standby screen memory mode each time the machine is turned on. Can be set to save the last operation "LAST" Or specify to save any memory mode M0-M15
Calibration	Calibration OFF	Turn on/off the automatic calibration function, the system will prompt after the calibration is completed.
Auto Power Off	Auto Power OFF 10min	The automatic shutdown time of the instrument can be set to 1-30min.
BLE ON/OFF	BLE ON	Bluetooth connectivity: ON/OFF
BLE MAC	BLE MAC 9cA525AEAF19	MAC address of Bluetooth

5.3 After Use

5.3.1 Regular Inspection

Regular maintenance and inspection are generally considered to be the duty and obligation of the user, but if, for some reason, the user is unable to carry out these duties, inspections can be performed by the accredited service personnel. Contact your local distributor or RebornEndo for details.

This instrument should be inspected in accordance with the following maintenance and inspection items. Regular inspection can be carried out according to the actual use of users.

•Connect the AC adapter to the battery charger, plug it in and check if the LED power indicator is ON.

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•Make sure there is no dirt, metal fragments etc. on the motor handpiece end or the battery charger.

•Check whether the handpiece connection end is dirty or damaged.

•Check if the connection end of the contra angle is clean and not damaged, and can be properly connected to the motor handpiece.

•Check if the push button works and a file can be properly installed.

•Check if the instrument turns on when the Main switch is pressed.

•Check if the settings for each of the memories can be changed.

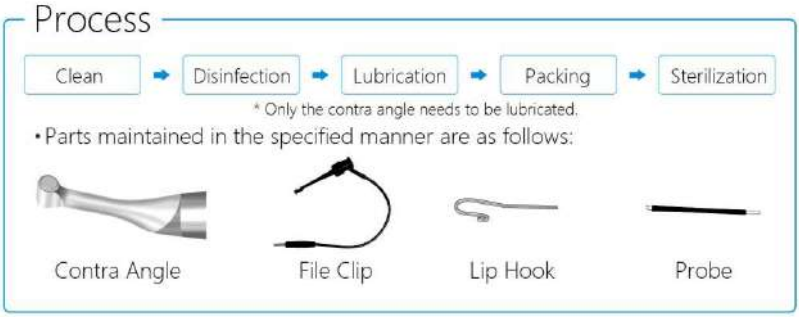
• Visually inspect the lip hook, file clip, measuring wire and their plugs to ensure there is no damage or stain.

•Make sure the measuring wire can be properly connected with motor handpiece.

•Connect the measuring wire, and touch the root canal file with the lip hook and check if all root canal length indicators on the display are lit up.

•Run the motor in the optimal reciprocating motion mode and check if the direction of rotation changes.

5.3.2 Maintenance



Parts of this instrument that are exposed/frequently in contact with patients need to be cleaned and sterilized by high temperature and high pressure from time to time according to the frequency of use. Note: The accessories (including lip hook, file clip, probe , etc.) should be cleaned, disinfected and sterilized under high temperature and high pressure (High temperature 134℃ sterilization for more than 4 minutes).

Cleaning

Remove pulp and dentine residue from the components and perform the cleaning no later than 2 hours after the operation. Do not wait until the residue drying out.

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Disconnect the contra-angle from the motor hand piece. Clean off the cutting debris with running water and a soft brush, and then wipe off the water.



Use a three-way syringe to blow out any moisture remaining inside the contra angle.

⚠CAUTION

- If a medical agent being used for the treatment has adhered to thecomponents, wash it off in running water.
- Do not clean the components with an ultra sonic cleaning device.

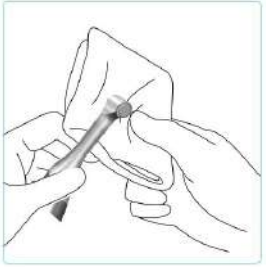
⚠CAUTION

- Check to see if the contra angle including its inside, is completely dry.If any water remains inside the component, expel it with an air gun or another such tool. Failure to do so could result in the remaining water coming out during use and cause malfunction, or poor lubrication and steril -ization.
- If dust or other impurities enter the contra angle, they may cause poor rotation.

⚠CAUTION

- Do not use anything except Ethanol for Disinfection (Ethanol 70 to 80vol%). Do not use too much ethanol as it could seep inside and damage the contra angle.
- Do not immerse the components in or wipe it with any of the follo -wing:functional water (acidic electrolyzed water, strong alkaline solution, or ozone water), medical agents (glutaral, etc.), or any other special types of water or commercial cleaning liquids. Such liquids may result in metal corrosion and adhesion of the residual medical agent to the components.
- Never clean the contra angle, file holder, or contrary electrode with chemicals such as formalin cresol (FC) and sodium hypochlorite. These will damage the plastic parts of the components. If any of these liquids being applied to the components, wash it off in running water.
- Use only Ethanol for Disinfection (Ethanol 70 to 80 vol%) for cleaning. Any other cleaning chemical or products should not be used including but not limited to the following cleaning products and similar cleaning products listed below because of the potential damage to the plastic components.

Disinfection I



Wipe and disinfect the components and surface of instrument with a piece of gauze, which has been disinfected with Ethanol (Ethanol 70 to 80 vol%） and wrung out thoroughly.

Operation Warning:

1. If any medication remains in the dental contra-angle, it may corrode the instrument or even cause the malfunction of handpiece.

2. It is forbidden to use liquid or spray cleaners directly on the equipment, especially the display screen.

3. Check and make sure the contra-angle including inside is completely dry. If any water remains in the handpiece, use an air gun or other tool to expel it. Otherwise it may lead to poor lubrication or bacterial colony of the contra-angle handpiece.

4. All parts that have been exposed in the source of infection should be wiped with a soft cloth of 70-80 vol% ethanol after each use.

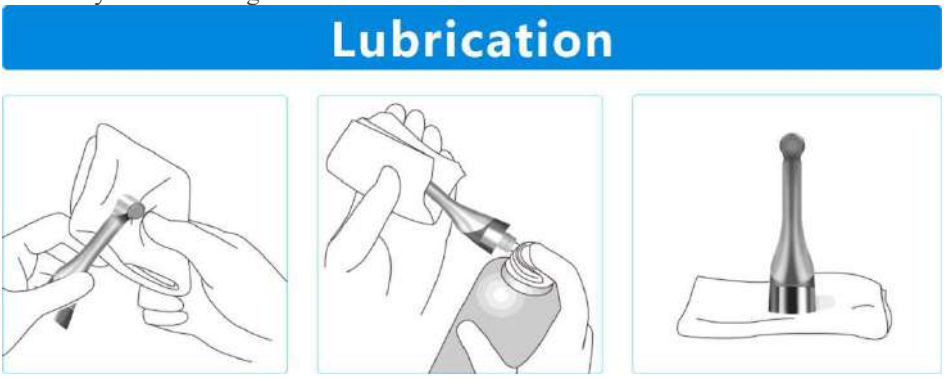
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5. Cleaning with chemical reagents may cause damage to the instrument.

6. For the motor handpiece, charging base, AC adapter, measuring wire and other accessories that are not directly contact with the patient, only need to use 70-80 vol% ethanol to wipe and disinfect.

Lubrication

Only the contra angle needs to be lubricated.



Cover the contra angle with a piece of gauze or other suitable cloth.

Screw the nozzle onto the spray can.Then insert it into the connection end of the contra-angle, and spray for 2s-3s. Using gauze to wipe off the excess oil from the outside of the contra-angle.

Keep the contra-angle upright on a piece of gauze for more than 30min, to drain out the excess oil under gravity.

❖ Warning：

① Clean the component parts completely before high temperature and high pressure sterilization.

② The temperature for sterilization and desiccation should not exceed 134℃.

③ Follow other advice of the file manufacturer for high temperature and high pressure sterilization.

④ Parts of this instrument that are not directly/frequently exposed or in contact with patients need to be disinfected from time to time according to the frequency of use. The accessories that only need the disinfection includes motor handpiece, adapter, bracket, measuring wire, etc.

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Sterilization

Besides the contra angle，lip hook, file clip,and probe，any other components can not be sterilized under high temperature and high pressure .

Recommended temperature and duration：

The Sterilization of contra angle is under 134℃, 2.0bar~2.3bar, at least for 10 min.

The Sterilizations of lip hook, file clip, and probe are under 134℃, 2.0bar~2.3bar, at least for 3 min.

Other Warming:

1. Wash and clean the components completely before high temperature and high pressure sterilization.
2. Sterilization and drying temperature shall not exceed 134℃.
3. Follow other advice of the file manufacturer's for sterilization.
4. Parts of this instrument that are not directly/frequently exposed or in contact with patients need to be disinfected from time to time according to the frequency of use. The accessories that only need the disinfection includes motor handpiece, adapter, bracket, measuring wire, etc.

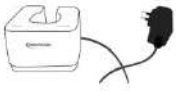
Process

Disinfection

•Parts disinfected in the specified manner are as follows:



Host handle

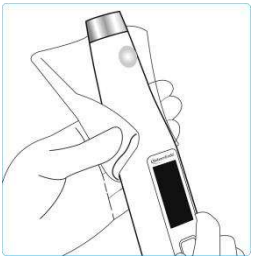


Adapter and charging base



Measuring line

Disinfection II



⚠CAUTION

• Do not use anything except Ethanol for Disinfection (Ethanol 70 to 80vol%). Do not use too much ethanol as it could seep inside and damage the contra angle.

• Do not immerse the components in or wipe it with any of the follo -wing:functional water (acidic electrolyzed water, strong alkaline solution, or ozone water), medical agents (glutaral, etc.), or any other special types of water or commercial cleaning liquids. Such liquids may result in metal corrosion and adhesion of the residual medical agent to the components.

• Never clean the contra angle, file holder, or contrary electrode with chemicals such as formalin cresol (FC) and sodium hypochlorite. These will damage the plastic parts of the components. If any of these liquids being applied to the components, wash it off in running water.

components and surface of instrument with a piece of gauze, which has been disinfected with Ethanol (Ethanol 70 to 80 vol%）and wrung out thoroughly.

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6 Troubleshooting

No.	Failure	Possible cause	Solutions
1	No display of the screen when turn on the equipment	Low battery	Recharge in time
2	The motor does not rotate.	1 Strong resistance of the root canal. 2 when using the mode of endo preparation accompany with apex locating function , operator connects the lip hook to the socket (black color end) on the measuring wire. 3 Choose EAL mode, EAL mode is only for root canal measurement. 4 Block of contra-angle.	1 Increase the setting torque. 2 Connect the file clip plug into the socket (black) on the measuring wire. Connect the lip hook to the socket (white) on the measuring wire. 3 Changing to CW, CCW, REC or ATR mode. 4 Clean or replace the contra-angle.
3	The motor handpiece can not reverse automatically.	1 The mode of automatic reverse function is not selected 2 The setting torque is too large	1 Please select a mode with automatic reversal function 2 Decrease the setting torque.
4	The motor handpiece reverses frequently.	1 Strong resistance of the root canal. 2 The root canal is too narrow. 3 The size of file is too large. 4 Electromagnetic interference.	1 Increase the setting torque. 2 Enlarge the root canal appropriately. 3 Replace with the smaller size file. 4 Check nearby devices and stay away from interference sources.
5	Motor rotates weakly	1 Low battery 2 The battery is broken 3 The battery is not installed correctly	1 Recharge in time 2 Replace the battery 3 Check the battery installation
6	The motor does not work when the file	1 The lip hook is not correctly hung at the corner of the patient's mouth.	1 Connect the lip hook to the white end of the measuring

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No.	Failure	Possible cause	Solutions
	enters the root canal	2 The equipment is set to EAL mode for apex positioning. 3 The Auto-Start function is turned off	wire and hang it at the corner of the patient's mouth 2 Set to operation mode other than apex positioning mode 3 Turn on Auto-Start function
7	No sound	Beeper Volume set to 0. Vol.0 is Mute.	Set Beeper Volume to 1,2,3.
8	The motor moves in the opposite direction automatically	1 The torque value is too small 2 The apical action is set to reverse mode 3 The instrument is set to CCW mode	1 Increase the torque value appropriately 2 Set apical action to off or stop 3 Set the equipment to a mode other than CCW
9	Motor can not run in reverse	1 The torque value is too large 2 The apical action is off. 3 The equipment is not set to CCW mode	1 Decrease the torque value 2 Set the apical action to REV or OAS. 3 Set the equipment to CCW mode
10	The device shut down automatically.	1 No operation of the equipment for a long time, which has reached the automatic shutdown time limit. 2 Low battery power.	1 Restart the device. 2 Battery charging.
11	Motor alternates between forward and reverse rotation	1 Select the REC mode and set the forward and reverse angle 2 Select the ATC/AIC mode and set the forward and reverse angle	1 Select a mode other than REC or ATC/AIC 2 Select a mode other than ATC/AIC or REC.
12	The device can not measure the root canal length.	1 The connection of file clip and lip hook is not correct. 2 The measuring wire is damaged. 3 Insufficient electrical conductivity between the shank and tip of the file	1 Connect the file clip and lip hook correctly. 2 Replace with a new measuring wire. 3 Replace with a file which is conductive
13	Can not be charged	1 Wrong adapter is used 2 The adapter is not connected correctly	1 Please use the original adapter 2 Check if the adapter is connected correctly

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* If there are any unsolvable problems, please contact your local distributor or the manufacturer of this instrument, Guangzhou RebornEndo Medical Instrument Co., Ltd.

7 Safety precautions

7.1 Please read this Instruction Manual carefully before use.The manufacturer is not liable if the user fails to follow the instructions or uses the instrument for other purposes.

7.2 Before use, run the instrument outside of the patient's mouth to ensure it works normally.

7.3 Only depending on the condition of the root canal of the tooth and the condition of the instrument, the root canal may not be properly shaped and measured. It can be judged with the aid of X-rays.

7.4 The equipment may not work properly due to the following environmental factors:

1) There are portable or mobile RF transmitters nearby.

2) Electromagnetic interference may cause abnormal operation of the instrument.

7.5 As with all electronic devices, this instrument has electromagnetic interference and should not be used in patients with pacemakers or other implanted electronic devices.

7.6 Do not use damaged, bent, rusted or ISO 1797-1 non-confirming root canal files, in order to avoid the risk of file breakage or flying out during use. Since the file is easily broken due to metal fatigue and excessive load, the file should be replaced frequently.

7.7 Pay full attention to whether there is looseness, vibration, noise or heat of the equipment. Please check the operation outside the patient's mouth in advance. If the instrument is seriously abnormal due to improper use or physical damage, please stop using it immediately and contact the local dealer or manufacturer. Only the manufacturer can open the device for maintenance. Users are strictly prohibited to disassemble the device for repairing.

7.8 Do not use excessive force. Even with reverse torque function, the file may be damaged depending on the set torque.

7.9 If resistance is encountered or automatic torque reversal is triggered, pull the file up by 3 or 4 mm and then carefully push it down into the canal again, or replace with a smaller file. Do not insert the file with excessive force.

7.10 Do not press the file down on the root canal or against the wall of the root canal, otherwise the file may be damaged.

7.11 Motor failure may result in improper control of instrument operation. It cannot be controlled entirely by the instrument itself. Watch the display, listen to

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the sound and pay attention to the feedback.

7.12 Do not collide, especially to avoid falling.

7.13 To avoid electric shock, do not insert other objects into the instrument.

7.14 During the cleaning process, make sure the cleaning detergent not entering the the equipment to avoid short circuits and fault. Please wash the dental contra-angle after use and keep it clean. If any dirt soaks into the interior, it will cause the vibration of shaft core or weaken clamping force of the collect.

7.15 Please turn off the power before removing the dental contra-angle or root canal file, to avoid accidental start or personal injury once the user accidentally touching the switch on the motor handle.

7.16 When the battery level display on the screen flashes, please charge it in time.

7.17 Please use original accessories. If operator uses non-original accessories, especially other dental contra-angles, power adapters or batteries, the instrument may be unable to use or damaged.

7.18 The equipment is for professional use only. Please follow local laws and regulations when handling the instrument, batteries, accessories, or packaging, etc.

7.19 Modification of this equipment is not allowed.

7.20 Please check the instrument before each use, and stop use it if there is any damage to it. Continuous use of damaged instrument may result in personal injury, adverse consequences, or serious hazards.

7.21 When charging or using, do not touch the charging port, battery and patient at the same time.

7.22 Do not turn on the instrument when it is charging.

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