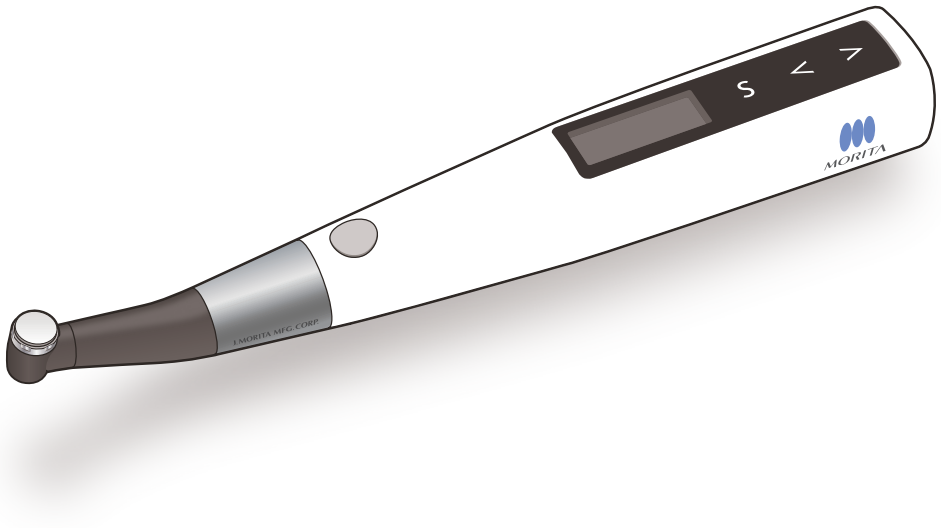
MORITA



Multipurpose Dental Treatment Motor

Tri Auto ZX2

Operation Instructions

Thinking ahead. Focused on life.

CE
0197

Thank you for purchasing the Tri Auto ZX2.

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 quick and easy reference.

■ Registered Trademarks and Brand Names
The names of companies, products, services etc. used in this manual are either registered trademarks or brand names.

Overview and Features

Tooth Icons

Normal Canals
Canals with normal shapes. This is for most canals.

High Difficulty Canals
Extremely curved canals, ledged canals, blocked canals, etc.

Linkage to Canal Measurement Function
If the contrary electrode is applied to the patient, the instrument can be linked to the canal measurement function while it is being used.

Canal Shapes

Almost all canals can be treated with the default settings of the memories from m1 to m4.
(☞p.16)

Use this instrument for the first time, refer to "Canal Shaping (for normal canals)".
(☞p.20)

Modes

The Tri Auto ZX2 has 5 different operating modes which can be used for depending on your intended use.
(☞p.10)

Memories

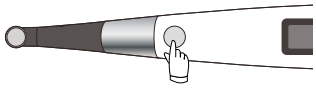
There are 8 memories with different combinations of motor operation, speed etc. that can be used at different stages of the treatment. Memory settings can be customized.
(☞p.33)

Before Use p.12

Canal Treatment p.16

Turn Power On

Press the Main switch.



1 Upper Part Shaping

Enlarge the upper part of the canal to make treatment easier

Memory: m2
Mode: CW
☞ p.20 2

Memory: m2
Mode: CW
☞ p.22 2

2 Canal Measurement

Measure the canal to determine the working length.

Memory: m1
Mode: EMR
☞ p.18

Memory: m1
Mode: EMR
☞ p.18

3 Glide Path

Use a thin file to make the glide path needed for shaping

Memory: m3
Mode: OGP
☞ p.21 4

Memory:
m5 or m6
Mode: OGP
☞ p.23 4 5

4 Canal Shaping

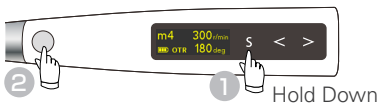
Change file sizes as you shape the canal.

Memory: m4
Mode: OTR
☞ p.21 5

Memory: m7
Mode: OTR
☞ p.23 6

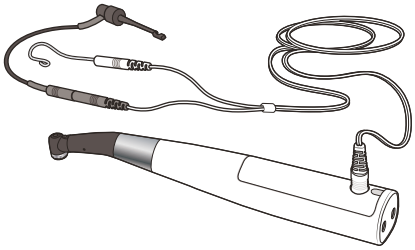
Turn Power Off

Hold the Select switch and then press the Main switch.



Maintenance p.28

For Canal Measurement and Linkage



Canal shaping can be safely made by being linked to the canal measurement function.

Rotation is controlled automatically at a point specified inside the canal. This insures safety by preventing perforation of the apical foramen.

- **OAS (Optimum Apical Stop)**
  File reverses slightly and then stop.
- **Auto Apical Reverse**
  File automatically reverses rotation.
- **Auto Apical Stop**
  File stops automatically.

(Apical Action ☞p.36)

Glide path can be made with the motor.

The motor reproduces the subtle and delicate finger movements of an experienced dentist.
Penetration can be performed efficiently with a thin Ni-Ti file or a #15 stainless steel file.

(OGP Function ☞p.39)

Canal shaping can be made safely and efficiently without distorting the original shape.

The file alternates between forward and reverse rotation delicately in response to the load applied to it. The makes for safe and efficient treatment by reducing jamming, breakage, ledge, and perforation.

(OTR Function ☞p.39)

Table of Contents

Prevent Accidents

Attention Customers

Do not fail to receive clear instructions concerning the various ways to use this instrument as described in this accompanying Operation Instructions.
Fill out and sign the warranty and give the dealer from whom you purchased the instrument his copy.

Attention Dealers

Do not fail to give clear instructions concerning the various ways to use this instrument as described in this accompanying Operation Instructions.
After instructing the customer in the operation of the instrument, have him fill out and sign the warranty. Then fill in your own section of the warranty and give the customer his copy. Do not fail to send the manufacturer's copy to J. MORITA MFG. CORP.

Prevent Accidents

Most operation and maintenance problems result from insufficient attention being paid to basic safety precautions and not being able to foresee the possibilities of accidents.
Problems and accidents are best avoided by foreseeing the possibility of danger and operating the instrument in accordance with the manufacturer's recommendations.
First, thoroughly read all precautions and instructions pertaining to safety and accident prevention; then, operate the instrument with the utmost caution to prevent either damaging the instrument 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 alerts the user of possibility of extremely serious injury or complete destruction of the instrument as well as other property damage including the possibility of fire.
⚠CAUTION	This alerts the user of possibility of minor or moderate injury or damage to the instrument.
(Usage Note)	This informs the user of important points concerning operation or the risk of instrument damage.

The user (i.e., healthcare facility, clinic, hospital etc.) is responsible for the management, maintenance and use of medical device.
This instrument must only be dentists and other legally licensed professionals.

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

⚠WARNING

- No modification of this instrument is allowed.

⚠PROHIBITION

- Do not use this instrument on patients who have implanted pacemakers or defibrillators.

⚠IMPORTANT PRECAUTIONS

These caution remarks are especially critical for safe operation and use.

- Do not use the wireless transmission devices listed below in the examination area:

1. Cell phone terminals.
2. Wireless transmitting devices such as ham radios, walkie-talkies, and transceivers.
3. Personal Handy-phone System (PHS)
4. Routers for intra-building paging systems, wireless LAN, cordless analogue telephones, and other electric wireless devices.

- This instrument could be adversely affect by the electromagnetic radiation produced by electric scalpels, illumination devices etc. that are being used nearby.
- Do not perform maintenance while using the instrument for treatment.

Disclaimer

J. MORITA MFG. CORP. will not be responsible for accidents, instrument damage, or bodily injury resulting from:

1. Repairs made by personnel not authorized by J. MORITA MFG. CORP.
2. Any changes, modifications, or alterations of its products.
3. The use of products or equipment made by other manufacturers, except for those procured by J. MORITA MFG. CORP.
4. Maintenance or repairs using parts or components other than those specified by J. MORITA MFG. CORP. and other than in their original condition.
5. Operating the equipment 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. Fires, earthquakes, floods, lightning, natural disasters, or acts of God.

J. MORITA MFG. CORP. will supply replacement parts and be able to repair the product for a period of 10 years after the manufacture of the product has been discontinued. For the duration of this period, we will supply replacement parts and be able to repair the product.

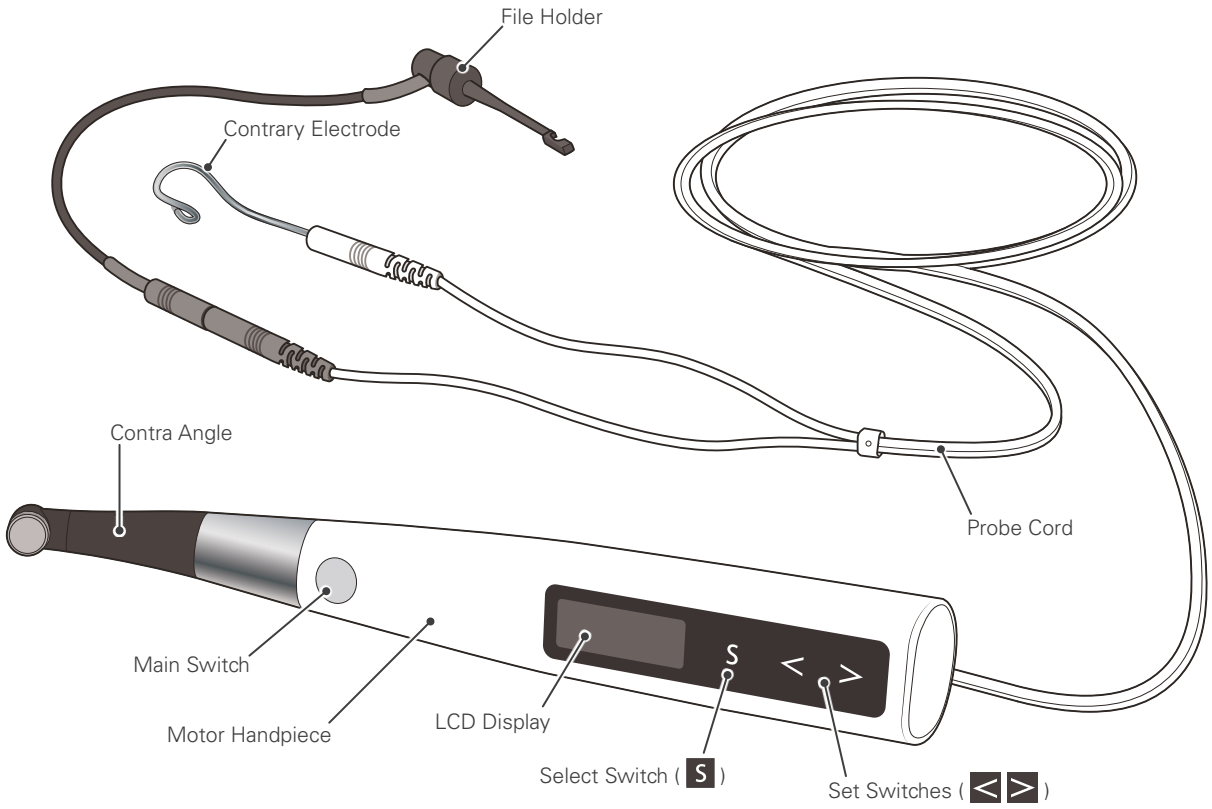
In Case of Accident

If an accident occurs, the Tri Auto ZX2 must not be used until repairs have been completed by a qualified and trained technician authorized by the manufacturer.

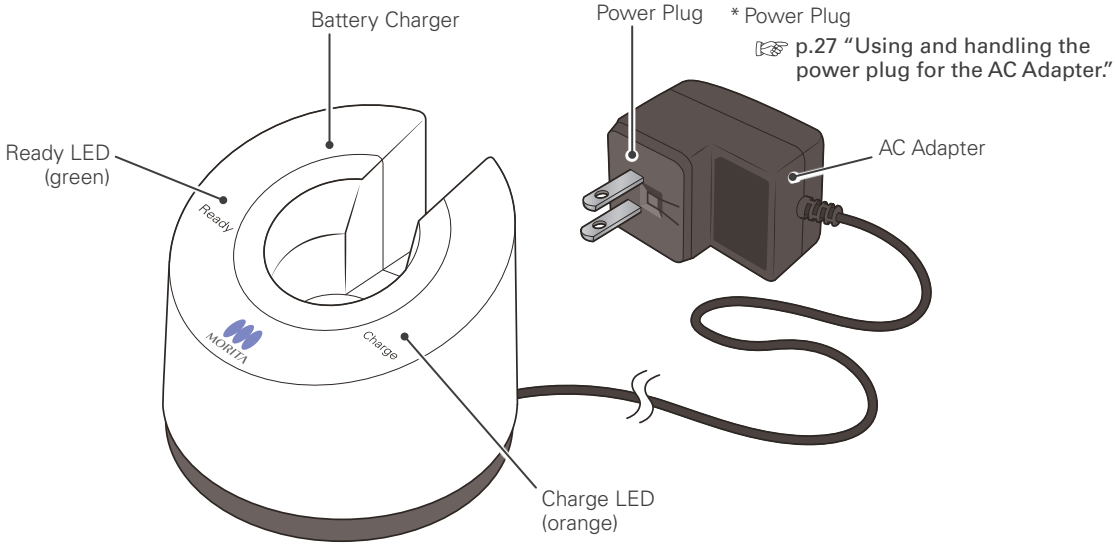
Parts Identification and Display Screens

Parts Identification

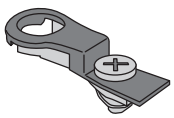
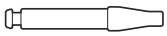
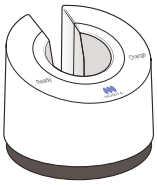
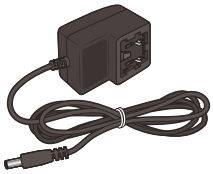
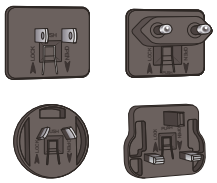
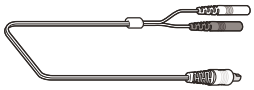
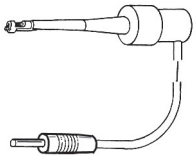
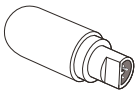
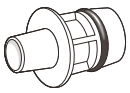
Handpiece



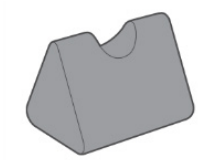
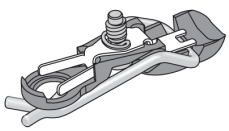
Battery Charger



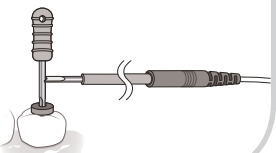
Components and Accessories

Motor Handpiece (1) 	Contra Angle (1) 	Built-in Electrode (1) * Pre-installed in Contra Angle 	Guide Bur (1) 
Battery Charger (1) 	Battery * Pre-installed in Motor Hand-piece 	AC Adapter (1) 	Power Plugs (one each of 4 types) 
Probe Cord (1) 	File Holder (1) 	Contrary Electrodes (3) 	Tester (1) 
HP Protective Sleeve Type A (30) * Replace for each patient. Never be re-used. 	Spray Nozzle (1) * Keep this nozzle and use it again when replacing the LS spray can. 	LS Spray (1) (sold separately) 	

Options (sold separately)

Handpiece Holder 	External File Electrode (with cap) 	Long File Holder 

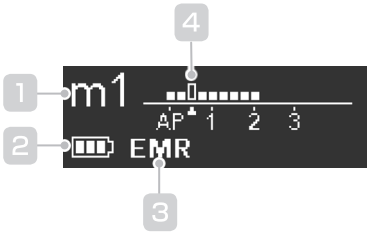
Using the long file holder



Display Screens for 5 Operation Modes and Standby

EMR Mode

This mode is for the canal measurement.
*The motor does not run in this mode.



1 Memory No.
2 Residual Battery Power
3 Operation Mode
4 Flash Bar Position

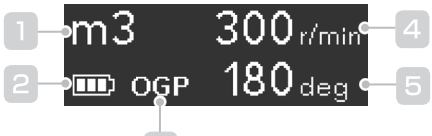
CW Mode

The motor rotates forward 360°.
Torque reverse and other functions can be used.

1 Memory No.
2 Residual Battery Power
3 Operation Mode
4 Speed Setting
5 Torque Limit Setting

OGP Mode

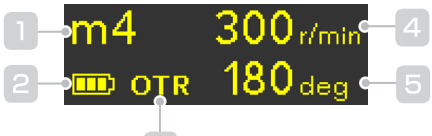
The OGP (Optimum Glide Path) function (☞p.39) is used for the canal negotiation making the glide path.



1 Memory No.
2 Residual Battery Power
3 Operation Mode
4 Speed Setting
5 Rotation Angle

OTR Mode

The OTR (Optimum Torque Reverse) function (☞p.39) is used for the canal shaping.



1 Memory No.
2 Residual Battery Power
3 Operation Mode
4 Speed Setting
5 Rotation Angle

CCW Mode

The motor rotates counterclockwise direction only. This mode is used to inject calcium hydroxide and other medicant.

*When this mode is being used, a double-beep sounds continuously.

1 Memory No.
2 Residual Battery Power
3 Operation Mode
4 Speed Setting
5 Torque Limit Setting

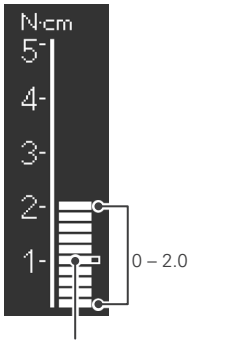
Display during Operation

Torque Display (This appears when the motor is running.)

Meter shows the torque load on the file. The color of the display changes depending on the torque load as shown below.

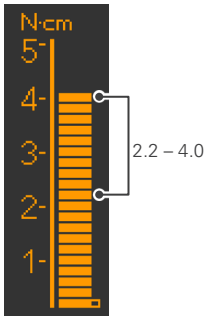
There is some discrepancy in the torque value depending on condition of the motor and contra angle and this value is used only as a reference.

Torque Value
0 – 2.0 N•cm

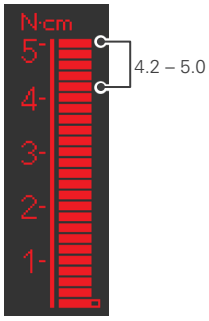


Torque Limit or Trigger Torque
(☞p.35)

Torque Value
2.2 – 4.0 N•cm



Torque Value
4.2 – 5.0 N•cm

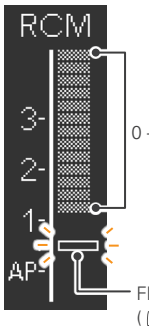


Canal Measurement Display (This appears when a file is inside the canal and the contrary electrode is applying the patient.)

Bars in meter show the location of the file tip. The color of the display changes depending on location of the file inside the canal as shown below.

*The meter numbers 1, 2, and 3 do not represent the actual length from the apical. These numbers are used to estimate the canal's working length.

Location Inside Canal
0 – 13 bars



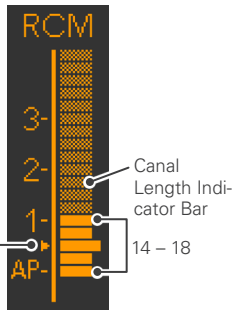
(☞p.37)

Alarm Sound: slow beep — There is slow beeping sound between bars 10 – 13.

Alarm Sound: continuous beep — A sustained beep sounds when the file tip reaches the flash bar point.

Location Inside Canal
14 – 18 bars

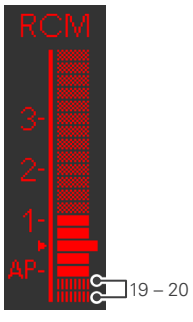
The meter's 0.5 reading (▶) indicates that the file tip is located very near the physiological apical foramen.



Alarm Sound: fast beep — There is fast beeping sound between bars 14 – 18.

Alarm Sound: continuous beep — A sustained beep sounds when the file tip reaches the flash bar point.

Location Inside Canal
19 – 20 bars



Alarm Sound: continuous beep — A sustained beep sounds if the file tip goes this far.

Usage

1. Operation and Storage Conditions

● Use and store the Tri Auto ZX2 under the following conditions.

Operation Conditions: Temperature: 10 – 35°C (50 – 90°F); Humidity: 30 – 80% RH (without condensation); Atmospheric Pressure: 80 – 106 kPa

Storage Conditions: Temperature: -10 – 45°C (14 – 113°F); Humidity: 10 – 85% RH (without condensation); Atmospheric Pressure: 70 – 106 kPa

* Do not expose the Tri Auto ZX2 to direct sunlight for an extended period of time.
* If the instrument has not been used for some time, make sure it works properly before using it again.
* Always remove the battery prior to storing or shipping the instrument. ☞p.42

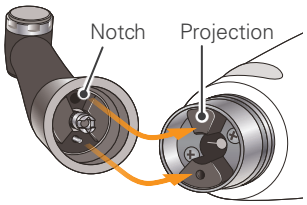
2. Before Use

Check the followings before using the instrument.

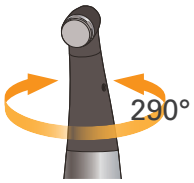
- Has everything been autoclaved? ☞p.28 "Autoclavable Components"
- Is the battery sufficiently charged? ☞p.26 "Battery Charging"

Assembling Components

1 Connect Contra Angle



Line up the notch inside the contra angle with the projection inside the motor and slide it in until it clicks securely into place.



The contra angle rotates 290° so that the LCD display can always be viewed easily.

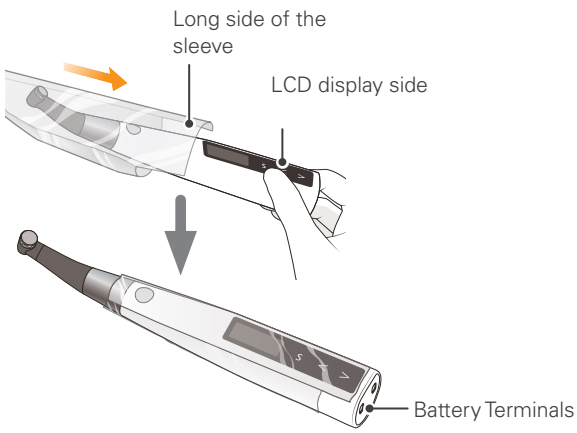
⚠WARNING

- Make sure the connection ends of the motor handpiece and the contra angle are not damaged. If these are damaged, the load on the contra angle could cause the motor to reverse rotation, and this might result in an injury to the oral cavity.

⚠CAUTION

- Push the contra angle all the way onto the motor handpiece and then give it a light tug to make sure it is securely attached.
- The contra angle does not rotate freely. Do not try to rotate it past its stopper.

2 Put on a protective sleeve



Put the HP protective sleeve on so that its long side is on the LCD display side.

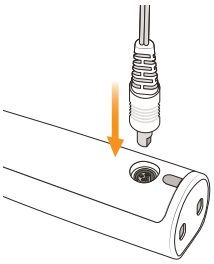
⚠WARNING

- A new HP protective sleeve must be used for each patient. (Never be re-used.)

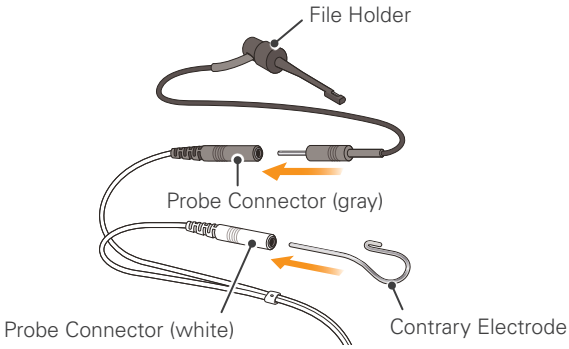
❗ If you hold the contra angle when you put the sleeve on, the contra angle might come off. Always put in on by pushing on the battery terminal end of the motor.

❗ Make sure the sleeve is not torn.

3 Connect Probe Cord



Connect the probe cord to the motor handpiece. Line up the probe jack with the notch for its mate of the back of the motor and push it all the way in.



Connect the file holder plug into the probe connector (gray) on the probe cord. Connect the contrary electrode to the probe connector (white).

* This is not required if the canal measurement function will not be used.

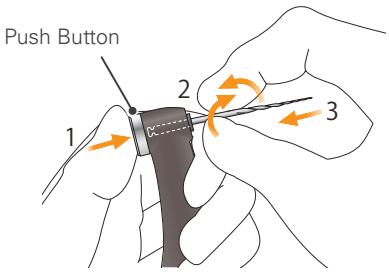
⚠CAUTION

- Do not bang or bump the plugs when they are inserted.
- Make sure the plug is all the way in. Otherwise canal measurements cannot be made.
- Do not wind the handpiece cord around the instrument.

⚠CAUTION

- Match colors to connect the file holder and contrary electrode. Accurate measurement cannot be made if there are reversed.

4 Install File



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

* Use only Ni-Ti or properly designed stainless steel files.

⚠WARNING

- Files are expendable, and they eventually wear out. Replace them before they break.
- Never use stretched, deformed or damaged files.
- Make sure the file is all the way in. Give the file a light tug to confirm it is securely held in place. If the file is not securely placed, it could come out and injure the patient.
- Make sure the screw is tight enough. Otherwise, it might come out and be swallowed. Also, canal measurements might not be accurate.

⚠CAUTION

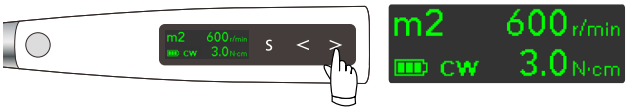
- Be careful when inserting and removing files to avoid injury to fingers.
- Inserting and removing files without holding the push button may damage the chuck.
- Take care not to touch the Main switch when putting files in. This will cause the file to rotate.
- If there is no electrical conductivity between the file and its shank, replace the cap with the one that has an external file electrode.
☞p.44 “External File Electrode”
- Do not use files with shanks larger than the ISO standard. These cannot be properly installed. (ISO standard: Ø2.334 – 2.350 mm)

Check Motor

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

Check the followings before turning on the instrument.

- Make sure the contra angle and the motor handpiece are securely connected.
- Make sure the file is securely installed in the contra angle.



Press the Right-Select switch (>) to select "m2"*.

* This is the default setting.
If m2 is set for EMR mode, select a memory that is not EMR mode.

Press the Main switch and make sure the motor runs smoothly.

The torque meter appears when the motor is running.

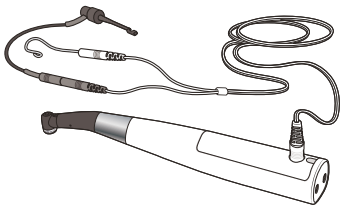
If there are abnormal vibrations or noises, stop using the instrument immediately and contact your local dealer or J. MORITA OFFICE.

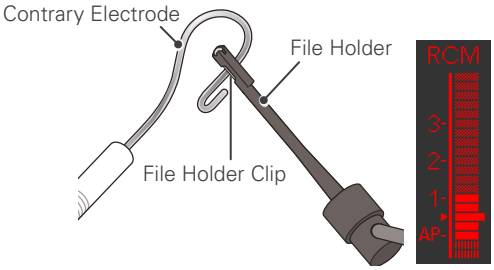
Check Canal Measurement Function

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

Check the followings before turning on the instrument.

- Make sure the file holder and the contrary electrode are properly connected to the probe connector.
- Make sure the probe cord is properly plugged into its jack on the motor handpiece.

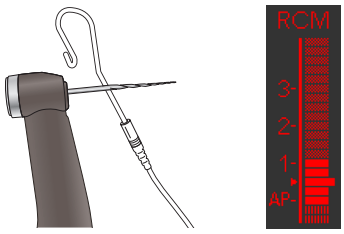




Touch the contrary electrode with the clip on the end of the file holder and check that all the indicator bars on the meter in the LCD display light up.

⚠WARNING

- Check the instrument's function before use with each patient. If all the indicator bars do not light up, an accurate measurement cannot be made. In this case, stop using the instrument immediately and have it repaired.

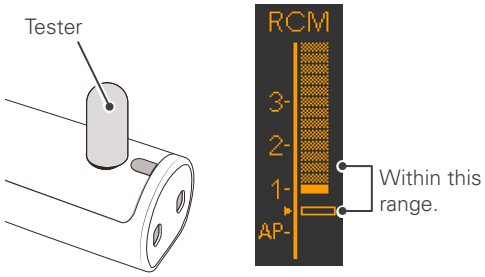


Touch the contrary electrode with the file in the contra angle and check that all the bars on the meter in the display light up.

Check with Tester

Check the instrument's measurement accuracy with the tester at least once a week.

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

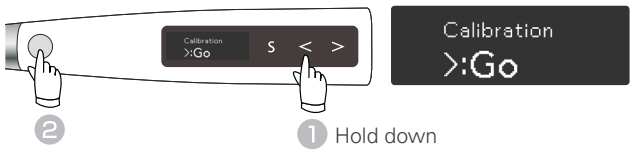


Connect the tester to the probe cord jack on the back of the motor handpiece.
Check that the canal length indicator bars light up to within two bars of the bar number 1.*1

* The canal length indicator bars may flicker up or down momentarily when the tester is plugged in.
Wait for about 1 second for the indicator bar to stabilize and then check it.

*1 If the meter lights up to three bars more or less than bar number 1, the instrument cannot make an accurate measurement. In this case, stops using the instrument immediately and contact your local dealer or J. MORITA OFFICE.

Calibration



With the instrument turned off, hold down the Left-Set switch (<) and then press the Main switch. The calibration display will appear.

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.
- Whenever, in the OTR mode, the instrument always alternates between forward and reverse rotation and never rotates forward continuously.

Press the Right-Set switch (>). Calibration will be performed. After calibration, the instrument will automatically return to the Standby display.

* Calibration is automatically performed from 100 to 1,000 r/min.

! Perform calibration with the contra head attached. If calibration is performed with a file inserted, be careful not to injure your fingers.

3. Operation

Select the memory appropriate to the treatment to be performed.
The main uses, operation modes, and apical actions for the default settings of each mode are listed below.

The following explanation is base on the default settings.

⚠CAUTION

- Since the following is based on the default settings, use changed settings for your own treatment procedures.
- Always check the settings after changing the memory number.

Default Settings

Almost all canals can be treated with the default settings of the memories from m1 to m4. However, settings can be changed to suit various stages of treatment.

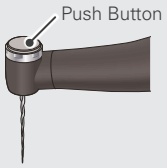
We recommend using the default settings until the user has gotten used to how the instrument works.

Memory	Main Uses with Default Settings	Operation Mode ☞p.34	Apical Action ☞p.36
m1	Canal measurement	EMR	—
m2	Shape the upper part of canal.	CW (forward)	OAS
m3	Negotiation and making a glide path for a normal canal	OGP	OAS
m4	Canal shaping for a normal canal	OTR	OAS
m5	Negotiation and making a glide path for a high difficulty canal	OGP	OAS
m6	Making a glide path for a high difficulty canal	OGP	OAS
m7	Canal shaping for a high difficulty canal	OTR	OAS
m8	Injection solutions such as calcium hydroxide, etc.	CCW (reverse)	Off

* Refer to page (☞p.33 **"How to Make Various Settings"**), for how to make and change settings.
* After changing settings, refer to page ☞p.41 **"Reset Memories to Original Default Settings"**, for how to restore the original settings.

⚠WARNING

- Before use, run the Tri Auto ZX2 outside the oral cavity to make sure it is operating normally.
- Depending on the condition of the tooth, the type of case, and the condition of the instrument, it may not be possible to shape and measure a canal properly. Make sure to take an X-ray to check the results.
- In general Ni-Ti files can sometimes wear out rather quickly depending on the shape and the degree of curvature of the root canal. Stop using the instrument immediately if tactile feedback indicates the instrument does not be working properly.
- Since files can easily break due to metal fatigue and excessive load, replace them frequently. Since stainless steel files are especially easily broken, it is best to not reuse them and replace them with new ones instead.
- Electric noise or a malfunction could make it impossible to control the motor properly. Do not depend entirely on the instrument controlling itself; always watch the display, listen to the sound and be aware of tactile feedback.
- Applying excessive force at canal shaping could cause the file to jam inside the canal or break the file.
- Do not apply excessive force. Even when using the torque reverse function, files may break depending on the torque setting.
- When changing files, always examine for stretching and other deformities or damage before using them. Deformed files tend to break.
- If the contra angle's file release button is pressed against the teeth opposite the one being treated, the file could come out and injure the patient.
- Never press the push button while the motor is running. This could cause it to heat up and burn the patient. Also the file might come out and injure the patient.
- Always use a rubber dam to prevent accidental swallowing of files etc.



⚠CAUTION

- Stop using the instrument immediately if tactile feedback indicates the instrument does not be working properly.
- Files break more easily at high speeds; always follow the file manufacturer's recommendations. Also always check the rotation speed before using the instrument.
- Use only Ni-Ti or properly designed stainless steel files.
- Ni-Ti files break rather easily. Pay close attention to the following points:
  - Never use excessive force to insert the file.
  - All foreign matter, such as bits of cotton, should be removed from the root canal before using the file.
  - Never use excessive force to advance the file down the root canal. Ni-Ti files break easily if too much load or force is applied.
  - Take great care when working on extremely curved canals. These can break the file easily.
  - Try not to trigger the auto torque reverse function as infrequently as possible when advancing the file down the root canal.
  - Use files in the order of their sizes without skipping any sizes. A sudden change to a larger file can lead to file breakage.
  - If you encounter resistance or the auto torque reverse is triggered, take back the file up 3 or 4 mm and carefully advance it down the root canal again. Or replace the file with a smaller size. Never use excessive force to insert the file.
  - Do not force the file down the root canal or press it against the root canal wall as it could break the file.
  - Do not use the same file continuously in one position for too long as it may lead to creating "steps" etc.
- Always remove the file after use.
- Use only files that are design for clockwise filing. Use files very carefully and follow all the recommendations of the manufacturer.

Canal Measurement

Examples using default settings

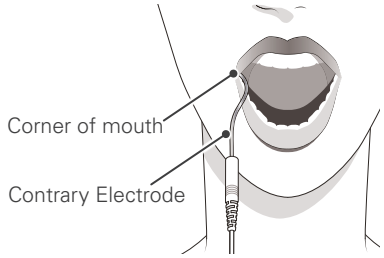
Measure a canal and determine its working length.

1 Turn Power On

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

EMR mode is now selected.

2 Apply Contrary Electrode



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

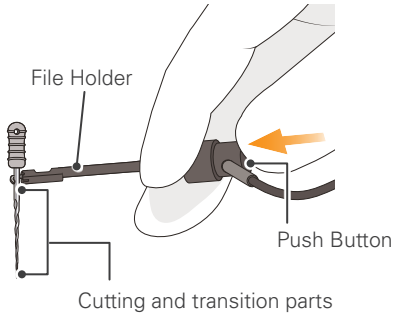
⚠WARNING

- Never use an electric scalpel when the contrary electrode is hooked in the patient's mouth. These devices emit electrical noise that could interfere with accurate measurement or cause the instrument to malfunction.
- Make sure that the contrary electrode, file holder, and their connectors, do not come into contact with an electric power source such as a power outlet. This will result in an electric shock.
- Accurate measurement is not always possible, especially in cases of abnormal or unusual root canal morphology. Make sure to take an X-ray to check the results.
- If connections are not securely plugged in the instrument may not make an accurate measurement. If the meter does not change as the file goes down the canal, stop using the instrument immediately and make sure all the connectors are securely inserted.

⚠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 or sodium hypochlorite do not get on the contrary electrode or the file holder. These could cause an adverse reaction such as inflammation.

3 Clip the File



Push the button on the file holder with your thumb in the direction shown by the arrow in the illustration. Clip the holder onto the metal upper part of the file and then release the button.

⚠CAUTION

- When clipping the file holder onto the metal part of a file or reamer, clip the file holder onto the metal shaft near the handle. Do not clip it onto the cutting part or transition part of the file or reamer. This will cause the file holder to wear out very quickly.

To measure a root canal, use a file or reamer with a plastic handle. If you do not wear gloves, do not use a file with a metal handle. Current leakage from a metal handle to your fingers will prevent an accurate measurement.

Do not use damaged or worn file holders, otherwise accurate measurements cannot be made.

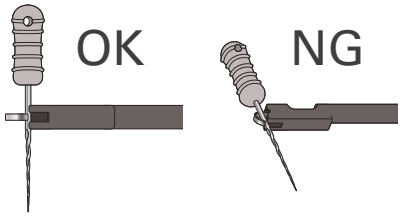


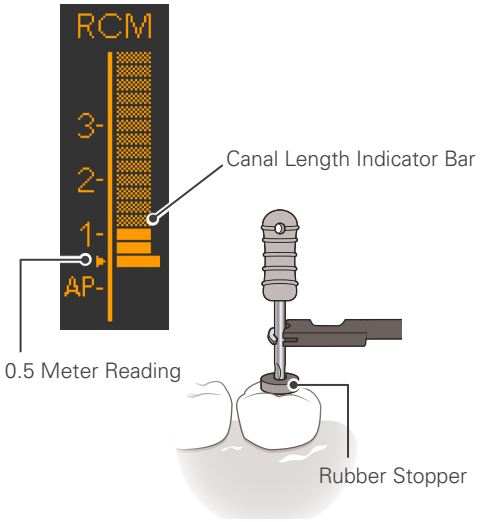
Figure 1 Figure 2

Clip the file or reamer as shown in figure 1.

⚠CAUTION

- Do not clip them as shown in figure 2. This will prevent accurate measurement and will damage the tip of the file holder.

4 Canal Measurement (m1)



Advance the file down the canal to the 0.5 meter reading point (▶). Then position a rubber stopper on the surface of the tooth or other suitable point to serve as a measurement reference.

⚠WARNING

- In some cases such as a blocked root canal, a measurement cannot be made.
  ☞p.24 "EMR (Electric Measurement of Root canal length)"
- Accurate measurement is not always possible, especially in cases of abnormal or unusual root canal morphology. Make sure to take an X-ray to check the results.
- Stop using the instrument immediately if it does not seem to be working properly.
- If the canal length indicator bar does not appear even when the file is inserted, the instrument may be malfunctioning and must not be used.

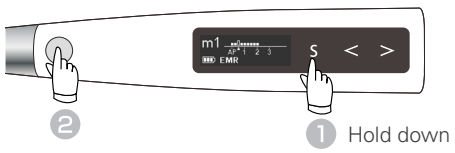
- Do not touch the gums with the file. The meter will light up all the way.
- If the canal is too dry, the meter may not move until the file is near the apex. If the meter does not move, stop the measurement. Moisten the canal with oxydol (hydrogen peroxide) or saline, and then try measuring again.
- Occasionally the meter will make a sudden and large movement as soon as the file is inserted into the root canal, but it will return to normal as the file is advanced down towards the apex.
- After measuring the root canal, make sure to take an X-ray to check the measurement results.

● 0.5 Meter Reading

The meter's 0.5 reading indicates that the file tip is located very near the physiological apical foramen. Use this to determine the working length depending on the individual case. The exact working length depends on the shape and condition of the canal, and a clinical judgment must be made by the dentist.

* The numerals 1, 2, and 3 do not represent length in millimeters from the apical. These numbers are used to estimate the canal's working length.

5 Turn Power Off



While the standby display is on, you can turn off the instrument by holding down the Select switch (S) and pressing the Main switch.

● Auto Power Off Function ☞p.40 "Auto Power Off Time"

If not switches are used for 10 minutes, the instrument will automatically turn off (default setting).

Canal Shaping (for normal canals)

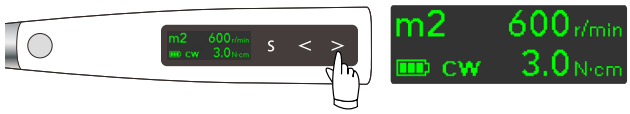
Examples using default settings

This can usually be done using memories 1 to 4.
Use these four memories to shape canals until you get used to using the Tri Auto ZX2.

1 Turn Power On

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

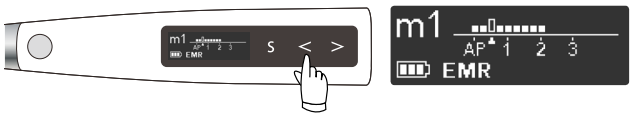
2 Shape Upper Part of Canal (m2)



Press the Right-Set switch (>) to select **"m2" (CW mode).**
Install a suitable file and shape the upper part of the canal.
Press the Main switch to start and stop the motor.

The torque display appears when the motor is running.
☞p.11 "Torque Display"

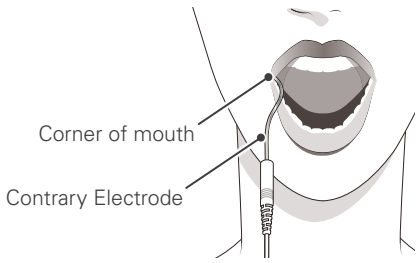
3 Canal Measurement (m1)



Press the Left-Set switch (<) to select **"m1" (EMR mode)** and measure the canal.
☞p.18 "Canal Measurement"

If the contrary electrode is applied to the patient, the instrument can be linked to the canal measurement function while it is being used.
☞p.36 "Settings for Canal Measurement Linkage"

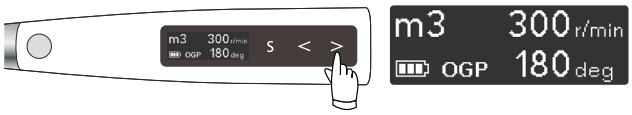
* The meter numbers 1, 2, and 3 do not represent the actual length from the apical. These numbers are used to estimate the canal's working length.



⚠WARNING

- Never use an electric scalpel when the contrary electrode is hooked in the patient's mouth. These devices emit electrical noise that could cause the motor to run or cause the device to malfunction.
- Make sure that the contrary electrode, file holder, handpiece file electrode etc., do not come into contact with an electric power source such as a power outlet. This will result in an electric shock.

4 Glide Path (m3)



Press the Right-Set switch (>) to select **"m3" (OGP mode).**
Install a suitable file to perform negotiation and make the glide path.

Linkage to Canal Measurement Function

● Auto Start and Stop Functions ☞p.37

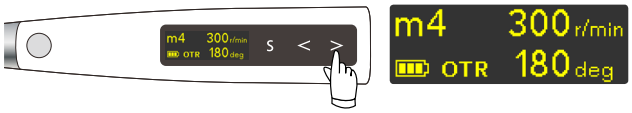
With the contrary electrode hooked in the patient's mouth, the canal measurement screen (☞p.11 "Canal Measurement Display") will appear when the file is inserted in the canal and the motor will start running. The motor will stop when the file is taken out of the canal.

* If the canal is dry and prevents the auto start from being triggered, press the Main switch to start the motor.
* If the Try Auto ZX2 is used without being linked to the canal measurement function, do not use the contrary electrode and start and stop the motor by pressing the Main switch.

● OAS Function ☞p.36 "Apical Action"

The file will reverse slightly and stop when it reaches the point where the flash bar has been set.

5 Canal Shaping (m4)



Press the Right-Set switch (>) to select **"m4" (OTR mode).**
Install a suitable file and shape the canal.

The file will alternate between forward and reverse rotation when the set trigger torque is reached.

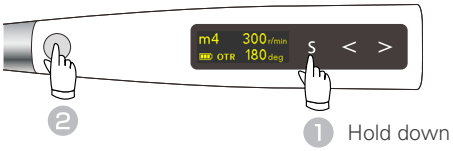
⚠CAUTION

- The file electrode, contrary electrode, and metal part at the end of the contra angle could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using them.
- Do not touch the oral mucosa or tooth with the metal part at the end of the contra angle. The file could start up and injure the patient or the instrument might not make accurate measurements.
- Be careful when replacing files; the file will start running if the Main switch is pressed.

Metal part at the end of the contra angle

- Take care that medicinal solutions such as formalin cresol or sodium hypochlorite do not get on the contrary electrode or the contra angle. These could cause an adverse reaction such as inflammation.
- Note that some types of files cannot be used with the file electrode.

6 Turn Power Off



While the standby display is on, you can turn off the instrument by holding down the Select switch (S) and pressing the Main switch.

● Auto Power Off Function ☞p.40 "Auto Power Off Time"

If not switches are used for 10 minutes, the instrument will automatically turn off (default setting).

Canal Shaping (for high difficulty canals)

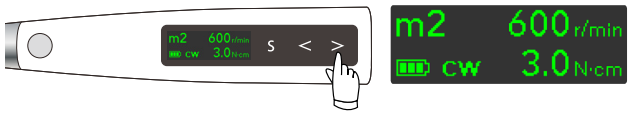
Examples using default settings

For high difficulty canals such as extremely curved ones or those that may produce ledges, use memories m5 to m7 after measuring the canal.

1 Turn Power On

Press the Main switch to turn on the instrument.
The stand by display (m1) will appear.

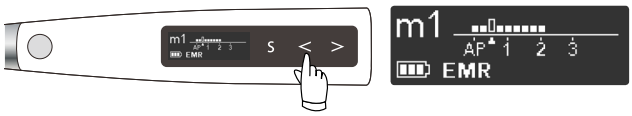
2 Shape Upper Part of Canal (m2)



Press the Right-Set switch (>) to select **"m2" (CW mode).**
Install a suitable file and shape the upper part of the canal.
Press the Main switch to start and stop the motor.

The torque display appears when the motor is running.
☞p.11 "Torque Display"

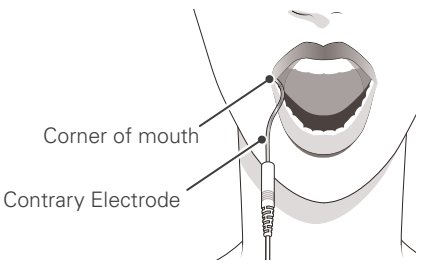
3 Canal Measurement (m1)



Press the Left-Set switch (<) to select **"m1" (EMR mode)** and measure the canal.
☞p.18 "Canal Measurement"

If the contrary electrode is applied to the patient, the instrument can be linked to the canal measurement function while it is being used.
☞p.36 "Settings for Canal Measurement Linkage"

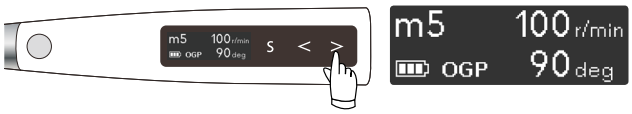
* The numerals 1, 2, and 3 do not represent length in millimeters from the apical. These numbers are used to estimate the canal's working length.



⚠WARNING

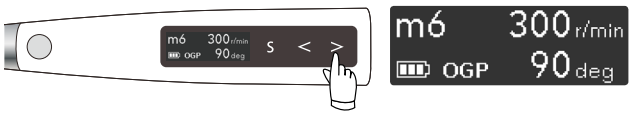
- Never use an electric scalpel when the contrary electrode is hooked in the patient's mouth. These devices emit electrical noise that could cause the motor to run or cause the device to malfunction.
- Make sure that the contrary electrode, file holder, handpiece file electrode etc., do not come into contact with an electric power source such as a power outlet. This will result in an electric shock.

4 Glide Path (m5)



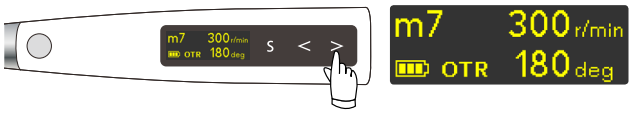
Press the Left-Set switch (>) to select "m5" (OGP mode).
Install a suitable file to perform negotiation and make the glide path.

5 Glide Path (m6)



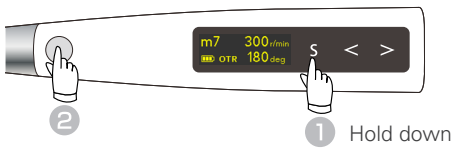
Press the Right-Set switch (>) to select "m6" (OGP mode).
Install a file and make the glide path.

6 Canal Shaping (m7)



Press the Right-Set switch (>) to select "m7" (OTR mode).
Install a suitable file and shape the canal.
The file will alternate between forward and reverse rotation when the set trigger torque is reached.

7 Turn Power Off



While the standby display is on, you can turn off the instrument by holding down the Select switch (S) and pressing the Main switch.

Linkage to Canal Measurement Function

● Auto Start and Stop Functions ☞p.37

With the contrary electrode hooked in the patient's mouth, the canal measurement screen (☞p.11 "Canal Measurement Display") will appear when the file is inserted in the canal and the motor will start running. The motor will stop when the file is taken out of the canal.

* If the canal is dry and prevents the auto start from being triggered, press the Main switch to start the motor.
* If the Try Auto ZX2 is used without being linked to the canal measurement function, do not use the contrary electrode and start and stop the motor by pressing the Main switch.

● OAS Function ☞p.36 "Apical Action"

The file will reverse slightly and stop when it reaches the point where the flash bar has been set.

⚠CAUTION

- The file electrode, contrary electrode, and metal part at the end of the contra angle could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using them.
- Do not touch the oral mucosa or tooth with the metal part at the end of the contra angle. The file could start up and injure the patient or the instrument might not make accurate measurements.
- Be careful when replacing files; the file will start running if the Main switch is pressed.

- Take care that medicinal solutions such as formalin cresol or sodium hypochlorite do not get on the contrary electrode or the contra angle. These could cause an adverse reaction such as inflammation.
- Note that some types of files cannot be used with the file electrode.

● Auto Power Off Function ☞p.40 "Auto Power OffTime"

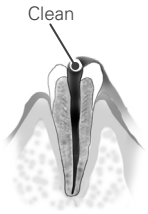
If not switches are used for 10 minutes, the instrument will automatically turn off (default setting).

Root Canal not suitable for Electric Measurement

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

Root canal with a large apical foramen

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

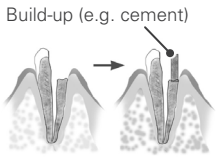


Root canal with blood overflowing from the opening

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

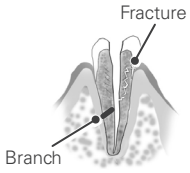
Root canal with a chemical solution overflowing from the opening

An accurate measurement cannot be obtained if some chemical solution is overflowing from the canal opening. In this case, clean the canal and its opening.
It is important to get rid of any solution overflowing the opening.



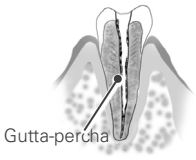
Broken crown

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 the tooth with a suitable material to insulate the gingival tissue.



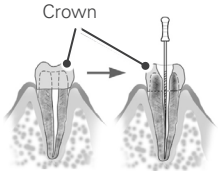
Fractured tooth
Leakage through a branch canal

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



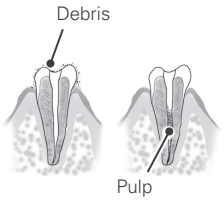
Re-treatment of a root filled with gutta-percha

The gutta-percha must be completely 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
Pulp inside canal

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

Caries touching the gums

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

Blocked canal

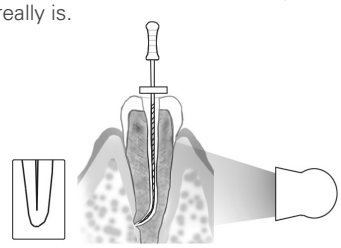
The meter will not move if the canal is blocked.
Open the canal all the way to the apical constriction to measure it.

Extremely dry canal

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

Tri Auto ZX2 Meter Reading and Radiography

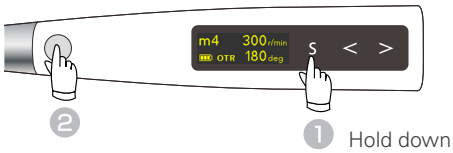
Sometimes the Tri Auto ZX2 meter reading and the X-ray image will not correspond. This does not mean that the Tri Auto ZX2 is not working properly or that the X-ray exposure is a failure. An X-ray image might not show the apex correctly depending on the angle of the X-ray beam, and the location of the apex might seem to be other than it really is.



In the illustration to the above, the actual apex for the canal is not the same as that for the anatomical apex. There are frequently cases where the apical foramen is located up towards the crown. In these cases, an X-ray might indicate that the file has not reached the apex even though it has actually reached the apical foramen.

4. After Use

1 Turn Power Off

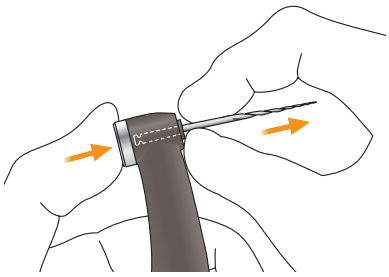


While the standby display is on, you can turn off the instrument by holding down the Select switch (S) and pressing the Main switch.

● Auto Power Off Function ☞p.40 “Auto Power Off Time”

If not switches are used for 10 minutes, the instrument will automatically turn off (default setting).

2 Take Out the File

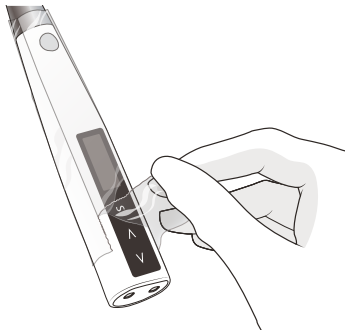


Hold down the push button on the contra angle and pull the file straight out.

⚠CAUTION

- Be careful when inserting and removing files to avoid injury to fingers.
- Inserting and removing files without holding the push button may damage the chuck.
- Take care not to touch the Main switch when removing the file. This will cause the file to rotate.

3 Remove HP Protective Sleeve



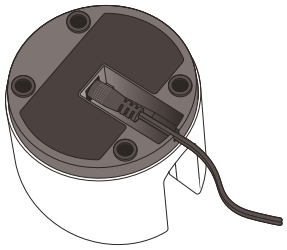
Remove the protective sleeve and throw it away.

* A new HP protective sleeve must be used for each patient. (Never be re-used.)

⚠WARNING

- To prevent cross contamination between patients, use a new sleeve for each patient. (Never be re-used.)

4 Battery Charging

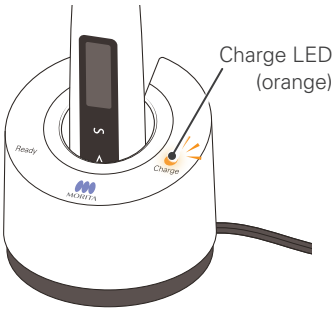


Plug the DC end of the adapter cable all the way into the bottom of the charger, and plug the other end into a power outlet. The Ready LED (green) will light up.

* The battery is inside the motor handpiece.

⚠WARNING

- Always use the adapter that comes with the Tri Auto ZX2. Using another adapter can result in electric shocks, malfunctions, fires, etc.
- The charger and its adapter must be located at least 2 meters away from the patient.
- Do not use the battery charger for any device except the Tri Auto ZX2.



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

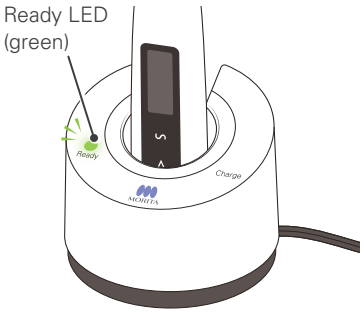
* It takes about 100 minutes to fully charge the battery.

⚠WARNING

- Do not touch the battery charger or AC adapter if there is lightening while the battery is being charged. This will result in an electric shock.
- Do not use the battery charger in a place where it might get wet.

⚠CAUTION

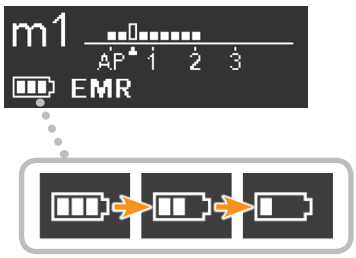
- Do not charge the handpiece with the probe cord connected or wrapped around the handpiece. This could break a wire inside the cord or damage the jack.
- There is a magnet inside the charger and this could attract metal clips etc. If this happens simply remove the metal clip etc.



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

- If the Charge LED (orange) goes off immediately or doesn't light up when the handpiece is put into the charger, the battery is already fully charged. To make sure, take the handpiece out and put it back in again.
- Make sure there is no dirt, metal fragments etc. on the connection contacts for both the handpiece end and the battery charger. If the contacts are dirty, wipe them with a piece of gauze dampened with Ethanol for Disinfection (Ethanol 70 to 80 vol%) after thoroughly wringing it out first. Pay attention to avoid bending or deforming the connection contacts.
- Do not leave the battery charger where it will be exposed to direct sunlight.
- Unplug the battery charger when it is not being used.

Residual Battery Power



If "Low Battery" appears in the display screen, the residual power is at a very low level. Charge the battery immediately if the instrument does not return to the standby display when the Main switch is pressed.

Low Battery
Please Charge

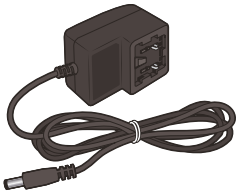
☞p.48 "2. Abnormal Stop"

- Charge the battery as soon as the indicator gets down only one bar.

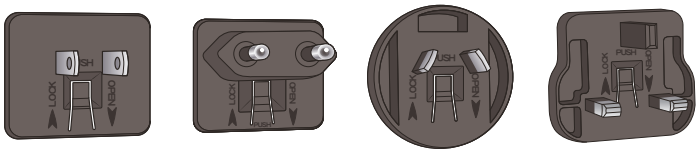
The number of bars show how much power is left.

Using and handling the power plug for the AC Adapter.

The main plug for the AC adapter is not connected when the Tri Auto ZX2 is shipped.
Four types of plugs are provided as shown below. Select the one suitable for your region.

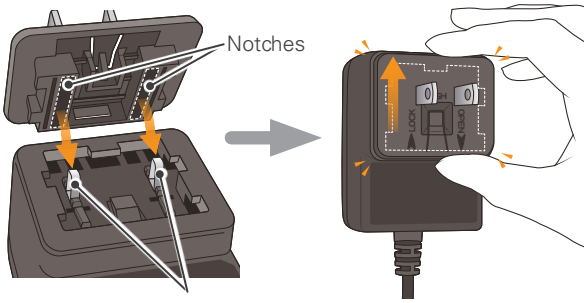


AC adapter



Power Plugs

● Connect Power Plug

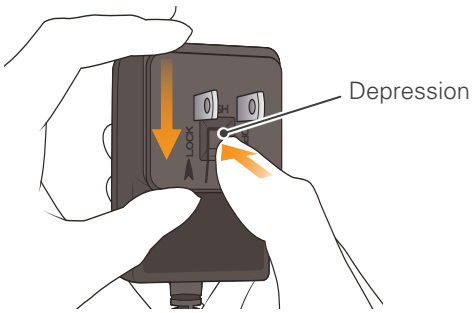


Match the notches in the power plug with the projections in the AC adapter and push it in the LOCK direction (arrow pointing up) until it clicks into place.

⚠WARNING

- Make sure the power plug is properly and securely installed.
- Never plug in a power plug alone without installing it. This will result in an electric shock.

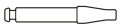
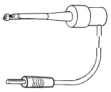
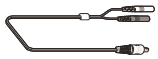
● Disconnect Power Plug



Press down on the depression in the center of the power plug and slide it in the OPEN direction (arrow pointing down)

5. Maintenance

There are 3 ways to clean and disinfect components depending on the component.
Be sure to follow the procedure below when performing daily maintenance.

Autoclavable Components	Wipe with Ethanol for Disinfection (Ethanol 70 to 80 vol%)	Washed and Wiped with Ethanol for Disinfection (Ethanol 70 to 80 vol%)
 Contra Angle	 Motor Handpiece	 Guide Bur
 File Holder	 Probe Cord	
 Contrary Electrode	 Battery Charger	
 Handpiece Holder	 AC Adapter	
Long File Holder		
 External File Electrode (with cap)		

⚠CAUTION

- Be careful to avoid cross contamination when performing maintenance.

Autoclavable Components

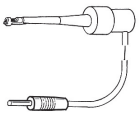
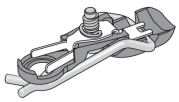
* Must be autoclaved after use for each patient.

Procedure

Cleaning → Disinfection → Lubrication → Packing → Sterilization

* Only the contra angle needs to be lubricated.

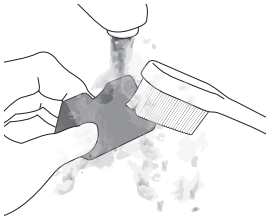
● Components maintained this way:

 Contra Angle	 File Holder	Contrary Electrode	 Handpiece Holder	Long File Holder	 External File Electrode (with cap)

⚠CAUTION

- Before cleaning the contra angle, do not fail to take out the file.

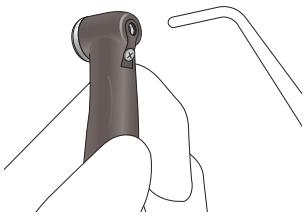
Cleaning



(1) Disconnect the contra angle from the motor handpiece. Clean off the cutting debris in running water with a soft brush and then wipe off the water.

⚠CAUTION

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

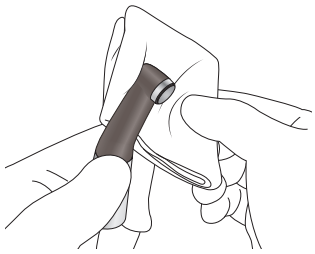


(2) Use a threeway syringe etc. to blow out any moisture remaining inside the contra angle.

⚠CAUTION

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

Disinfection



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

⚠CAUTION

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

Operating conditions for high-temperature washer-disinfectors

*When using a high-temperature washer-disinfector to clean the contra angle, strictly adhere to the conditions specified below.

High-temperature cleaning conditions

Unit Name	Mode	Detergent (concentration)	Neutralizer* (concentration)	Rinse (concentration)
Miele G7881	Vario TD	neodisher mediclean (0.3 - 0.5%)	neodisher Z (0.1 - 0.2%)	neodisher mieclear (0.02 - 0.04%)

*After cleaning there may be streaks or white spots on the contra angle. Use a neutralizer only if there are streaks or white spots.

Operating Precautions

- Always use a handpiece holder when washing the contra angle, making sure to rinse the inside of the contra angle thoroughly.
- If any medical agent remains inside the contra angle, it may corrode, resulting in a malfunction of the contra angle.
- For details on handling medical agents or adjusting their concentration, refer to the user manual for the washing device.
- Check to see if the contra angle including its inside, is completely dry. If any water remains inside the contra angle, expel it with an air gun etc. Failure to do so could result in the remaining water coming out during use and cause poor lubrication or sterilization.
- Always lubricate the contra angle after washing.

Inappropriate cleaning methods and solutions will damage the contra angle.

Do not clean the contra angle using strong acidic or alkaline solutions that could cause the metal to corrode.

Do not leave the contra angle inside the high-temperature washer-disinfector.

Lubrication

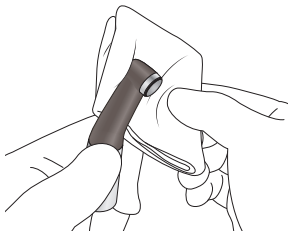
*Only the contra angle needs to be lubricated.

*We recommend using the Lubrina dental handpiece maintenance unit for lubricating the contra angle.

Before autoclaving, the contra angle must be lubricated with the LS spray.

⚠CAUTION

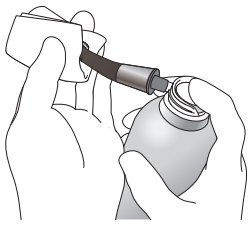
- Do not use any type of spray other than LS spray.
- Failure to lubricate the contra angle will result in a malfunction.



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

⚠WARNING

- Prevent spray from splashing into your eyes etc. by always covering the contra angle with gauze etc.



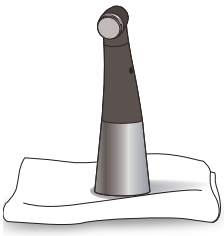
(2) Screw the nozzle onto the spray can. Then insert it into the connection end of the contra angle, and spray for 2 seconds. Use gauze etc. to wipe excess spray off the outside of the contra angle.

⚠WARNING

- Never direct the spray towards a person.
- Never use the spray near an open flame.
- Hold both the contra angle and the spray can firmly when using the spray. Otherwise, the pressure of the spray could make the contra angle fly out of your hand.

⚠CAUTION

- Always shake the LS spray can two or three times before using it. Use the can in an upright position.

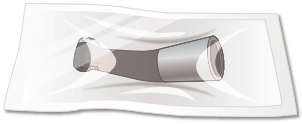


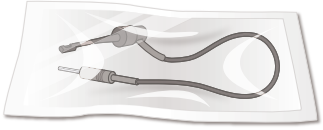
(3) Stand the contra angle up on a piece of gauze to allow all the excess spray to drain out.

⚠CAUTION

- The motor handpiece could be damaged if the contra angle is attached without allowing the excess spray to drain out first.

Packing





Put components in individual autoclave pouches.

⚠CAUTION

- Do not put stress on the cable when you place the file holder in a sterilization pouch.

Sterilization

Autoclave the components.

Recommended Temperature and Time:
In a sterilization pouch, at least 6 minutes at 134° C (273.2° F)
or at least 60 minutes at 121° C (249.8° F)

Minimum drying time after sterilization: 10 minutes

⚠WARNING

- To prevent the spread of serious, life-threatening infections such as HIV and hepatitis B, the components (contra angle, file holder, contrary electrode, handpiece holder, long file holder, external file electrode) must be autoclaved after each patient's treatment has been completed.

⚠CAUTION

- Do not sterilize the components by any method other than autoclaving.
- Components are extremely hot right after autoclaving. Wait for them to cool off before touching.
- Do not leave the components in the autoclave.

- Thoroughly clean and wash the components before autoclaving. If chemical solutions or foreign debris are not removed, autoclaving could damage or deform the components.
- The sterilization and drying temperatures must not exceed 135°C (275°F).
- No components can be autoclaved other than the contra angle, file holder, contrary electrode, handpiece holder, long file holder, and external file electrode.
- Take the file out of the contra angle or file holder before autoclave.
- Do not fail to lubricate the contra angle with the LS spray before autoclaving it.
- Follow file manufacturer's recommendations for autoclaving files.

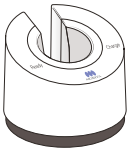
Wipe with Ethanol for Disinfection (Ethanol 70 to 80 vol%)

Procedure

Disinfection

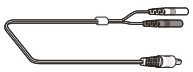
● Components maintained this way:

Motor Handpiece



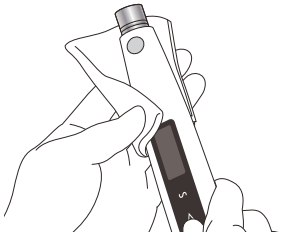
Battery Charger

AC Adapter



Probe Cord

Disinfection



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

⚠CAUTION

- Do not use anything except Ethanol for Disinfection (Ethanol 70 to 80 vol%). Do not use too much ethanol. It could seep inside and damage the contra angle.
- Do not immerse the components in or wipe it with any of the following: functional water (acidic electrolyzed water, strong alkaline solution, and ozone water), medical agents (glutaral, etc.), or any other special types of water or commercial cleaning liquids. Such liquids may result in metal corrosion and adhesion of the residual medical agent to the components.
- Never clean the contra angle, file holder, or contrary electrode with chemicals such as formalin cresol (FC) and sodium hypochlorite. These will damage the plastic parts of the components. If any of these liquids being applied to the components, use dry gauze etc. to wipe it off.

Wash and Wipe with Ethanol for Disinfection (Ethanol 70 to 80 vol%)

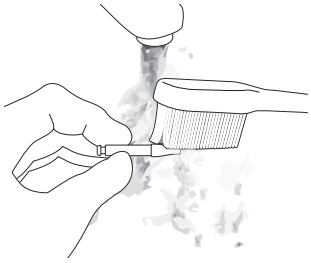
Procedure

Cleaning → Disinfection

● Components maintained this way:

Guide Bur

Cleaning

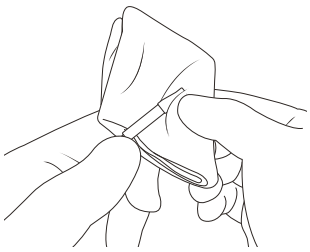


Clean off the cutting debris in running water with a soft brush and then wipe off the water.

⚠CAUTION

- Do not clean the components with an ultra sonic cleaning device.

Disinfection



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

⚠CAUTION

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

How to Make Various Settings

Rotation Controls

The Tri Auto ZX2 has the rotation controls listed below. These controls can be assigned for each memory.

Some functions cannot always be used or set depending on the operation mode and other settings for various functions.

Functions	Descriptions	Setting Method
Operation Mode	Shows 5 operation modes for canal shaping and measurement.	p.34
Speed	Shows file rotation speed.	p.35
Torque (Torque Limit / Trigger Torque)	For CW and CCW modes, the torque value that triggers reverse rotation. For OTR mode, the torque value that triggers OTR action. For CW and CCW modes, also the torque reverse less can be set.	
Apical Action	The file action when file tip reaches the flash bar point.	p.36
Auto Start	The file rotation starts automatically when the file is inserted in the canal.	p.37
Auto Stop	The file rotation stops automatically when the file is taken out of the canal.	
Flash Bar Position	Shows the point inside the canal where specified apical action is triggered.	
Apical Slow Down (Apical Slow Dwn.)	The file slows down automatically as it approaches the apex.	p.38
Torque Slow Down (Torq. Slow Dwn.)	The file slows down automatically as the torque loads increases.	
Apical Torque Down (Apical Torq. Dwn.)	Torque limit automatically decrease as the file approaches the apex.	p.39
Rotation Angle	For OTR and OGP modes, this shows the arcs for forward and reverse rotation.	
Beeper Volume	Volume of beeping for showing the position inside the canal, torque reverse etc.	

Default Memory Settings

The default memory settings are listed below. These settings can be changed as needed.

Setting Items	m1	Normal Canals			High Difficulty Canals			m8	Setting Method
		m2	m3	m4	m5	m6	m7		
Function	Canal Measurement	Upper Part Shaping	Glide Path	Canal Shaping	Glide Path	Glide Path	Canal Shaping	Inject Medicinal Solutions	
Operation Mode	EMR	CW	OGP	OTR	OGP	OGP	OTR	CCW	p.34
Speed (r/min)	N/A	600	300	300	100	300	300	200	p.35
Torque Limit (N•cm)	N/A	3.0	N/A	N/A	N/A	N/A	N/A	R.L	
Trigger Torque (N•cm)	N/A	N/A	N/A	0.2	N/A	N/A	0.2	N/A	
Apical Action	N/A	OAS	OAS	OAS	OAS	OAS	OAS	Off	p.36
Auto Start	N/A	Off	On	On	On	On	On	Off	p.37
Auto Stop	N/A	Off	On	On	Off	Off	Off	Off	
Flash Bar Position	▲	1	▲	1	▲	▲	1	▲	
Apical Slow Down	N/A	Off	N/A	N/A	N/A	N/A	N/A	Off	p.38
Torque Slow Down	N/A	Off	N/A	N/A	N/A	N/A	N/A	Off	
Apical Torque Down	N/A	Off	N/A	N/A	N/A	N/A	N/A	Off	p.39
Rotation Angle (OGP mode)	N/A	N/A	180	N/A	90	90	N/A	N/A	
Rotation Angle (OTR mode)	N/A	N/A	N/A	180	N/A	N/A	180	N/A	
Beeper Volume	Vol. 3	Vol. 3	Vol. 3	Vol. 3	Vol. 3	Vol. 3	Vol. 3	Vol. 3	

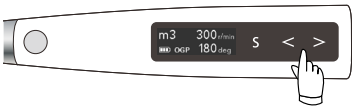
Set Operation Mode

Operation Mode

1 Turn Power On

Press the Main switch to turn on the instrument.

2 Select Memory Number



Press the Set switches (< >) to select a memory from m1 to m8.

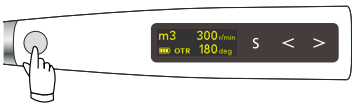
3 Show Setting Display

Hold down the Select switch (S) for 1 second or more.
Operation mode display will appear.

4 Select Operation Mode

Press Select switches (< >) to select an operation mode.

5 Return to Standby Display



Press the Main switch to return to the standby display. Or simply wait until the instrument automatically goes back to the standby display.

■ Operation Mode Settings

Operation Mode

There are 5 modes for canal shaping and measurement.

- EMR : Canal measurement
- CCW : Reverse rotation only. Used to inject calcium hydroxide and other solutions.
  *When this mode is being used, a double-beep sounds continuously.
- CW : Normal 360° forward rotation. Torque reverse and other functions can be used.
- OTR : Used for the canal shaping.
- OGP : Used for the negotiation and making glide paths.

Set Speed and Torque

Speed (r/min) Torque (N•cm)

1 Turn Power On

Press the Main switch to turn on the instrument.

2 Select Memory Number

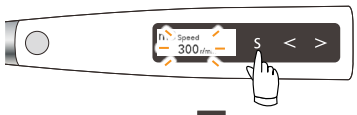
Press the Set switches (< >) to select a memory from m1 to m8.

3 Show Setting Display

Hold down

Hold down the Select switch (S) for 1 second or more.
Operation mode display will appear.

4 Select and Set Functions



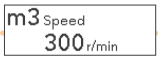
Press the Select switch (S) until the desired function appears. Press the Set switches (< >) to make the setting.

5 Return to Standby Display

Press the Main switch to return to the standby display. Or simply wait until the instrument automatically goes back to the standby display.

Speed and Torque Settings

Speed (r/min)

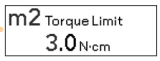


This is the file rotation speed.

- Possible speed settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	100 150 200 250 300 400 500 600 800 1000		100 300 500	

Torque (N•cm)



For CW and CCW modes, the torque value that triggers reverse rotation. For OTR mode, the torque value that triggers OTR action. For CW and CCW modes, also the torque reverse less (R.L) can be set.
For EMR and OGP modes, the torque limit and trigger torque value cannot be set.

* In CCW mode, the motor only runs in reverse and does not change rotation direction even when it reaches the set torque limit. The beeping sound changes to alert the user when the torque limit has been reached.

- Possible Torque Limit Values

CW (forward)	CCW (reverse)
0.2 0.4 0.6 0.8 1.0 1.5 2.0 2.5 3.0 4.0 5.0 R.L	

If the Torque Slow Down or the Apical Torque Down is turned on, 0.2 N•cm and R.L (torque reverse less) cannot be selected.

- Possible Trigger Torque Values

OTR
0.2 0.4 0.6 0.8 1.0

⚠CAUTION

- If the instrument is set for Torque Reverse Less, the motor will not reverse rotation no matter how large the torque load is.
- Match the torque setting to the canal and file.

There is some discrepancy in the torque value depending on condition of the motor and contra angle and this value is used only as a reference.

Settings for Canal Measurement Linkage

Apical Action | Auto Start | Auto Stop | Flash Bar Position

1 Turn Power On

Press the Main switch to turn on the instrument.

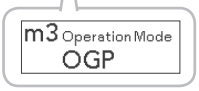
2 Select Memory Number

Press the Select switch (< >) to select a memory from m1 to m8.

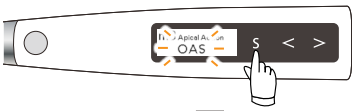
3 Show Setting Display

Hold down

Hold down the Select switch (S) for 1 second or more.
Operation mode display will appear.



4 Select and Set Functions



Press the Select switch (S) until the desired function appears. Press the Set switches (< >) to make the setting.

5 Return to Standby Display

Press the Main switch to return to the standby display. Or simply wait until the instrument automatically goes back to the standby display.

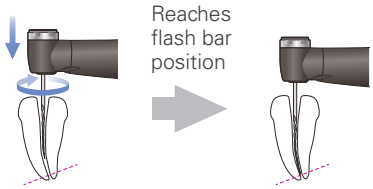
■ Settings

Apical Action

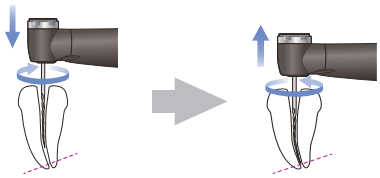
Actions that happen automatically when the file tip reaches the point inside the canal determine by the Flash Bar setting.
☞p.37 “Flash Bar Position”

Off : Rotation keeps going as before without stopping or reversing.

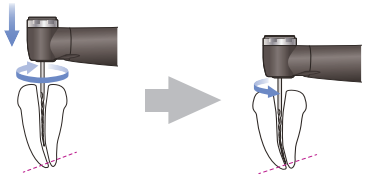
Stop **Auto Apical Stop**
: File stops automatically.



Reverse **Auto apical Reverse**
: File automatically reverses rotation.



OAS **Optimum Apical Stop**
: Automatically reverses slightly (1/2 to 1 rotation) and then stops after file jamming is freed.



- Possible apical cation settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	Off Stop Reverse OAS	Off Stop OAS	Off Stop Reverse OAS	Off Stop Reverse OAS

Auto Start

Rotation starts automatically when file is inserted in canal.

On : Motor starts automatically.

Off : Motor does not start when file is inserted into the canal.
The Main switch is used to start and stop the motor.

- Possible auto start on/off settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	On Off			
	If Auto Stop is turned on, this cannot be turned off.			

Auto Stop

Rotation stops automatically when file is taken out of canal.

On : Motor stops automatically.

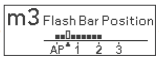
Off : Motor does not stop when file is taken out.
The Main switch is used to start and stop the motor.

- Possible auto stop on/off settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	On Off			
	If Auto Start is turned off, this cannot be turned on.			

The auto stop function works only if the motor was started with the auto start function.
It will not work if the motor was started with the Main switch even if it is turned on.

Flash Bar Position



This is the point where various apical actions are triggered.

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

The flash bar can be set from 2 to AP (Apex) on the meter.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
Setting Range: AP (Apex) – 2				

Set Other Functions

Apical Slow Down | Torque Slow Down | Apical Torque Down | Rotation Angle | Beeper Volume

1 Turn Power On

Press the Main switch to turn on the instrument.

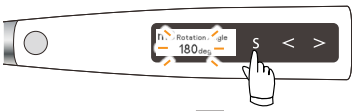
2 Select Memory Number

Press the Select switch (< >) to select a memory from m1 to m8.

3 Show Setting Display

Hold down the Select switch (S) for 1 second or more.
Operation mode display will appear.

4 Select and Set Functions



Press the Select switch (S) until the desired function appears. Press the Set switches (< >) to make the setting.

5 Return to Standby Display

Press the Main switch to return to the standby display. Or simply wait until the instrument automatically goes back to the standby display.

Settings

Apical Slow Down

Rotation automatically slows down as the file tip approaches the apex.

On : Automatically slows down.

Off : Does not slow down.

- Possible apical slow down settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	On Off If Apical Torque Down is turned on, this cannot be turned on.		N/A	N/A

Torque Slow Down

Rotation automatically slows down as the torque load on the file increases.

On : Automatically slows down.

Off : Does not slow down.

- Possible torque slow down settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	On Off If Apical Torque Down is turned on or the torque is set for 0.2 or R.L (torque reverse less), this cannot be turned on.		N/A	N/A

Apical Torque Down

m2 Apical Torq. Dwn. Off

The torque limit automatically decreases as the file approaches the apex.

On : Automatically decreases.

Off : Doesn't not change.

- Possible apical torque down settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	On Off If Apical Slow Down or Torque Slow Down is turned on or the torque is set for 0.2 or R.L (torque reverse less), this cannot be turned on.		N/A	N/A

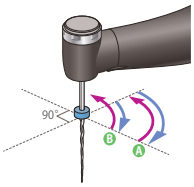
Rotation Angle

m3 Rotation Angle 180deg

For OGP and OTR modes, this shows the arcs for forward and reverse rotation.

OGP Mode

● OGP (Optimum Glide Path) Function



* Illustration is for 90 setting.

Repeat the watch-winding (A) and balanced force (B) motions.

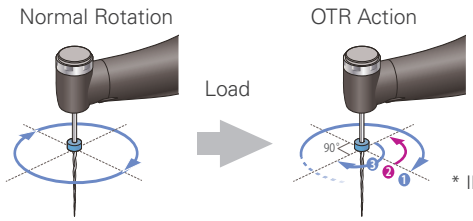
90 : A 90° forward and 90° forward → B 90° forward and 120° reverse

180 : A 180° forward and 180° reverse → B 180° forward and 270° reverse

240 : A 240° forward and 240° reverse → B 240° forward and 330° reverse

OTR Mode

● OTR (Optimum Torque Reverse) Function



* Illustration is for 180 setting.

Continuous forward rotation normally, but when the load on the file exceeds the set limit, the file automatically starts alternately between forward and 90° reverse rotation (default setting).

180 : 90° reverse and 180° forward

240 : 120° reverse and 240° forward

- Possible rotation angle settings for various modes.

EMR	CW (forward)	CCW (reverse)	OTR	OGP
N/A	N/A	N/A	180 240	90 180 240

Beeper Volume

m2 Beeper Volume Vol.3

Volume of beeping for showing the position inside the canal, torque reverse etc.

Vol. 0 : Off, Vol. 1 : Soft, Vol. 2 : Medium, Vol. 3 : Loud

EMR	CW (forward)	CCW (reverse)	OTR	OGP
Vol. 0 Vol. 1 Vol. 2 Vol. 3				

Other Handpiece Functions

Beside the rotation control functions, the Tri Auto ZX2 has the following functions as well. These settings are common for all memories.

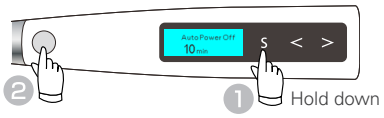
Default Handpiece Settings

The default settings are listed below. These settings can be changed as needed.

Auto Power Off Time	Auto Return to Standby Display	Dominant Hand	Startup Memory Number
10 min	10 sec	Right	m1

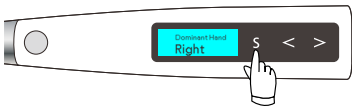
Set Handpiece Functions

1 Turn Power On



With the instrument turned off, hold down the Select switch (S) and press the Main switch to turn on the instrument.
The Auto Power Off Time display will appear.

2 Select and Set Functions



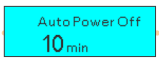
Press the Select switch (S) until the desired function appears. Press the Set switches (< >) to make the setting.

3 Return to Standby Display

After making the setting, press the Main switch to return to the standby display.

Settings

Auto Power Off Time



This shows how long it takes for the instrument to shut itself off if no switches are pressed.

It can be set from 1 to 30 minutes in 1 minute increments. 1 min. – 30 min.

Auto Return to Standby Display

This shows how long it takes for the instrument to go back to the standby display if no switches are pressed.

It can be set from 1 to 15 seconds in 1 second increments. 3 sec. – 15 sec.

Dominant Hand

This will rotate the display direction 180°.

Set this for right or left depending on the user's dominant hand. Right or Left

Startup Memory Number

This sets the memory number that appears right after the instrument is turned on.

m1 : Memory m1 will appear when the instrument is turned on.

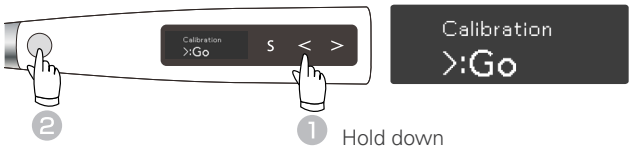
Previous : The memory being used when the instrument was turned off will appear.

Reset Memories to Original Default Settings

All memories and handpiece settings will revert to their original default settings.

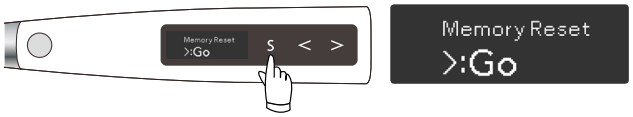
* All memories (m1 to m8) and handpiece functions will be initialized.
  It is not possible to initialize just one of them.

1 Turn Power On



With the instrument turned off, hold down the Left-Set switch (<) and then press the Main switch.
The calibration display will appear.

2 Select Display



Press the Select switch (S) and select the Memory Reset.

3 Reset Memory

Press the Right-Set switch (>) to reset the memories to their default settings.
After the memories are reset, the instrument will automatically return to the standby display.

Replacement Parts

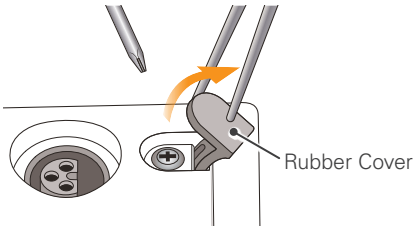
* Replacement parts and consumable parts are described in the Regular Inspection List. Replace the parts as necessary depending on degree of wear and length of use.
* Order parts from local dealer or J. MORITA OFFICE.

Replacing Battery

Replace the battery if it seems to be running out of power sooner than it should.
The battery will last for approximately 1 year under normal circumstances and use. (This depends somewhat on how the instrument is used and ambient conditions such as humidity.)

(1) Turn the power off.

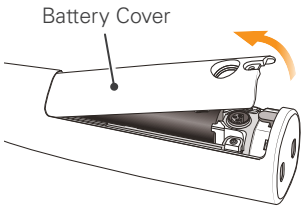
Do not leave the power on when disconnecting the battery.



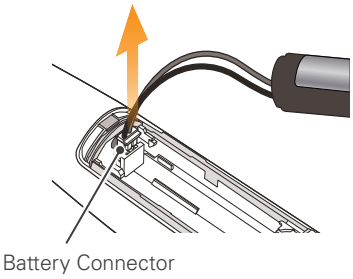
(2) Use tweezers etc. to open the rubber cover and then remove the screw.

Open the rubber cover carefully. Don't pull too hard. It might come off the motor handpiece.

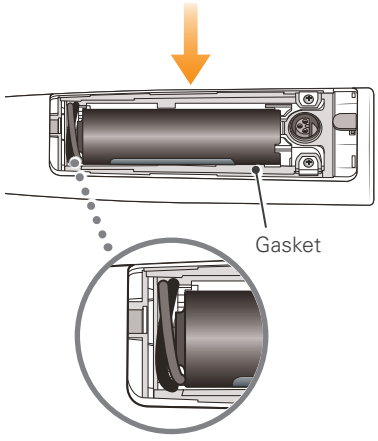
Do not remove the battery cover if the handpiece is wet.



(3) Remove the battery cover as shown in the illustration.



(4) Remove the old battery and disconnect the connector.



(5) Connect the new battery and put it in the motor handpiece.

⚠CAUTION

- Use only the battery designed for the Tri Auto ZX2. Other batteries could cause overheating.
- Do not use a battery if it is leaky, deformed, discolored or if its label is peeled off. It might overheat.

Wind the cable in a ring and put it away as shown in the illustration. Stuffing it in haphazardly could make it hard to close the cover or result in a broken wire.

(6) Replace the cover and its screw.

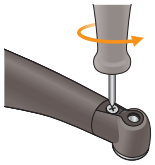
Do not tighten the cover screw too much. This could strip the threads.

Dispose of old batteries (Lithium-ion batteries) in an environmentally safe way and in strict according with local regulations.

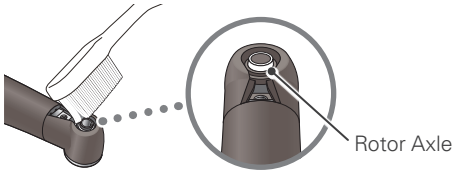
Do not put the cover on if the gasket is not properly in place. The cover could be loose and liquids might seep inside.

Replacing Built-in Electrode

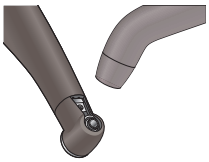
If the canal length indicator bars flicker during use, or if all the bars in the meter do not light up when the file touches the contrary electrode, and cleaning the rotor axle and built-in electrode does not solve this problem, then the built-in electrode is worn out and must be replaced with a new one according to the following procedure.



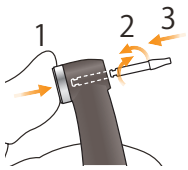
(1) Loosen the screw and remove the built-in electrode.



(2) Put a little Ethanol for Disinfection (Ethanol 70 to 80 vol%) on a brush and clean the rotor axle with it.



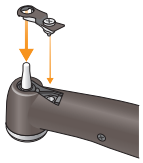
(3) Blow air on the electrode to remove any remaining moisture.



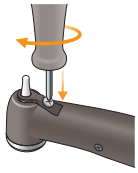
(4) Hold down the push button, insert the guide bur and turn it back and forth until it fits into the latch groove. Then release the push button to secure the bur.

⚠CAUTION

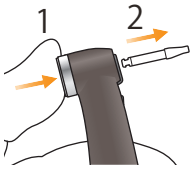
- Always use the guide bur and make sure it will not come out. If the guide bur is not properly fix in place, the internal contact could be bent, and then the instrument might not be able to make accurate measurements or else it might malfunction.
- Do not run the motor with the guide bur inserted. This could damage the instrument.



(5) Slide the built-in electrode onto the guide bur and line up the screw holes.



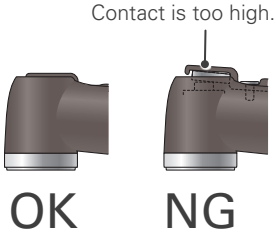
(6) Slowly turn the screw and make sure the built-in electrode goes into the head properly.



(7) Tighten the screw up securely and then hold down the push button and pull out the guide bur.

⚠WARNING

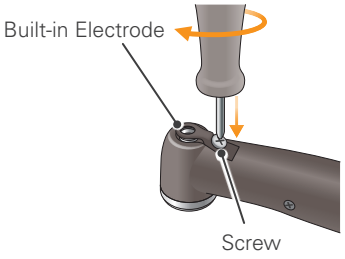
- Make sure the screw is tight enough. Otherwise, it might come out and be swallowed. Also, canal measurements might not be accurate.



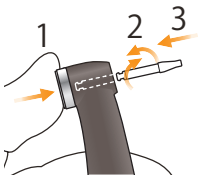
(8) Autoclave the contra angle.
☞p.28 “Autoclavable Components”

External File Electrode

If you use a file that cannot make a measurement with the built-in electrode, replace it with external file electrode (sold separately).



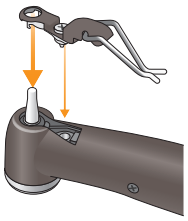
(1) Loosen the screw and remove the built-in electrode.



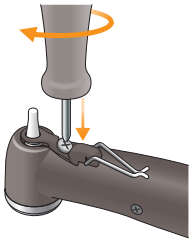
(2) Hold down the push button, insert the guide bur and turn it back and forth until it fits into the latch groove. Then release the push button to secure the bur.

⚠CAUTION

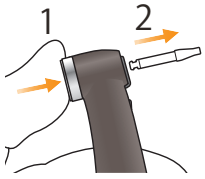
- Always use the guide bur and make sure it will not come out. If the guide bur is not properly fix in place, the internal contact could be bent, and then the instrument might not be able to make accurate measurements or else it might malfunction.
- Do not run the motor with the guide bur inserted. This could damage the instrument.



(3) Slide the external file electrode onto the guide bur and line up the screw holes.



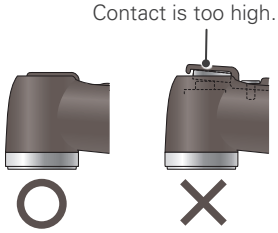
(4) Slowly turn the screw and make sure the cap goes into the head properly.

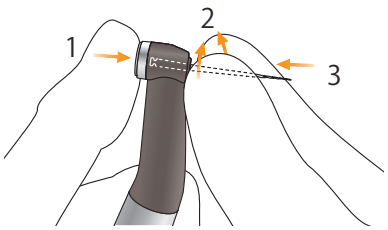


(5) Tighten the screw up securely and then hold down the push button and pull out the guide bur.

⚠WARNING

- Make sure the screw is tight enough. Otherwise, it might come out and be swallowed. Also, canal measurements might not be accurate.





(6) Hold down the push button on the contra angle and insert the file. Turn the file back and forth until it is lined up with interior latch groove and slips into place. Release the button to lock the file into the contra angle.

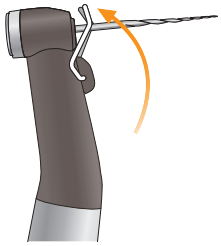
* Use only Ni-Ti or properly designed stainless steel files.

⚠WARNING

- Make sure the file is all the way in. Give it a light tug to make sure it is held securely.
- Never use stretched, deformed or damaged files.

⚠CAUTION

- Be careful when inserting and removing files to avoid injury to fingers.
- Never put file in or take them out without pressing the button down. This could damage the chuck. Always hold the button down to put a file in or take it out.
- Do not use files with shanks larger than the ISO standard.
  ISO Standard: Diameter 2.334 to 2.350 mm



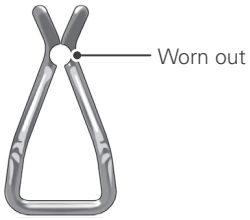
(7) Lift the electrode up and clip it onto the file.

⚠WARNING

- Always clip the electrode on the file when using it. Otherwise, measurements may not be accurate or rotation may not be properly controlled. (It may not be possible to measure a canal if blood or some other liquid overflows the canal or if the canal is completely blocked.)

⚠CAUTION

- Do not let the cutting part of the file touch the electrode. Otherwise the file electrode will wear out very quickly.
- Some files cannot be used with this electrode.
- Also the Ni-Ti files noted below cannot be used. To use these types of files, do not clip on the electrode and use the motor in manual mode.
  - Those with a file diameter of more than 1.2 mm.
  - Those with chuck shanks that are nor perfectly round.
  - Gates-Glidden Drills
  - Those that have cutting sections with large diameters such as largo burrs.



⚠WARNING

- Replace the external file electrode if it is worn out as shown in the photo to the left.

Maintenance and Inspection

Regular Inspection

* Maintenance and inspection are generally consider 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 be performed by the accredited service personnel. Contact your local dealer or J. MORITA OFFICE for details.
* Consumable and replacement parts are described in page 51.
* This instrument should be inspected every 6 months in accordance with the following maintenance and inspection items.

- Connect the AC adapter to the battery charger, plug it in and check that the Ready LED (green) lights up.
- Make sure there is no dirt, metal fragments etc. on the connection contacts for both the motor handpiece end and the battery charger.
- Put the motor handpiece into the battery charge and check that the Charge LED (orange) light up. Check that the battery does not seem to be losing its charge too quickly.
- Check that the connection end of the motor handpiece is not damaged of dirty.
- Check that the connection end of the contra angle is clean and not damaged and that it can be properly connected to the motor handpiece.
- Check that the push button works and a file can be properly installed.
- Check that the external file electrode (option) clips onto the file properly and that it is not worn or damaged.
- Check that the instrument turns on when the Main switch is pressed, and that the instrument turns off when the Select switch is held down and the Main switch is pressed.
- Press the Set switch (< >) to select a memory from m1 to m8.
- Check that the settings for each of the memories can be changed.
- Look at the probe cord and its plugs and connectors carefully and make sure that are not damaged or dirty.
- Make sure the probe cord connector goes into its motor jack properly.
- Visual inspect the file holder and contrary electrode to make sure that are not damaged or dirty.
- Make sure the file holder plug fits properly into its probe connector (gray).
- Make sure the file holder holds a file properly.
- Make sure the contrary electrode fits properly into its probe connector (white).
- Contact the file with contrary electrode and check that all the root canal length indicator bars on the display are lit.
- Connect the tester and make sure the meter reads within 2 bars above or below bar 1 on the meter.
- Press the Main switch and make sure that this starts and stops the motor.
- Run the motor in OGP mode, and check that it changes rotation direction.
- Run the motor in CW mode and make sure the torque meter changes according to the load on the file.

* For repairs contact your local dealer or J. MORITA OFFICE.

Standards and Procedures for the Disposal of Medical Devices

The dentist or doctor responsible for the patient's treatment must confirm that a medical device is uncontaminated, and must then have it disposed of by a healthcare facility or an agent licensed and qualified to handle standard industrial waste and industrial waste requiring special treatment.

The rechargeable battery should be recycled. Metal parts of the equipment are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. Material must be disposed according to the relevant national legal regulations. Consult specialized disposal companies for this purpose. Please inquire of the local city/community administrations concerning local disposal companies.

Troubleshooting

1. Troubleshooting

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

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

Problem	Check Points	Remedies	Remarks
No power.	Check the battery power.	Charge the battery.	p.26
	Check the battery installation.	Install the battery properly.	p.42
	Degraded battery.	Replace the battery.	
Display does not appear.	Is there a sound when the instrument is turned on and off?	Charge battery if there is no sound. Broken display if there is a sound.	p.26
Motor handpiece does not run.	Is it set for EMR mode?	Select a mode other than EMR mode.	p.34
No sound.	Beep volume set for 0?	Set beep volume for 1, 2, or 3.	p.39
Beep sound an alarm even though the instrument is not being used.	Is the instrument set for CCW (reverse rotation) mode?	When set for CCW, the beeper sounds an alarm after a set time period elapses. If this is annoying, set the beeper sound for 0.	
Motor does not run when the file is inserted in the canal.	Is contrary electrode properly hooked in the corner of the patient's mouth?	Hook the contrary electrode in the corner of the patient's mouth.	p.18
	Is the instrument set for EMR mode?	Select a mode other than EMR mode.	p.34
	Check is auto start is turned off.	Turn the auto start function on.	p.37
Motor spontaneously starts running in reverse.	Torque limit may be set.	Set the Torque Reverse function for R.L (torque reverse less) if this is not desired.	p.35
	Is the apical action setting on reverse?	Change the apical action setting to off to on.	p.36
	Is the instrument set for CCW (reverse rotation) mode?	Change rotation mode to other than CCW (reverse rotation).	p.34
Motor reverse its rotation too easily.	Torque limit value might be set too low.	Increase the torque limit value.	p.35
	The Apical Torque Down function might be turned on.	The torque limit automatically decreases as the file approaches the apex. To use a definite reverse torque value, turn the Apical Torque Down function off.	p.39
Motor does not reverse its rotation.	Set for R.L (torque reverse less)?	Change this for something other than R.L (torque reverse less).	p.35
	Torque reverse setting might be too high.	Lower the torque reverse setting.	
	Apical Action might be turned off.	Set Apical Action for Reverse.	p.36
	Is Apical Action setting on "Stop" or "OAS"?	Set Apical Action for Reverse.	
Motor changes speed spontaneously.	Apical Slow Down might be turned on.	Rotation slows down as file approaches the apex. For a steady rotation speed, turn it off.	p.38
	Torque Slow Down might be turned on.	Rotation slows down as file torque increases. For a steady rotation speed, turn it off.	
Instrument turns off by itself.	Instrument might not have been used for a while.	Auto Power Off was triggered. Press the Main switch to turn on the instrument again.	p.40
	Momentary large load when battery is low?	If pressing the Main switch returns to standby display but the battery is low, charge the battery.	p.48

Problem	Check Points	Remedies	Remarks
Canal measurement meter is unstable.	Does the built-in electrode need replacement? Has it been replaced recently?	• Clean and lubricate the contra angle. • Remove the internal electrode and clean it and the rotor axle with a brush. • Replace the built-in electrode.	p.43
Motor alternates between forward and reverse rotation.	Is it set for OTR mode?	In OTR mode, rotation alternates between forward and reverse if the torque is greater than the specified value.	p.39
	Is it set for OGP mode?	In OGP mode, the motor always alternates between forward and reverse.	
	Does alternating rotation happen even after calibration?	Raise the trigger torque 1 level.	p.35
Cannot make a canal measurement.	Is contrary electrode properly hooked in the corner of the patient's mouth?	Hook the contrary electrode in the corner of the patient's mouth.	p.18
	Does the file or reamer lack electrical conductivity between the shank and the file?	Use a file or reamer that has conductivity or used the external file electrode.	p.44
	A wire in the probe cord might be broken.	Touch the white connector on the probe cord with the gray one and see if all the bars on the meter light up.	N/A

2. Abnormal Stop

The motor handpiece may stop working in the 4 cases listed below.

Display	Cause	Remedies
	Control circuits may have malfunctioned.	Turn the instrument off and then back on again. If the error message appears again, stop using the instrument immediately and contact your local dealer or J. MORITA OFFICE. The number that appears after "Error" depends on the malfunction. ☞p.48 "3. Error Numbers"
	Battery power is very low or the motor was subjected to a very large load momentarily.	Normally, press the Main switch to return to the Standby display. If the instrument does not return to the Standby display when the Main switch is pressed or if the message reappears after returning to the Standby display, the battery is very low and must be recharged. ☞p.26 "Battery Charging" However, if the Standby display does not appear while a file is in the canal, take the file out and then press the Main switch.
	This appears if the motor is subjected to a large load constantly such as when the file is locked in the canal and the motor cannot rotate.	Normally, press the Main switch to return to the Standby display. If the instrument does not return to the Standby display when the Main switch is pressed the battery is very low and must be recharged. ☞p.26 "Battery Charging" However, if the Standby display does not appear while a file is in the canal, take the file out and then press the Main switch.
	If the motor was subjected to a very large load momentarily and the battery does not have enough power, the instrument is forced off. When the instrument is turned back on after being forced off, the message show to the right appears in the screen.	If pressing the Main switch returns to standby display but the battery is low, charge the battery. ☞p.26 "Battery Charging"

3. Error Numbers

If an error or problem is detected, the instrument will stop and an error number will appear in the display.
If the instrument stops, turn it off and then back on again. If the error message appears again, stop using the instrument and contact your local dealer or J. MORITA OFFICE.
Make a note of the error number and report it when requesting help for the company.

Error No.	Problem etc.	Error No.	Problem etc.
01	Faulty battery power detection	65	Faulty EEPROM
04	Faulty motor	66	Faulty canal measurement
08	Faulty torque settings	96	Faulty watch dog
16	Faulty internal buffer		

Technical Specifications

* Specifications may be changed without notice due to improvements.

Name	Tri Auto ZX2
Model	TR-ZX2
Classification	Safety according to IEC 60601-1, IEC 60601-1-2 European Directive 93/42/EEC IIa
Degree of Protection (IEC 60529)	IPX0
Intended Use	The Tri Auto ZX2 device is a cordless endodontic treatment motorized handpiece with root canal measurement capability.It can be used to enlarge the canals while monitoring the position of the file tip inside the canal.It can be used as a low-speed motorized handpiece and device for measuring canal length.
Essential Performance	• Switch motor on and off. • Switch motor rotation directions

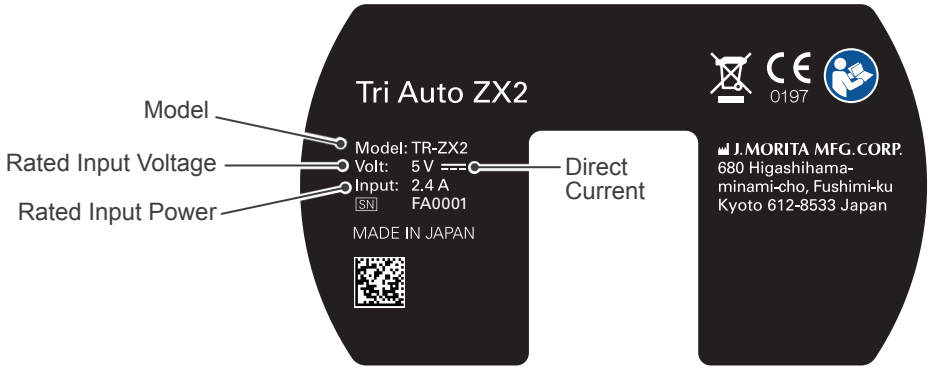
Handpiece	
Free Running Operation Speed	100 ±20 – 1000 ±100 r/min
Gear Ratio	1.9 : 1
Usable Burs	Type 1(CA)
Rated Torque	min. 0.04 N•m (4.0 N•cm)
Chuck Type	Push button latch type
Classification of Protection against Electric Shock	Internal Powered ME Equipment
Degree of Protection against Electric Shock	Type BF applied part
Mode of Operation	Continuous
Battery	Lithium ion battery (DC 3.7 V)
Dimensions	Approx. Dia.31 x Length 202 mm (including Contra Angle and Motor Handpiece)
Weight	Approx. 140 g (including Contra Angle and Motor Handpiece)

Battery Charger	
Classification of Protection against Electric Shock	Class II
Rated Input Voltage	DC 5 V
Rated Input Current	2.4 A
Dimensions	Approx. Dia.86 x Height 72 mm
Weight	Approx. 280 g

AC Adapter	
Rated Input Voltage	AC100 – 240 V
Rated Input Frequency	47 – 63 Hz
Rated Input Current	0.4 A

Rating Label and Symbols

Rating Label



Symbols

Descriptions	Location	Descriptions	Location
CE 0197 CE (0197) marking Conforms with the European Directive, 93/42/EEC. CE marking Conforms with the European Directive, 2011/65/EU.	Rating Label Contra Angle Motor Handpiece Package Operation Instructions	SN Serial Number Example) F A 0001 (1) (2) (3) (1) Year of Manufacture F : 2017, G : 2018, H : 2019... (2) Month of Manufacture A: Jan., B: Feb., C: March... (3) Lot No. 0001, 0002, 0003...	Rating Label Package
WEEE directive marking	Rating Label Package	Consult instructions for use	Rating Label Package
Manufacturer	Rating Label Operation Instructions	Data matrix code	Rating Label
Type BF applied part	Contra Angle Motor Handpiece	135°C Autoclavable up to 135°C (275°F)	Contra Angle
Supports high-temperature cleaning and disinfection.	Contra Angle	Never be re-used.	HP Protective Sleeve Type A
2017-02 Date of manufacture	Package	Keep dry	Package
Fragile	Package	This way up	Package
45°C -10°C Temperature limitation	Package	85% 10% Humidity limitation	Package
106kPa 70kPa Atmospheric pressure limitation	Package	EC REP EU Authorized Representative under the European Directive 93/42/EEC	Operation Instructions

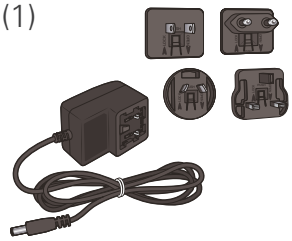
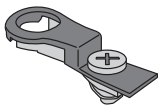
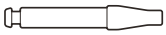
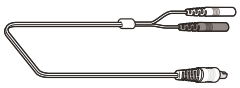
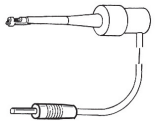
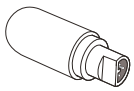
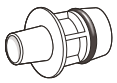
Service Contacts

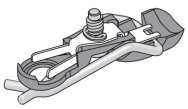
Tri Auto ZX2 may be repaired and serviced by

- 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.

For repairs or other types of service, contact your local dealer or J. MORITA OFFICE.

Consumable and Replacement Parts

Battery	AC Adapter	Built-in Electrode	Guide Bur
(1) 	(1) 	(with guide bur) (1) 	(1) 
Probe Cord	**File Holder**	**Contrary Electrode**	**Tester**
(1) 	(5) 	(5) 	(1) 
HP Protective Sleeve Type A	**LS Spray Nozzle**	**LS Spray**	
(box of 100) 	(1) 	(1) 	

Handpiece Holder	External File Electrode	Long File Holder
(1) 	(with cap and guide bur) (1) 	(5)

Appendix-Electromagnetic Declaration

This device conforms to IEC 60601-1-2: 2007, the relevant international standard for electromagnetic compatibility (EMC). EMC適合

The following is the "Guidance and Manufacturer's Declaration" which is required by IEC 60601-1-2: 2007, the relevant international standard for electromagnetic compatibility.

⚠WARNING

- The Tri Auto ZX2 (hereafter referred to as the TR-ZX2) needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.
- Portable and mobile RF communications equipment can affect the TR-ZX2.
- Use of parts other than those accompanied or specified by J. MORITA MFG. CORP. may result in increased EMC emissions or decreased EMC immunity of the TR-ZX2.
- The TR-ZX2 should not be used adjacent to with other equipment. If adjacent use is necessary, the TR-ZX2 should be observed to verify normal operation in the configuration in which it will be used.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
The TR-ZX2 is intended for use in the electromagnetic environment specified below. The customer or the user of the X800 should assure that it is used in such an environment.		
Emissions Test	Compliance	Electromagnetic Environment – Guidance
RF emissions CISPR 11	Group 1	The TR-ZX2 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The TR-ZX2 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions*1 IEC61000-3-2	Class A	
Voltage fluctuations/flicker emissions*1 IEC 61000-3-3	Complies	

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The TR-ZX2 is intended for use in the electromagnetic environment specified below. The customer or the user of the X800 should assure that it is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±2, 4, 6 kV contact ±2, 4, 8 kV air	±2, 4, 6 kV contact ±2, 4, 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transients/bursts*1 IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines*2	Mains power quality should be that of a typical commercial or hospital environment.
Surge*1 IEC 61000-4-5	±0.5, 1, 2 kV line(s) to earth ±0.5, 1 kV line(s) to line(s)	±0.5, 1, 2 kV line(s) to earth ±0.5, 1 kV line(s) to line(s)	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply lines*1 IEC 61000-4-11	Voltage Dips: <5% U_T for 0.5 cycle 40% U_T for 5 cycle 70% U_T for 25 cycle Short Interruptions: <5% U_T for 250 cycle	Voltage Dips: <5% U_T for 0.5 cycle 40% U_T for 5 cycle 70% U_T for 25 cycle Short Interruptions: <5% U_T for 250 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the TR-ZX2 requires continued operation during power mains interruptions, it is recommended that the TR-ZX2 be powered from an uninterruptible power supply or a battery.
Supply frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic field should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

*1: Battery charger data

*2: This test is not applicable since the EUT signal cable is less than 3 m.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The TR-ZX2 is intended for use in the electromagnetic environment specified below. The customer or the user of the X800 should assure that it is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz – 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the TR-ZX2, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance: $d = \frac{3.5}{3}\sqrt{P}$ $d = \frac{3.5}{3}\sqrt{P}$ 80 MHz – 800 MHz $d = \frac{7}{3}\sqrt{P}$ 800MHz – 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:
Radiated RF IEC 61000-4-3	3 V/m 80 MHz – 2.5 GHz	3 V/m	
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for ratio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicated theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the TR-ZX2 is used exceeds the applicable RF compliance level above, the TR-ZX2 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting of relocating the TR-ZX2. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.			

Recommended separation distances between portable and mobile RF communications equipment and the TR-ZX2.			
The TR-ZX2 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the TR-ZX2 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the TR-ZX2 as recommended below, according to the maximum output power of the communications equipment.			
Rated Maximum Output Power of Transmitter (W)	Separation Distance According To Frequency of Transmitter (m)		
	150 kHz – 80 MHz $d = 1.17\sqrt{P}$	80 MHz – 800 MHz $d = 1.17\sqrt{P}$	800 MHz – 2.5 GHz $d = 2.33\sqrt{P}$
0.01	0.12	0.12	0.233
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.67	11.67	23.33
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

* Essential Performance:

• Even if noise causes display distortion or stops rotation, normal operation can be restored manually when the noise stops.

* Cable Length:

• AC Adapter Cable: 1.8 m

Safety and Accident Prevention for the Operation of Electrical Medical Devices

1. Only fully trained and qualified personnel may operate device.
2. Items to be duly noted when installing device.
   (1) Locate the instrument in a place where it will not get wet.
   (2) Install the instrument in a location where it will not be damaged by air pressure, temperature, humidity, direct sunlight, dust, salts, or sulfur compounds.
   (3) The device should be protected from tilting, vibrations, percussive shocks, etc. (including when it is being moved).
   (4) Do not install the instrument where chemicals are stored or where gas may be released.
   (5) Follow all electrical specifications including frequency (Hz), voltage (V), and current capacity (A) (power consumption).
   (6) The device must be properly grounded.
3. Item to be duly noted before use.
   (1) Inspect all switch connections, polarity, dial settings, meters etc. to confirm that the device will operate properly.
   (2) Confirm that the ground is connected properly.
   (3) Confirm that all cords are connected properly.
   (4) Take into consideration that simultaneous use of more than one instrument or device can create a dangerous situation or lead to a mistake in diagnosis.
   (5) Reconfirm the safety of external circuits or systems which are connected directly to the patient.
4. Item to be duly noted during use.
   (1) Never use the device for treatment or diagnosis more than necessary or for longer than necessary.
   (2) Maintain a constant vigilance for abnormal conditions in both the device and the patient.
   (3) Appropriate steps, such as shutting the device down, should be devised to protect the safety of the patient in case any abnormalities in the device or the patient are observed.
   (4) Make sure the patient does not handle or manipulate the device.
5. Items to be duly noted after use.
   (1) Turn the power off after returning dials, switches etc. back to their original positions in the prescribed order.
   (2) Do not use excessive force or pull the cord itself to disconnect cords.
   (3) The following items should be considered when storing the device:
      (3)-1. The storage area should protect the device from getting wet.
      (3)-2. The storage area should protect the device from any possible damage due to atmospheric pressure, temperature, humidity, wind, direct sunlight, dust or air containing salts or sulfur.
      (3)-3. The device should be protected from tilting, vibrations, percussive shocks, etc. (including when it is being moved).
      (3)-4. The storage are should be free of chemicals and gases.
   (4) All accessories, cords, guides etc. should be cleaned, properly arranged and carefully put away.
   (5) Before storage, the device should be cleaned so that it is ready to be used again.
6. In case of a malfunction or defect, the operator should attach a written notice indicating that the device is out of order without attempting to repair the device himself; repairs should be referred to a qualified serviceman.
7. Device must not be modified in any way.
8. Maintenance and Inspection
   (1) All device and components should be inspected regularly.
   (2) Device which has not been used recently should always be inspected to confirm that it functions properly and safely before being put back into use.

Diagnostic and Imaging Equipment

Treatment Units

Handpieces and Instruments

Endodontic System

Laser Equipment

Laboratory Devices

Educational and Training Systems

Auxiliaries

MORITA

Development and Manufacturing

J. MORITA MFG. CORP.

680 Higashihama Minami-cho, Fushimi-ku, Kyoto 612-8533, Japan

T +81. (0)75. 611 2141, F +81. (0)75. 622 4595

Morita Global Website

www.morita.com

Distribution

J. Morita Corporation

3-33-18 Tarumi-cho, Suita-shi, Osaka 564-8650, Japan

T +81. (0)6. 6380 1521, F +81. (0)6. 6380 0585

J. Morita USA, Inc.

9 Mason, Irvine CA 92618, USA

T +1. 949. 581 9600, F +1. 949. 581 8811

J. Morita Europe GmbH

Justus-von-Liebig-Strasse 27a, 63128 Dietzenbach, Germany

T +49. (0)6074. 836 0, F +49. (0)6074. 836 299

Morita Dental Asia Pte. Ltd.

3 Science Park Drive,

#01-05 The Franklin Singapore Science Park1, Singapore 118223

T +65. 6779. 4795, F +65. 6777. 2279

J. Morita Corporation Australia & New Zealand

Suite 2.05, 247 Coward Street, Mascot NSW 2020, Australia

T +61. (0)2. 9667 3555, F +61. (0)2. 9667 3577

J. Morita Corporation Middle East

4 Tag Al Roasaa, Apartment 902, Saba Pacha 21311 Alexandria, Egypt

T +20. (0)3. 58 222 94, F +20. (0)3. 58 222 96

J. Morita Corporation India

Filix Office No.908, L.B.S. Marg, Opp. Asian Paints, Bhandup (West), Mumbai 400078, India

T +91-22-2595-3482

J. MORITA MFG. CORP. Indonesia Representative Office

28F, DBS Bank Tower, Jl. Prof. Dr. Satrio Kav. 3-5, Jakarta 12940, Indonesia

T +62-21-2988-8332, F + 62-21-2988-8201

Siamdent Co., Ltd.

71/10 Mu 5, Thakham, Bangpakong, Chachuengsao 24130, Thailand

T +66. 38. 573042, F +66. 38. 573043

www.siamdent.com

EU Authorized Representative under the European Directive 93/42/EEC

EC REP **MEDICAL TECHNOLOGY PROMEDT CONSULTING GmbH**

Altenhofstraße 80, 66386 St. Ingbert, Germany T +49. 6894 581020, F +49. 6894 581021

The authority granted to the authorized representative, MEDICAL TECHNOLOGY PROMEDT Consulting GmbH, by J. MORITA MFG. CORP. is solely limited to the work of the authorized representative with the requirements of the European Directive 93/42/EEC for product registration and incident report.

Pub. No.: K316-80002-500 Printed in Japan