



PERFECT ENDO.

Endo Motor

MR-Auto-Motor

User Manual



Endo Motor

MR-Auto-Motor

Congratulations

- Thank you for purchasing the MR AUTO MOTOR
- For optimum safety and performance, read this manual thoroughly before using the instrument and pay close attention to warnings and notes
- Keep this manual in a handy place for your quick and easy reference
- Hotline: +86 0755-28540953
- E-mail: endoservice@dental-perfect.com

1 PRODUCT INTRODUCTION

1.1. Product description

“MR AUTO MOTOR” is a compact device combining endodontic motor with microprocessor control for working with rotating Ni-Ti instruments, Integrated “root expansion” and “root measurement” two functions. Root expansion is used for root canal shaping and cleaning equipment during root canal treatment, while root measurement is an auxiliary device for root canal treatment to measure apical length.

1.2. Scope of application

For root canal treatment only; Qualified dentists are required.

1.3. Safety measures and warnings

- The PATIENT shall not be an intended OPERATOR.
- Never open or repair the device by yourself, otherwise void the warranty.
- Prevent liquid from entering the enclosure from the enclosure.
- Away from the heat source and make sure that there is no combustible surrounding.
- Sterilize and disinfect each patient to avoid cross-infection.
- If the micro-motor malfunctions (noise, chatter, vibration), stop using it immediately, try to find out the cause of the failure based on the information presented in Section 11.
- Strictly follow the manufacturer's instructions for the use of endodontic instruments.
- Do not use “continuous” rotating instrument tools in a “reciprocating rotation” system, and vice versa.
- Do not use instruments that are bent, deformed, or inconsistent with ISO requirements.
- The equipment is usually operated at a temperature of 10-35 ° C, the relative humidity of the air does not exceed 80%, the atmosphere pressure (101 ± 3) kPa.

1.4. Contraindications

None know.
Safety and effectiveness have not been.

1.5. Introduction to preset mode

MR AUTO MOTOR has 10 modes P0~P9, P0 is only used for root canal depth measurement, P1~P9 can also be measured at the same time as the root expansion. As shown in Table 1.

Table 1.

Mode	Function	Introduction to program features
0	Root canal measurement	For root canal measurement only
1,2, 3, 4		_____ (Adjustable)
5		
6		Forward rotation 170° / reverse 50°
7		Reverse 150° / forward 30°
8		Reverse 170° / forward 50°
9		Continuous forward rotation, when the load exceeds the preset value, the motor will automatically reverse 90° and forward 180° until the load torque value does not exceed the set value, and resume continuous rotation.

2 STANDARD COMPONENT

2.1. Component list

MR AUTO MOTOR component list , As shown fig 1:

1. Main unit 2. Handheld micro-motor 3. 1:1 Motor headpiece 4. Adapter
5. Measuring wire, File holder, Contrary Electrode 6. Silicone holder

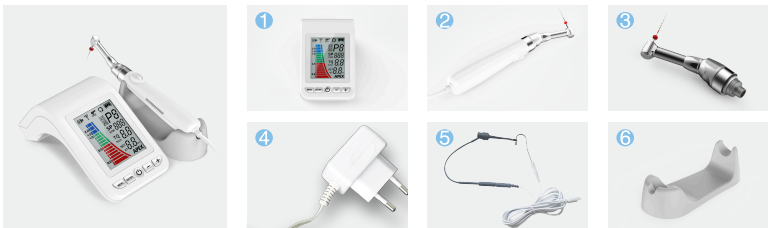


Fig.1

2.2 LCD interface

1. "Battery capacity"
2. Mode select
3. Preset speed (rpm)
4. Preset torque (N.cm)
5. Preset depth of root canal working part to apical foramen (mm)
6. Continuous rotation / reciprocating rotation
7. Autotwist/"Autostop"
8. volume
9. Distance from apical foramen depth

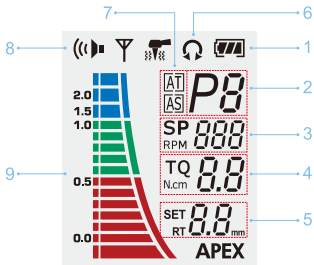


Fig.2

Introduction to the display interface

2.3 Main unit key function

2.3.1 Key function introduction

1. Select the menu key
2. Confirmation key
3. Device power on/off key
4. Parameter adjustment
5. Motor start and stop key

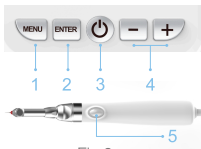


Fig.3

2.3.2 Parameter preset range

- a) Preset speed (rpm)
150,200,250,300,350,400,450,500,550,600,
650,700,750,800,850,900,950
b) Preset torque: 0.6N.cm~3.4N.cm
c) Preset depth of root canal needle to apical
foramen: 0.0mm~1.0mm

3 TECHNICAL PARAMETERS

3.1 Technical Parameters

Power supply	Lithium battery (3.7V; 1500 mA/h)
Contra-angle	Model 2110CH (micro, Friction fixed), Transmission ratio 1:1
Applied part	Contra-angle type BF
Charging time	3±0.5 h
LCD Screen	45*73mm
Dimensions	(124*75*30) ±3 mm
Weight	200±10 g
Operating temperature	+10°C~+40°C
Operating humidity	30%~75%

3.2 Handheld

Electrical safety classification	class II, type B
Dimensions	(108*23*23) ±3 mm
Weight	45±10 g

3.3 Adapter

Input	100-240V, ~50/60Hz
Output	5V; 2A

4 DEVICE CHARGING

4.1 Charging

"MR AUTO MOTOR" is powered by a rechargeable lithium battery, The first time you use this device, fully charge the lithium battery is required. Connect the handle and adapter as shown Fig4:

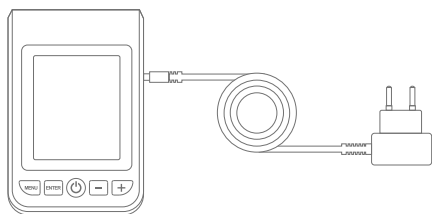


Fig.4

When the display battery icon is buffered, it indicates that the lithium battery is charging. When the lithium battery is fully charged, the battery icon shows full.

Warning!



- Only the original adapter could be used.
- Unplug the adapter from the outlet when the device is not charging.

4.2 Battery charge indication

When the lithium battery is below the minimum allowable power (< 20%), the battery icon shows "🔋", Charge the lithium battery according to P4.1.

Otherwise, the device will automatically shut down when the battery drops to 10%.

Note!



When the battery is below 20%, it is recommended to charge the device!

4.3 Automatic shutdown function

Short press the power button (3-fig.3) to turn on the device, press and hold the button for about 2 seconds to turn off the device.

It will automatically shut down after 8 minutes without any operation.

5 DEVICE OPERATION GUIDELINES

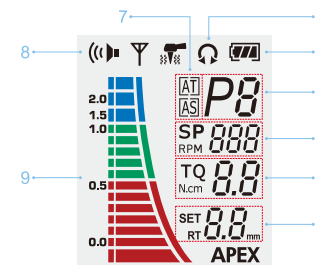


Fig.5

Warning!



- Parameter setting is only possible when the motor is not working.
- When adjusting the parameters, the motor is locked. Once the parameter is confirmed, press the Enter (2 - Fig3), the motor can be started.

5.1 Preset mode

2-Fig5 is the mode selection, Press the Menu (1-Fig3), when the 2-Fig5 area is beating, Press the "+" "-" (4-Fig3) to choose the mode you need; Press the Enter (2-Fig3), mode setting is completed.

5.2 Preset speed

In continuous forward rotation mode, the speed can be adjusted from 150 rpm to 600 rpm, press the menu select button (1-Fig3), when the **SP** **300** **RPM** is beating, then press "+" "-" button (4-Fig3), choose the speed you need, finally press the enter key (2-Fig3) to complete the preset.

5.3 Preset torque

Torque editable in continuous rotation mode, and the range is 0.6 N.cm – 3.4 N.cm.

Press the menu key (1-Fig3), when the $\tau_{N.cm} 3.0$ is beating, then press “+” “-”key (4-Fig3), choose the torque you need, finally press the enter key (2-Fig3) to complete the preset.



P6, P7, P8 are reciprocating rotation modes, torque can not be adjusted!



When selecting the rotational limit torque of the device, follow the recommendations of the nickel-titanium device manufacturer (please refer to the included torque card). Do not preset the torque value that exceeds the manufacturer's maximum recommended value to avoid malfunction during operation.

5.4 Root depth setting and operation precautions

(1) Explanation of the display interface

- When the file is closed to the apex of the root canal, Display the 0.5mm area as a root canal curve on the display interface. Fig.6a
- When the curve reaches the red indication., it indicates that the root canal files has reached the vicinity of the apical hole. Fig.6b
- When the curve reaches -0.3mm in the red indication area, the root canal files has passed through the apex of the root canal and the device will continue to beep.Fig.6c

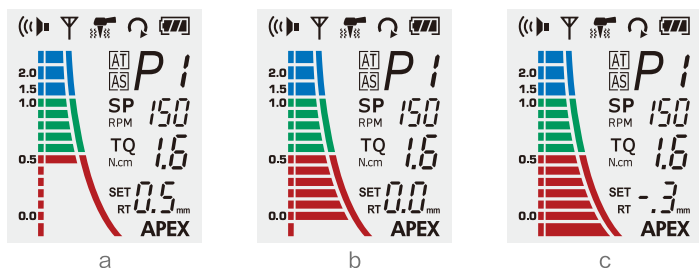


Fig.6

(2) Root depth measurement preset

The root depth measurement preset value described in this paper refers to the position of the root canal from the apex of the root canal. The preset range is 0.0mm~1.0mm. When the root canal reaches the preset position, the motor will reverse the root canal. Press the menu select key (1-Fig.3), when the “5-Fig.5 ”area is beating, then press “+” “-”to choose parameter you need, finally press the enter key (2-Fig.3) to complete the preset.



- It is recommended to insert the tester (7-Fig. 1) before using the root test function. If the root test area (5-Fig. 5) shows 0.2 0.3 or 0.4, the device is normal.
- Before using the equipment, the line connection test must be carried out. See (Fig.8) to confirm that the clamp and the measurement are in good connection. When the root test area (5-Fig.5) shows that -0.3, it indicates that the connection is good, otherwise the line is not connected, the cause should be checked.
- The data arc displayed in the device does not represent a certain length or distance or other linear units which expressed in millimeters and the date reduction merely indicates that the needle moves toward the apex.
- In the 9-Fig.5 area, a beating horizontal line appears, indicating the preset distance from the apex.
- The instrument's test stop (red area, showing the number “0.0”) is an anatomical apical hole, clinically used as a safety measure, the length of the root canal length measuring instrument measured minus 0.5-1mm, as the root canal working length.
- In order to prevent measurement errors caused by liquid contact with the gums or adjacent root canal, the cotton pulp must be dried with a cotton ball before testing.
- Use a file that matches the diameter of the root canal, a large root canal with a small file will result in unstable screen digital display.
- The instrument's contact with the patient's accessories (file clip, lip hook and file) can be reused and must be autoclaved before each use. It is recommended that the root canal be used no more than three times.
- Avoid the internal fluid of the root canal to connect with the external fluid of the root canal, or it will cause measurement error.
- Make sure the file and file clip are not connecting with other metals or instruments during measurement.
- To ensure that the measurement results are not affected by short circuits, special attention should be paid to patients with metal crowns or bridges. Make sure that the root canal is wet enough to ensure measurement reliability. If it is determined that the file has not reached the apex and the value indicated on the display is too low, On the one hand, check if the root canal is too dry, and on the other hand, take X-rays for approval.



Fig.7



Fig.8

5.5 “Autotwist” / “Autostop” ON/OFF

(1) This device has two optional functions: “Autotwist” and “Autostop”. “Autotwist” is referred to as “AT” in the display interface (7-Fig.5). In continuous rotation mode, when the load reaches the set torque value, the motor will rotate in the opposite direction, When the torque returns to 50% of the set value, the original direction of rotation is restored, as shown in Fig.9.

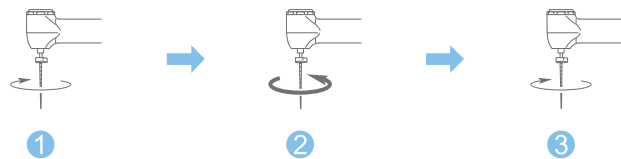


Fig.9

- 1 Forward rotation:
Rotation within the torque maximum.

3 Forward rotation:
After resistance removing , micromotor will automatically resume the forward rotation.
- 2 Reverse rotation:
When reaches the torque maximum during operation, micromotor will automatically reverse .

“Autostop” is referred to as “AS” in the display interface (7-Fig.5). In continuous rotation mode, when the load reaches the set torque value, the motor will stop rotating immediately, as shown in Fig.10.

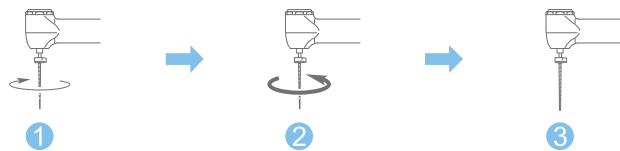


Fig.10

- 1 Forward rotation:
Rotation within the torque maximum.

3 Stop:
When the load is removed, the micromotor stops
- 2 Reverse rotation:
When reaches the torque maximum during operation, micromotor will automatically reverse .

- (2) Press the Menu(1-Fig.3), when the 7-Fig.5 area is beating, Press “+” “-” to choose parameter you need, finally press the Enter (2-Fig.3)to complete the preset.
- (3) The “Autotwist” function (AT) has been activated at the factory setting of the device.

Note! ⚠

P9 mode: Continuous rotation under normal conditions, but when the load exceeds the set limit, the motor will automatically reverse 90° and forward 180° until the load torque value is 50% of the preset value, and then resume continuous rotation, as shown in Fig.11. Shown.

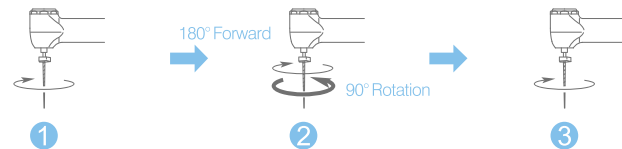


Fig.11

- 1 Forward rotation:
Rotation within the torque maximum.

3 Forward rotation:
After resistance removing , micromotor will automatically resumes the forward rotation.
- 2 OTPC rotation:
If the current torque reaches the maximum during rotation, micromotor will automatically reverse 90° then 180° forward rotation .

5.6 Volume adjustment and prompt tone interpretation

The volume can be adjusted freely with the button “+” or “-”. The interpretation of the device sound signal is shown in Table 2 below:

Phenomenon	sound signal
Device on	a short buzzer signal
Press the key	a short buzzer signal
The alarm sounds when the motor starts and its load reaches half of the preset torque value. As the load approaches the torque limit, the sound becomes more and more urgent.	Buzzer single frequency becomes faster as the load becomes larger
The file is gradually approaching the apical apex.	Buzzer single frequency becomes faster as the distance increases
The file through the apical apex.	Long buzzer signal does
Power off	Ringing a long signal.

Table 2

6 INSTALLATION OF THE CONTRA-ANGLE

6.1 Connection

Contra-angle can be connected to 6 adjustable positions. Align the positioning pin of the contra-angle with the positioning groove of the motor(Fig.12).

6.2 Disassembly

Pull the contra-angle horizontally directly (Fig.12).

Warning!

- Make sure the motor is off when installing the contra-angle.
- Connect the contra-angle and handle properly.

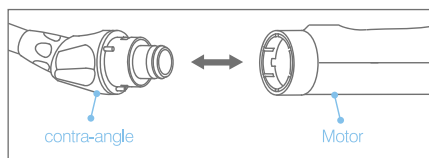


Fig.12

7 INSERTING AND REMOVING THE FILE

7.1 Inserting the file

- 1) Insert the file into the chuck until it stops.
- 2) Turn the file gently until it engages with the latch mechanism. Push inwards to click.

7.2 Removing the file

Press the push-button and pull out the file(Fig.13)

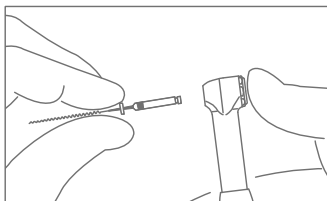


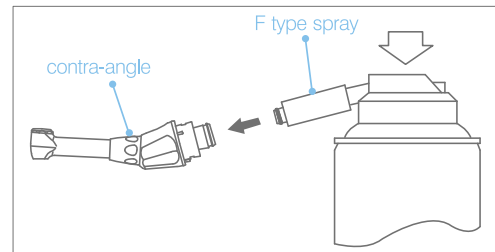
Fig.13

Warning!

- Make sure the motor is stopped when insert the file.
- Pull on the file gently to make sure it is locked.

8 LUBRICATION OF THE CONTRA-ANGLE

1. Screw the nozzle onto the sprayer for approximately 10 revolutions.
2. Insert the nozzle into the back of the contra-angle and lubricate for 2-3 seconds until the oil comes out of the contra-angle.
3. Use gravity to make excess oil flow away.



Warning!

- When lubricating the contra-angle take care to ensure that no oil gets into the motor handpiece.
- Lubricate the contra-angle immediately after thermal disinfection.
- Use the spray adapter included to lubricate the contra-angle.
- Warning! Do not lubricate the contra-angle while in use!

9 CLEANING, DISINFECTION AND STERILIZATION

The contra-angle must be pre-cleaned, thermal-disinfected and sterilized prior to and following every treatment.

Warning!

- Frequent reprocessing has minimal effects on the service life of contra-angles. The end of the product service life is normally dependent on wear and damage caused by use.
- Use only cleaning agents that do not have a protein-binding effect.
- Do not place the contra-angle in a disinfectant solution or in an ultrasonic bath.
- Ensure the contra-angle attachment is completely dry after thermal disinfection. Remove any residual liquid with particle-free compressed air.
- The fast sterilization procedure and the sterilization procedure with non-packaged accessories are not permissible. In addition, do not use hot-air sterilization, radiation sterilization or sterilization with formaldehyde, ethylene oxide or plasma.

10 REFRESH THE BATTERY

MR AUTO MOTOR operates on a rechargeable battery. It can be recharged not less 300times, depending on the operating conditions of the device.

The battery needs to be replaced if the operating time or battery recharging time becomes shorter or the rotation power weaker, and the battery refresh function has not resolved the problem.

When replacing, be sure to observe the following "Precautions on changing battery". Note that Manufacturer shall not be held liable for any malfunction or failure resulting from the failure to follow the "Precautions on changing battery".

Ensure adequate maintenance of med equipment containing rechargeable batteries to be maintained by anyone other than service personnel.

Warning!

- Only after-sales personnel can replace the battery.
- Replacement of lithium batteries or fuel cells when incorrect replacement would result in an unacceptable risk.
- Do not open any part other than the battery cover.
- Be sure to purchase and use only the recommended battery. Otherwise, battery may cause damage, fluid leakage or explode.
- Do not change the battery with wet hands as this may cause short-circuiting of the battery and moisture infiltrating the device.
- The battery compartment is located at the rear of the unit.
- Disconnect the Adapter.
- Take out the battery and pull out the cord, holding it at the connector.
- Close the battery cover.
- Do not charge the device while using it.
- Away from the heat source and make sure that there is no combustible surrounding.
- Charge the device fully when battery is low. Frequently charging in low power state for short time will shorten the battery life.

11 TROUBLE SHOOTING

Table3

Malfunction	Cause	Action
After charging the battery, the use time becomes shorter.	Battery life is over.along with lithium battery capacity becomes smaller and smaller.	Contact after-sale replacement lithium battery.
Root test function is invalid.	• Check connection • Check measurement wire	Confirm that the connection is secure and confirm that the measurement wire is intact.
Motor handpiece is getting hot.	Continuously use for a long time	Stop using after cooling.
The data is unstable when measured.	• Whether the lip hooks are in good contact with the oral mucosa. • Whether the blood and liquid spilled and stained in the crown. • Whether the root canal is full of blood, liquid medicine. • Whether there is liquid, crumb on the tooth surface. • Whether the file is in contact with the gums. • Whether the pulp remains in the root canal.	• Make sure the lip hooks are in good contact with the oral mucosa. • The blood and the liquid overflow in the root canal and stick to the crown or the neck, causing a short circuit, which causes an abnormal phenomenon. • Measure after drying the spilled blood solution. • Clean the tooth surface. • In the case where there are more pulps in the root canal, the root canal length cannot be correctly determined.

The MANUFACTURER will make available on request circuit diagrams, component part lists, descriptions, calibration instructions, or other information that will assist SERVICE PERSONNEL to repair those parts of MED EQUIPMENT that are designated by the MANUFACTURER as repairable by SERVICE PERSONNEL.

If you could not found the necessary information in need, you may consult the manufacturer on the hotline phone: +86-755-28540953 , E-mail: endoservice@dental-perfect.com or address to the service department.

12 CALIBRATION OF THE SYSTEM MICROMOTOR

The calibration function allows you to check and compensate for the friction system of the micromotor.

- Calibrate the instrument at the following times:
- Right after purchase.
 - Whenever the contra angle has been replaced.
 - When using a contra angle other than the one that has been calibrated.

Hold down the POWER KEY (3-Fig.3)and then press the START/STOP KEY(5-Fig.3) for 3 second. The LCD display will appear. “ **SP 450** ”(abbr. Calibration). After calibration, the instrument will automatically return to the Standby display.

Note!  Calibration is automatically performed from 150 to 950rpm/min. It is recommended to calibrate the motor every month.

The whole calibration procedure takes about 90 seconds.

- In case of error calibration, the display will show the error indicator“E” (abbr. Error). In this case you should:
- power off the device;
 - disconnect the head from the control unit;
 - again to turn on the power and re-calibrate the micromotor without head.

If no head calibration is successful, then you need to lubricate, clean or replace the head. If no head system again fails the calibration it is necessary to replace or repair the control unit of the device.

13 OPERATION AND STORAGE CONDITIONS

	Operation conditions	Storage conditions
Temperature	+10℃ to +40℃	−10℃ to +50℃
Humidity	30% to 75%	10% to 85%
Pressure	70kPa to 106kPa	

14 DISPOSAL OF WASTE PRODUCTS

 Do not throw the device into the system of household rubbish. Disposal of waste in accordance with local laws and regulations.

15 EMC TABLES

GUIDANCE AND MANUFACTURER'S DECLARATION - ELECTROMAGNETIC EMISSIONS		
The model MR AUTO MOTOR is intended for use in the electromagnetic environment specified as below. The customer or the user of the model MR AUTO MOTOR should assure that it is used in such an environment.		
EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIRONMENT-GUIDANCE
RF emissions CISPR 11	Group 1	The model MR AUTO MOTOR uses RF energy only for its internal function. Therefore, its RF emissions are very low which are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	The model MR AUTO MOTOR is suitable for used in domestic establishment and in establishment directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
Voltage fluctuations flicker emissions IEC 61000-3-3	Complies	

16 WARRANTY

- ◉ Manufacturer warrants products to the original purchaser against defect in material and workmanship under normal practices of installation, use and servicing.
- ◉ MR AUTO MOTOR is warranted for 24 months (exception: micro motor head & battery are covered by a 12 month warranty) from the date of purchase.
- ◉ In case the product fails within 30 days from the date of installation, contact with your distributor immediately (with relevant proof of purchase ready).

17 SYMBOL DESCRIPTIONS

	Serial number
	Manufacturer
	Date of manufacture
	Class II equipment
	Type B applied part
	Attention, consult operation instructions
	If the instruction are not followed properly, operation may lead to hazards for the product or the user/patient
	Consult instructions for use
	Do not dispose of with normal household waste
	Direct current (connection for power supply)
	Autoclavable at the specified temperature
	For indoor use only
	Alternating current
REV	The device firmware version
CE 0197	Mark of conformity to product quality and safety standards of the European Union (CE-mark)

Endo Motor MR-Auto-Motor

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