

# E CUBE PLUS

## INSTRUCTION MANUAL





INTRODUCTION

USER GUIDELINES

PRODUCT FEATURES

PRODUCT COMPONENTS

PART NAME OF CONTROL BOX

BUTTONS ON OPERATION PANEL

LCD WINDOW

CONNECTION OF EACH PART

OPERATION PROCESS

MAINTENANCE OF THE PRODUCT

ATTENTION

PRODUCT SPECIFICATION

ELECTROMAGNETIC COMPATIBILITY INFORMATION

WARRANTY

SYMBOL




## INTRODUCTION

This product is **the medical device**.

Make sure to read this user manual before using.

This user manual is to assure proper installation and use.

Pay attention to read this user manual in order to making the best use of this product and to assure the prolonged lifespan before using.

Specially, pay attention the contents with marks such as   and .


### < User >


- Qualified Professional

### < Intended purpose >

- 1) Dental apex locator : It is a dental device that measures the length of the root canal by using changes in electrical resistance, etc. and is used to check the location of the tip of the root canal in dental treatment.
- 2) Electric dental handpiece : A handpiece powered by electric motors to remove teeth, etc.

### < Classification of equipment >

- Type of protection against electric shock: Class I equipment  
 - To avoid the risk of electric shock, the product must be connected to a power source with a protective ground.

- Degree of protection against electric shock: Type BF applied part 
- Classification according to the degree of protection against ingress of water as detailed in the current edition of IEC 60529:

- Control Box: IPX 0

- Foot Controller: IPX 1

- Not suitable product in the atmosphere that exist flammable anesthetic mixture with air or with oxygen
- User sterile product (non-sterile product at shipment)
- Classification according to mode of operation: Continuous operation with intermittent loads
- Applied part: Bur, Lip Hook

### < Use time >

- Loading time: 3 minutes
- Resting time: 10 minutes

### < Operating and storage condition >

Operating condition	Temperature (°C)	10 ~ 35
	Relative humidity (%)	10 ~ 80
	Atmospheric pressure (hPa)	700 ~ 1,060
Transport and Storage condition	Temperature (°C)	-20 ~ 60
	Relative humidity (%)	10 ~ 90
	Atmospheric pressure (hPa)	500 ~ 1,060



## USER GUIDELINES



### CAUTION

- Please pay attention to the use considering the patient's safety first of all.
- Check condition of the product before use.
- Stop to use and inspect the product when an abnormal sign such as calescence, vibration or noise occurs before or during operation.
- Please contact manufacturer if cannot find reason of problem, or cannot solve the problem.
- Replace the bur or file after the motor is completely stopped. Otherwise, inside of the angle could be damaged, and it could cause an accident.
- Please sterilize and lubricate the handpiece right after use. Otherwise, the product could be damaged due to coagulation of blood inside the product.
- This product is not sterilized when shipped from the manufacturer.  
Refer to the maintenance section of the product and sterilize components that require sterilization before use.
- The control box, motor, foot controller and adaptor are not steam sterilization objects.
- Contact manufacturer if incorrect display is on the screen. There is a risk of an accident.
- Do not drop or give a strong impact to the product. It may cause a breakdown.
- Do not insert oil into the motor. It will damage bearing or cause calescence.
- The product is designed to be used indoor, do not use outdoor.
- Do not use the product in humid or dusty environment.
- Use the regulated products and consumables by manufacturer. Otherwise there might be a risk of an accident or failure.
- User has responsibility to operate and maintain the product.
- This product uses a rechargeable battery [Ni-MH battery]. Recycling is possible, but some countries may not allow processing, so return it to the place of purchase.
- When connecting the cord and connector, check the direction and attach it.
- When the battery bar is one level on the screen, please charge it as much as possible.
- If the battery has been almost discharged, the battery level on the screen is blank and a beep sounds. Stop using it immediately and charge it..
- When using apex measurements, check if the patient is allergic to metals.
- Excessive force on the root canal may result in damage or blockage of the root canal wall caused by the file.
- Be careful when using reverse rotation, as the torque of the motor is strong and the file may be broken.



### WARNING

- Please watch old person, children, or disabled person near the place that the product is installed. If so, do not let them alone.
- Portable and mobile radio frequency communications equipment may affect the product. Do not use radio frequency equipment in close proximity for the product.
- Before measuring root canal length, make sure the "Auto Start/Stop" function is turned off. If it is on, the motor will rotate automatically.
- If the root canal is blocked or under special circumstances, the measurement may not be possible or accurate.
- Do not let the metal part of the contra-angle come into contact with the oral mucosa. There is a risk of an accident due to the rotation of the motor.
- Do not modify this equipment without authorization of the manufacturer.



## PROHIBITION

- Do not use damaged or broken power cord, plug, and outlet. It may cause fire and electric shock.
- When unplug the power cord, hold the plug and do not touch with wet hand. Do not use loose power cord, it may cause electric shock and fire.
- Do not damage to power cord (do not bend too hard, do not put heavy objects on it). It may cause electric shock and fire.
- Do not disassemble, modify or modify this product. It may cause a breakdown.
- Do not use the solvent such as thinner or benzene for cleaning.
  - ※ Be careful not to drop liquid on control box.
  - ※ Do not wipe the control box (membrane) with wet fabric.
- Do not place the product near heat equipment, and do not put candles or cigarette on it.
- Be sure to use designated bur or file by ISO 1797.
- Follow the instruction manual by manufacturer of part to use bur or file.
- Keep the recommended speed limit by manufacturer of part to use bur or file. If exceed the speed limit, it might cause an accident.
- Before use, check the bur or file for bent, broken, or transformed before use. Do not use the bur or file that was bent, broken and transformed.
- The product must be used by specialist or expert. If not, patient might get burn or damage by improper use.
- Do not use the product to patient with cardiac pacemaker because the product may disturb the performance of cardiac pacemaker.
- If patient is taking antibiotics, patient needs to consult with doctor before operation.
- Keep away from fire or heat when using spray containing flammable material.
- Manufacturer does not have any responsibility for defects or loss of property in cases below.
  1. User did not follow the instruction manual to use the product.
  2. Used the product in the place of unregulated wire condition.
  3. Unauthorized person repaired or assembled the product.
  4. Did not follow the instruction manual to keep the product.
- Only Rechargeable battery(Ni-MH battery) is allowed to be used. Do not use manganese and alkaline battery. If mishandled, that causes leakage or ruptures.
- If the product is not in use for long period, please put out the battery. there is possible leakage.
- If the batteries leak, do not allow the liquid to come into contact with your skin, eyes or clothes.
- Using the product under electromagnetic interference may cause system malfunction. Do not use the product near devices that emit electromagnetic waves. If there is an ultrasonic vibrator or electrode knife nearby, turn off the main unit.
- Do not use on the following patients.
  1. People with medical complications or allergies
  2. People with heart, lung disease, kidney failure, or high blood pressure
  3. Pregnant or lactating person
  4. Patients with pacemakers and infants
- Do not use with radio knife. It interferes with accurate measurement and there is a risk of an accident.
- For safety, install the control box in a place where the power cord can be easily removed.



## PRODUCT FEATURES

### < Endo Mode >

- Max. RPM :

1:1	4:1	10:1	16:1	20:1
10,000 RPM	3,250 RPM	1,300 RPM	800 RPM	650 RPM



- The free-running speed of the handpiece shall be in accordance with the manufacturer's instructions at a tolerance of  $\pm 10\%$  as specified. (Refer to ISO 14457)

- Max. Torque :

1:1	4:1	10:1	16:1	20:1
-: N·cm	1.3 N·cm	3.2 N·cm	5.2 N·cm	6.5 N·cm

- Apex length measurements : 0.0~2.0 (When contact, O.A(Over Apex) displayed)

### < Program Memory Function >

- 7 programmable memories for setting gear ratio, torque, speed, rotating direction and etc.
- Programs 8 and 9 can be used by setting the rotation ratio of the forward and reverse directions in the reciprocating mode.

### < Auto Reverse Function >

- During the procedure, when the actual load is close to the set torque value, an alarm sound is generated to notify you.
- When it exceeds the set torque value, it automatically stops or reverses.

### < Automatic Power OFF Function >

- Power is off with beep sound after 10 minutes without operation.  
(During the motor operation even without use, power is not off automatically.)

### < AUTO START/STOP >

- When the apex measurement starts, the motor starts to rotate automatically, and when the measurement is finished, the motor stops. (Available only in APEX+ENDO mode)

### < AUTO SLOW DOWN >


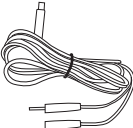
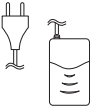

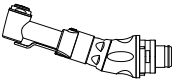



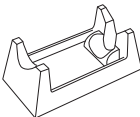



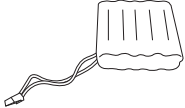

- The rotational speed of the motor is gradually reduced according to the ratio of the apex depth, and the motor stops when it reaches the set APICAL LINE. (Available only in APEX+ENDO mode)



- The AUTO START/STOP function and the AUTO SLOW DOWN function can be used individually or at the same time.

## PRODUCT COMPONENTS

\* Please check all components are included.

①		⑧	
②		⑨	
③		⑩	
④		⑪	
⑤		⑫	
⑥		⑬	
⑦		⑭	

No.	COMPONENTS	No.	COMPONENTS
1	Control Box	8	Probe Cord
2	Adaptor and AC Power Cord	9	Lip Hook
3	Angle Handpiece (Option)	10	File Clip
4	Motor (Option)	11	Connecting Cord
5	Motor Stand	12	Tester
6	Foot Controller	13	Cable Tie
7	Battery (Including in the control box)	14	SPANNER FOR ANGLE

## BUTTONS ON THE OPERATION PANEL



Power Button

: Push the power button over the 3 seconds, power is turned on/off.



Apex/Endo Button

: Use for selecting the apex or the endo mode.



AUTO  
Rev

Auto Reverse Button

: Use for setting the automatic reverse mode. Three modes can be selected.



Operation Direction Button

: Use for selecting the rotary direction. The beep sound is heard during rotation in reverse direction.  
In Reciprocating mode, use for selecting forward or reverse rotation when changing the rotation angle.



Gear Ratio Button

: Use for setting the gear ratio.



Speed/Rotation Angle Button

: Use for setting the speed(RPM).  
Press and hold the button, can set the speed.  
In Reciprocating mode, use for changing the rotation angle.



Torque Button

: Use for setting torque.  
Press and hold the button, can set the torque.



Program

Program Button

: Use for selecting the program number.  
Press and hold the button, can set the program.



Apical  
Line

Apical Line Button

: Use for setting apical line. The default is 0.5.  
Press and hold the button to set the AUTO START/STOP, AUTO SLOW DOWN functions.

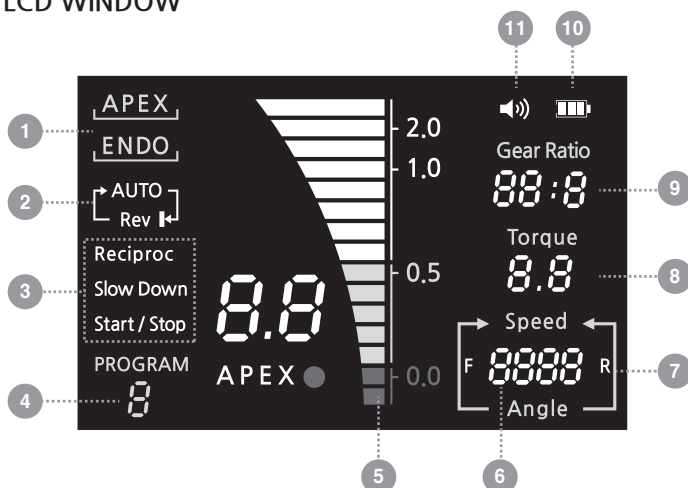


Volume Button

: Use for changing system volume value.



## LCD WINDOW



### 1. Working Mode Display

: It shows the currently selected working mode. There are three working modes: APEX, ENDO and APEX+ENDO (combination).

### 2. Automatic Reverse Display

: It shows the selected automatic reverse direction mode.

### 3. Special function of Working Mode

: When using the ENDO and APEX+ENDO mode, programs 8 and 9 are in reciprocating mode and "Reciproc" is displayed.

In APEX+ENDO mode, displays the set status when using the Start/Stop and Slow Down functions.

### 4. Program Number Display

: It shows the selected program number.

### 5. Apex length Display / Load Display.

: In APEX, APEX+ENDO mode, it displays the length of the apex length. In ENDO mode, it shows the load condition of motor during operating.

### 6. Speed Display

: It shows the preset RPM.

In reciprocating mode (programs 8 and 9), the currently set angle is displayed when selecting the forward or reverse rotation angle. Except when selecting rotation angles, 350 RPM is displayed.

### 7. Rotary Direction Display

: It shows the selected rotary direction.

In reciprocating mode (programs 8 and 9), the forward or reverse icons flash when selecting the forward or reverse rotation angles.

### 8. Torque Display

: It shows the preset torque.

### 9. Gear Ratio Display

: It shows the selected gear ratio.

### 10. Battery Display

: There are three bars which indicate battery power and if the battery bar is less than one level, the battery have to be recharged.

### 11. System volume display

: It shows the system volume value.

## ● CONNECTION OF EACH PART





### 1. Motor Connection

: Please insert the pins of motor cord to the holes position of control box carefully.



- To remove the motor, hold the plug ring and pull it out.



### 2. Probe Cord Connection

: Connect the file clip and lip hook to the probe cord respectively.

Connect the Micro USB terminal of the probe cord to the probe connector of the main controller.

(When connecting, please check the direction of the Micro USB port.)

In APEX+ENDO mode, connect the connecting cord to the file clip holder of angle handpiece and the probe cord.



### 3. Adaptor connection

Please insert the adaptor plug into the adaptor connector exactly.

(When charging the battery)



- Please use the designated adaptor only. Please check the battery bar on the LCD display of the main controller for charging status.

- It takes about 5 hours to complete full recharge, however, it might vary upon surrounding temperature and battery condition.

Older Batteries might remarkably shorten both charging and operating time.

Under unstable surroundings, such as high temperature or low temperature, the batteries might not be properly recharged.

Avoid sunlight and use the product at consistent temperature location.

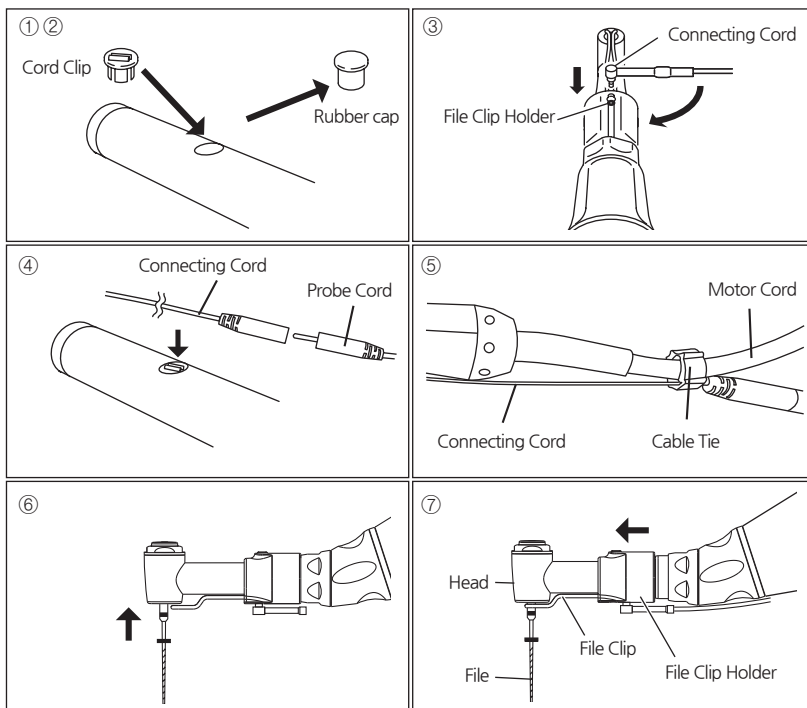


### 4. Foot Controller Connection

: Please insert the foot controller plug into the foot controller connector exactly.

### < Handpiece Connection >

- ① Remove the rubber cap on the back of the motor handpiece and fit the cord clip.
- ② Mount the angle handpiece to the motor handpiece.
- ③ Connect the connecting cord to the file clip holder. At this time, insert the connecting cord into the file clip holder with 3 o'clock or 9 o'clock directions and rotate 90° to fix it.
- ④ Connect the connecting cord to the probe cord, then insert it into the cord clip.
- ⑤ Secure the connecting cord to the motor cord with cable tie.
- ⑥ Insert file.
- ⑦ Connect the file and the file clip by pushing the file clip holder toward the head of the angle handpiece.



## 5. Angle Handpiece Connection

: Please insert the angle handpiece to motor until 'click' sound after arrange the angle handpiece positioning pin and motor positioning slot.

To separate the angle handpiece and motor, pull out the angle handpiece to its axis side.

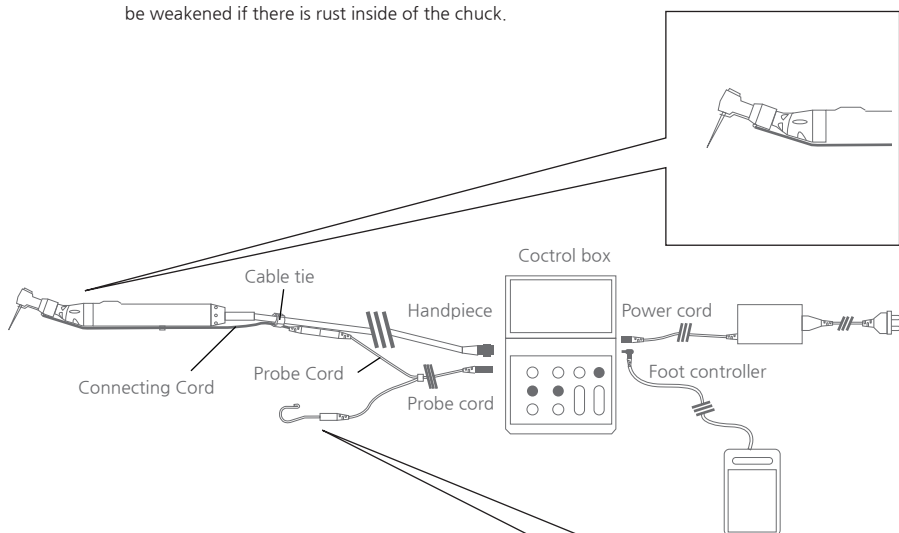
## 6. File Connection

: Please insert the file into the chuck of angle handpiece until stop the file.

To separate the file and angle handpiece, pull out the file after pushing the button of angle handpiece head.



- Turn off the control box when insert or remove the file.
- Pull out the file to confirm locking it after connecting the file.
- Clean the chuck of angle handpiece at all times. The file can lose its balance or chucking power can be weakened if there is rust inside of the chuck.



## 7. File clip connection

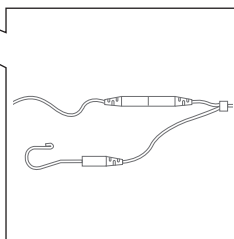
: Insert the file clip to one side of the probe cord.

In APEX mode, connect the file to the file clip.



In APEX + ENDO (combination) mode, connect the file clip to the connecting cord.

## 8. Lip hook connection

: Put the lip hook on the other side of the probe cord.



## OPERATION PROCESS (ENDO MODE)

1. Turn on the control box by pressing the power button over the 3 seconds.
2. Press the APEX/ENDO button  to set to ENDO mode. .
3. Select the program number by pressing the program button.
4. Save the program by pressing the memory button over the 2 seconds after setting the auto reverse mode, gear ratio, speed(RPM), torque. Ring the beep sound if the program is saving.

(Function of each buttons refers to 'BUTTONS ON THE OPERATION PANEL'.)



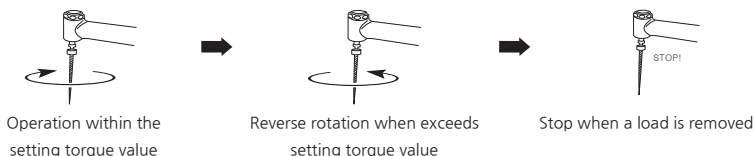
- Press and hold the each setting button about gear ratio, speed and torque, value is set rapidly.
- Rotary direction is not saved in program. (Program is set to forward direction.)
- Press and hold the memory button until beep sound when save the program. Otherwise, program cannot be saved.

### <Auto Reverse Function>

- The function is operated when the torque value exceeds the setting value. It can be choose three modes below.

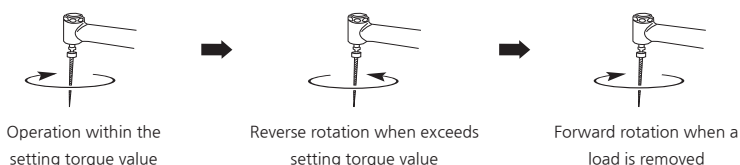
#### **AUTO Rev**

If torque value exceeds the setting value, the handpiece rotates in reverse automatically. When a load is removed, the handpiece stops.



#### **AUTO Rev**

If torque value exceeds the setting value, the handpiece rotates in reverse automatically. When a load is removed, the handpiece rotates in forward.



#### **(EMPTY)**





If torque value exceeds the setting value, the handpiece stops.



- When the batteries go down, the actual load may not reach the preset torque limit value. In this case (in the case of operation by batteries), this auto reverse function will not be activated. When high torque is required, use the adaptor or use this product in a condition where the batteries are not significantly consumed.
- If a load is continuously applied to the motor, it may automatically stop to prevent overheating. In this case, leave the motor for a while until it cools down. When the display returns to normal, the product can be used.
- Auto reverse function is not supported in the reciprocating mode (Program No. 8, 9).

### <RECIPROCATING>

- The motor reciprocates rotation in the forward and reverse directions according to each set angle ratio.


- ① Press  to enter the Reciprocating Mode in program 8 and 9.
- ② Press  to set the angle ratio (30°, 60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°).
- ③ Press  to set the opposite direction.
- ④ Press  to set the angle ratio (30°, 60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°).



- The F/R icon blinks when setting the angle, and the setting value is saved if there is no button operation for 4 seconds.

5. Set the rotary direction by pressing the operation direction button.

6. Motor is operated by pressing the motor button or the foot controller.

Motor Button is,  of motor, the motor stop operation by pressing the motor button once more. Motor operation can be controlled by pressing and releasing the foot controller.



- Foot Controller is ON/OFF switch. Intensity is not controlled.

ON/OFF Button



7. After use, place the handpiece on the motor stand, turn off the control box by pressing the power button over the 3 seconds after operating.




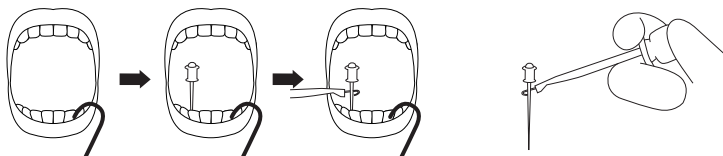
- Power is off after 10 minutes without operation.  
However power is not off automatically during the motor operation even without use.

## ● OPERATION PROCESS (APEX MODE)

1. Turn on the control box by pressing the power button over the 3 seconds.

Press APEX/ENDO button  to set APEX mode .



2. Press Apical Line button  to change Apical Line value.
3. Hang the lip hook on the patient's lips.
4. The file is inserted into the patient's teeth..
5. Hang the file clip to the file.



6. Checking the graph and measured value on the LCD display, move the file slowly along the root canal, and the motor automatically stops when the file reach the default apical value(factory default value is set to 0.5), the apex symbol "APEX" blinks and the motor automatically stops.
7. After placing the stopper on the file at the tooth reference point, remove the file from the tooth.
8. Cross-check the length of the measured root canal and the length by taking an x-ray.

## ● OPERATION PROCESS (APEX+ENDO MODE)

1. Turn on the control box by pressing the power button over the 3 seconds.


2. Press APEX/ENDO button  to set APEX+ENDO combination mode .

3. Press Apical Line button  to change Apical Line value.  
(Set the special functions if necessary.)


4. Please insert the file into angle handpiece. (Refer to CONNECTION OF EACH PART)
5. Connect the file clip to the connecting cord of the angle handpiece.
6. Hang the lip hook on the patient's lips.
7. Refer to the OPERATION PROCESS (ENDO MODE), insert the file into the patient's teeth and proceed with the operation.
8. Checking the graph and measured value on the LCD display, move the file slowly along the root canal, and the motor automatically stops when the file reach the default apical value (factory default value is set to 0.5).



### <AUTO START/STOP>

- If you long press the Apical Line button  once, **Start / Stop** is displayed and the AUTO START/STOP function is executed.
- When the apex measurement starts, the motor starts to rotate automatically, and when the measurement is finished, the motor stops. (Available only in APEX+ENDO mode)

### <AUTO SLOW DOWN>

- If you long press the Apical Line button  twice, **Slow Down** is displayed and the AUTO SLOW DOWN function is executed.
- The rotational speed of the motor gradually decreases according to the ratio of the apex measurement depth, and the motor stops when it reaches the set APICAL LINE. (Available only in APEX+ENDO mode)



- For more accurate measurement, connect the provided tester to the probe connector of the main body and check that the apical value is within the range of 0.4 to 0.6.
- AUTO START/STOP & AUTO SLOW DOWN are not supported in the reciprocating mode. (Program No. 8, 9).

## MAINTENANCE OF THE PRODUCT

### 1. Cleaning

#### ■ Angle Handpiece

- ① Rotate the head in a tap water about 10 seconds with maximum speed to remove the remains (blood, physiologic saline solution, etc.) and rinse.
  - ※ Do not put tap water in the motor. May cause malfunction.
- ② Disconnect the angle handpiece to the motor.
- ③ Remove contaminants on the angle handpiece using a nylon brush after soaking for 20 minutes in Enzymatic Detergent.
- ④ Rinse the angle handpiece using the tap water for 3 minutes to remove Enzymatic Detergent.
- ⑤ Wash the angle handpiece for 10 minutes in the ultrasonic cleaner containing Enzymatic Detergent.
- ⑥ Rinse the angle handpiece for 3 minutes in the ultrasonic cleaner containing purified water repeatedly subjected 3 times.  
(Change the purified water each time.)
- ⑦ Wipe using dust-absorbent after the product soaked in alcohol(70%) for 30 seconds.

#### ■ Control box, Motor, Foot controller

Wipe the surface of motor with alcohol swab or paper towel after removing the dirt.

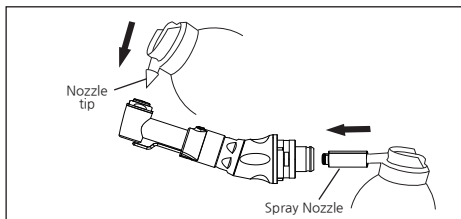
- ※ Pay attention to not enter the water into the motor.

## 2. Lubrication

### ■ Lubrication product list

- Angle handpiece

- ① Insert the spray nozzle to motor assembly part (the end part of angle) and spray lubricant 2~3 seconds.
- ② Insert the nozzle tip to head part and spray lubricant 2~3 seconds.



- The nozzle tip and spray nozzle are not provided by manufacturer.
- If the continuous operation, please put the oil every an hour.
- When lubrication, please hold the handpiece firmly because the handpiece can go out by the spray pressure.



- Do not lubricate the motor section of the motor handpiece. It may cause bearing failure and heat generation.

## 3. Sterilization

### ■ Sterilization product list

- Angle handpiece, Lip hook, file clip

### ■ Sterilization Method

- ① Dry the applicable product completely after cleaning.
- ② Put the applicable product in a sterile bag and seal tightly.
- ③ Put the sterile bag in the sterilizer and sterilization for 4 minutes with 132°C, and let it dry for 30 minutes.



Sterilization	Temperature	Time	Drying time
Moist heat sterilization	132 °C	4 minute	30 minute



- Maximum sterilization number is 250 times.
- Moist steam sterilization only. Otherwise the products might be damaged.
- Make sure to use the sterilization bag and seal tightly.
- Make sure to dry the applicable products before sterilization.
- Sterilizing the angle handpiece with blood or other remains may cause the breakage of the angle handpiece.  
Therefore, it is necessary to clean the angle handpiece before sterilization.
- Keep dry a connector and socket of the control box.
- Before using, dry the product completely.

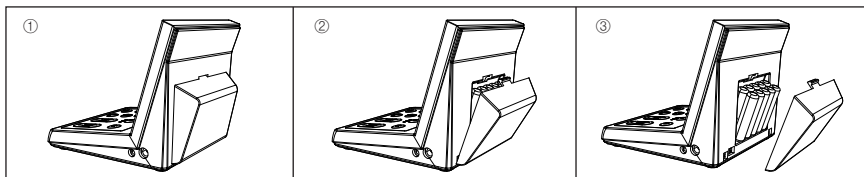
## 4. Battery Replacement

E-CUBE Plus uses rechargeable battery. Battery is reused about 300 ~ 500 cycles, the span life may be different according to handpieces. Replace the battery when it shows shorter operation and recharging time and weak torque than set up. Be aware of 'Caution' for battery replacement. Manufacturer is not responsible for damage or breakage of the product caused by not following the instructions 'Caution' for changing battery.

Spec : 12Vd.c, 800mAh

### Battery Replacement Method

- ① Remove the adaptor after turning off the control box.
- ② Open the rear battery cover.
- ③ Insert the replaceable battery to right direction.
- ④ Close the battery cover.
- ⑤ Charge the battery in order to use.



- Do not open except the battery cover.
- Use the recommended battery only. Otherwise, there are risks for the product damage, material leakage or explosion.
- Do not replace the battery by wet hands. In this case, there can be a short circuit or water penetration.
- Used and finished battery is recommended to be back to supplier. The product use battery which is composed of Nickel Metal Hydride, rechargeable, however, some countries stipulate it to be disposed as special waste.
- Unplug the adaptor to the control box. Otherwise, it may cause the product damage.

### 5. Troubleshooting

When trouble is found, check the following before contacting the manufacturer.

If none of these are applicable or the trouble is not remedied even after action has been taken, please contact the manufacturer.

#### 1) Control Box & Adaptor

Problem	Cause	Remedy
The power is not turned on.	The adaptor is not connected to the control box.	Check the connection.
	The adaptor plug is not inserted into the adaptor connector exactly, or there is no electricity in the outlet.	Check the connection.
	The battery is discharged.	Charge the battery.
		Use the adaptor.
The adaptor is not operated. (The charging-LED is not operated.)	The adaptor is not connected to the control box.	Check the connection.
	The adaptor plug is not inserted into the adaptor connector exactly, or there is no electricity in the outlet.	Check the connection.
	The adaptor fuse is blown out.	Contact the manufacturer.
	The temperature of battery is low.	If the temperature of battery is less than 0°C (32°F), the battery is not recharged. Charge the battery in a warm room. (Be careful about moisture condensation)
	The temperature of battery is high.	It is normal that the batteries become a little bit warm right after charging. If the batteries are hot under normal operating conditions, not right after charging, there may be an abnormality. Contact the manufacturer.

## 2) Motor

Problem	Cause	Remedy
The handpiece does not rotate.	The motor cord is not connected to the control box.	Check the connection.
	Use the foot controller without the connection.	Check the connection.
	The motor cord is broken or motor is malfunctioning.	Contact the manufacturer.
	The head of angle handpiece is clogged.	Clean the angle handpiece.
Display the “---” and setting torque alternately at the torque display part. (when the use the function that the handpiece rotates in forward after rotating in reverse automatically)	The head of angle handpiece is clogged.	Clean or replace the angle handpiece.
	The motor cord is broken or motor is malfunctioning.	Contact the manufacturer.

## 6. Product Disposal

- Follow your country-specific law, directives, standards and guidelines for the disposal of used electrical devices.



## ATTENTION

### 1. Please read the notice below before operating the product.

- 1) Check various connection codes such as motor code, foot controller code, etc., and check that it works normally when the switch is turned on.
- 2) Make sure to check the contact part to patient.
- 3) If not use the adaptor, check the charging volume of battery.
- 4) Check the sterile condition of autoclavable parts.

### 2. Please read the notice below during the product use.

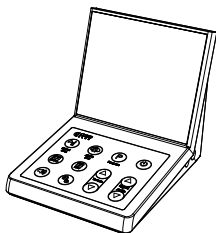
- 1) Check the status of product and patient constantly during the surgery.
- 2) When product or patient has any problem, stop the operation in condition of patient's safety or take proper action.
- 3) Do not let patient to approach the product.

### 3. Please read the notice below after operating the product.

- 1) Do not put any physical pressure on the adaptor cord, motor cord and foot controller cord.

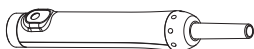
## PRODUCT SPECIFICATION

### 1. Control Box



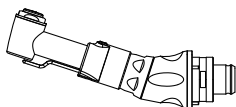
<b>Model Name</b>	E-CUBE-Plus
<b>Input</b>	DC 20 V, 1.5A
<b>Output</b>	DC 6 V (Max)
<b>Charging Time</b>	Approx. 3 hours 30 minutes

### 2. Motor



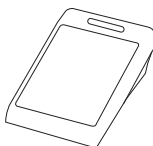
<b>Model Name</b>	CUBE EP	CUBE EP Plus
<b>Rated Input</b>	DC 6 V (0~6 V)	
<b>Max. RPM</b>	10,000rpm	
<b>Cord color</b>	Gray	White

### 3. Angle



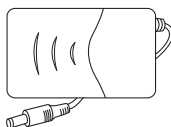
<b>Name</b>	ACL(B)-51EPB	ACL(B)-52EPB	ACL(B)-56EPB
<b>Gear ratio</b>	20:1	16:1	10:1
<b>Bur replacement type</b>	Button type		
<b>Bur dimension</b>	CA bur (Ø 2.35)		
<b>Chuck type</b>	Type 1. (ISO 1797)		

### 4. Foot Controller



<b>Model Name</b>	E-CUBE FOOT	E-CUBE-Plus FOOT
<b>Classification according to the degree of protection against ingress of water (IEC 60529)</b>	IPX 1	IPX 1
<b>Color</b>	Black	Gray

### 5. Adaptor



<b>Input</b>	AC 100-240V , 47-63Hz, 0.9-0.34A
<b>Output</b>	DC 20 V, 1.5A (Max)
<b>Manufacturer</b>	Sinpro Electronics Co., Ltd.
<b>Model name</b>	MPU31-107




## ELECTROMAGNETIC COMPATIBILITY INFORMATION

In IEC/EN 60601-1-2 4th edition. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, use and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving device.
- Increase the separation between the equipment.
- Connect the equipment into an outlet on a circuit different from that to which the other device(s) are connected.
- Consult with the dealer.

Electromagnetic Emissions		
The E-CUBE-Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the E-CUBE-Plus should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment - guide
RF emission - CISPR 11 EN 55011	Group 1	E-CUBE-Plus uses RF energy for internal operation. Therefore, its radiofrequency emissions are very low and are not likely to cause any interference in nearby equipment.
RF emission - CISPR 11 EN 55011	Class A	E-CUBE-Plus covers devices for usage in all establishments other than domestic and that are not directly connected to a low voltage power supply network, which supplies domestic environment.
Harmonic emission - IEC 61000-3-2 EN 61000-3-2	Class A	
Voltage fluctuations Flicker emission - IEC 61000-3-3 EN 61000-3-3	Compliance	This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Electromagnetic Immunity			
The E-CUBE-Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the E-CUBE-Plus should assure that it is used in such an environment.			
Emission test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2 EN 61000-4-2	±8kV contact ±15kV air	±8kV contact ±15kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transients IEC 61000-4-4 EN 61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Power mains quality should be that of a typical commercial or hospital environment.
Surges IEC 61000-4-5 EN 61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Power mains quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations IEC 61000-4-11 EN 61000-4-11	0 % UT for 0.5 cycle at 8 $\Phi$ angles 0% UT for 1 cycle 70 % UT for 25/30 cycles 0 % UT for 250/300 cycle	0 % UT for 0.5 cycle at 8 $\Phi$ angles 0% UT for 1 cycle 70 % UT for 25/30 cycles 0 % UT for 250/300 cycle	Power mains quality should be that of a typical commercial or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the E-CUBE-Plus get power from an uninterruptible power supply or battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8 EN 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: UT is the a.c. mains voltage prior to application of the test level.			

Electromagnetic Immunity			
The E-CUBE-Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the E-CUBE-Plus should assure that is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6 EN 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms In ISM bands from 150 kHz to 80 MHz	3 Vrms 150 kHz to 80 MHz 6 Vrms In ISM bands from 150 kHz to 80 MHz	Portable and mobile RF communications equipment should be used no closer to any part of the E-CUBE-Plus including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Radiated RF IEC 61000-4-3 EN 61000-4-3	3 V/m 80 MHz to 2.7 GHz	3 V/m 80 MHz to 2.7 GHz	<p>Recommended separation distance</p> $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P} \text{ 80MHz to 800MHz}$ $d = 2.3 \sqrt{P} \text{ 800MHz to 2.7GHz}$ <p>Where "P" is the maximum output power rating of the transmitter in watt (W) according to the transmitter manufacturer 'd' is the recommended separation distance (m).</p> <p>The electromagnetic field strength of fixed radiofrequency emitters, which is determined by an electromagnetic environment measurement (a), must be less than the compliance level in each frequency range (b).</p> <p>Interference may occur near equipment marked with the symbol below:</p> 
<p>Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.</p> <p>Note 2: These specifications may not be applicable in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and persons.</p>			
<p>(a): The electromagnetic field strength of fixed radiofrequency emitters, such as base stations for mobile telephones (cellular / cordless), mobile radio, AM/FM radio broadcasts and TV broadcasts cannot be determined exactly by theory.</p> <p>To assess the electromagnetic environment due to fixed radiofrequency emitters, an electromagnetic environment measurement must be made.</p> <p>If the measured radiofrequency field strength in the immediate environment where the product is used exceeds the compliance level specified above, the performance of the product must be tested to verify whether it conforms to the specification. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the product.</p> <p>(b): In the 150 kHz to 80 MHz frequency range, the electromagnetic field strengths must be less than 3V/m.</p>			



Recommended separation distances between portable and mobile RF communications equipment and the E-CUBE-Plus			
<p>The E-CUBE-Plus is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the E-CUBE-Plus can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the E-CUBE-Plus as recommended below, according to the maximum output power of the communications equipment</p>			
Rated maximum output Power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz ~ 80 MHz d = 1.2 √P	80 MHz ~ 800 MHz d = 1.2 √P	800 MHz ~ 2.7 GHz d = 2.3 √P
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
<p>For transmitters rated at a maximum output power not listed above, the recommended separation distance 'd' in meters (m) can be estimated by 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.</p> <p>Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.  Note 2: These specifications may not be applicable in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and persons.</p>			

Cables and accessories	Maximum length	Shield	Complies with	
			RF emissions, CISPR11	Class A / Group 1
Motor cord	1.5 M	Unshielded	Harmonic emissions	IEC 61000-3-2 EN 61000-3-2
			Voltage fluctuations / flicker emissions	IEC 61000-3-3 EN 61000-3-3
			Electrostatic discharge (ESD)	IEC 61000-4-2 EN 61000-4-2
			Electrical fast transient / burst	IEC 61000-4-4 EN 61000-4-4
			Surge	IEC 61000-4-5 EN 61000-4-5
Foot controller with cord	1.4 M	Unshielded		
AC power cord	1.9 M	Unshielded	Voltage dips, short interruptions and voltage variations on power supply input lines	IEC 61000-4-11 EN 61000-4-11
			Power frequency (50/60Hz) magnetic field	IEC 61000-4-8 EN 61000-4-8
			Conducted RF	IEC 61000-4-6 EN 61000-4-6
			Radiated RF	IEC 61000-4-3 EN 61000-4-3

#### Description of BASIC SAFETY and ESSENTIAL PERFORMANCE

The E-CUBE-Plus is intended for use in the electromagnetic environment specified above. The following essential performance of E-CUBE-Plus should be running in such an environment.

- 1) Frequency of handpiece should be a value between 20 to 30 kHz.
- 2) Irrigation volume should be over the 25 ml/min during handpiece is operated.



## WARRANTY

SAESHIN guarantees out product for 1 year from invoice date, and product warranty means that SAESHIN has responsibility of defective material or operation failure. The product warranty does not cover user's misuse, wrong installation, inappropriate maintenance and repair, and normal wear of consumables such as bearings, spindle, gear, and rotator. To check the warranty requires the operating condition, environment information, serial number of the product and stamped invoice. The warranty will be performed as repairs or exchanges by manufacturer's judgement and analysis of product.

### Exception of warranty

User's misuse or improper use and treatment

Use the product with incorrect input voltage (AC voltage)

Drop the device during setting, moving, using

Use the not recommended consumables or accessories

Malfunction after repairing the product at the not recommended repair shop

Normal wear of the consumables such as ball bearing, gear, chuck, spindle case assy, rotator etc.

Faulty by Act of God

### Foreign Language Manual Support

This manual is offered in Korean and English. If other languages are needed, please contact Saeshin for the manual.

- 1) The translated manual will be supplied by manufacturer on demand.
- 2) Saeshin will send the translated manual with an English manual to the import company to review the translated manual.
- 3) After getting feedback from the import company, Saeshin will offer a final version of the manual.

## SYMBOL



Power Button



APEX/ENDO Button



AUTO  
Rev

Auto Reverse Button



Operation Direction Button



Gear Ration Button



Manufacturer



Serial Number



Autoclave



Type BF



This product should not be mixed  
with other commercial waste for disposal.



Non-sterile



Fuse



Speed/ Reciprocating  
Angle Ratio Button



Torque Button



Program Button



Apical Line Button



Volume Button



Consult Instruction for Use.



General Caution Sign



General Warning Sign



General Prohibition Sign



Foot Controller



Alternating Current



This product is **the medical device.**



Made in Korea

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