MORITA

Signo T500
Root Canal Length Measurement Function

Operation Instructions

CE 0123

Thinking ahead. Focused on life.

Thank you for purchasing Signo T500.
For optimum safety and performance, read this manual thoroughly before using the equipment and pay close attention to warnings and notes.
Keep this manual in a readily accessible place for quick and easy reference.

Table of Contents

1. Prevent Accidents

Attention Customers

Be sure to receive clear instructions concerning the various ways to use this equipment as described in this accompanying Operation Instructions.
Please fill out and sign the warranty and give a copy to the dealer from whom you purchased the equipment.

Attention Dealers

Be sure to give clear instructions concerning the various ways to use this equipment as described in this accompanying Operation Instructions.
After instructing the customer in the operation of the equipment, have them fill out and sign the warranty. Then fill in your own section of the warranty and give the customer their copy. Be sure to send the manufacturer's copy to J. MORITA TOKYO MFG. CORP.

Prevent Accidents

Most operation and maintenance problems result from insufficient attention being paid to basic safety precautions and the inability to foresee potential accidents.
Problems and accidents are best avoided by foreseeing the possibility of danger and operating the equipment in accordance with the manufacturer's recommendations. First, thoroughly read all precautions and instructions and the sections "Contraindications/ Prohibitions" and "Precautions for Use (Safety and Hazard Prevention) of Electric Medical Devices"; then, operate the equipment with the utmost caution to prevent either damaging the equipment itself or causing bodily injury.

The following symbols and expressions indicate the degree of danger and harm that could result from ignoring the instructions they accompany:

⚠WARNING This warns the user of the possibility of extremely serious injury or complete destruction of the equipment as well as other property damage including the possibility of fire.

⚠CAUTION This warns the user of the possibility of mild injury or damage to the equipment.

Be sure to implement these actions. Otherwise, the equipment may be damaged.

The user (e.g., healthcare facility, clinic, hospital) is responsible for the management, maintenance and use of medical devices.
This equipment must only be used by dentists and other legally licensed professionals.
This equipment may be used only in pediatric to elderly patients who can remain still during treatment. Patients may be of any body weight, sex or nationality.
*For patients with pacemakers and ICDs, refer to "2. Warnings and Prohibitions" (p. 5).

Do not use this equipment for anything other than its specified dental purpose.

Do not carry out maintenance of the device during its use in patients.
Do not modify the device.

Disclaimer

• J. MORITA TOKYO MFG. CORP. is not responsible for accidents, instrument damage, or bodily injury resulting from:

(1) Repairs made by personnel not authorized by J. MORITA TOKYO MFG. CORP.
(2) Any disassembly or modifications of its products.
(3) The use of products or instrument made by other manufacturers, except for those procured by J. MORITA TOKYO MFG. CORP.
(4) Maintenance or repairs using parts or components other than those specified by J. MORITA TOKYO MFG. CORP.
(5) Operating the instrument in ways other than the operating procedures described in this manual or resulting from the safety precautions and warnings in this manual not being observed.
(6) Workplace conditions and environment or installation conditions which do not conform to those stated in this manual such as improper electrical power supply.
(7) Natural disasters such as fires, earthquakes, floods, lightning, etc.

• J. MORITA TOKYO MFG. CORP. will stock replacement parts for the product for a period of 10 years after manufacture of the product has been discontinued. We will supply these parts and be able to repair the product through this period.

• The useful life of the product is six years (based on self-certification) from the date of installation provided it is regularly and properly inspected and maintained.

In Case of Accident

If an accident occurs, the Root ZX mini U (Built-in Model) must not be used until repairs have been completed by a qualified and trained technician authorized by the manufacturer.

Intended Operator Profile

The Root ZX mini U (Built-in Model) must only be used by dentists and other legally licensed professionals.

Patient Population

Age	Child to Elderly
Weight	N/A
Nationality	N/A
Sex	N/A
Health	It is not intended for use on patients wearing pacemakers or ICDs.
Condition	Conscious and mentally alert person. (Person who can stay still during treatment.)

⚠CAUTION

• This device is not recommended for use in children under 12 years of age.

2. Warnings and Prohibitions

* J. MORITA TOKYO MFG. CORP. is not responsible for any accidents or other types of trouble that are caused by not following the warnings and prohibitions noted below.

⚠WARNING

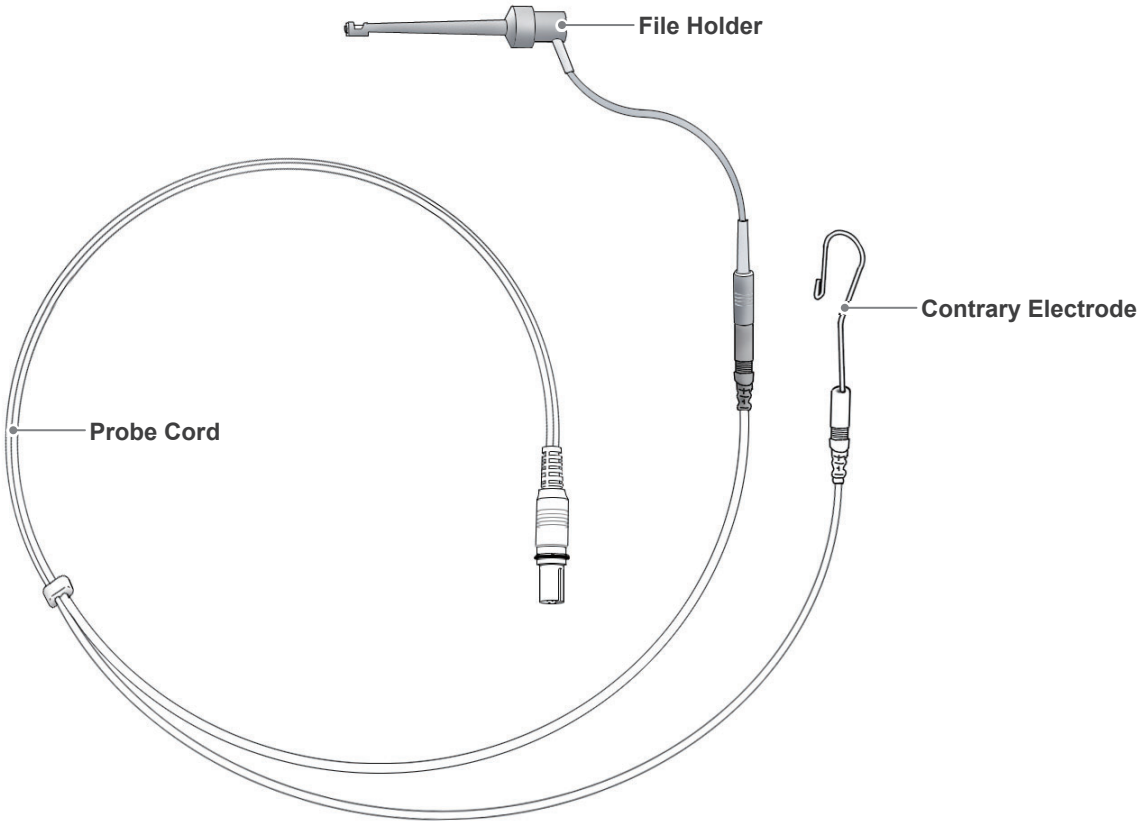
- During a lightening storm, there is a risk of getting an electric shock so turn the instrument off and do not touch it or its cord.

⚠PROHIBITION:This indicates when not to use the equipment.

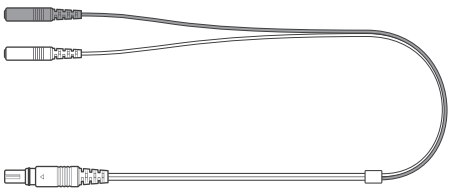
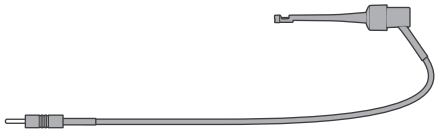
- Electromagnetic wave interference could cause this unit to operate in an abnormal, random and possibly dangerous manner. Cellular phone, transceivers, remote controls and all other devices which transmit electromagnetic waves located inside the building should be turned off.
- Instruments which produce considerable electrical noise such as electric scalpels can cause the Root ZX mini U (Built-in Model) to operate abnormally. Turn the Root ZX mini U (Built-in Model) off before using any instruments that produce electrical noise.
- Do not use the Root ZX mini U (Built-in Model) on patients who have a pacemaker or an Implantable Cardioverter Defibrillator (ICD). It could cause the pacemaker or the Implantable Cardioverter Defibrillator (ICD) to function abnormally.
- The electro-magnetic waves emitted by inverters used for film viewers, neon lights etc. can interfere with the proper operation of the Root ZX mini U (Built-in Model). Turn off all lights that use inverters in the immediate area before using the Root ZX mini U (Built-in Model).
- The Root ZX mini U (Built-in Model) must not be connected to or used in combination with any other apparatus or system. The Root ZX mini U (Built-in Model) must not be used as an integral component of any other apparatus or system.
- No modification of the Root ZX mini U (Built-in Mode) is allowed.
- Do not perform maintenance while using the Root ZX mini U (Built-in Model).

* J. MORITA TOKYO MFG. CORP. is not responsible for any accidents or other types of trouble that are caused by not following the prohibitions and other conditions noted above.

3. Parts Identification and Accessories



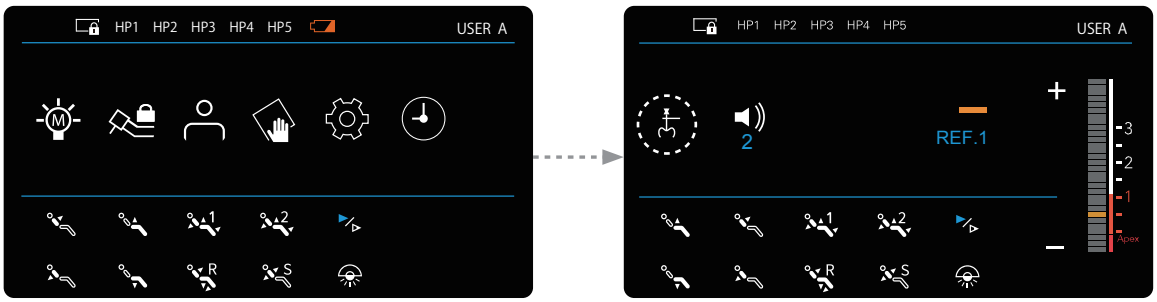
Accessories * (Quantity)

Probe Cord (1)	**File Holder** (3)
	
Contrary Electrode (5)	**Tester** (1)
	

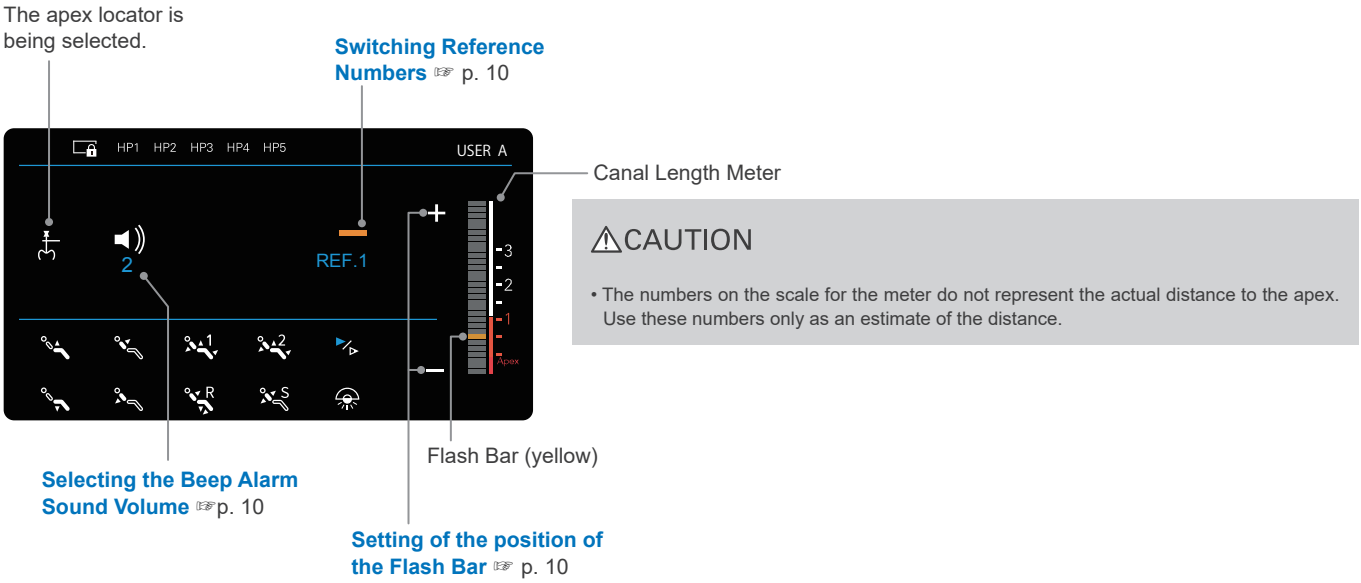
Display

The display switches when the probe cord is connected or the file holder is touched with the contrary electrode to cause a short circuit with the handpiece retracted, unless:

- When the user is picking up the micromotor and using the equipment in EMR-interlock endodontic mode.
- When the user is picking up the scaler.



Home screen **Instrument selection screen**



⚠CAUTION

- The numbers on the scale for the meter do not represent the actual distance to the apex. Use these numbers only as an estimate of the distance.

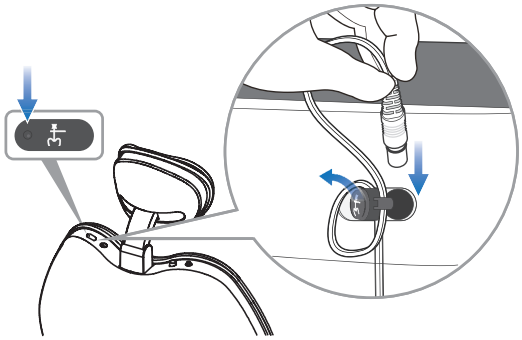
4. Usage

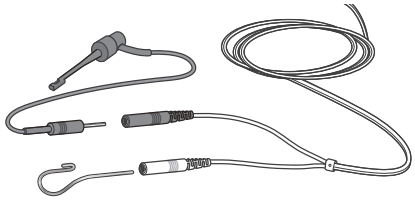
Operating Environments:
Temperature: 10°C to 35°C (50°F to 95°F)
Humidity: 30% to 80% (without condensation)
Atmospheric Pressure: 70kpa to 106kPa

* If the equipment has not been used for some time, make sure it works properly and safely before using it again.

4.1 Preparation Before Use

4.1.1 Connecting the Probe Cord





1 Insert the probe cord completely into the jack on the shoulder of the chair.

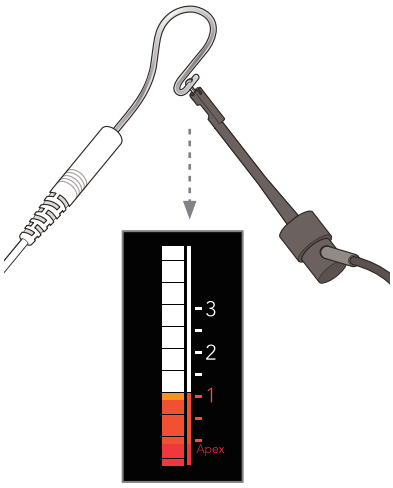
! Make sure the probe cord plug is securely plugged into the jack. A poor connection can prevent accurate measurement.

! Do not drop anything on or bang the probe cord plug after it has been inserted into the jack.

2 Insert the file holder's plug into the gray male connector on the probe cord. Insert the contrary electrode into the white female connector on the probe cord.

! Make sure to match colors of the file holder and contrary electrode to the probe cord. Measurements cannot be made if these connections are reversed.

4.1.2 Checking Function (for Each Patient)



Please check:

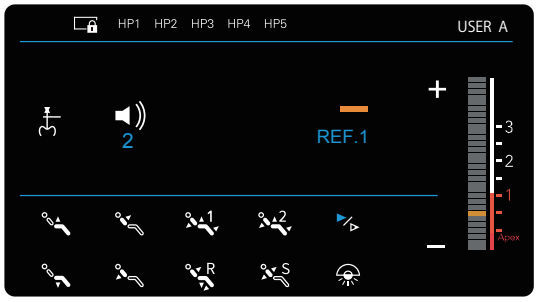
- That the file holder and contrary electrode are properly connected to the probe cord.
- That the probe cord is properly plugged into the jack on the shoulder of the chair.
- That all meter indicator bars on the display light up by touching the metal part of the file holder with the contrary electrode.

⚠WARNING

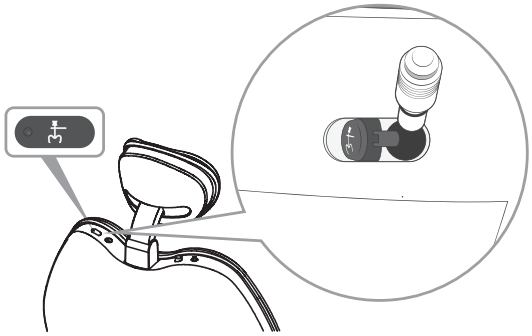
- Check for each patient that the equipment is operating normally. If the indicators on the display do not all appear normally, the instrument may not be able to make an accurate measurement. In this case, stop using the instrument and have it repaired.

4.1.3 Checking Function with the Tester (Once a Week)

Check the performance of the apex locator with the tester once a week.



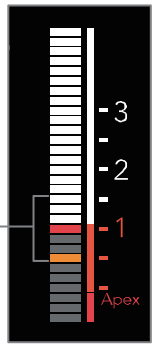
1 Turn the chair ON and display the screen for root canal length measurement.



2 Insert the tester into the probe cord jack on the shoulder of the chair. Check that the meter on the display indicates within three bars above or below 1.

* The meter may jump when the tester is inserted. Wait for about one second until the meter stabilizes and then check the reading.

* If the reading is four or more bars away from 1, the equipment will not make an accurate measurement. Contact your local dealer or J. MORITA OFFICE.

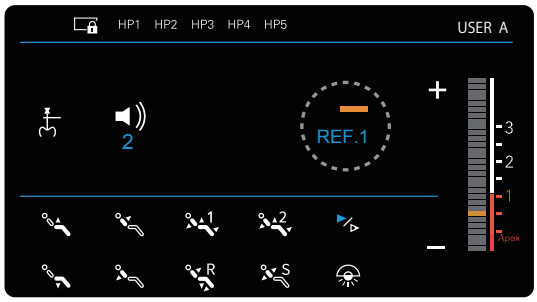


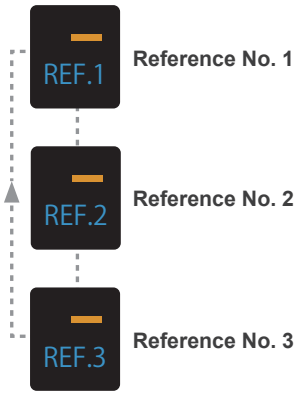
The meter indicates within three bars above or below 1.

4.2 Settings

4.2.1 Switching Reference Numbers

This changes the reference numbers and sets the position of the Flash Bar and the beep alarm sound volume.



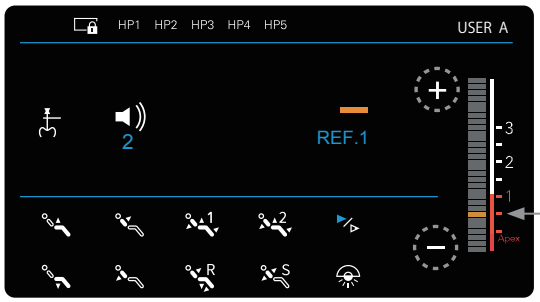


⚠WARNING

- Do not fail to check the Flash Bar setting whenever you change reference numbers.

4.2.2 Flash Bar Position

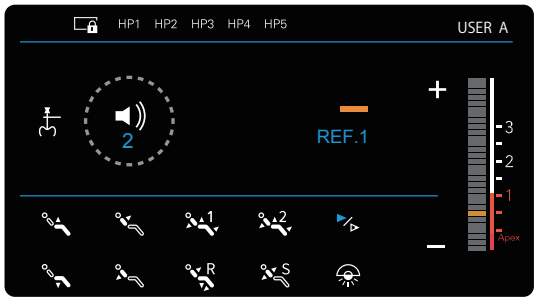
In this setting, you can set the position in the root canal as a reference point to determine the working length.

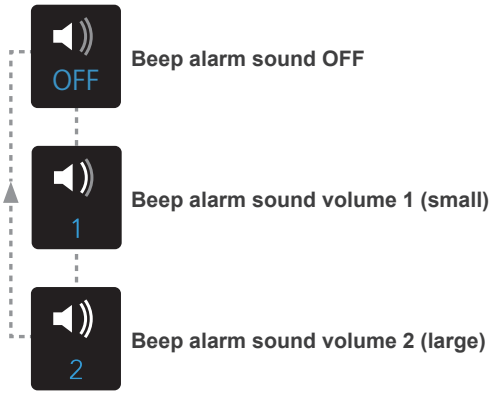


Specify the position of the Flash Bar using “+” or “−.”
The position can be set within a range from “Apex” to “2.”
The 0.5 reading on the meter indicates the area near the physiological apical foramen.

4.2.3 Selecting the Beep Alarm Sound Volume

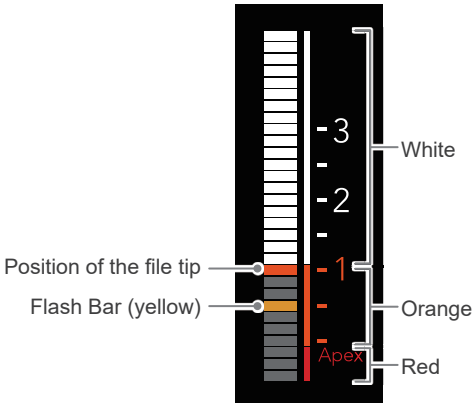
In this setting, you can set the volume of the alarm that sounds when the file tip reaches or advances beyond a self-set position in the root canal (the Flash Bar position).





4.3 Operation Method

4.3.1 Meter and Beep Alarm Sounds



The position of the file tip is shown by the meter on the display.
The Flash Bar starts blinking when the file is inserted into the canal.

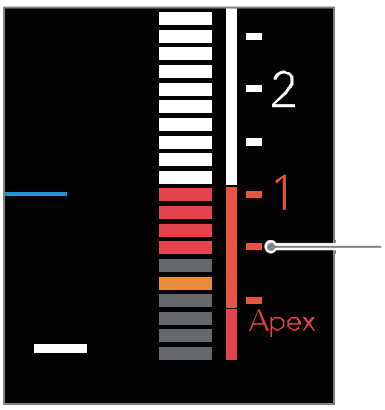
⚠WARNING

- In some cases such as a blocked canal, a measurement cannot be made. (For details, refer to “Root Canals Not Suitable for Electronic Measurement” (☞ p. 40).)
- In some cases, an accurate measurement cannot be made because of the canal shape, unusual cases, or poor performance of the equipment. Always check the measurement with an X-ray.
- Stop using the instrument immediately if you sense something odd or abnormal while taking a measurement.

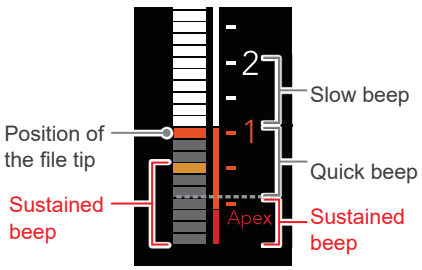
⚠CAUTION

- The numbers on the scale of the meter do not represent the actual distance to the apex. Use these numbers only as an estimate of the distance.

- Do not touch the gums with the file. This will cause the meter to go all the way to Apex.
- If a canal is too dry, the meter may not react until the file gets quite close to the apex. In this case, moisten the canal with a little hydrogen peroxide or saline before using it.
- Very occasionally, the meter jumps considerably as soon as the file is inserted. However, it will work normally as the file advances down the canal.



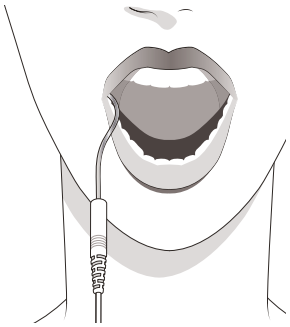
The meter’s 0.5 reading indicates that the file tip is located very near the physiological apical foramen.



The beep alarm sound changes depending on the position of the file tip in the root canal.
- Positioned between “2” and before “1”: Beeps slowly
- Positioned between “1” and before “Apex”: Beeps quickly
-The file tip reaches the position of Flash Bar or below “Apex” :Sustained beep

*The Flash Bar is positioned at “0.5” in the figure.

4.3.2 Measurement



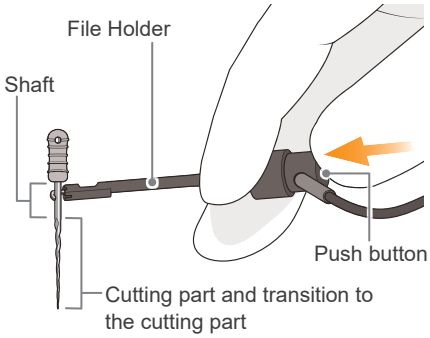
1 Hook the contrary electrode in the corner of the patient's mouth.

⚠WARNING

- Make sure that the contrary electrode, file holder and connecting portions of these parts do not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock.

⚠CAUTION

- The contrary electrode could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using the contrary electrode.
- Take care that medicinal solutions such as formalin cresol (FC) or sodium hypochlorite do not get on the contrary electrode or the file holder. These could cause an adverse reaction such as inflammation. If these solutions are spilled on these parts, wash them with water.

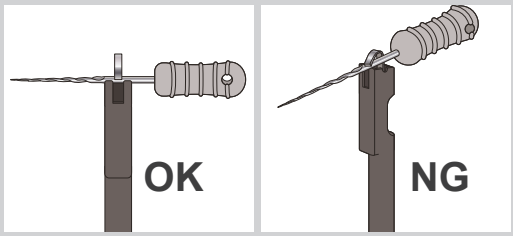


2 Clip on the hand file with the file holder.

(1) Press down the file holder button with your thumb.
(2) Clip the file holder on the metal shaft of the file in the root canal.
(3) Release the button.

⚠CAUTION

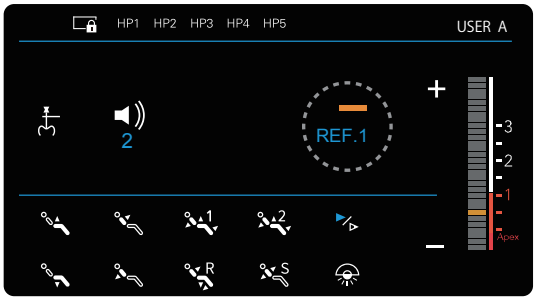
- Make sure the file or reamer is properly clipped on. Otherwise, it may not make a correct measurement or the file holder could be damaged.



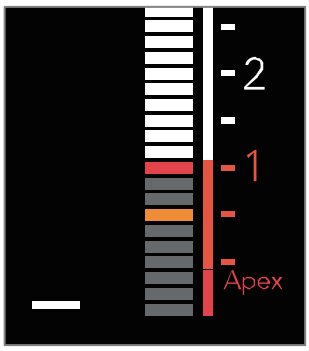
Clip the upper part of the file shaft, near the handle, with the file holder. The metal and plastic part of the file holder can be damaged if they are attached to the file's cutting part or the transition to the cutting part.

For root canal length measurement, use files and reamers with plastic handles only. If you are not wearing dental gloves, do not use the file having a metal handle. Electrical leakage will occur when the handle is touched by fingers if you are not wearing gloves, and this will prevent an accurate root canal length measurement. Even if the file handle is made of plastic, make sure not to touch the metal part of the file with finger.

Do not use damaged file holders. Measurements cannot be made if these connections are reversed.

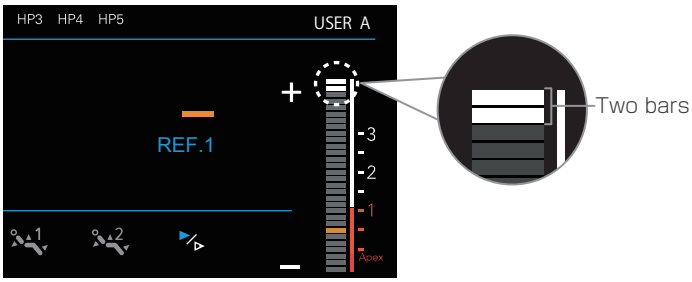


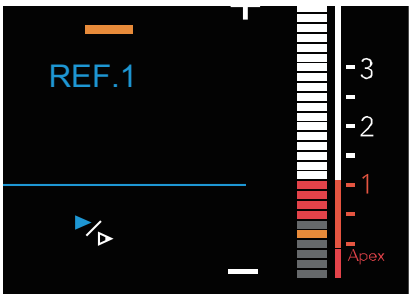
3 Select the reference number (1/2/3).

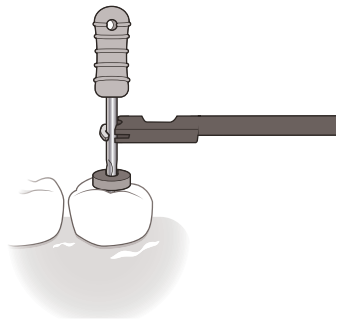


4 Insert the file and advance it down the canal.

* Measurement settings and chair operation are unavailable when root canal length measurement is being performed and two or more bars on the meter are blinking.,





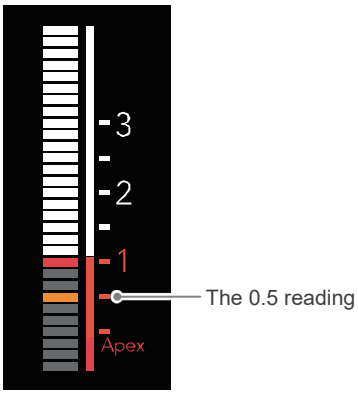


5 When the file tip reaches the point designated by the Flash Bar, the Flash Bar will stop blinking and stay on. Put a rubber stopper on the tooth surface as a reference point to determine the root canal's working length.

* Use the "0.5" reading on the meter to estimate the length of the canal.

⚠CAUTION

• The numbers on the scale of the meter do not represent the actual distance to the apex. Use these numbers only as an estimate of the distance.



6 Determine the working length.

The "0.5" reading on the meter indicates a distance of 0.5 to 1.0 mm from the anatomical apex. Use this as an estimate to determine the working length, which will differ somewhat depending on the individual tooth.

* The actual working length depends on each individual canal and must be judged by the dentist as he works.

4.4 Micromotor

4.4.1 Operation Modes

For details on how to handle the micromotor and handpiece, be sure to read the separate operation instructions and medical device package insert.

This manual will provide information on the operation modes of the micromotor: “Endodontic mode” and “EMR-interlock endodontic mode.” For “normal cutting,” refer to the operation instructions for the dental equipment, micromotor and handpiece.
“EMR-interlock endodontic mode” is an operation mode capable of root canal enlargement/preparation in conjunction with the apex locator. In conjunction with the apex locator, this mode has an automatic rotation control function to prevent the micromotor from penetrating the apex (apical action) as well as a delicate rotation control function (OGP/OTR). For using this mode, the equipment should meet all of the following operational requirements:

Operational requirements of EMR-Interlock endodontic mode

- ☑ **Unit:** The root canal length measurement function is incorporated.
- ☑ **Micromotor:**TR-S3-R-O (Torx model with light and compatible with root canal length measurement)
- ☑ **Handpiece:**CA-10RC-ENDO (Torqtech speed-down contra angle model for endodontic treatment)
- ☑ **Variable speed ratio:**set to 10R:1 (☞p. 26)

⚠WARNING

- The EMR-interlock endodontic mode is not automatically recognized. Be sure to confirm that the equipment meets all operational requirements.

List of Operation Mode-Specific Main Functions

Operation mode	Endodontic mode	EMR-interlock endodontic mode *Available only when the equipment meets the above operational requirements.
Memory ☞ p. 21	Endo1–4	
Variable speed ratio ☞ p. 23	1:1/Speed reduction (n:1)	10R:1
Number of rotations ☞ p. 25	100–2,000 (Number of bar/file rotations)	100–1,000 (Number of bar/file rotations)
Rotational motion ☞ p. 22	Clockwise rotation/torque rotation/counterclockwise rotation	Clockwise rotation/torque rotation/ OGP/OTR/counterclockwise rotation
Torque setting ☞ p. 24	Torque limit	Torque limit, Trigger torque
Meter display ☞ p. 32	Display* (Not linked to motor)	Display (linked to motor)
Rotation angle settings ☞ p. 23		OGP:90°/180°/240° OTR:180°/240°
Apical action ☞ p. 32		OAS/A.Rev/Stop/OFF
Variable speed/constant speed ☞ p. 27	Variable speed/ constant speed **	Constant speed
Water flow ☞ p. 29	ON/OFF	ON/OFF ***
Tip air ☞ p. 30	ON/OFF	ON/OFF ***
Handpiece light ☞ p. 34	ON/OFF	ON/OFF ***

The functions shown in orange are specific to the EMR-interlock endodontic mode.
* Shows functions available only when the chair unit has the root canal length measurement function.
** Only constant speed mode is available when the rotational motion is set to torque reverse.
***These functions can be changed by setting each memory, but the default is set to OFF.

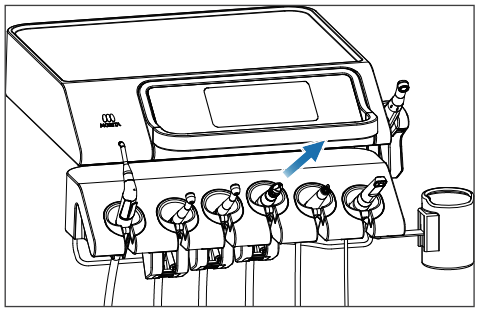
☞ Refer to Appendix “Root Canal Enlargement and Preparation Using EMR-Interlock Endodontic Mode.”

Operation Mode-Specific Default Settings

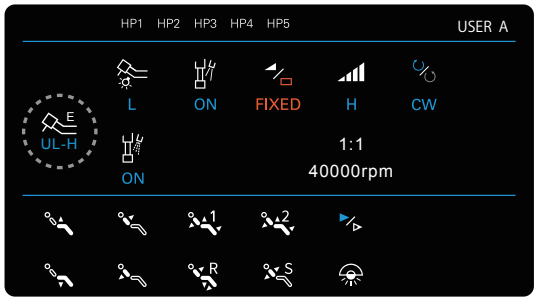
Operation mode	Endodontic mode				EMR-interlock endodontic mode			
Setting options	Endo1	Endo2	Endo3	Endo4	Endo1	Endo2	Endo3	Endo4
Variable speed ratio	1:1				10R:1			
Operation mode	Clockwise rotation	Clockwise rotation	Clockwise rotation	Counterclockwise rotation	Clockwise rotation	OGP	OTR	Counterclockwise rotation
Number of rotations	300	300	500	200	1,000	300	300	200
Torque limit (N·cm)	2.0	2.0	1.5		3.0			
Trigger torque (N·cm)							0.2	
Apical action					OFF	OAS	OAS	OFF
Flash Bar position					0.5 The 24th bar	0.5 The 24th bar	0.5 The 24th bar	0.5 The 24th bar
Rotation angle (OGP mode)						180		
Rotation angle (OTR mode)							180	

4.4.2 Switching Between Endodontic Mode and EMR-Interlock Endodontic Mode

■ Switching operation

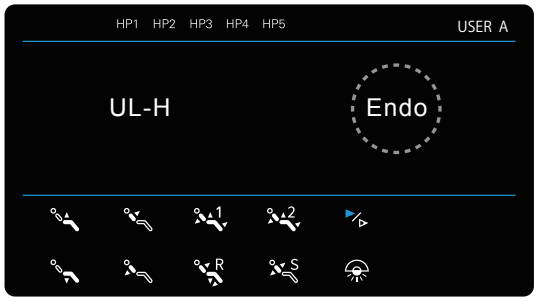


1 Pick up the micromotor.
The handpiece that was picked up earlier is preferentially selected.
The micromotor selection screen (normal cutting) is displayed.



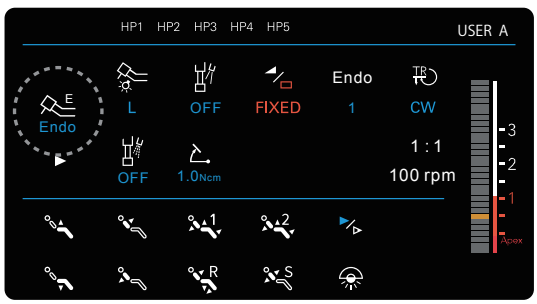
Micromotor selection screen (normal cutting)

2 Press the micromotor key.
The screen is displayed to select “UL-H” and “Endo.”



3 Press“Endo” on the selection screen.
Press “UL-H” to return to the normal cutting screen.

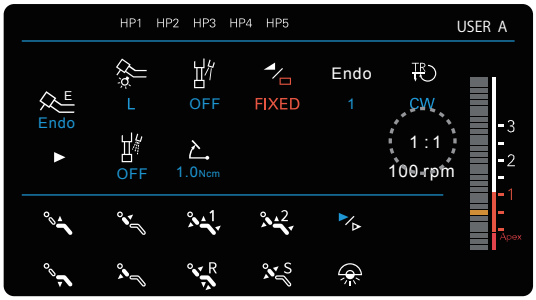
Endodontic mode



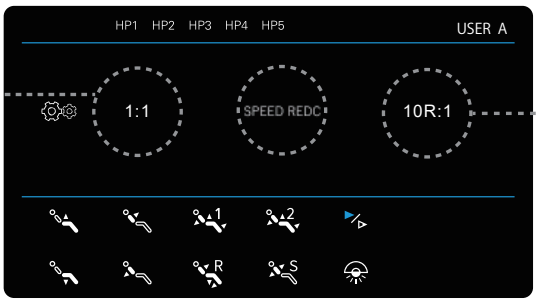
4 The endodontic mode screen is displayed.

Explanation of the micromotor key

The micromotor not compatible with root canal length measurement



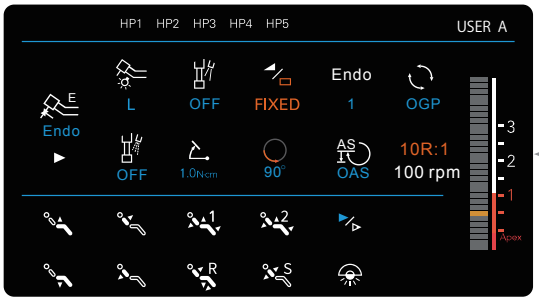
4 Switches the endodontic mode screen Option to the EMR-interlock endodontic mode screen.
Press the variable speed ratio setting key on the endodontic mode screen to display the selection screen.



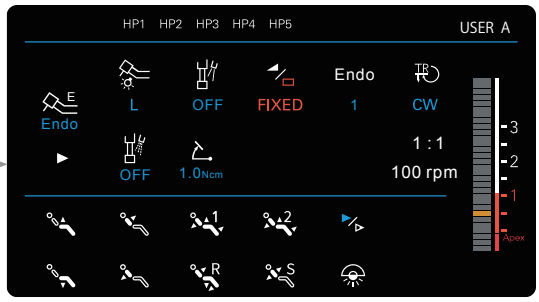
Selection screen

5 Press the “10R:1” key to change to the EMR-interlock endodontic mode screen.
Press the “1:1” key to change to the endodontic mode screen. You can change the variable speed ratio optionally in the user’s personal settings for the chair unit. You cannot change the setting on this screen. Refer to the operation instructions for the chair unit.

EMR-interlock endodontic mode



Endodontic mode



Explanation of the micromotor key

Micromotor compatible with root canal length measurement Option

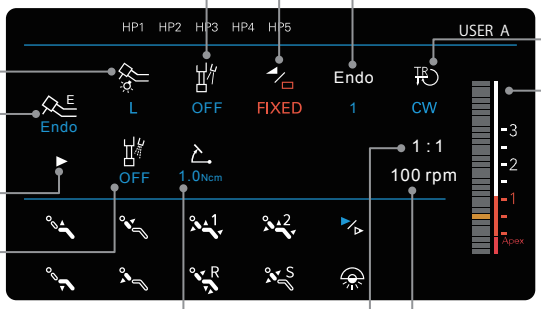
Micromotor compatible with root canal length measurement Option

Operation mode-specific basic screen

Endodontic mode

When the micromotor is TR-S3 or TR-S3-O
When the micromotor is TR-S3-R-O and does not meet the operational requirements for EMR-interlock endodontic mode (☞p. 14)

Page 1



Switching between the variable speed/constant speed ☞ p. 27

Switching water flow ON/OFF ☞ p. 29

Selecting the memory ☞ p. 21

Switching rotational motions ☞ p. 22

Setting the handpiece light ☞ p. 34

Canal Length Meter

* The meter is indicated on the unit that have a root canal measurement function (option).
The file tip position is indicated during root canal length measurement using the hand file.
The EMR-interlock function does not work.

Micromotor key (compatible with root canal length measurement)

To the next page

Switching the air ON/OFF ☞ p. 30

Setting torque limit values ☞ p. 24
Setting trigger torque values

Number of rotations (Number of the bar point file rotations)

Setting the variable speed ratio ☞ p. 26

Page 2

Setting beep alarm sound volumes ☞ p. 33

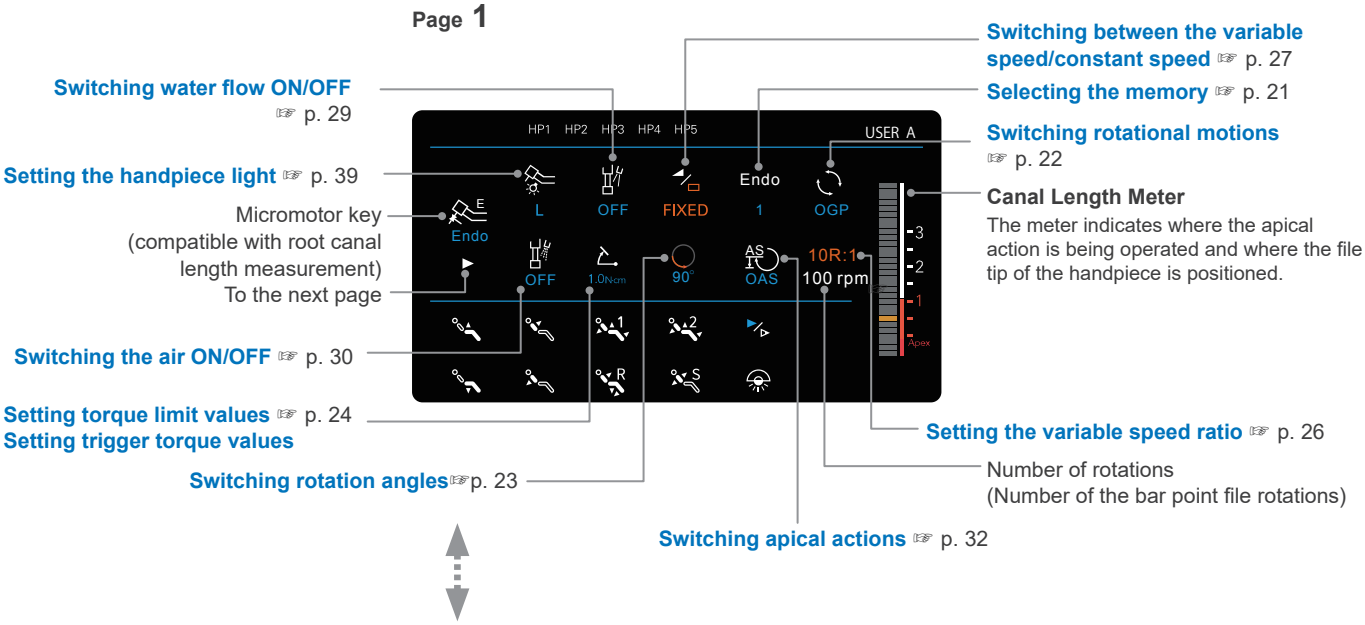
Back to previous page

EMR-interlock endodontic mode

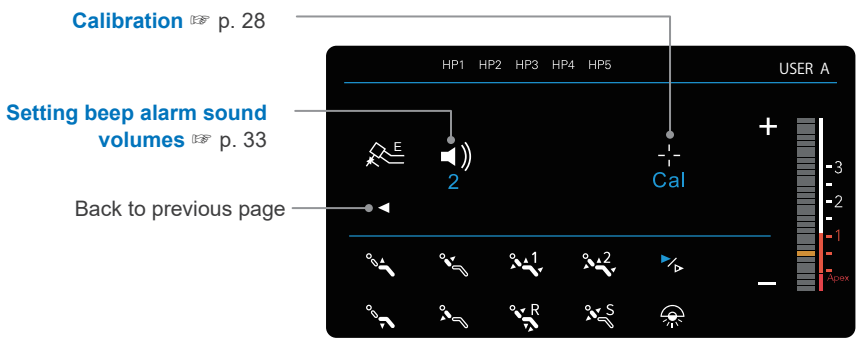
When the equipment meets all operational requirements for the EMR-interlock endodontic mode (☞ p. 14)

* Connect the probe cord to the probe cord jack to use the EMR-interlock endodontic mode.

Page 1



Page 2



4.4.3 Basic Operations

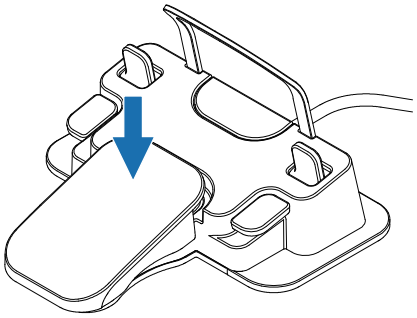
⚠WARNING

- Pull the micromotor and main tube gently to confirm that they are securely connected. Insufficient connection may cause detachment of the main tube and harm to humans.
- Confirm that the micromotor to be used is indicated on the system display and it is properly configured.

Perform calibration before using EMR-interlock endodontic mode. ☞ p. 28

For use of the bar point file, follow the manufacturer's instructions on the number of rotations.

Starting and Stopping the Micromotor



Pick up the micromotor.
Step on the foot control pedal to start the micromotor and release the pedal to stop.
During this process, operations such as Up/Down and Upright positions of the chair or changing the screen are not possible.

⚠WARNING

- During this process, it is dangerous to move the handpiece into or out of the patient's mouth. Move it into or out of the patient's mouth after stopping rotation.

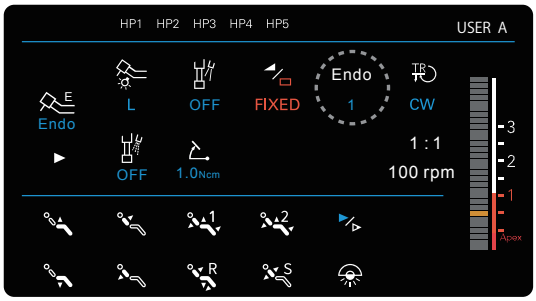
⚠CAUTION

- If the micromotor does not rotate even when stepping on the pedal, the micromoter may generate heat and cause burns or low-temperature burns. Stop stepping on the pedal.

4.4.4 Memory Selection

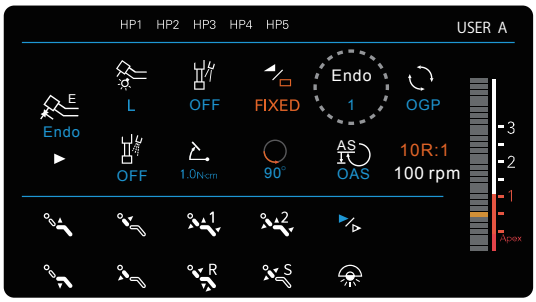
The equipment has a memory function for storing up to four patterns of settings such as rotational motion, rotation angle and number of rotations.
Switching the memory can also be performed using the foot control operation.

Endodontic mode



Press the “Endo1” key to select “Endo2,” “Endo3” or “Endo4.” Each memory stores the data set for previous use.

EMR-interlock endodontic mode

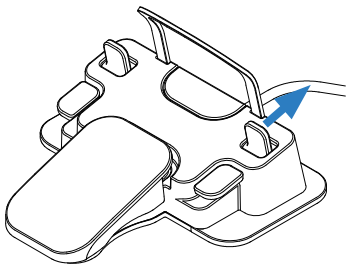


Press the “Endo1” key to select “Endo2,” “Endo3” or “Endo4.” Each memory stores the data set for previous use.

Foot control operation “Switching Memory” Option

- If the operation is performed under the endodontic mode and EMR-interlock endodontic mode:

Endo1 → Endo2 → Endo3 → Endo4



* Water flow timing and AI catch (option) timing can be set in the chair unit settings. You can set them in the user’s personal settings for the chair unit.

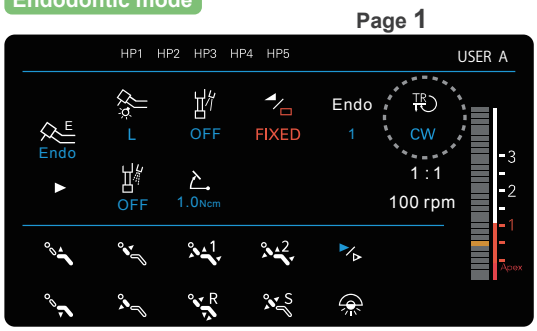
4.4.5 Setting Rotational Motions

Switching Rotational Motions

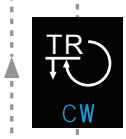
Rotational motions can be changed on the system display or through the foot control operation.

Check the rotation direction by rotating the micromotor outside the patient's mouth before use.

Endodontic mode



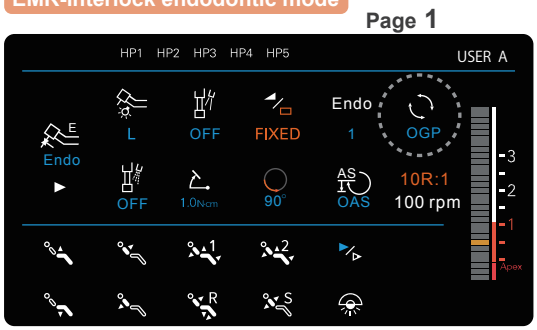
Clockwise rotation



Torque reverse
If the load on the file exceeds the set value, the micromotor is automatically rotated counterclockwise to prevent it from penetrating into the file or being broken.

Counterclockwise rotation

EMR-interlock endodontic mode



Clockwise rotation

Torque reverse
If the load on the file exceeds the set value, the micromotor is automatically rotated counterclockwise to prevent it from penetrating into the file or being broken.

OGP
This motion is a combination of clockwise rotation and counterclockwise rotation and works effectively for creating a glide path.

OTR
Depending on the load on the file, the motor alternates between clockwise and counterclockwise rotation. This function works effectively for root canal enlargement and preparation.

Counterclockwise rotation

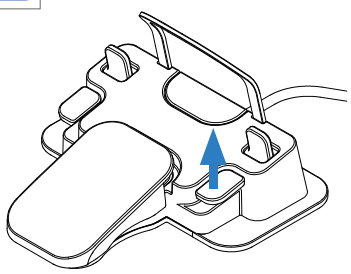
Foot control operation "Switching Rotational Motions" Option

- In endodontic mode:

Clockwise rotation → **Torque reverse** → **Counterclockwise rotation**

- In EMR-interlock endodontic mode:

Clockwise rotation → **Torque reverse** → **OGP** → **OTR** → **Counterclock-wise rotation**



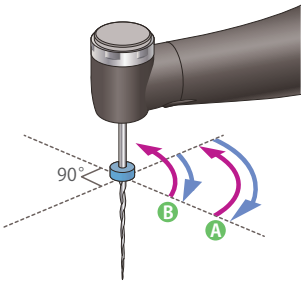
■ Overview of OGP and OTR and Switching Rotation Angles

OGP and OTR control rotational motion and are effective functions for endodontic treatment.

* These functions are available only in EMR-interlock endodontic mode.

● OGP (optimum glide path) function

A glide path can be created through the rotational motion made using the motor, which reproduces the subtle and delicate finger movements of an experienced dentist. Use of narrow Ni-Ti file and stainless-steel files size #15 or smaller allows you to perform negotiation efficiently.

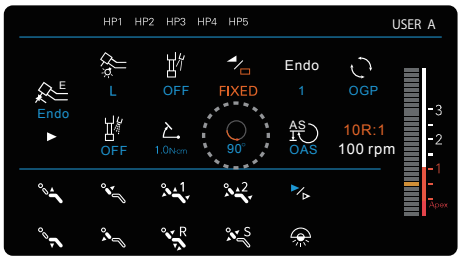


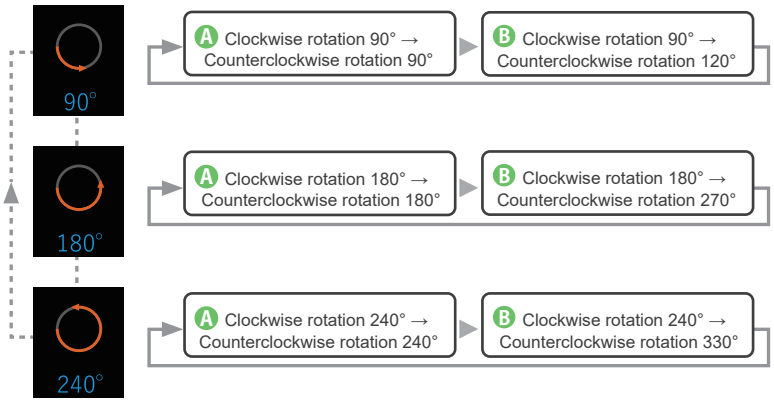
The motor repeats the watch-winding (A) and balanced force (B)movements.

Of three types of rotation angle combinations, the figure shows the motor set to rotate “90°.”

EMR-interlock endodontic mode

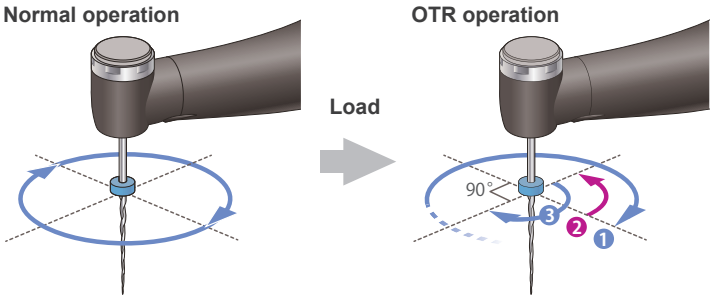
Page 1





● OTR (optimum torque reverse) function

The motor alternates between clockwise and counterclockwise rotation with great sensitivity depending on the load on the file. This allows you to perform root canal enlargement and preparation safely and efficiently without affecting the root form to reduce the occurrence of file penetration/brakeage, ledge or perforation.

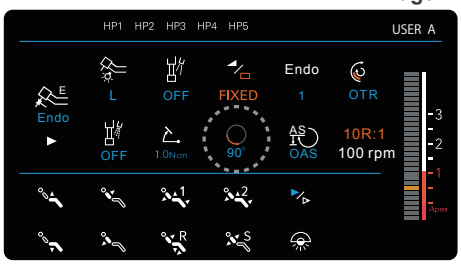


In normal operation, the motor continues in clockwise rotation and the operation automatically alternates between clockwise and counterclockwise rotation when the load on the file exceeds the set value.

Of two types of rotation angle combinations, the figure shows the motor set to rotate “180°.”

EMR-interlock endodontic mode

Page 1



Counterclockwise rotation 90° ⇔ Clockwise rotation 180°

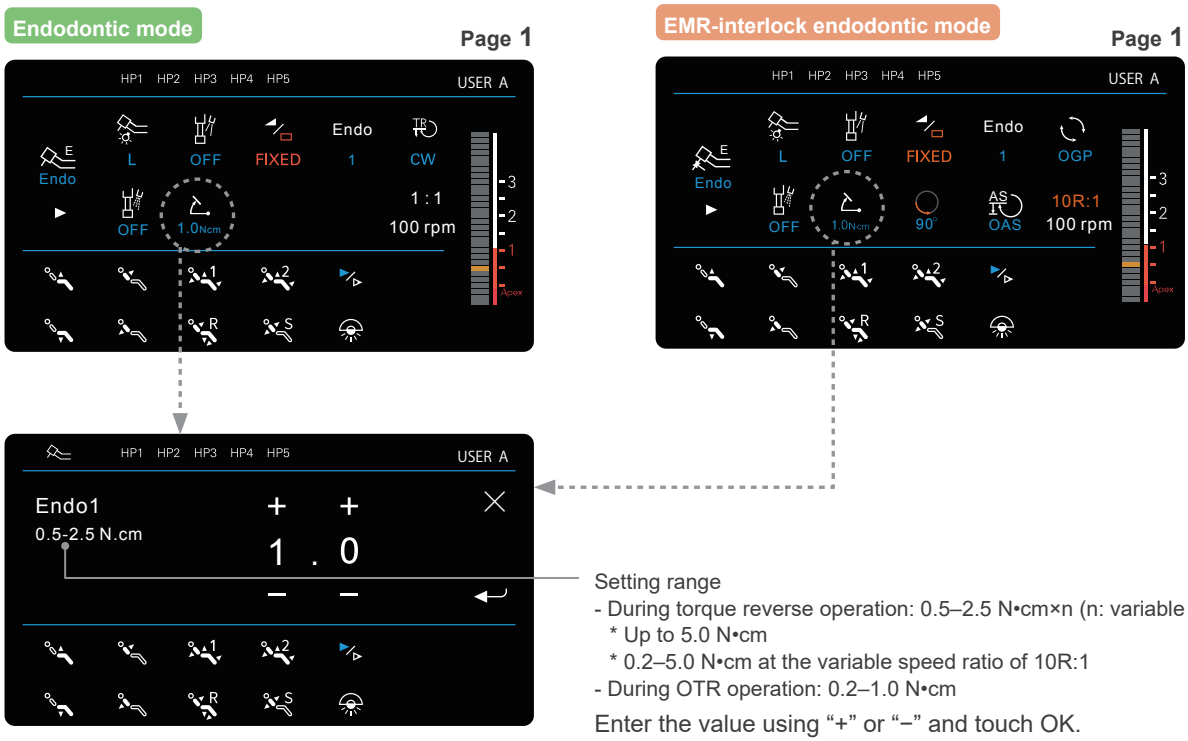
Counterclockwise rotation 120° ⇔ Clockwise rotation 240°

Setting of torque limit value/trigger torque value

You can set the following torque values:

- When rotational motion is set to torque reverse: Torque value when changing from clockwise rotation to counterclockwise rotation (Torque limit value)
- When rotational motion is set to OTR: Torque value when operating the OTR function (Trigger torque value)

* The above torque values can be set only when the rotational motion is set to torque reverse or OTR.



⚠WARNING

- The file should be handled with utmost care because it can break easily when excessive torque is placed on it during a cutting operation.

⚠CAUTION

- The torque limits and trigger torque values are set based on those of “Torqtech.” If using handpieces provided by other manufactures, the set values should be used as reference values.
- Change the set values as required, if these values may be not set appropriately.

Actual counterclockwise rotation may be started at a different torque limit or trigger torque values from those you have set depending on the status of the handpiece to be used. The set values should be used as reference values. (The set values should be increased gradually from smaller ones.)

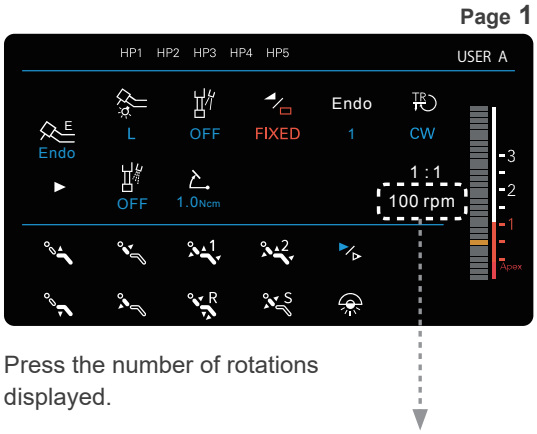
Deterioration of the micromotor or handpiece may cause torque reverse or OTR operation simultaneously when it starts to rotate. In this case, increase the set value until torque reverse or OTR is not caused, and to the increased value, add the value at which you desire to operate torque reverse or OTR.

4.4.6 Setting the Number of Rotations

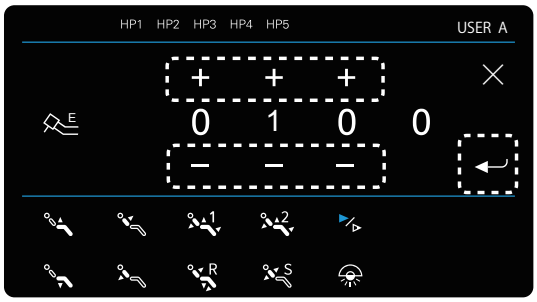
Setting the Number of Rotations

You can set the number of bar point file rotations.
The number of bar point file rotations is determined by applying the variable speed ratio of the handpiece to the number of micromotor rotations.
If the variable speed is selected in “Switching between Variable Speed and Constant Speed” (☞ p. 27), the set value represents the maximum number of rotations.

Endodontic mode

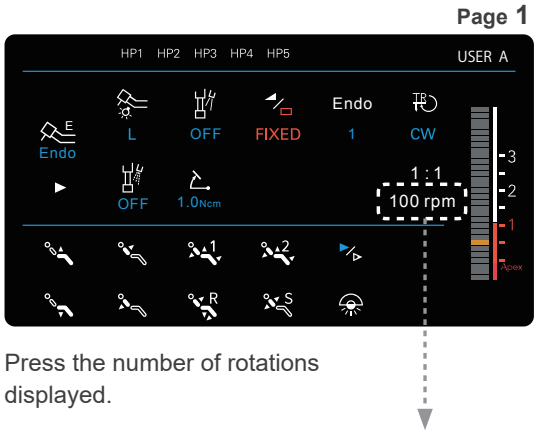


Press the number of rotations displayed.



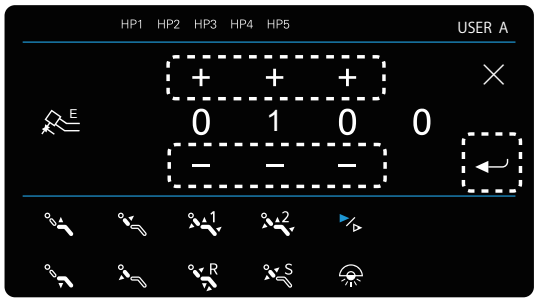
Increase or decrease the value using “+” or “−.”
Enter the value and press the Enter key to confirm.

EMR-interlock endodontic mode

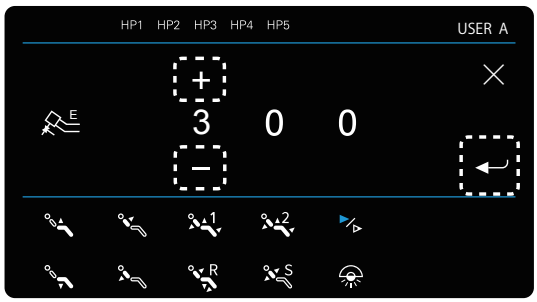


Press the number of rotations displayed.

If the rotational motion is set to clockwise rotation (CW), torque reverse (TR) or counterclockwise rotation (CCW)



If the rotational motion is set to optimum glide path (OGP) or optimum reverse (OTR)



Increase or decrease the value using “+” or “−.”
For OGP and OTR, select the value from the specified values.
Enter the value and press the Enter key to confirm.

Be sure to press the Enter key to confirm the entered or selected value. Otherwise, the value set for the number of rotations will be canceled.

● **Setting range of the number of bar point file rotations** (rpm)

Operation mode	Variable speed ratio ☞ p. 26		
	1:1 (constant speed)	10R:1 (speed reduced by 1/10)	n:1 (self-selected reduced speed)
Endodontic mode	100–2,000		100–2,000
EMR-interlock endodontic mode Endodontic mode		100–1,000 * **During OGP operation**[*1]: 100/300 * **During OTR operation**[*1]: 100/300/500	

Number of micromotor rotations: 100 to 40,000 rpm
[*1] Only constant speed is available

For use of the bar point file, follow the manufacturer's instructions on the number of rotations.

Setting the Variable Speed Ratio

In this setting, you select the variable speed ratio of the handpiece to be used.

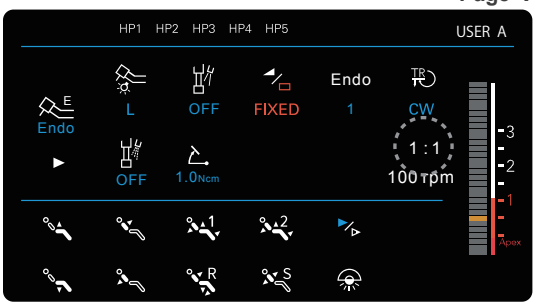
* Change the variable speed ratio to go to the screen to enter the number of rotations.
* "10R:1" (interlocking with the root canal length measurement function) is indicated if the root canal length measurement function is incorporated in the chair unit.

Constant speed	1:1	Constant speed (Endodontic mode)
Speed reduction	10R:1	Speed reduced by 1/10 (EMR-interlock endodontic mode)
	n:1	Enter a self-selected value (Endodontic mode)

Endodontic mode

In endodontic mode, you can select the variable speed ratio of "1:1" or the self-selected variable speed ratio of "n:1." Setting to "n:1" is not possible on this screen. You can set the variable speed ratio to "n:1" in the user's personal settings for the chair unit. Refer to the operation instructions for the chair unit.

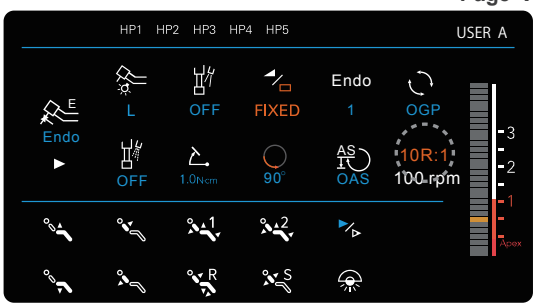
Page 1



EMR-interlock endodontic mode

In EMR-interlock endodontic mode, the variable speed ratio is fixed to "10R:1." The variable speed ratio cannot be changed.

Page 1



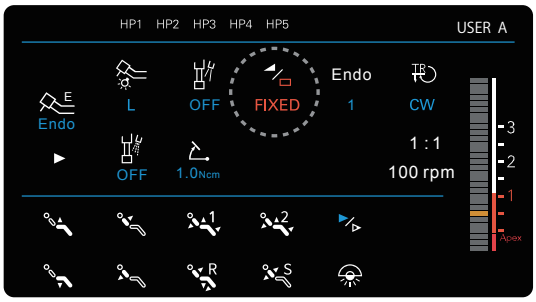
Be sure to press the Enter key to confirm the entered or selected value. Otherwise, the set value of the variable speed ratio will be canceled.

Switching between Variable Speed and Constant Speed

* Switching is not possible during micromotor operation.
* If the rotational motion is set to torque reverse, only constant speed is available.

Endodontic mode

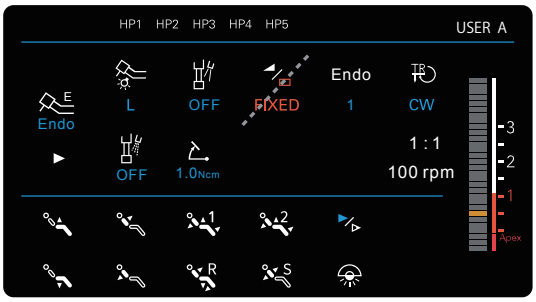
Page 1



Each press switches between constant speed (VER) and the variable speed (VER).

EMR-interlock endodontic mode

Page 1



* Only constant speed is available in EMR-interlock endodontic mode. Switching is not possible.

Constant speed

The speed of rotation is constant regardless of the pressure on the foot pedal.

Variable speed

The speed of rotation changes according to the pressure on the foot pedal. The set number of rotations is the maximum number of rotations.

4.4.7 Calibration

Optimize rotation control in order to improve torque detection accuracy during endodontic treatment.

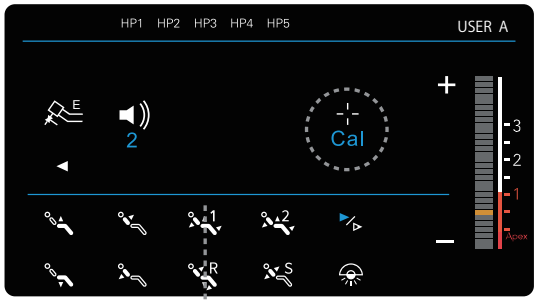
* These functions are available only in EMR-interlock endodontic mode.

● You should calibrate the micromotor:

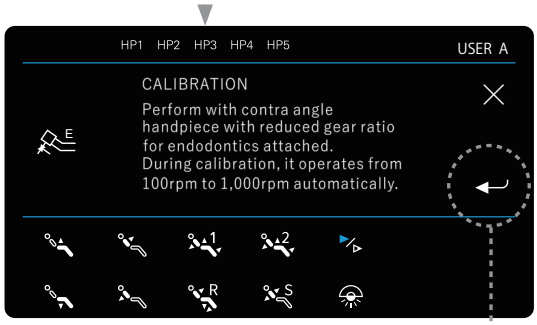
- Before using it for the first time after purchasing.
- After replacing your handpiece with a new one.
- Before using a handpiece different from the one which has been calibrated.
- When the micromotor fails to rotate continuously in the OTR mode and alternates between clockwise rotation and counterclockwise rotation.

EMR-interlock endodontic mode

Page 2



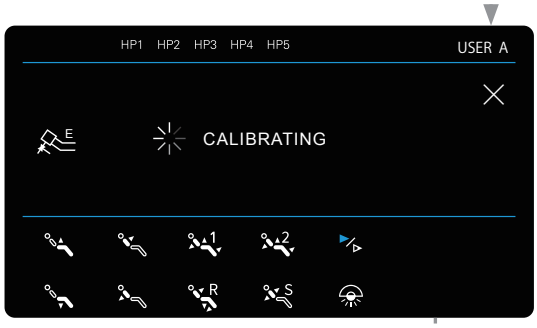
1 Press the calibration key.
Read tattention screenthoroughly.



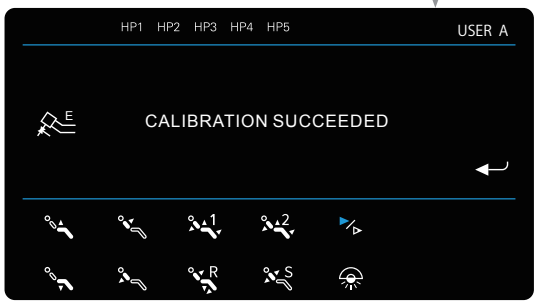
2 Press the Enter key
Start calibration.

! Perform calibration after a speed-down contra angle handpiece for endodontic treatment has been attached to the micromotor.

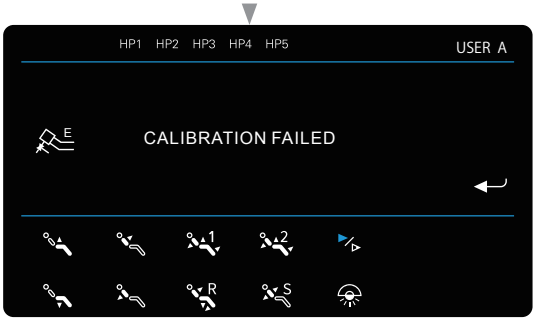
! When performing calibration with the file attached, prevent your fingers from touching the file during rotation.



Calibration in progress.



Calibration has successfully completed.



Calibration has failed.

! If calibration has failed, press the Enter key to return to the basic screen to execute calibration again.

4.4.8 Setting water flow and tip air

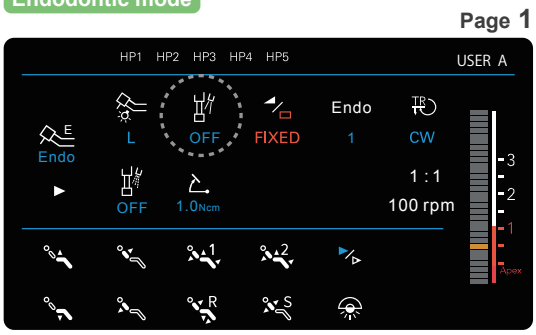
⚠CAUTION

- Pay careful attention to prevent water flow from turning OFF, because cutting with no or only a small volume of water flow will cause the cutting part to heat up.

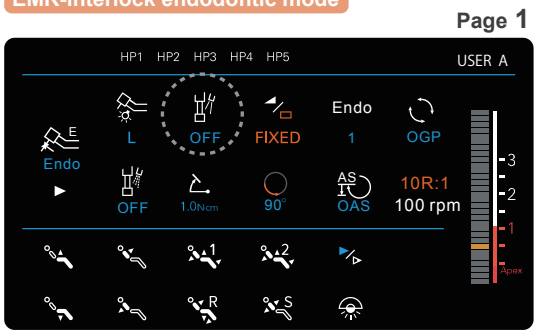
■ Switching water flow ON/OFF

Water flow is switched to ON/OFF on the system display or through the foot control operation.
Each press switches water flow ON/OFF.

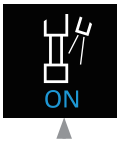
Endodontic mode



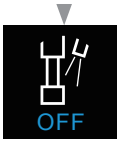
EMR-interlock endodontic mode



* Water flow can be set for each memory. Confirm that the water flow is OFF before using EMR-interlock endodontic mode.



Water flow ON

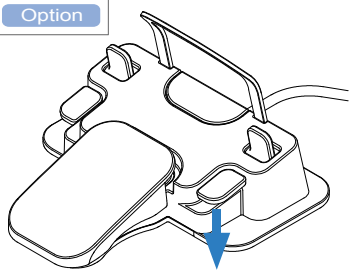


Water flow OFF

Foot control operation
“Switching Water Flow ON/OFF” Option

- All modes:

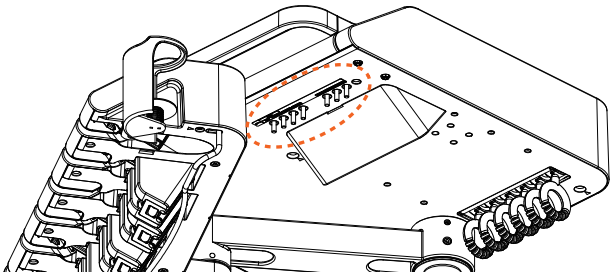
Water flow ON ⟷ **Water flow OFF**

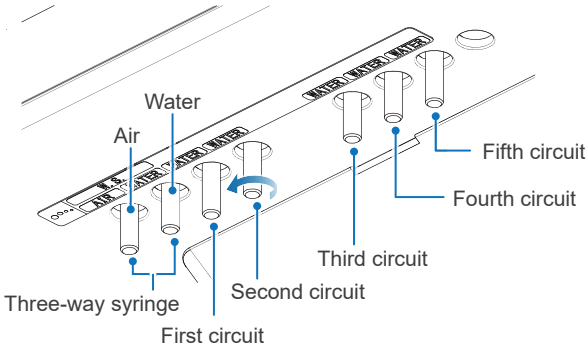


■ Switching the Water Flow Timing

Switching water flow timing (instant water flow/delayed water flow) is not possible on this screen. You can set the water flow timing in the user’s personal settings for the chair unit. Refer to the operation instructions of the chair unit.

Adjusting Water Flow





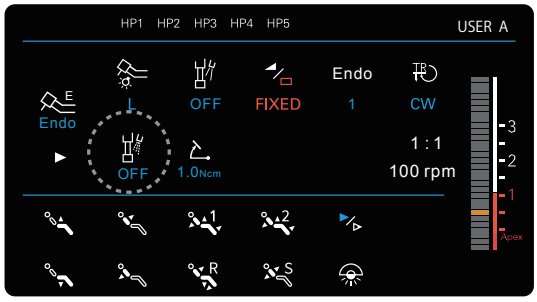
Adjust the water flow volume using the valves on the underside of the table.
Turn the valve in the direction of the arrow to increase the water flow volume and air flow volume.

Switching the Tip Air ON/OFF

Each press switches air ON/OFF.

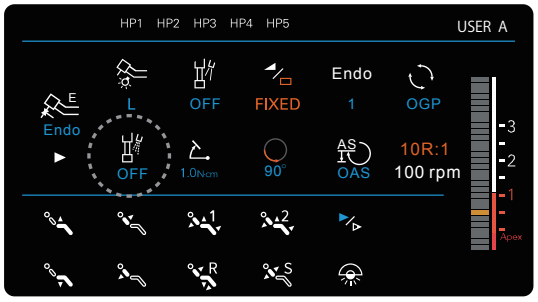
Endodontic mode

Page 1

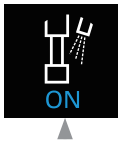


EMR-interlock endodontic mode

Page 1



* Tip air can be set for each memory. Confirm that the water flow is OFF before using EMR-interlock endodontic mode.



Tip air ON

Tip air OFF

4.4.9 Setting the Function Interlocking with Root Canal Length Measurement (Apical Action)

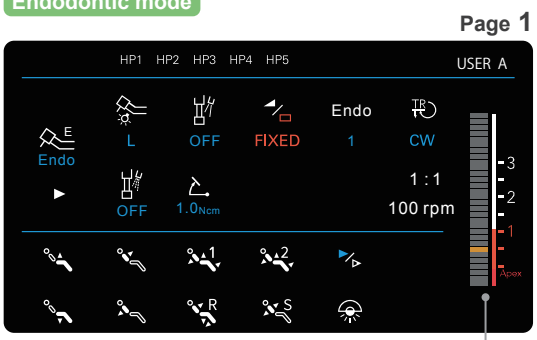
For the chair unit incorporating the apex locator (option), the meter is indicated on the endodontic mode and EMR-interlock endodontic mode screens.

In EMR-interlock endodontic mode, you can use the rotation control function (apical action) in coordination with the root canal length measurement function. This function prevents the micromotor from penetrating into the apex and provides safer endodontic treatment by automatically controlling its rotation at a self-set position.

⚠CAUTION

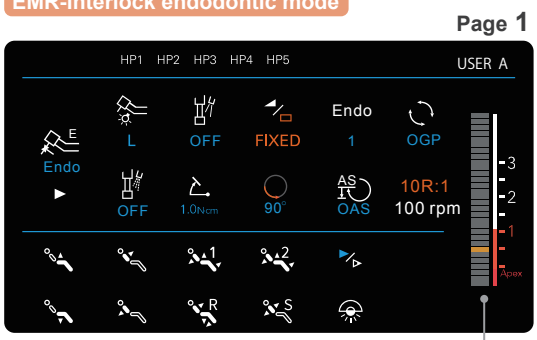
- Before using the file, touch the file with the contrary electrode of the probe cord to confirm that the entire meter is indicated on the root canal length measurement screen on the chair unit.

Endodontic mode



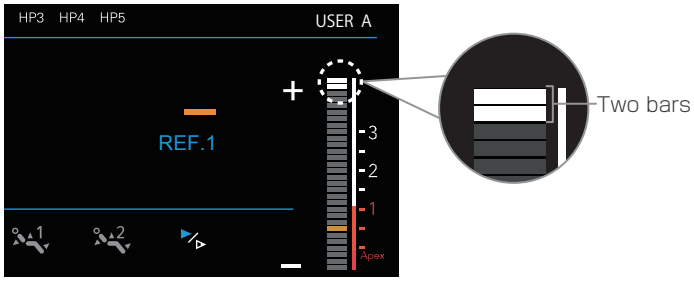
* In endodontic mode, apical actions are not available.

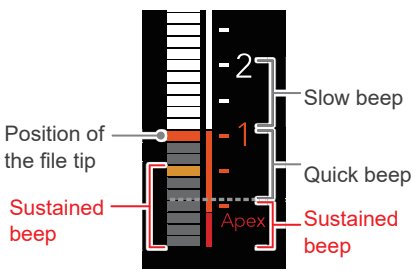
EMR-interlock endodontic mode



Canal Length Meter

* Measurement settings and chair operation are unavailable when root canal length measurement is being performed and two or more bars on the meter are blinking.,





Beep Alarm Sounds

The beep alarm sound changes depending on the position of the file tip in the root canal.

- Positioned between “2” and before “1”: Beeps slowly
- Positioned between “1” and before “Apex”: Beeps quickly
- The file tip reaches the position of Flash Bar or below “Apex” :Sustained beep

*The Flash Bar is positioned at “0.5” in the figure.

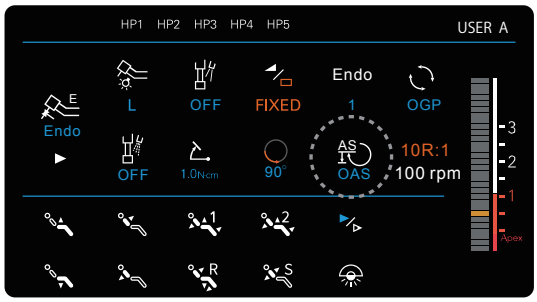
Switching Apical Actions

In this setting, you can set the motion of the micromotor when the file tip reaches a self-set position in the root canal (Flash Bar position).

* These functions are available only in EMR-interlock endodontic mode.

EMR-interlock endodontic mode

Page 1



OAS(Optimum apical stop)
This function automatically semi-rotates or rotates the micromotor counterclockwise to resolve file penetration and stop its motion.

Automatic apical reverse
This function automatically rotates the micromotor counterclockwise.

Automatic apical stop
This function automatically stops the action.

Apical action OFF
Turning the action OFF prevents the micromotor from automatically stopping or rotating counterclockwise so that the operation may continue even after the file reaches the Flash Bar position.

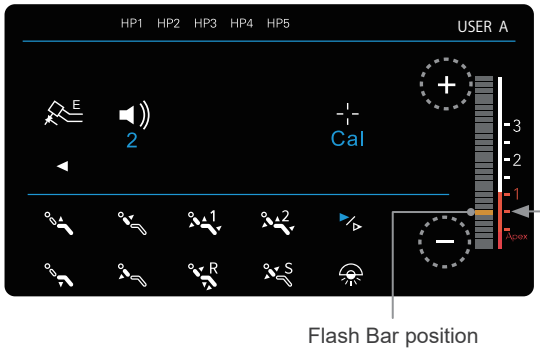
Setting the Flash Bar Position

You can set the position in the root canal where the apical action is being operated.

* These functions are available only in EMR-interlock endodontic mode.

EMR-interlock endodontic mode

Page 2



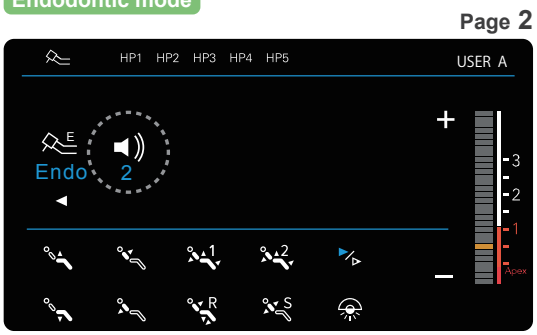
Set the Flash Bar position (yellow) using “+” or “−.”
The position can be set within a range from “Apex” to “2.”
The 0.5 reading on the meter indicates the area near the physiological apical foramen.

4.4.10 Setting Beep Alarm Sound Volumes

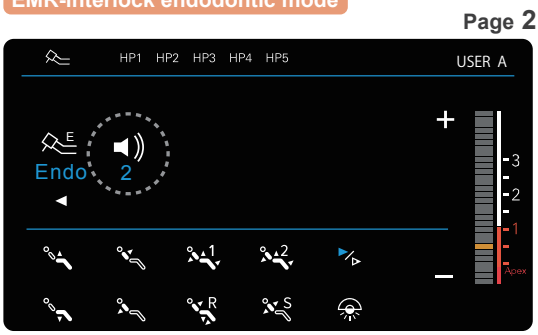
Beep alarm sound volumes can be set for the following. A beep alarm sound volume is set for each micromotor.

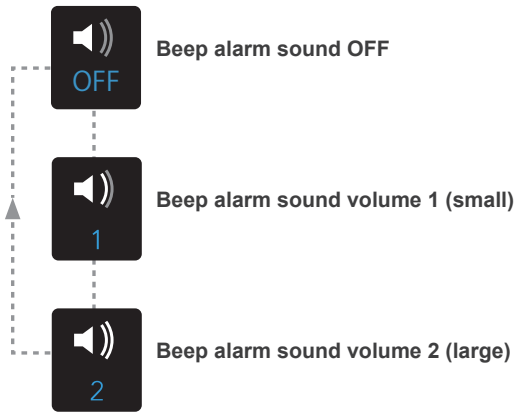
- Beep alarm sound alerting you that torque reverse is being operated
- Beep alarm sounds corresponding to the file tip position in the root canal

Endodontic mode



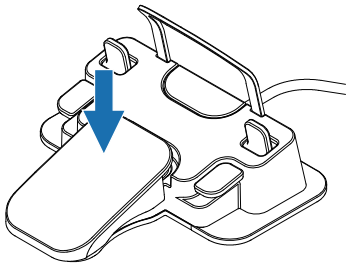
EMR-interlock endodontic mode





Foot control operation “Return to the Top Page”

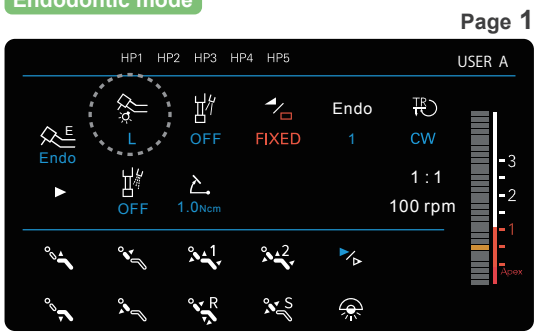
When the screen displays Page 2 or subsequent pages with the ultrasonic scaler picked up, step on the pedal to switch the screen to Page 1.



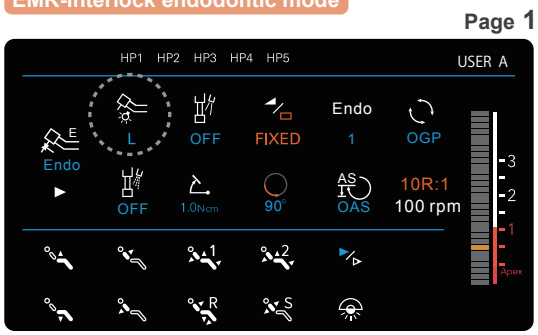
4.4.11 Setting the Handpiece Light

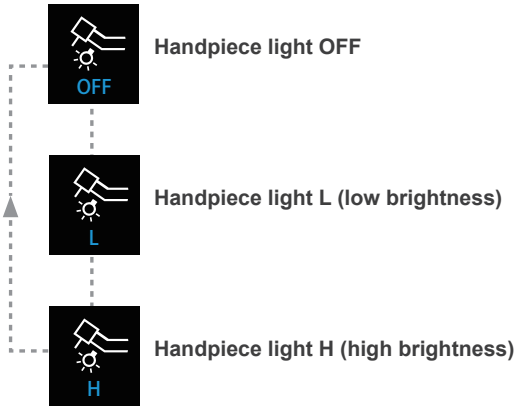
In this setting, you can switch the handpiece light between ON/OFF and two levels of brightness.
Each press switches the light from OFF to L (low brightness) and H (high brightness).
For devices without a light, this function is not available (light remains off).

Endodontic mode



EMR-interlock endodontic mode



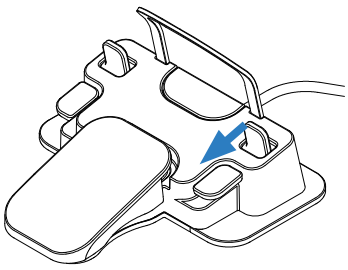


* The handpiece light can be set for each memory. Confirm that the water flow is OFF before using EMR-interlock endodontic mode.

Foot control operation
"Switching the Handpiece Light" Option

- All modes:

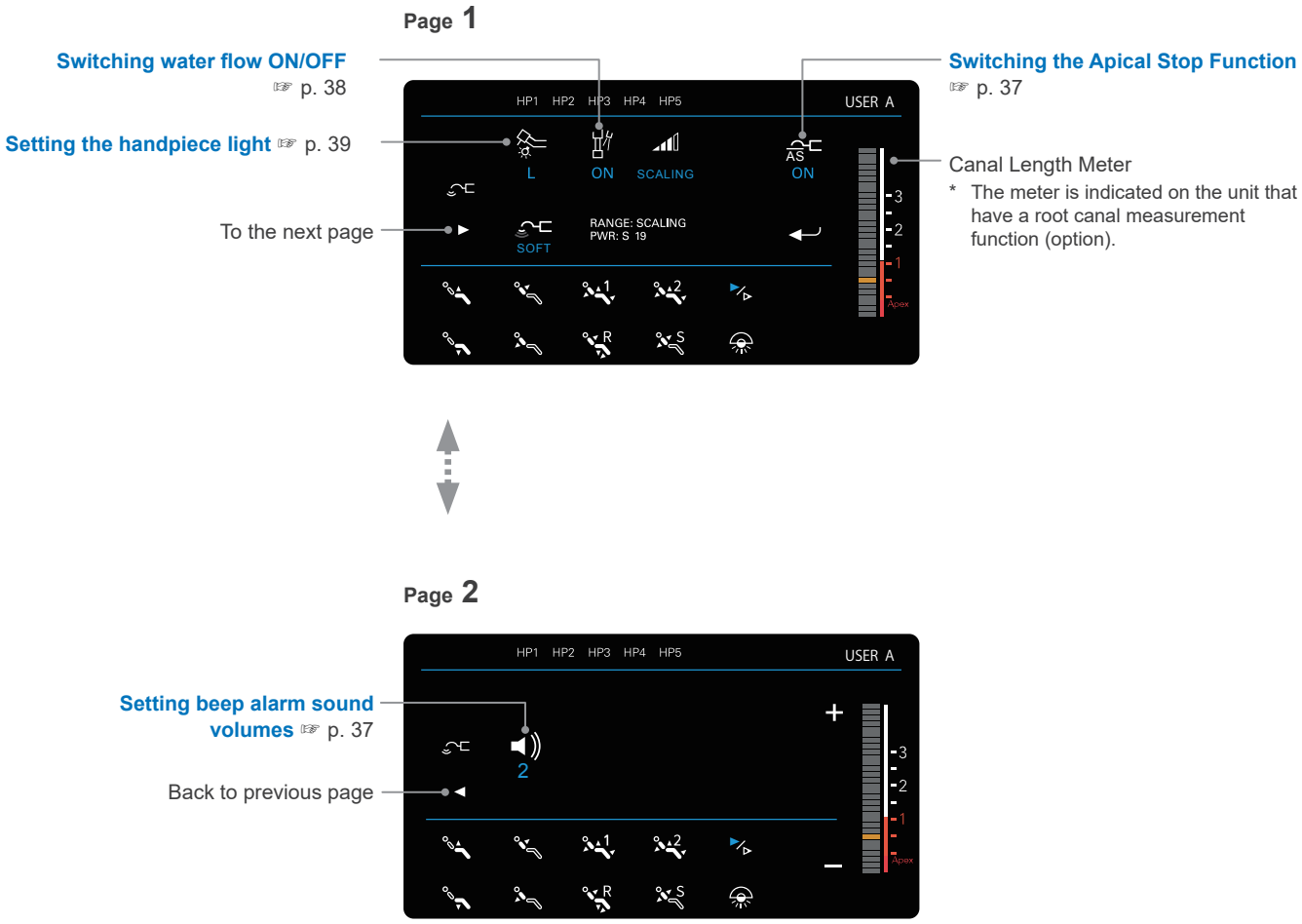
OFF → L → H



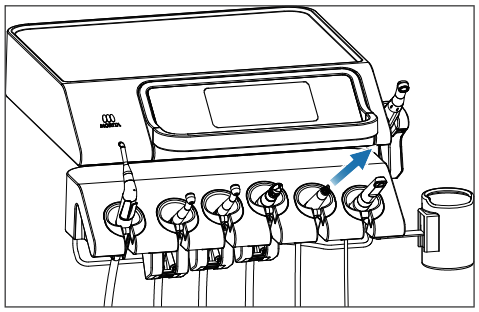
4.5 Ultrasonic Scaler (Solfy) Option

For details on how to operate the ultrasonic scaler (built-in model), be sure to read the separate operation instructions and medical device package insert.

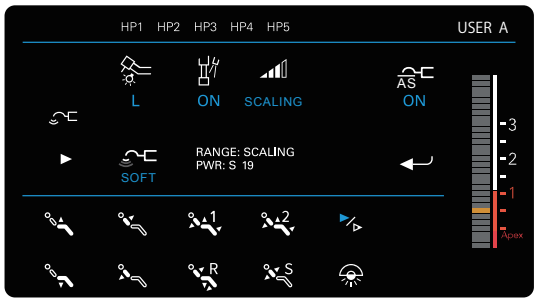
4.5.1 Basic Screen



4.5.2 Basic Operation

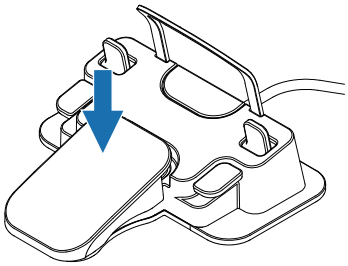


1 Pick up the ultrasonic scaler.



Ultrasonic scaler selection screen (model with built-in apex locator)

2 The ultrasonic scaler selection screen is displayed.



3 Step on the foot control pedal to start the micromotor and release the pedal to stop.
Chair operation is not possible while stepping on the pedal (during handpiece operation).

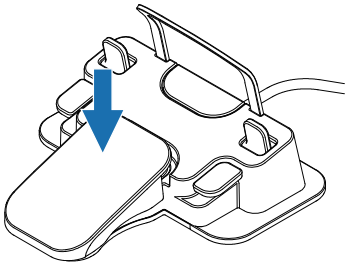
Confirm that the handpiece to be used is indicated on the system display and is properly configured.

⚠WARNING

- Move the handpiece into or out of the patient's mouth after the tip vibration has stopped.

Foot control operation "Return to the Top Page"

When the screen displays Page 2 or subsequent pages with the ultrasonic scaler picked up, step on the pedal to switch the screen to Page 1.



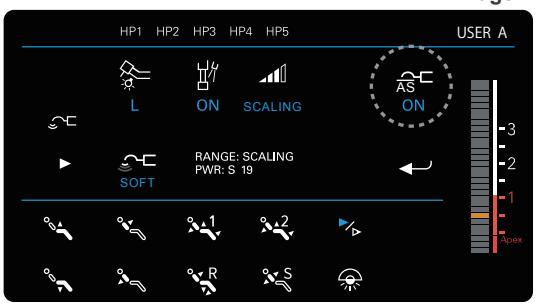
4.5.3 Setting the Function Interlocking with Root Canal Length Measurement (Apical Stop)

For chairs that incorporate the apex locator (option), the meter is indicated on the right corner of the screen.

Switching the Apical Stop Function

In this setting, you can switch vibration ON/OFF when the file tip reaches a self-set position in the root canal (the Flash Bar position).

Page 1



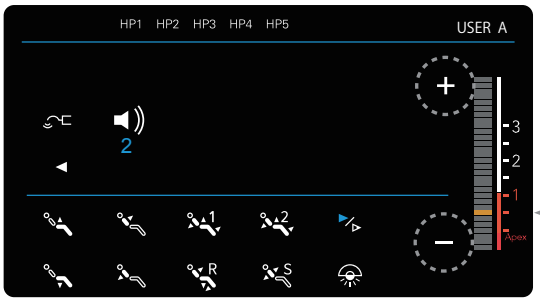
Apical stop ON
This function automatically stops the action.

Apical stop OFF
Turning the action OFF prevents the micromotor from automatically stopping so that the operation may continue even after the file reaches the Flash Bar position.

Setting the Flash Bar Position

You can set the position in the root canal where the apical stop is being operated.

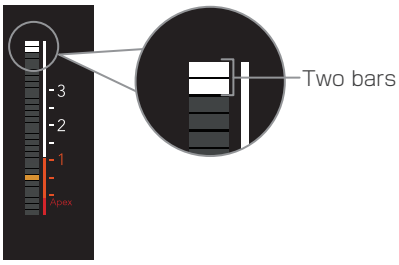
Page 2



Specify the position of the Flash Bar using “+” or “−.”
The position can be set within a range from “Apex” to “2.”
The 0.5 reading on the meter indicates the area near the physiological apical foramen.

Area near the physiological apical foramen

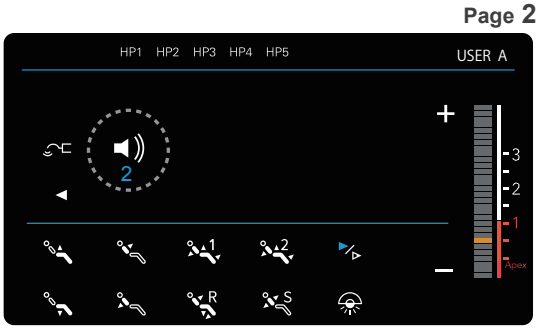
* When using the root canal length measurementfunction, two or more bars blinking on the meter locks measurement settings and chair operation.



Selecting Beep Alarm Sound Volumes

In this setting, you can set the volume of the alarm that sounds when the file tip reaches or advances beyond a self-set position in the root canal (the Flash Bar position).

Page 2



Beep alarm sound OFF

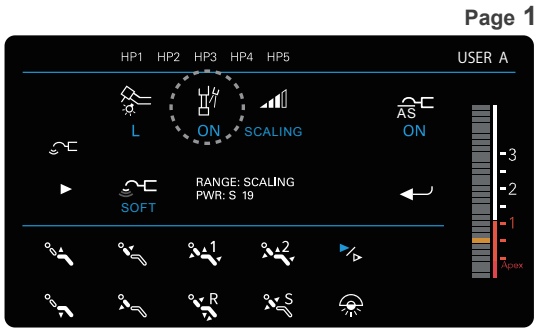
Beep alarm sound volume 1 (small)

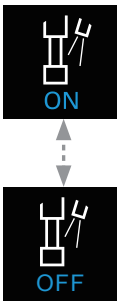
Beep alarm sound volume 2 (large)

4.5.4 Setting Water Flow

Switching water flow ON/OFF

Water flow can be switched ON/OFF on the system display or using the foot control switch.



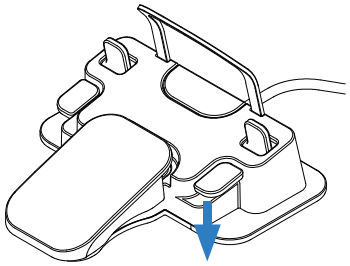


Water flow ON

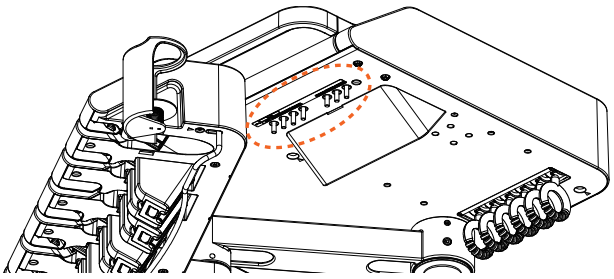
Water flow OFF

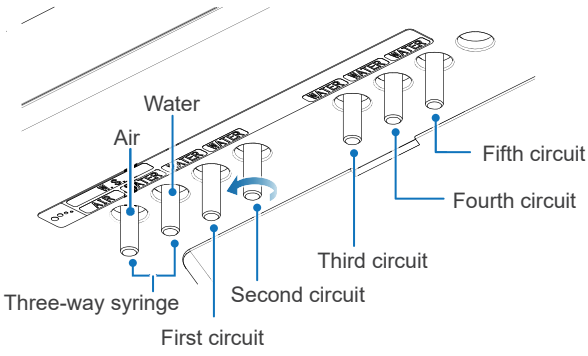
Foot control operation
“Switching water flow ON/OFF”

Water flow ON ⟷ Water flow OFF



Adjusting Water Flow

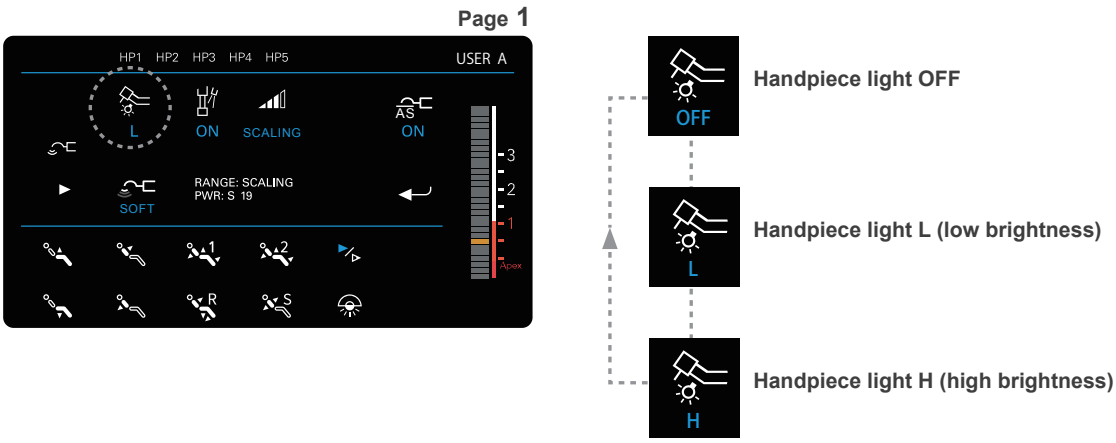




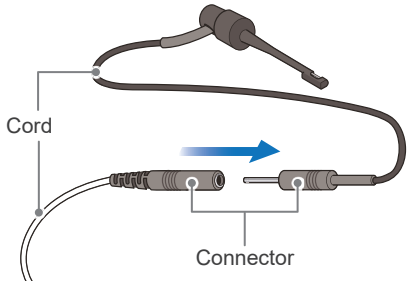
Adjust the water flow volume using the valves on the underside of the table.
Turn the valve in the direction of the arrow to increase the water flow volume and air flow volume.

4.5.5 Handpiece Light Setting

You can switch the handpiece light ON/OFF and change the brightness.

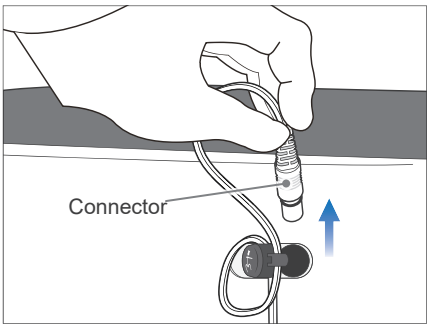


4.6 After Use



Disconnect Probe Cord.

Always disconnect the cord by gripping the connector. Never pull or yank on the cord itself.



4.7 Electronic Meter Reading (EMR)

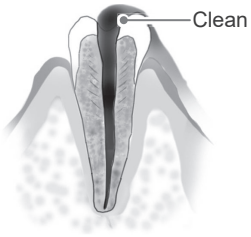
Root Canals not Suitable for Electronic Measurement

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

Root Canal with a large apical foramen

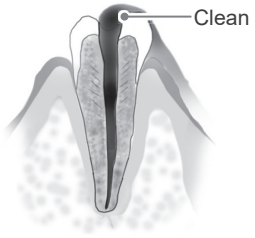
The root canal length of the tooth in which the root is absorbed due to a lesion or which has incompletely developed root is indicated shorter and cannot be accurately measured.

Root Canal with blood overflowing from the opening



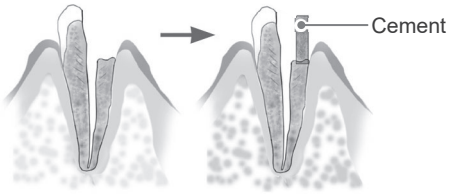
If blood overflows from the opening of the root canal and contacts the gums, this will result in electrical leakage and an accurate measurement cannot be obtained.
Wait for bleeding to stop completely. Clean the inside and opening of the canal thoroughly to get rid of all blood and then take a measurement.

Root Canal with chemical solution overflowing from the opening



If a chemical solution overflows from the opening of the root canal, an accurate measurement cannot be obtained.
Clean the inside and opening of the canal thoroughly to get rid of the chemical solution and then take a measurement.
Hemorrhage should be treated. You can detect the apex more reliably after wiping the chemical solution or blood in the root canal. Overflowing liquid should be cleaned thoroughly.

Broken crown

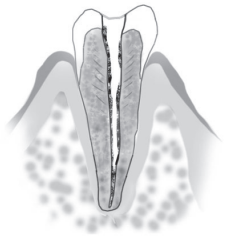


If the crown is broken and a section of the gingival tissue intrudes into the cavity surrounding the canal opening,contact between the gingival tissue and the file will result in electrical leakage and an accurate measurement cannot be obtained.
In this case, build up a barrier with cement to insulate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

Fractured tooth, Electrical leakage through a branch canal

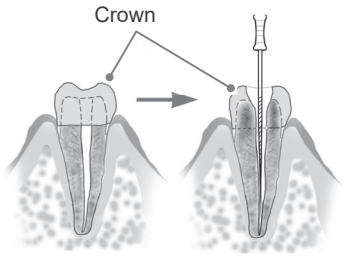
Fractured tooth will cause electrical leakage and an accurate measurement cannot be obtained.
A branch canal will also cause electrical leakage.

Re-treatment of a root filled with gutta-percha



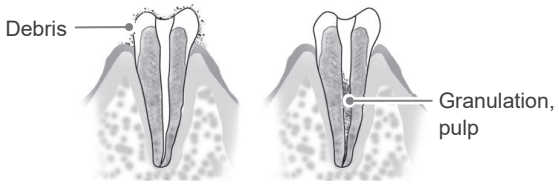
The gutta-percha must be completely removed to eliminate its insulating effect.
After removing the gutta-percha, pass a small file all the way through the apical foramen and then put a little saline in the canal, but do not let it overflow the canal opening.

Crown or metal prosthesis touching gingival tissue



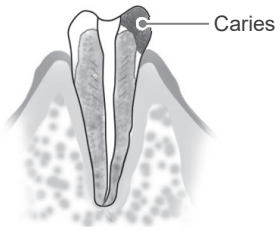
Accurate measurement cannot be obtained if the file touches a metal prosthesis that is touching gingival tissue. In this case, widen the opening at the top of the crown so that the file will not touch the metal prosthesis before taking a measurement.

Cutting debris on tooth, Granulation, Pulp inside canal



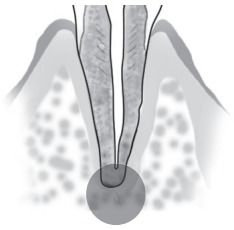
Thoroughly remove all cutting debris on the tooth.
Thoroughly remove all the pulp inside the canal; otherwise an accurate measurement cannot be obtained. If granulation penetrates into the root canal, the meter may wrongly detect the granulation as the apex.

Caries touching the gums



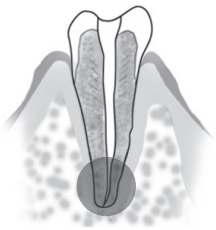
In this case, electrical leakage through the caries infected area to the gums will make it impossible to obtain an accurate measurement.

Blocked Canal



The meter will not move if the canal is blocked. Open the canal all the way to the apical constriction to measure it.

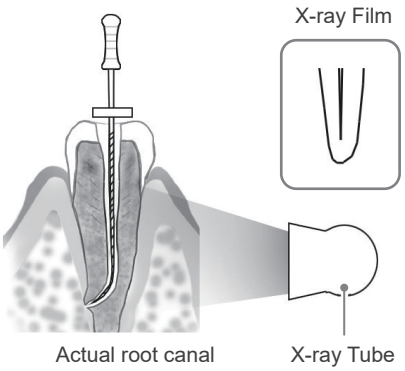
Extremely dry canal



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

Electrical Meter Readings and Radiography

Sometimes the electrical meter readings and the X-ray image will not correspond. This does not mean that the root canal length measurement function is not working properly or that the X-ray exposure is a failure. Depending on the angle of the X-ray beam, the apical foramen may appear to be located differently than it actually is.
In the example, the X-ray often seems to show that the position of apical foramen is deviated to the crown side because the actual foramen does not correspond with the anatomical apex.

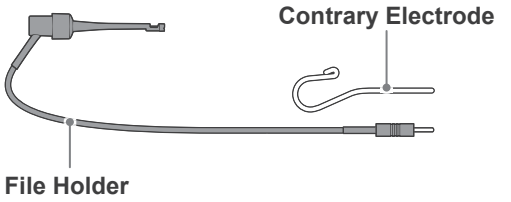


5 Maintenance

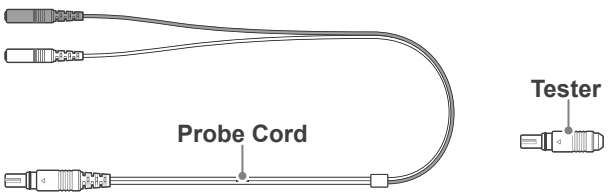
5.1 Cleaning

There are two ways to maintain components depending on the item. Be sure to follow the appropriate procedure according to the component when performing daily maintenance.

Autoclavable Components



Wipe with ethanol for disinfection



⚠WARNING

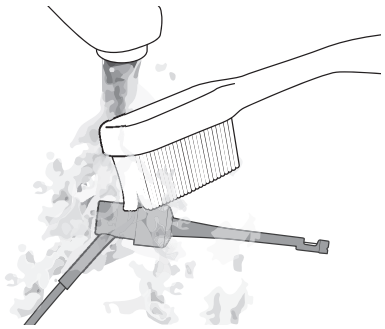
- The file holder and contrary electrode must be autoclaved after each patient's treatment has been completed.

Do not autoclave the probe cord.

5.1.1 Autoclaving

Be sure to follow the procedure below when performing autoclaving.

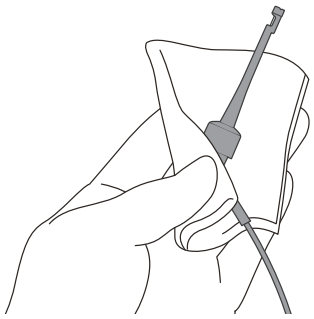
Cleaning → Disinfection → Packing → Sterilization



1 Cleaning

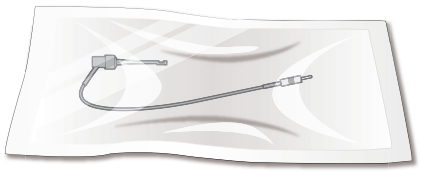
Clean the components off in running water with a soft brush.
And then wipe off the water.

The adhesion of a medical agent used for treatment to the components may cause malfunction or discoloration. After cleaning thoroughly, autoclave the component.



2 Disinfection

Wipe the components with a piece of gauze that has been dampened with ethanol for disinfection (ethanol 70 vol% to 80 vol%) and wrung out thoroughly.



3 Packing

Put the components in individual autoclave pouches and seal them.

4 Sterilization

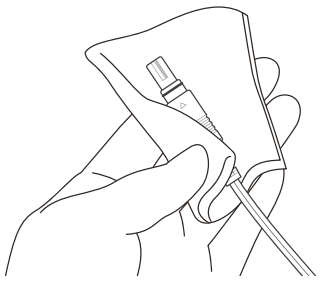
Autoclave the components after use for each patient.
Recommended temperature and time: 135°C (275°F), six minutes minimum in a sterilization pouch.

⚠CAUTION

- Do not sterilize the components by any method other than autoclaving.
- The file holder and contrary electrode are extremely hot after autoclaving; do not touch them until they cool off.

- Autoclaving and drying temperatures must never exceed 135°C (275°F).
- For sterilizing files, follow the manufacturer's instructions.

5.1.2 Wiping with Ethanol for Disinfection (Ethanol 70 vol% to 80 vol%)



Wipe the components with a piece of gauze that has been dampened with ethanol for disinfection (ethanol 70 vol% to 80 vol%) and wrung out thoroughly.

- Never wipe components with any solution other than ethanol for disinfection (ethanol 70 vol% to 80 vol%). Other solutions could cause cracking and discoloration.
- Avoid spilling chemical solutions used for treatment on the any of the components. Wipe up any chemical spills immediately. These chemicals could damage, deform or discolor plastic and metal. Use extra caution to avoid spilling formalin cresol (FC) and sodium hypochlorite as they are quite strong.

5.2 Micromotor

For maintenance of the micromotor, follow the package insert and operation instructions.

5.3 Ultrasonic Scaler

For maintenance of the ultrasonic scaler, follow the package insert and operation instructions.

5.4 Transport and Storage

Transport and storage environments:

Temperature: -10°C to 70°C (14°F to 158°F)
Humidity: 10% to 85% (without condensation)
Atmospheric Pressure: 70kPa to 106 kPa

- Avoid frequent or continuous exposure to direct sunlight.
- If the equipment has not been used for a while, make sure it operates properly and safely before using it again.

6 Maintenance and Inspection

Responsibility for Maintenance and Inspection

The user (medical institutions, hospitals and clinics) is responsible for maintenance and inspection of the medical device.

* This apparatus should be inspected every 6 months in accordance with the following maintenance and inspection items.
* 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, they may rely on a qualified medical device service provider. Consult your local dealer or J. MORITA OFFICE for details.
* If your equipment needs to be repaired, contact your local dealer or J. MORITA OFFICE for details.

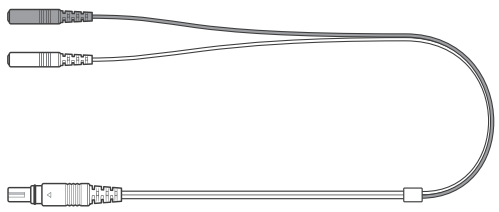
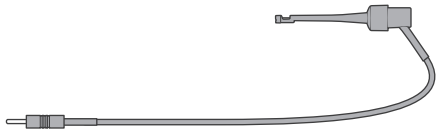
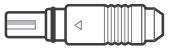
Items to be inspected

- Insert the Tester and check that the indicator is within three bars above or below 1 on the meter.
- Press the Reference button to make sure it changes from 1 to 2 to 3, etc.
- Check that the probe cord can be properly plugged into its jack on the shoulder of the chair.
- Check that the file holder's plug can be connected properly to the probe cord and that the file holder can be clipped onto a file. Check the contrary electrode can be plugged into its probe cord connector.
- Touch the contrary electrode with the file holder and make sure all the bars on the meter light up.

Disposal of Medical Devices

Any medical devices which could possibly be contaminated must be first decontaminated by the responsible dentist or doctor and then be disposed of by an agent licensed and qualified to handle medical and industrial waste upon the request from the medical institution.

Parts List

Probe Cord (1) Code No. : 3177999	**File Holder** (5) Code No. : 7503670
	
Contrary Electrode (5) Code No. : 7503680	**Tester** (1) Code No. : 9039953
	

7 Troubleshooting

7.1 Items to be Checked before Requesting Repair

If the equipment does not seem to be working properly, the user should first try to inspect and adjust it themselves.

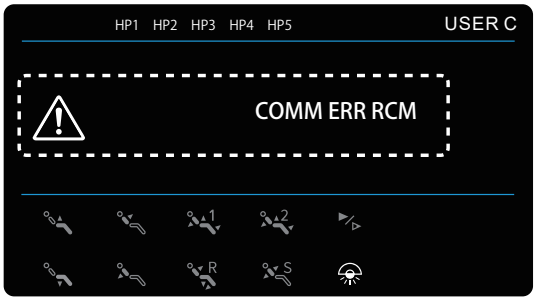
* If the user is unable to inspect the equipment themself or if the equipment fails to work properly after being adjusted or after parts are replaced, contact your local dealer or J. MORITA OFFICE.

Problem	Check Points	Response
Cannot make a Measurement.	Check cord connections.	Check that all connections are properly secured.
	Check probe cord for broken wire.	Touch the contrary electrode to the file holder to check probe cord conductivity.
Beep Alarm Sound doesn't sound.	The beep alarm sound volume may set to OFF.	Turn sound on. (☞ p. 10)
The chair doesn't work.	Two or more bars on the meter may be blinking.	When two or more bars on the meter are blinking, measurement settings and chair operation are locked. If the chair doesn't work even after measurement is canceled, contact your local dealer or J. MORITA OFFICE.
Reference numbers will not change.	Are you currently making a measurement?	Reference numbers cannot be changed while making a measurement.
	Switch may not be working.	In this case, the switch may be defective.
	Two or more bars on the meter may be blinking.	Remove the file out of the patient's mouth and operate it after the meter has turned off.
The canal length meter is unstable.	Is the contrary electrode making good contact with oral mucosa?	Make sure the contrary electrode makes good contact with the oral mucosa.
	Is the file holder dirty?	Clean the file holder with ethanol for disinfection (ethanol 70 vol% to 80 vol%).
The canal length meter does not move at all or only when the file tip is close to the apical foramen.	Is the canal blocked?	Open the passage all the way through the apical constriction first and then take the measurement.
	Is the apical foramen very large and open?	If the apical foramen is large or wide open and not completely formed, the canal length indicator bar will suddenly jump when the file tip gets close to the apex.
	Is the canal extremely dry?	Moisten the canal with hydrogen peroxide or a saline solution.

Problem	Check Points	Response
The canal length meter overreacts or is too sensitive. (Measurements are too short. Poor accuracy. Erratic results.)	Is blood or a chemical solution overflowing from the opening of the crown?	If blood or other fluids overflow the canal, the current will leak to the gums and the meter will jump to Apex. Clean the canal, canal opening and tooth crown thoroughly.
	Is the canal filled with blood, saliva or chemical solution?	The canal length indicator bar may suddenly swing when it breaks the surface of fluids inside the canal. But it will return to normal as the file is advanced down toward the apex.
	Is the tooth surface covered with cutting debris or chemical solution?	Clean the entire tooth surface.
	Is the file touching the gingival tissue?	This will cause the canal length indicator bar to suddenly jump all the way to the “Apex.”
	Is there pulp tissue left inside the root canal?	Accurate measurements cannot be obtained if a large amount of pulp tissue is left inside the root canal.
	Is the file touching a metal prosthesis?	Touching a metal prosthesis with the file allows a flow of current to the gingival tissue or periodontal pocket and will cause the meter to jump to the “Apex.”
	Is the tooth surface infected with caries?	Current can flow through the caries infected area to the gums and prevent an accurate measurement from being obtained.
	Are there lateral canals or is the tooth fractured?	The canal length indicator bar may jump to “Apex” when it reaches the opening of a lateral canal or the opening of a fractured tooth that allows the current to flow to the gingival tissue.
	Is a broken crown allowing leakage of electric current?	A lesion can destroy the apical foramen through absorption and an accurate measurement cannot be obtained. Build up an insulating barrier to stop the leakage.
	Is there a lesion at the apex?	
	Is the file holder broken or dirty?	Replace or clean the file holder.
During a root canal enlargement and preparation operation, the motor stops rotation and the file penetration prevents it from being pulled out.		Press the push button of the handpiece in the patient’s mouth to remove the file. Then, hold the file by hand and pull it out with caution to prevent breakage.

7.2 Error Display

If the following error messages appear on the panel display during use, refer to the table below and performed the recommended checks and actions.
If the error is not resolved even when the following checks and actions are performed, or if any abnormality other than those described in the table is found, please stop using the device and consult your reseller or nearest J. MORITA OFFICE.



Display	Possible causes	Checks and Actions
COMM ERR RCM	Wire disconnection and circuit board fault	Contact your local dealer or J. MORITA OFFICE for inspection or repair.
ERR LS OVERHEAT	Abnormal overheat of micromotor	Stop using the micromotor and leave it for a while until it has cooled thoroughly. Contact your local dealer or J. MORITA OFFICE if the error occurs frequently.
ERR LS	Wire disconnection and circuit board fault	Contact your local dealer or J. MORITA OFFICE for inspection or repair.
COMM ERR RCM	Wire disconnection and circuit board fault	Contact your local dealer or J. MORITA OFFICE for inspection or repair.

8 Technical Specifications

* Specifications may be changed without notice due to improvements.

Name	Root ZX mini U (Built-in Model)
Model	RCM-7-CU
Intended Use	The Root ZX mini U (Built-in Model) is intended to detect the apex of the root canal.
Operating Principle	The impedance in the root canal is measured by measuring at two frequencies and the position of the treatment instruments in the root canal is detected.
Mode of operation	Continuous
Power supply	DC 5 V
Power Rating	0.2 W
Measurement Voltage	AC 80 mV, maximum
Measurement Current	10 μA, maximum
Manufacturer	J. MORITA MFG CORP.

9 Electromagnetic Disturbances (EMD)

The Root ZX mini U (Built in Model) conforms to the relevant international standard for electromagnetic disturbances (EMD).
For details, refer to the accompanying user manual for the dental treatment unit.

■ Essential Performance

None

10 After-sales Service and Contact Information

The Root ZX mini U (Built-in Model) may be repaired and serviced by:

- The technicians of J. MORITA's subsidiaries all over the world.
- Technicians employed by authorized J. MORITA dealers and specially trained by J. MORITA.
- Independent technicians specially trained and authorized by J. MORITA.

Diagnostic and Imaging Equipment

Treatment Units

Handpieces and Instruments

Endodontic System

Laser Equipment

Laboratory Devices

Educational and Training Systems

Auxiliaries

MORITA

Authorized representative in the European Community

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More Infos about Products: **www.dental-plaza.com**

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