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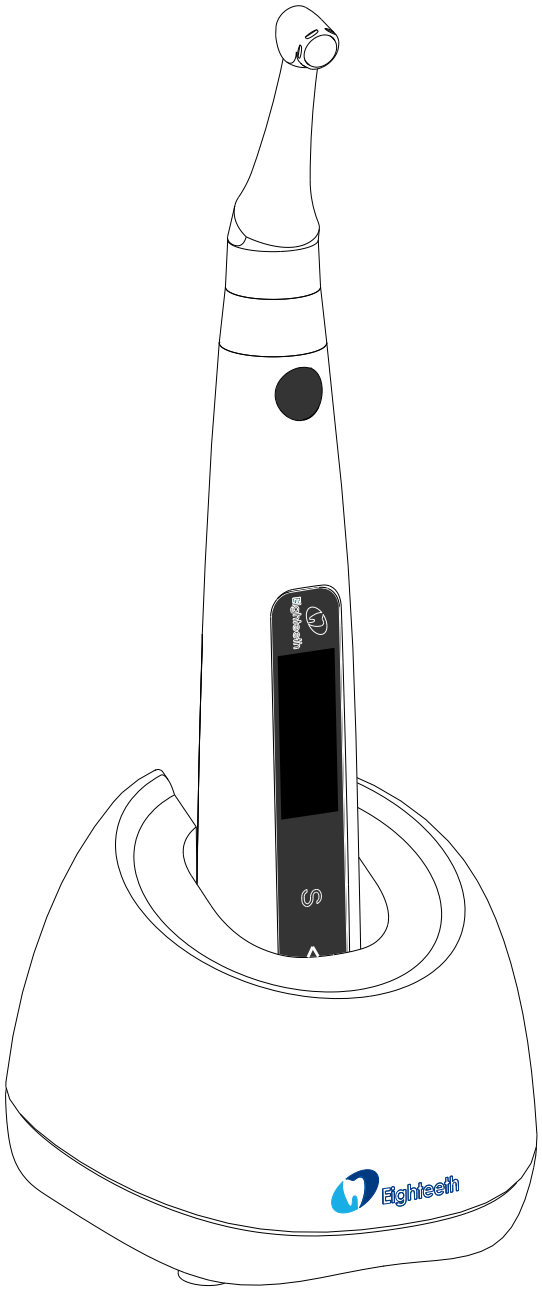


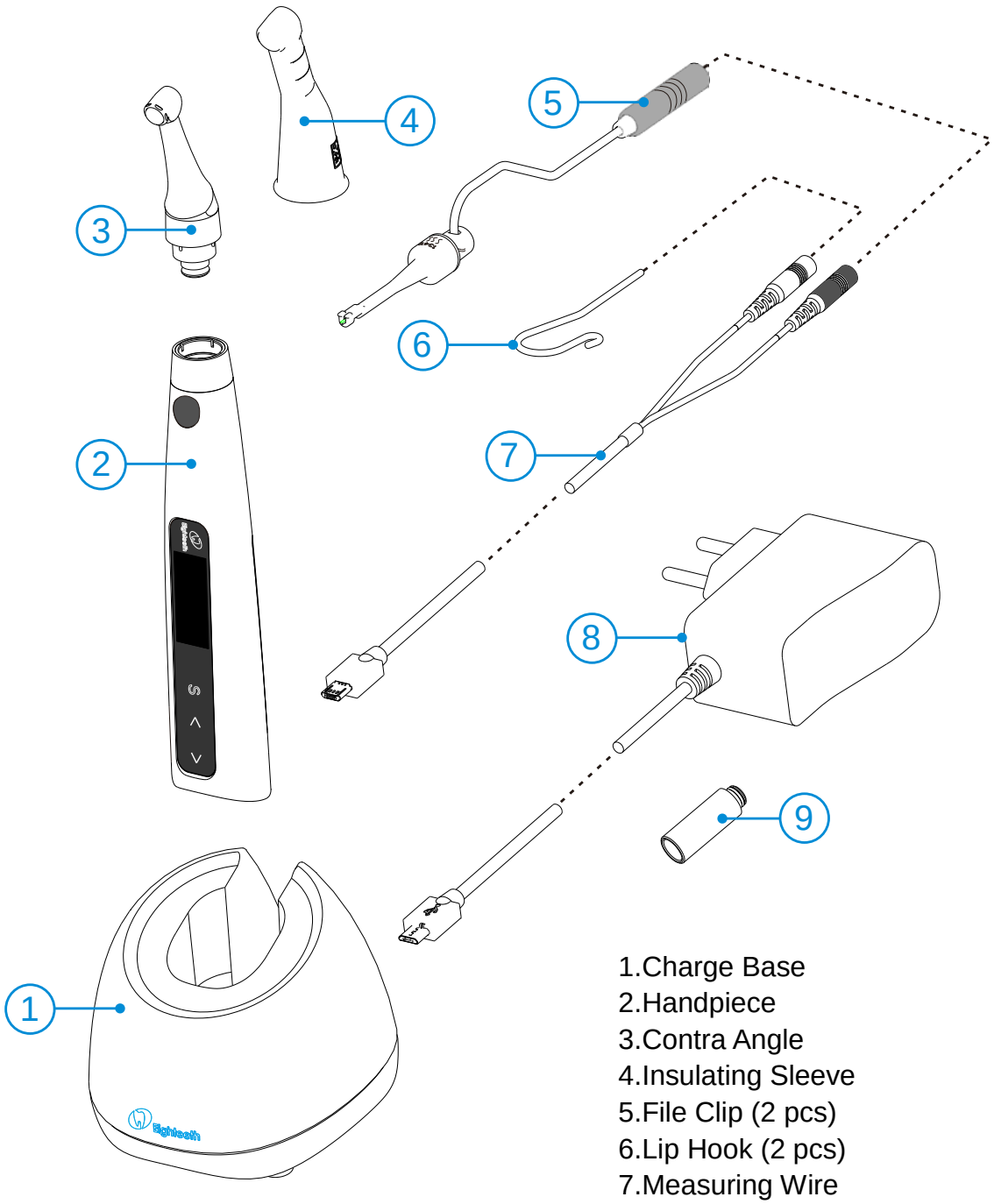
E-connect S

USER MANUAL

Content

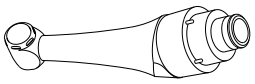
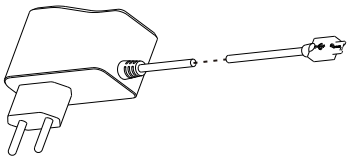
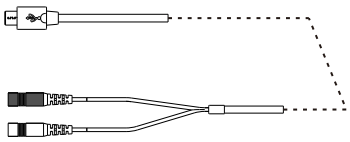
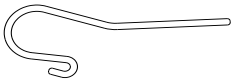
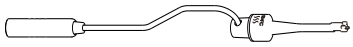
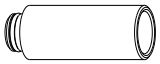
1. Scope of E-connect S

1.1 Parts Identification

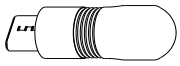


1.Charge Base
2.Handpiece
3.Contra Angle
4.Insulating Sleeve
5.File Clip (2 pcs)
6.Lip Hook (2 pcs)
7.Measuring Wire
8.Adapter
9.Spray Nozzle

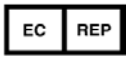
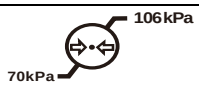
1.2 Components and Accessories

Motor Handpiece (1pcs) Part No. 6051035 	Charge Base (1pcs) Part No. 6051036 	Contra Angle (1pcs) Part No. 6036006 
Adapter (1pcs) Part No. 6016007+6016008 	Measuring Wire (1pcs) Part No. 6015011 	Lip Hook (2pcs) Part No. 6072002 
File clip (2pcs) Part No. 6051005 	Insulating Sleeve (1pcs) Part No. 6004027 	Spray Nozzle (1pcs) Part No. 6051038 

1.3 Options (sold separately)

Handpiece Base Part No. 6005002 	Apex Tester (1pcs) Part No. 6015012 	

2. Symbols used in the User Manual

	If the instructions are not followed properly, operation may lead to hazards for the product or the user/patient.
	Additional information, explanation of operation and performance.
	Serial number
	Catalogue number
	Manufacturer
	Date of manufacture
	Lot of manufacture
	Class II equipment
	Type B applied part
	CE marking
	Direct current
	WEEE directive marking
	Keep dry
	Can be autoclaved up to a maximum temperature of 134° Celsius
	Authorized Representative in the European Community
	Temperature limitation
	Humidity limitation
	Atmospheric pressure limitation
	Manufacturer's LOGO
	Consult instructions for use
	Washer-disinfector for thermal disinfection

3. Before Use

3.1 Intended Use

E-connect S is a cordless endodontic treatment motorized handpiece with root canal measuring capability. It can be used to enlarge 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.

This device must only be used in hospital environments, clinics or dental offices by qualified dental personnel and not used in the oxygen-rich environment.

3.2 Contraindications

The integrated apex locator of the E-connect S is contraindicated in cases where patient/user carry medical implants such as pace makers or cochlear implants etc.

Do not use the device for implants or other non-endodontic dental procedures.

Safety and effectiveness have not been established in pregnant women and children.

WARNING

Read the following warnings before use:

1. The device must not be placed in humid surroundings or anywhere where it can come into contact with any type of liquids.

2. Do not expose the device to direct or indirect heat sources. The device must be operated and stored in a safe environment.

3. The device requires special precautions with regard to electromagnetic compatibility (EMC) and must be installed and operated in strict compliance with the EMC information. In particular, do not use the device in the vicinity of fluorescent lamps, radio transmitters, remote controls and do not use this system near the active HF Surgical Equipment in the hospital. Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the E-connect S, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result. Do not charge, operate or store at high temperatures. Comply with the specified operating and storage conditions.

4. Gloves and a rubber dam are compulsory during treatment.

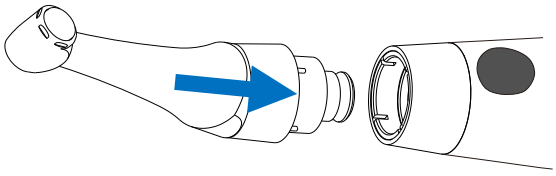
5. If irregularities occur in the device during treatment, switch it off. Contact the agency.

6. Never open or repair the device yourself，otherwise, void the warranty.

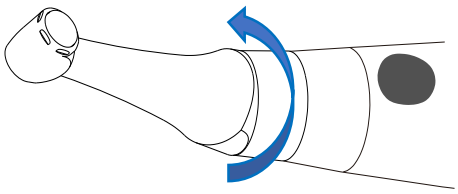
4. Installing the E-connect S

4.1 Installation of the contra angle

Make sure 4 pins on contra angle alignment the slots of handpiece, plug them together until it “click” securely into place.



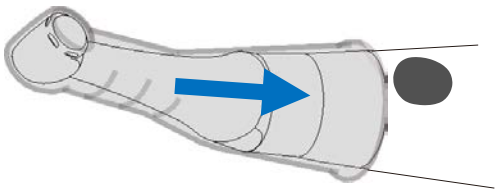
The contra angle can be 340 degrees rotated without take off, make it easy to watch the LCD in treatment by rotating the contra-angle.



WARNING

- Make sure the assembly is connected properly, otherwise might cause unexpected motor reverse, even hurt the patients
- After connecting the contra angle and handle, pull it gently to make sure the connection is good.

The improve insulation of the contra angle during combine apex, we recommend using an insulating sleeve.



You can also use disposable sleeve (sold separately) instead of insulating sleeve

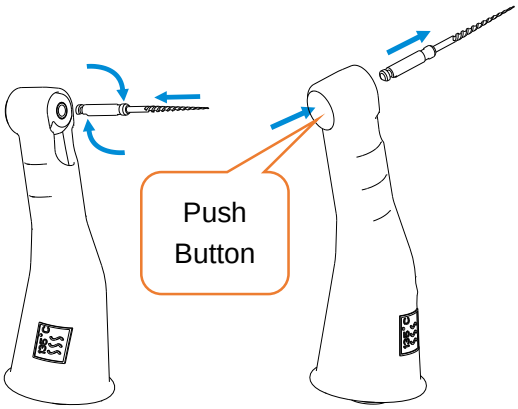
NOTE

Without the insulating sleeve, when performing the apex measurement with handpiece, wear appropriate insulated gloves, and make sure the contra angle does not touch the lips. It is advisable to use a rubber dam when performing such treatments.

4.2 Install the file

Turn the file back and forth until it is lined up with interior latch groove and slips into place, lock the file into the contra angle.

Hold down the push button on the contra angle and can release the file.

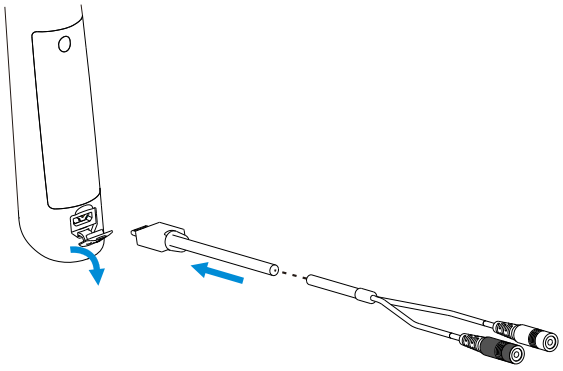


WARNING

- Inspect the file head before inserting the file. Do not use the damaged file head.
- Make sure the motor is stopped when inserting and removing files.
- Be careful when inserting and rem-oving files to avoid injury to fingers.
- Take care not to touch the Main switch when putting files in. this will cause the file to rotate.
- Pull the file gently to make sure that the file is secure in handpiece properly, otherwise it may pop out and hurt the patient.

4.3 Connecting measuring wire

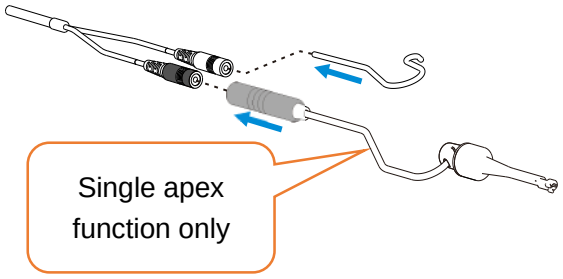
If want activity apex measurement function, uncap the USB cover on handpiece, insert measuring wire.



Insert lip hook into white slot, insert file clip into black slot.

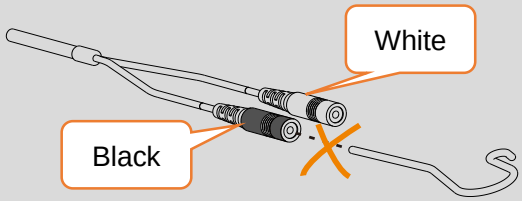
NOTE

It's not necessary to connect file clip during motor combine apex function, only during single apex function.



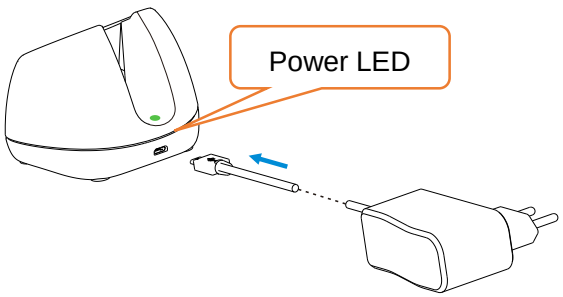
NOTE

Match colors to connect the lip hook and file clip, if connect lip hook with black slot, apex auto start will have no function.



4.4 Connecting charge base

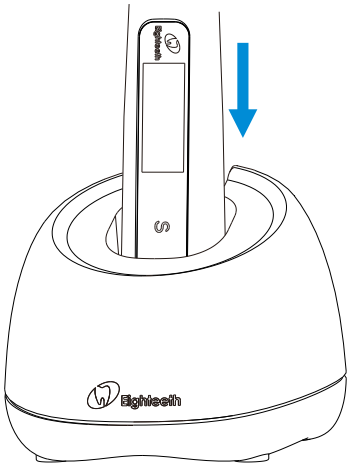
Plug the USB of adapter into the charge base, and plug the other end into a power outlet, the Power LED on charge base will light up (green).



NOTE

Only the original adapter could be used.

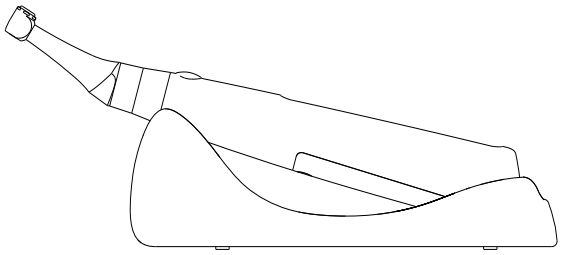
Put the handpiece all the way into the charge base, the charge state will show on the screen.



NOTE

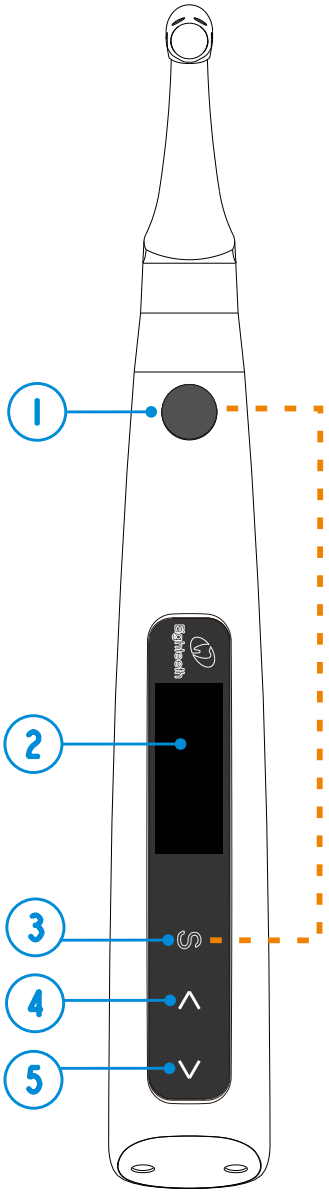
Put the handpiece into the charge base in the right direction, otherwise the handpiece will not be recharged.

If only need a base to put the device on dentist element of dental chair (without charge function), handpiece base is recommended (sold separately) to instead of charge base.



5.Use Interface

5.1 Panel key



① ● Main switch

② Display Screen

③ S Setting key

④ < Decrease key

⑤ > Increase key

Turn Power On
Press ● more than 0.5 seconds to turn on the instrument

Memory Change
Press < or > during standby state

Operation mode Change
Press S once during standby state, press < or > to change, then press ● or wait 5 seconds to confirm

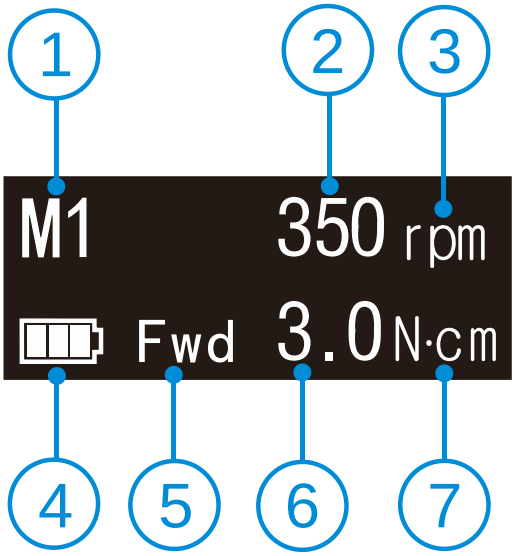
Parameter Adjustment
Press S till target parameters, press < or > to adjust, then press ● or wait 5 seconds to confirm

Preset Program Selection
Long press S to entry preset program during standby state, press < or > to change, then press ● to confirm

Turn Power Off
Holding down press S then press ●

Advanced setting
During power off state, holding down press S then press ● to entry advanced setting, Press S till target setting, press < or > to adjust, then press ● to confirm

5.2 Screen display



Standby interface

① Memory mode number

② Speed of this memory program

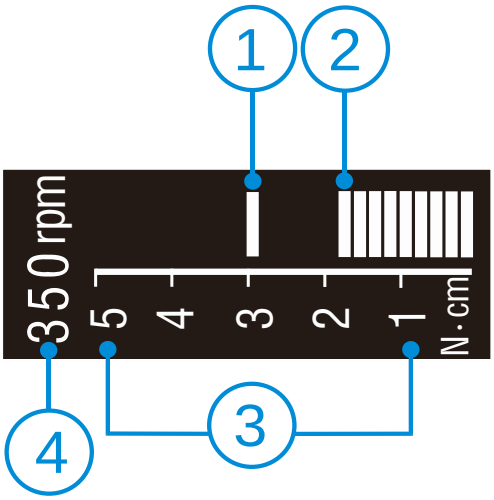
③ Unit of speed: Revolutions Per minute

④ Residual battery power

⑤ Operation mode

⑥ Torque of this memory program

⑦ Unit of torque: Newton centimeter



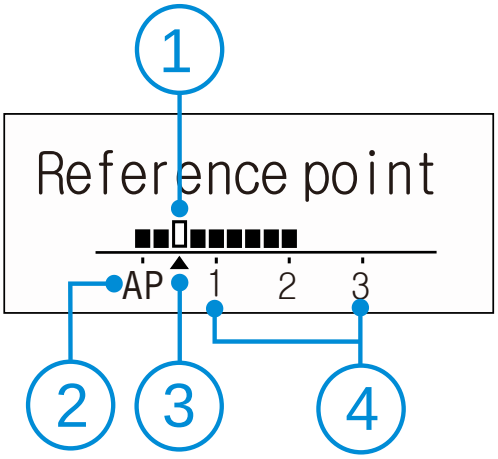
Standard working mode

① The set maximum torque

② Real time torque

③ Torque display scale

④ The preset speed



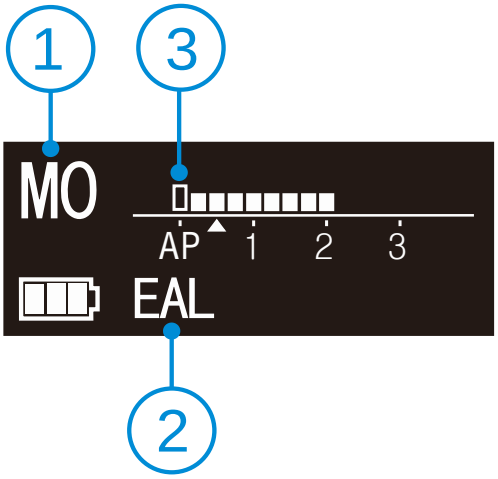
Reference point interface

① Flash bar of apical reverse position

② Apex (Major/Anatomic apical foramen)

③ 0.5mm meter reading (Very near Minor/Physiological apical foramen)

④ 1mm-3mm (Estimate dimension) distance scale from apex (Estimate dimension)



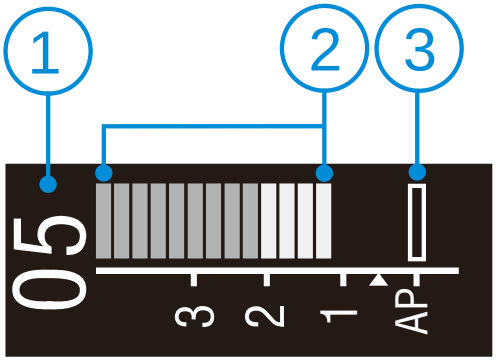
Canal measurement standby interface

① Memory mode number

M0 is apex stand-alone memory

② Electronic apex locator

③ Apex flash bar



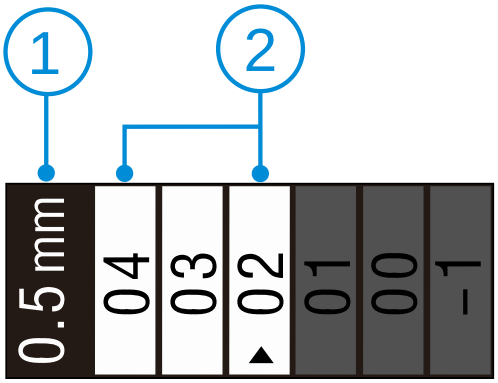
Canal measurement start interface

① Indication number

The number has no represent of actual length, only for indication

② Canal length indicator bar

③ Apex flash bar (apex stand-alone mode) or reference point flash bar (motor combine with apex mode)



Canal measurement approach apex interface

① The estimate dimension from apex (Major/Anatomic apical foramen)

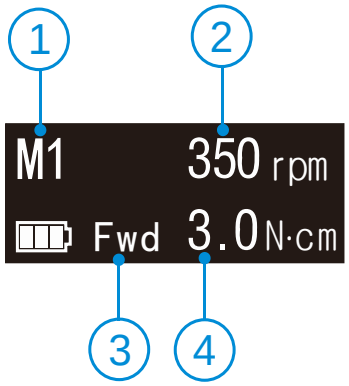
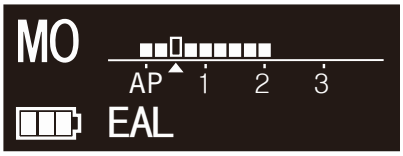
② Canal length indicator bar

5.3 Terms and definition

Fwd	Forward (Clockwise rotation)
Rev	Reverse (Counter clockwise rotation) Be applied to special file, inject calcium hydroxide and other solutions
REC	Reciprocation Be applied to reciprocating file, path file and rotary file protection by setting some special angle
ATC	Adaptive torque control Up to setting torque, the motor will move with reciprocating mode; when torque reduce to normal value, the motor will clockwise rotate
EAL	Electronic apex locator In the mode, the device will work like a stand-alone apex locator
AP	Apex Major apical foramen or Anatomic apical foramen
R.L	Torque reverse less The motor will not reverse rotation no matter how large the torque load is
Reference point	During combined length determination, normally apical reverse must active before reaching major apical foramen, setting apical reverse position by change the flash bar
FWD Angle	Forward angle (Clockwise rotation angle), activating in REC and ATC operation mode
REV Angle	Reverse angle (Counter Clockwise rotation angle), activating in REC and ATC operation mode
Memory Mode	Such as M0-M10
Operation Mode	Such as FWD, REV, REC and ATC

6.Setting

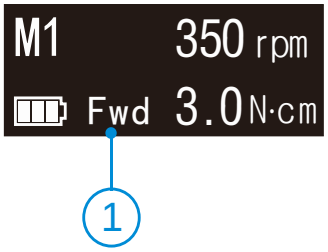
6.1 Selecting memory

	E-connect S has 11 memory programs, press < or > to change during standby state, the memory number (①) will change according. M1-M10 is standard working memory for canal shaping, every memory has its own speed (②), mode (③) and torque (④), all this these parameters can be changed **(See chapter 6.2 Setting parameters)**.
	M0 is special memory for stand-alone apex locator function **(See chapter 7.3 Apex operation and not suitable condition)**.

6.2 Setting parameters

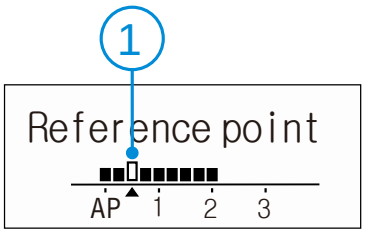
WARNING

All the parameters must be set according to files, make sure all the parameters are expected before starting the motor, otherwise has risk of file broken.

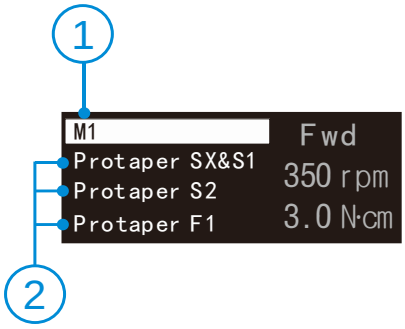
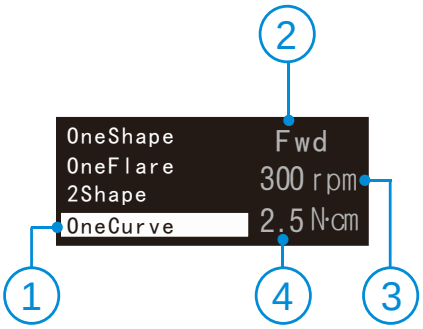
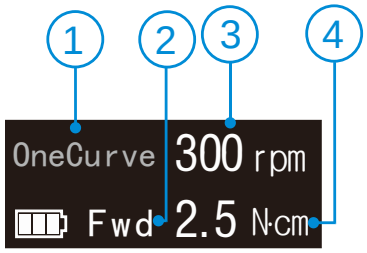
	Before start the motor, check the operation mode (①) is correct, otherwise press S once during standby state, press < or > to change.
	E-connect S has 4 operation modes: FWD, REV, REC and ATC **(See chapter 5.3 Terms and definition to get the explanations of these modes)**.

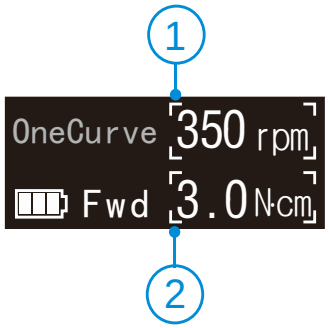
<table>
<tr><td></td><td>NOTE
When choice REV mode, a slow beep alarm sound appears after starting the motor, used for indicating counter clockwise rotation happening.</td></tr>
<tr><td colspan="2">Repeatedly press S to check all the next level parameters of this operation mode are expected, press < or > to change if not.
NOTE
The parameter will differ in difference mode according to certain logic (See chapter 6.5 Parameter logic).</td></tr>
<tr><td>Speed
300 rpm</td><td>The speed setting can be adjusted from 120 rpm to 1000 rpm.
NOTE
The speed of REC and ATC operation mode is difference according to certain logic (See chapter 6.5 Parameter logic).</td></tr>
<tr><td>Torque Limit
3.0 N·cm</td><td>The torque setting can be adjusted from 0.5 N·cm to 4.0 N·cm, and R.L (torque reverse less) is also available.
NOTE
The torque of REC and ATC operation mode is difference according to certain logic (See chapter 6.5 Parameter logic).

WARNING
When choice R.L (torque reverse less), a slow beep alarm sound appears after starting the motor. Be careful to use this function, very professional skill is needed, otherwise has risk of file broken.</td></tr>
<tr><td>Auto Start
ON</td><td>E-connect S integrated apex locator, if the lip hook is connecting with patient’s lip, when the endo file entering root canal, the motor will start automatically.
Press < or > to shut off this function if not expected, press ● to start and stop the motor.
WARNING
The motor will start automatically if handpiece</td></tr>
</table>

	(without insulating sleeve) or file touch the patient's lip or operator's fingers (without insulating glove), take care to avoid this, the file rotated by motor has risk of injure someone.
Auto Stop **OFF**	When the endo file out of root canal, the motor will not auto stop with default setting, Press **<** or **>** to select auto stop "ON" if needed.
Apical Action **Reverse**	Because of integrated apex locator, when the file reaches the reference point, the motor will response according to setting, it can be Reverse, SlowDown, Stop and Off. Press **<** or **>** to change. **Reverse:** rotation direction changing till the file upward a little bit by operator, rotation direction will change back again. **SlowDown:** rotation slowdown when approach the reference point, will reverse if reach. **Stop:** rotation stop when reach the reference point, upward a little bit and will rotate again. **Off:** rotating as usual even if reach the reference point.
	During combined length determination, normally apical reverse must active before reaching major apical foramen, Press **<** or **>** to set apical reverse position by change the flash bar (①), the motor will reverse while reaching the flash bar every time.
FWD Angle **120°**	Activating in REC and ATC operation mode. forward angle (Clockwise rotation angle) can be adjusted by operator from 30° to 370°, Press **<** or **>** to change.
REV Angle **150°**	Activating in REC and ATC operation mode. reverse angle (Counter Clockwise rotation angle) can be adjusted by operator from 30° to 370°, Press **<** or **>** to change.
	NOTE The sum of FWD Angle and REV Angle must be greater than 120°, the motor system has closed the angle not needed. For example: if you set FWD Angle 30°, the REV Angle must be setting greater than 90°.

6.3 Preset programs

<table>
<tr>
<td> 
</td>
<td>For convenience, we preset some common file system.
Long press S to entry preset program during standby state, the interface will show as left.
M1 (①) meanings the current memory mode, you can replace it by preset program (②)
press < or > to change, then press ● to confirm.</td>
</tr>
<tr>
<td> 
</td>
<td>If you selecting “OneCurve” (①), the operation mode (②), speed (③) and torque limit (④) will change according to the file system default setting.
NOTE
Protaper®, GATES®, Pro.Glider®, and Wave one® is a registered trademark of Dentsply.
Mtwo®, Flex.Master®, Reciproc® and R-Pilot® is a registered trademark of VDW.
K3XF®, TF® is a registered trademark of SybronEndo.
OneG®, OneShape®, OneFlare®, 2Shape® and OneCurve® is a registered trademark of Micro-Mega
XPendo.Shaper®, XPendo.Finisher®, iRace®, BT-Race® and BioRace® is a registered trademark of FKG</td>
</tr>
<tr>
<td> 
</td>
<td>And the memory mode (①) will change according, also operation mode (②), speed (③) and torque limit (④) will charge according to the file system default setting.
NOTE
All of memory mode (from M1-M10) can be replaced with same mothed.</td>
</tr>
</table>

	The parameters of “OneCurve” can also be changed make it different from default setting, and there will be 4 corners around the parameter (①)(②). If want to change back to default setting, long press S to entry preset program during standby state, select “OneCurve” and press ● to confirm, the default setting will be recalled, and the 4 corners around will disappear. If want to change back to M1 (or M2-M10), long press S to entry preset program during standby state, press < or > to select M1 (or M2-M10) again, then press ● to confirm **WARNING** Changing the default setting is not recommended only if you are very sure it can be changed, otherwise has risk of file broken.

6.4 Advanced setting

Versions E.1.1.008	During power off state, holding down press S then press ● to entry advanced setting, the version number software will appear on the display screen. E-connect S can update software very easy without tools and software. Contact your distributor to update if necessary. **NOTE** After updating, all of the setting parameters will be covered.
Auto Power Off 10 Min	Press S again, the “Auto Power Off” time can be change, press < or > to adjust, then press ● to confirm. The “Auto Power Off” time can be set from 3-15 minutes.

Auto Return time 5 Sec	Press S again, the “Auto Return time” can be change, it means when setting parameters just like speed and torque, the system will back to standby interface if there is no operation in 5 seconds. press < or > to adjust, then press ● to confirm. The “Auto Return time” can be set from 3-15 seconds.
Beeper Volume Vol. 2	Press S again, the “Beeper Volume” can be change, press < or > to adjust, then press ● to confirm. The “Beeper Volume” can be set from 0-3.
Habit hand Right Hand	Press S again, the “Habit hand” can be change, press < or > to adjust, then press ● to confirm. The right hand and the left hand can be set.
Startup memory M1	Press S again, the “Start memory” can be change, it means every time turn power on, which memory mode will appear first. press < or > to adjust, then press ● to confirm. M1 and Last (the memory mode number when you turn power of) can be set.
Calibration OFF	Press S again, entry “Calibration” function, press < or > to select “ON”, press ● to start calibration. ***WARNING*** ● Before calibrating, making sure the original contra angle is installed, and do not install the file. ● The torque will not correct if calibration without original contra angle or any load on contra angle chuck, and has risk of file broken.
Calibration 1000 rpm	The motor speed will increase from 120 to 1000 rpm. When the speed up to 1000 rpm, the calibration successful and automatic power off.

Restore settings OFF	Press S again, entry “Restore setting” function, press < or > to select “ON”, press ● to start recovering, all the parameters be set by operator will be recovered by default factory setting **(See chapter 6.5 Parameter logic).** ***NOTE*** After restore setting, all the parameters will be covered, record what you need before this operation.

6.5 Parameter logic

The default **memory settings** are listed below, the setting can be changed as needed.

Function	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Operation Mode	FWD	FWD	REC	REC	ATC	ATC	REV	REV	FWD	FWD
Speed (rpm)	300	400	350	450	450	300	350	500	800	1000
Torque Limit (N·cm)	3.0	2.0	N/A	N/A	1.5	1.5	2.5	2.0	1.5	1.0
Auto Start	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Auto Stop	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Apical Action	REV	REV	REV	REV	REV	REV	REV	REV	REV	REV
Reference point	02	02	02	02	02	02	02	02	02	02
FWD Angle	N/A	N/A	30	40	370	210	N/A	N/A	N/A	N/A
REV Angle	N/A	N/A	150	160	50	50	N/A	N/A	N/A	N/A

The default **advanced settings** are listed below, the setting can be changed as needed.

Auto Power off	10Min
Auto Return time	5Sec
Beeper Volume	2
Habit hand	Right hand

Startup memory	M1
Language	English
Calibration	OFF
Restore settings	OFF

The **speeds** (rpm) in different operation mode are not the same, details are listed below.

Fwd	Rev	REC	ATC
120 150 200 250 280 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000		150 200 250 300 350 400 450 500	

The **torques** (N·cm) in different operation mode are not the same, and even in the same operation mode, when the speed changing, the possible torque is difference, details are listed below.

Speed (rpm)	Fwd	Rev	REC	ATC
120-700	0.5 0.8 1.0 1.5 1.8 2.0 2.2 2.5 3.0 3.2 3.5 4.0 R.L		N/A	0.5 0.8 1.0 1.5 1.8 2.0 2.2 2.5 3.0
700-1000	0.5 0.8 1.0 1.5 1.8 2.0		N/A	N/A

The **FWD Angle** (degrees) and **REV Angle** (degrees) in different operation mode are not the same, details are listed below.

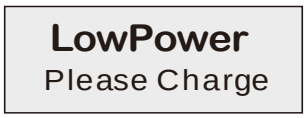
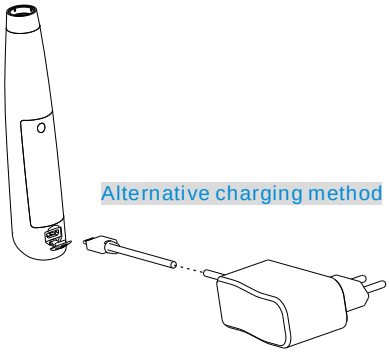
	Fwd	Rev	REC	ATC
FWD Angle	N/A		30 40 50 60 70 80 90 100 120 150 160 180 200 230 250 260 280 300 320 340 360 370	The same with the front table
REV Angle	N/A		The same with the front table	The same with the front table

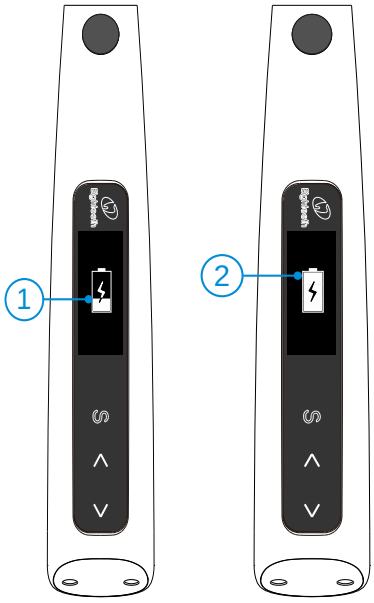
NOTE

The sum of FWD Angle and REV Angle must be greater than 120°, the motor system has closed the angle not needed. For example: if you set FWD Angle 30°, the REV Angle must be setting greater than 90°.

7.Operation

7.1 Charge

	Displays the present remaining amount of the battery. Less than 15% remains, please charge.
	NOTE If the power if less than 15%, must be recharged within 30 days, otherwise the battery will be damaged.
	If continue to use, the torque and speed will low than the setting value, and low power warming will appear on screen, and the device will stop work.
	NOTE The remaining amount of battery mark indicates a voltage. When a load is applied to the motor handpiece, the remaining amount of battery mark appears to become lower.
	Charge without charge base also available, using adapter connect to handpiece directly, the charge state will show on the screen. Charge with charge base is recommended **(See chapter 4.4 Connecting charge base)**. **NOTE** Only the original adapter could be used.



Charging indication appears on the screen, and flashes slowly (①), when battery is fully charged or in a state near full charge, the flash will stop and show like picture (②).

Fully charged will take about 4 hours, depending on residual battery power and battery state.

It can be recharged 300-500 times, depending on the operating conditions of the device.

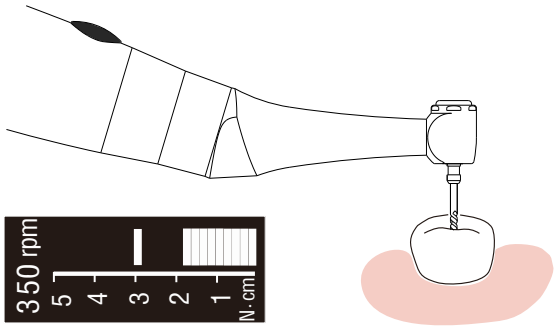
NOTE

When changing, other function will forcibly stop, take from charge base, press main switch, the last function will recall.

WARNING

Do not change the battery, only trained technician or distributor can change the battery, the electronic parts will be damaged if use a wrong battery or install with a wrong way.

7.2 Motor operation



When using as a stand-alone motor, the torque bar will show on the screen **(more information about torque bar, please see chapter 5.2 Screen display)**.

WARNING

- Use the E-connect S outside the oral cavity to make sure that the device is functioning properly.
- Change file on time to avoid file separation within the canal. File may separate because of cyclic / torsional fatigue.
- Heavy force / hand pressure on endo motor while using may even cause file separation.
- Do not press the button to release the files while the motor is running, otherwise the file may pop out and even hurt the patient.

● Electromagnetic noise in surroundings environment may interfere with the device operation, do not rely on device's automatic control completely, always pay attention to the feedback from display.

NOTE

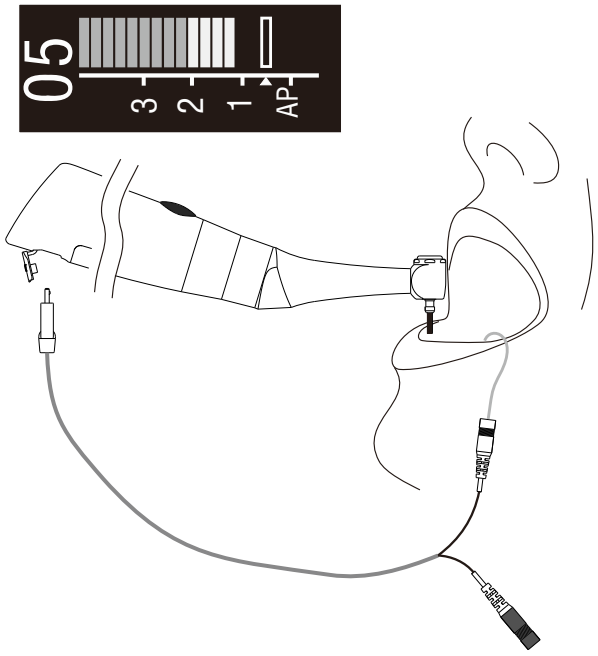
If there is any abnormal functioning, stop using the device and report to company.

The file separates more easily at high speeds, please follow the manufacturer's recommendations of the speed and check the settings of the Endo motor before use.

Do not use the files are except nickel-titanium or stainless steel.

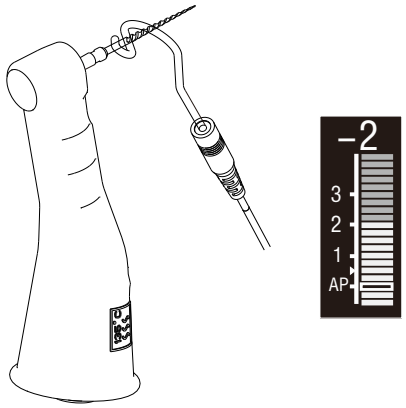
Gloves and a rubber dam are compulsory during treatment.

Do not forget to remove the file from the Contra-angle after its use.



When using motor combine apex function, the measure wire must be connecting with motor by USB socket, and white slot connects with lip by lip hook, keep the black slot idle.

The reference point bar will show on the screen **(more information about reference point bar, please see chapter 5.2 Screen display)**.



NOTE

We strongly recommend check the function every time before use.

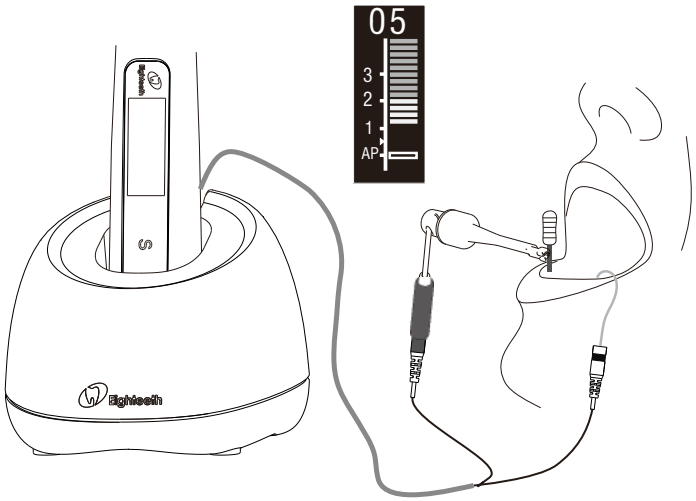
Touch the lip hook with the file in the contra angle and check that all the bars on the meter on the screen light up, and the motor should be reversed continuously.

NOTE

The will not be able to perform a precise measurement for every time, especially in cases of abnormal or unusual morphology of the root canal. The user need coordinate with x-ray to check the results of the measurement.

If the meter does not move when you enter the file, it is possible that the unit is not working normally, therefore, stop using.

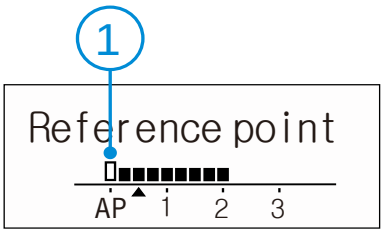
7.3 Apex operation and not suitable condition



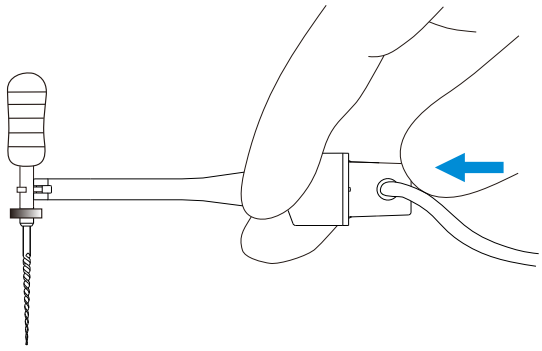
When using as a stand-alone apex locator. We suggest put the handpiece on the charge base to get better visual angle.

the measure wire must be connecting with motor by USB socket, white slot connects with lip by lip hook, and black slot connect with file clip.

the canal length indicator bar will show on the screen **(more information about canal length indicator bar, please see chapter 5.2 Screen display)**.



The reference point can be adjusting when use stand-alone apex function. Press S to active reference point interface during M0 standby state, Press < or > to change reference point by change the flash bar (①), a continuous beeping with appear when reach the reference point.

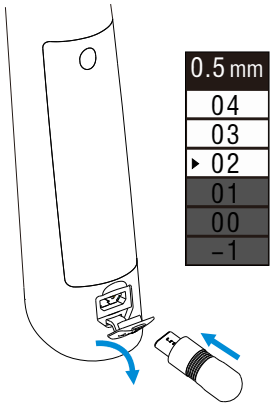


NOTE

The file clip must hold the file correctly.

Push the button of file clip in the direction shown by the arrow, clip the holder onto the metal upper part of the file and then release the button.

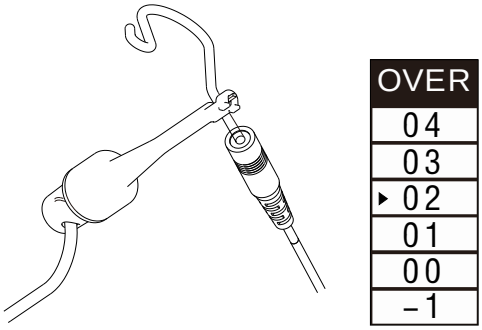
The file clip must be nearly vertical with file handle, otherwise will damage the tip of the file holder.



NOTE

We recommend using Apex Tester to check the accuracy of apex locator every time before use.

Insert the Apex Tester into handpiece USB socket during M0 mode, check the highlight number must between 01-03 (0.3mm-0.8mm on the top)



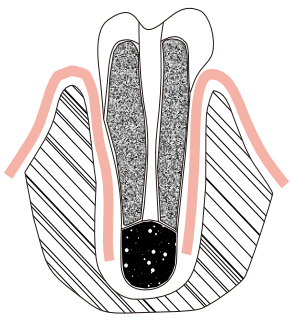
NOTE

We recommend check the connection of apex locator every time before use.

Touch the lip hook with metal part of file clip, check all the bars on the meter on the screen light up, and “over” flash on the top.

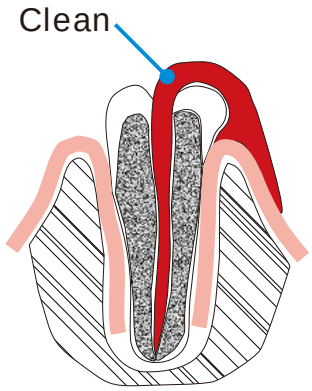
Unsuitable situation of root canals for Electric Measurement

Cannot obtain precise measurements if the root canal conditions as below



Root canal with a large apical foramen

The root canal cannot be accurately measured because of the lesion or incomplete development of the apical foramen. The results may show that the length measured is shorter than the actual one.



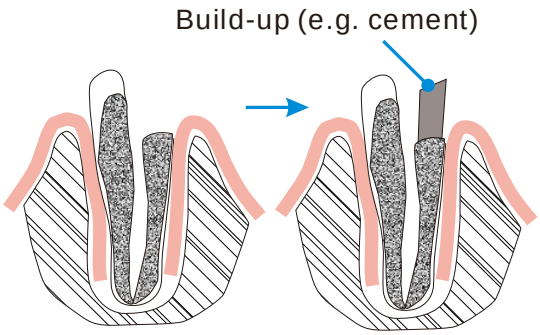
Root canal blood overflow from the opening

If blood spills from the root opening and contacts the gums, it will cause leakage of electricity, which cannot be accurately measured. Wait for the bleeding to stop completely. Clean the root canal and the opening, completely empty the root canal blood, and then measure it.

The root canal uses a chemical solution to flow out from the opening

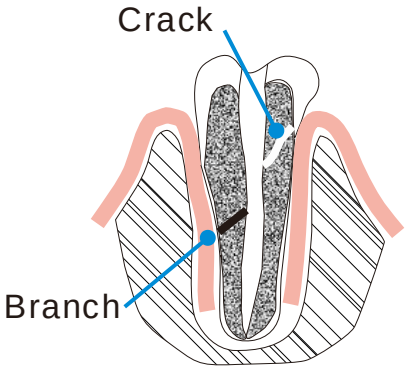
If a chemical solution flows out of the root canal, it is impossible to get an accurate measurement.

It is important to remove the overflow from the opening.



Broken crown

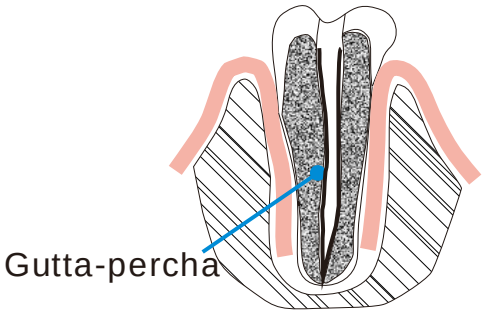
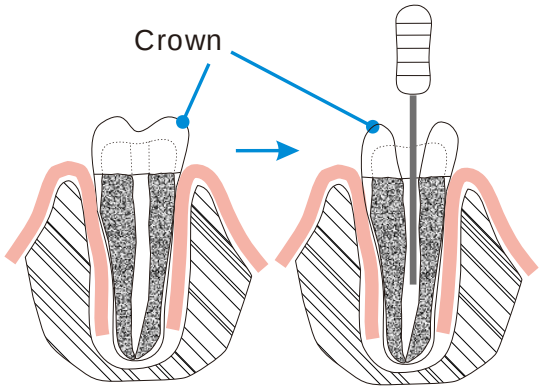
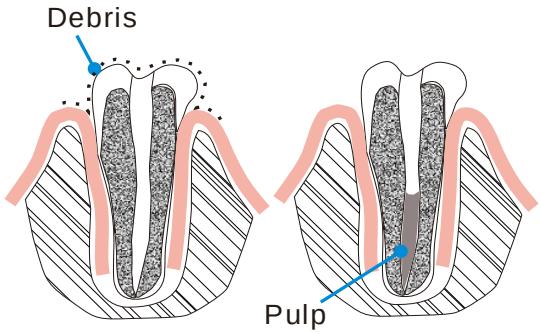
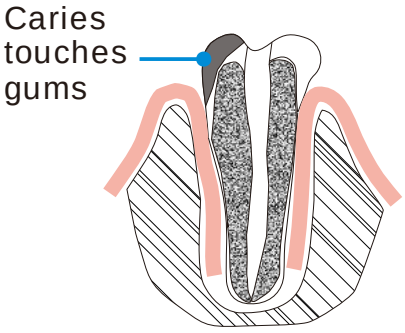
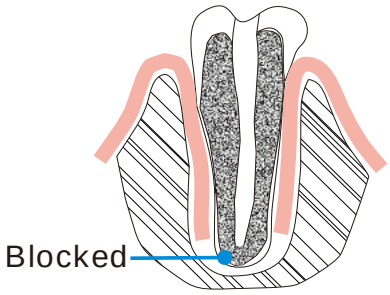
If the crown is broken, a segment of the gingival tissue enters the lumen, and the contact between the gingival tissue and the root file causes electrical leakage, which cannot be accurately measured. In this case, the appropriate material should be used to isolate the gingival tissue.

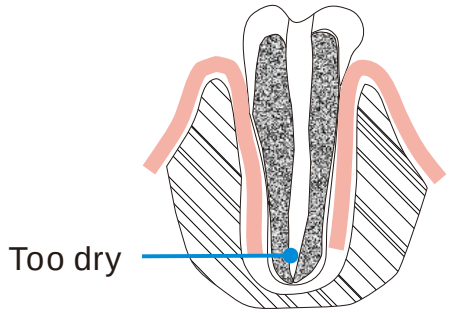


The crack tooth Leakage through branch of the root canal

Broken teeth can cause electrical leakage and cannot be accurately measured.

Branch tubes can also cause leakage.

	**Retreatment canal which was filled with gutta-percha** The gutta-percha must be completely removed to eliminate its insulation, then 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 that touches gingival tissue** Accurate measurement cannot be obtained if the file touches a mental 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 mental prosthesis before taking a measurement.
	**Cutting debris on tooth Pulp inside canal** Remove all cutting debris on the tooth. 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 are impossible to obtain an accurate measurement.
	**Blocked canal** The meter will not run if the canal is blocked. Opening the canal all the way to the apical construction to measure it.

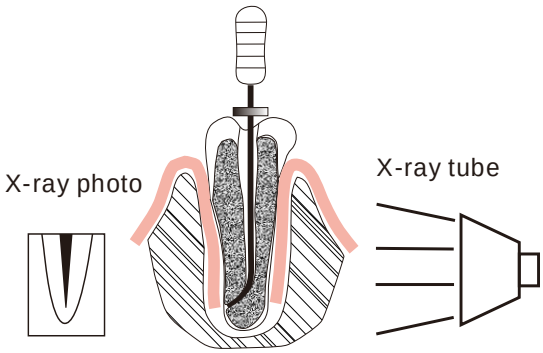


Extremely dry canal

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

Difference measuring result between Apex locator reading and Radiography

Sometimes the reading of the apex locator reading does not correspond to the X-ray image. this does not mean inaccurate of apex locator or X-ray, depending on the angle of the X-ray beam, the root tip may not be displayed correctly. The position of the root tip seems to differ from its true position.



The X-ray photo shows that the actual apex of the root canal is not the same as the anatomic end. In fact, the apical foramen is located at the coronal end. in this case, X-ray may indicate that the file needle has not reached the apical foramen, even if it has actually reached the apical foramen.

8.Cleaning, Disinfection and Sterilization

8.1 Foreword

For hygiene and sanitary safety purpose, the components (contra angle, file clip, lip hook and insulating sleeve) must be cleaned, disinfected and sterilized before each usage to prevent any contamination. This concerns the first use as well as the subsequent uses.
Comply with your national guidelines, standards and requirements for cleaning, disinfection and sterilization.

8.2 General recommendations

8.2.1 The user is responsible for the sterility of the product for the first cycle and each further usage as well as for the usage of damaged or dirty instruments, where applicable after sterility.

8.2.2 For your own safety, please wear personal protective equipment (gloves, safety glasses, etc.).

8.2.3 Use only a disinfecting solution which is approved for its efficacy (VAH/DGHM-listing, CE marking, and FDA approval) and in accordance with the DFU of the disinfecting solution manufacturer.

8.2.4 The water quality has to be convenient to the local regulations especially for the last rinsing step or with a washer-disinfector.

8.2.5 Thoroughly clean and wash the components before autoclaving.

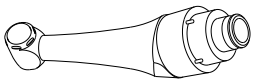
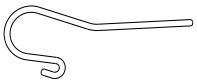
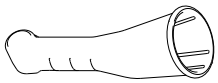
8.2.6 Do not lubricate the motor handpiece.

8.2.7 Do not clean the contra angle with an ultrasonic cleaning device.

8.2.8 Do not use bleach or chloride disinfectant materials.

8.3 Autoclavable Components

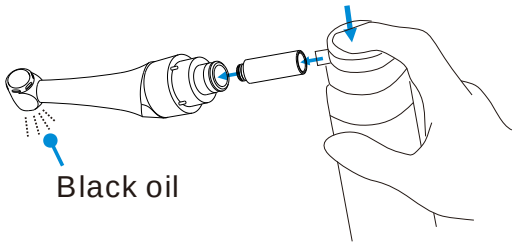
Autoclavable Components

Contra Angle	Lip Hook	File clip	Insulating Sleeve
			

WARNING

- Only the components above can be autoclaved.
- Before first use and after each use, sterilize the above components.

<table>
<tr><th>STEP NO.</th><th colspan="2">INSTRUCTIONS</th></tr>
<tr><td>1</td><td>Initial treatment at point of use</td><td>Immediately after using, wipe gross contaminations from the components (contra angle, file clip, lip hook and insulating sleeve), and put them in container for transportation.
Prepare the components directly after treatment.
  WARNING
● Do not submerge the components or wipe them with any of the following functional water (acidic electrolyzed water, strong alkaline solution, or ozone water), medical agents (glutaral, etc.), or any other special types of water or commercial cleaning liquids. Such liquids may result in metal corrosion and adhesion of the residual medical agents to the components.</td></tr>
<tr><td>2</td><td>Preparation before cleaning</td><td>Remove and disconnect the components (Contra Angle, Lip Hook, File clip, Insulating Sleeve) before cleaning. Refer to "Chapter 4-Installing the E-connect S" of this manual for disassembly instructions.
  WARNING
● Do not fail to take out the file before cleaning the contra angle.
● Observe suitable personal protective measures.</td></tr>
<tr><td colspan="3">The following Step 3 to Step 5 are operated in a washer-disinfector:
  WARNING
● Use only approved washer-disinfectors according to EN ISO 15883, maintain and calibrate it regularly.
● Follow instructions and observe concentrations given by the manufacturer (see general recommendations).
● Sufficient rinsing step should be available in purified water (max 10 germs/ml and max 0.25 endotoxin units/ml)
● Avoid any contact between the contra-angle and any instrument, kit, support or container.
● Make sure the components are dry before moving to the #6 step.</td></tr>
<tr><td>3</td><td>Cleaning: Automated</td><td>- Carefully put the components (Contra Angle, Lip Hook, File Clip, Insulating Sleeve) into the washer-disinfector and set the parameters as follows:</td></tr>
</table>

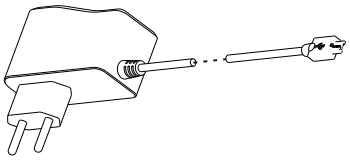
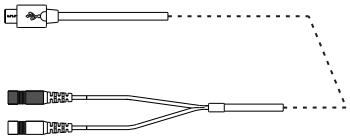
		- Pre-cleaning: water temperature <30℃, 2 min; - Cleaning: water temperature 45℃, 5 min; use an enzyme detergent solution (mild and aldehyde free solution) which is suitable to be used with washer-disinfector, and use in accordance with the IFU of the detergent solution manufacturer; - Rinsing: water temperature 45℃, 1 min (Rinsing twice).
4	Disinfection: Thermal	Thermal disinfection at least 5 min at 90℃/194° F, make sure A0 value≥3000.
5	Drying	Heat, 20min, 90℃/194° F
6	Maintenance and Inspection	- Inspect components and sort out those with defects. Dirty components must be cleaned and disinfected again. - Only the contra angle needs to be lubricated.  **WARNING** ● Before autoclaving, the contra angle must be lubricated. ● Attaching the spray nozzle to oil can and contra angle, press the oil can button more than 3 seconds, till all the black oil flow out from the head of the contra angle.
7	Packaging	Pack each component in a separate steam-sterilization pouch. **WARNING** ● Check the validity period of pouch given by the manufacturer to determine the shelf life. ● Use pouches which resist to a temperature up

		to 141℃(286°F) and in accordance with EN ISO 11607.
8	Sterilization	Steam sterilization at 134℃, at least 6 minutes. Minimum drying time after sterilization: 10 minutes. **WARNING** ● Use only approved autoclave devices according to EN 13060 or EN 285. ● Use a validated sterilization procedure according to ISO 17665. ● Respect the maintenance procedure of the autoclave device given by the manufacturer. ● Use only this recommended sterilization procedure. ● Control the efficiency (packaging integrity, no humidity, color change of sterilization indicators, physicochemical integrators, digital records of cycles parameters). ● The sterilization procedure must comply with ISO 17665. ● Wait for cooling before touching.
9	Storage	Keep the components in sterilization packaging in a dry and clean environment. **WARNING** ● Sterility cannot be guaranteed if packaging is open, damaged or wet. ● Check the packaging and the contra angle before using it (packaging integrity, no humidity and validity period).

NOTE

The instructions provided above have been validated by the manufacturer of the medical device as being capable of preparing a medical device for use. It remains the responsibility of the processor to ensure that the processing, as actually performed using equipment, materials and personnel in the processing facility, achieves the desired result. This requires verification and/or validation and routine monitoring of the process. Likewise, any deviation by the processor from the instructions provided should be properly evaluated for effectiveness and potential adverse consequences.

8.4 Disinfection Components

<table>
<tr><td colspan="3">Disinfection components</td></tr>
<tr><td>Motor Handpiece
  </td><td>Charge Base
  </td><td>Adapter
  </td></tr>
<tr><td>Measuring Wire
  </td><td>Handpiece Base
  </td><td></td></tr>
<tr><td colspan="3">Wipe all the surfaces with a cloth lightly moistened with Ethanol for Disinfection (Ethanol 70 to 80vol%) at least 2 min, repeat for 5 times.</td></tr>
<tr><td colspan="3">NOTE
● Do not use anything except Ethanol for Disinfection (Ethanol 70 to 80 vol%).
● Do not use too much ethanol as it’s going into machine and damage the components inside.</td></tr>
</table>

9.Error Warning

Overload Restart Motor	When setting the torque limit as R.L or during reverse processing, the Overload warning may appear on the screen, it means a large load happened greater than the motor force. Press the Main switch to restart motor.
Overheat See user manual	The temperature of motor is higher than expectation, turn the power off and waiting more than 5 minutes to let it cold down.
HWFault See user manual	Hardware of the handpiece broken, contact your distributor.
MotorFault See user manual	Motor of the handpiece broken, contact your distributor.
LowPower Please Charge	The power is very low, charge it immediately

10.Troubleshooting

When trouble is found, check the following points before contacting your distributor. If none of these are applicable or the trouble is not remedied even after action has been taken, the product may have failed. Contact your distributor.

Problem	Cause	Solution	Ref. chap
The power is not turned on.	The battery is flat.	Charge the battery.	7.1
	Press the main switch too short time.	Press the main switch more than 0.5 seconds.	5.1
The power LED on charge base does not light.	Using a wrong adapter.	Use the original adapter.	4.4
	The adapter is not connected.	Check the connection.	4.4
	The plug of the adapter is not inserted into the outlet.	Check the connection.	/
	There is no electricity in the outlet.	Check the connection.	/
No charge indicator flash on handpiece screen	Put the handpiece into the charge base in the wrong direction.	Check the direction.	4.4
	Charge pin of charge base unable to rebound.	Remove debris which between move part and base of the charge pin.	/
	Contactors are dirty.	Cleaning the surface of contactors.	/
	The charge base broken.	using adapter connect to handpiece directly, and Contact your distributor.	/
Handpiece screen does not appear	The handpiece broken.	Check if there is a sound of beep or motor, and Contact your distributor.	/
The motor doesn’t rotate.	M0 mode is stand-alone apex locator function.	Changing to M1-M10.	6.1
	The contra-angle is clogged	Clean or replace the	/

		contra-angle.	
	Motor is protected by system or broken.	Check the error warning.	9
Motor does not run when the file is inserted in the canal.	The measure wire connecting not properly.	Check the connection.	4.3
	The lip hook not properly hooked in the corner of the patient's mouth.	Check the connection.	7.2 7.3
	The Auto start function is OFF	Turn the auto start function ON if necessary.	6.2
The motor Can't stop.	The Auto stop function is OFF.	Press main switch to stop it, setting Auto stop function ON if necessary.	6.2
	There is a short circuit inside the motor handpiece or the motor handpiece cord.	Press "S" button to stop the motor and contact your distributor.	/
Motor spontaneously starts running in reverse.	Up to setting torque limit.	Check the torque limit is enough or not.	6.2
	Apical action setting to Reverse	Change setting if it's not expected.	6.2
	Setting to REV mode.	Change setting if it's not expected.	6.2
Motor does not reverse.	R.L mode is set.	Change setting if it's not expected.	6.2
	Torque reverse setting might be too high.	Change setting if it's not expected.	6.2
	Apical action setting Stop or OFF.	Change setting if it's not expected.	6.2
Motor speed changes spontaneously.	Apical action setting Slow Down.	Change setting if it's not expected.	6.2
Motor alternates between forward and reverse rotation.	Operation mode setting to REC or ATC.	Change setting if it's not expected.	6.2
No sound.	Beep volume set to 0.	Set beep volume to 1, 2 or 3.	6.4

Beep sound an alarm even though the instrument is not being used.	The motor is set to REV or R.L mode.	If it is the expected mode, ignore the alarm.	6.2
Canal measurement is unstable.	Complex root canal environment.	Check situation of root canals.	7.3
Cannot make a measurement.	Measure wire, lip hook or file clip connecting not properly.	Check the connection.	7.2 7.3
	Lack electrical conductivity between the shank and the file.	Use a file that has conductivity.	/
	Unsuitable situation of root canals.	Check the root canal environment.	7.3

11.Technical Data

Manufacturer	Changzhou Sifary Medical Technology Co.,Ltd
Model	E-connect S
Dimensions	21.5cm x 17.5cm x 9cm±1cm (Outer box)
Weight	1kg±10%
Contra-angle	Contra-angle compatible with rotary and reciprocating instruments, equipped with a 2.35 mm shaft conforming to ISO 1797-1:2011, Type 1, Files length 11-31mm.
Power supply	Lithium ion battery: 3.7V, 1500mAh, ±10%
Charger power supply	AC 100-240 V, ±10%
Charger power output	5V⎓ 1A
Frequency	50/60Hz, ±10%
Charger nominal power input	5.5VA
Torque range	0.5N·cm – 4N • cm
Speed range	120-1000 rpm
Type of protection against electrical shock	Class II and internally powered equipment
Applied part	B
Operation conditions	Use: in enclosed spaces Ambient temperature: 5°C ~ 40 °C Relative humidity: <80% Operating altitude < 3000m above sea level Atmospheric pressure: 70kPa ~ 106kPa
Transport and storage conditions	Ambient temperature: -20 °C ~ +55 °C Relative humidity: 20% ~ 80 % Atmospheric pressure: 70kPa ~ 106kPa

12.EMC Tables

Guidance and manufacturer's declaration – electromagnetic emissions		
The **E-connect S** is intended for use in the electromagnetic environment specified below. The customer or the user of the **E-connect S** should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The **E-connect S** 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 **E-connect S** 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 IEC61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The **E-connect S** is intended for use in the electromagnetic environment specified below. The customer or the user of the **E-connect S** 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	+/- 8 kV contact +/- 2 kV, +/- 4 kV, +/- 8 kV, +/- 15 kV air	+/- 8 kV contact +/- 2 kV, +/- 4 kV, +/- 8 kV, +/- 15 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 IEC 61000-4-4	±2kV 100kHz repetition frequency	±2kV 100kHz repetition frequency	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	Line to line: ±0.5kV, ±1kV Line to earth: ±0.5kV, ±1kV, ±2kV	Line to line: ±0.5kV, ±1kV Line to earth: ±0.5kV, ±1kV, ±2kV	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips IEC 61000-4-11 Voltage interruptions IEC 61000-4-11	0% UT; 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% UT; 1 cycle and 70% UT; 25/30 cycles sine phase at 0° 0% UT; 250/300 cycle	0% UT; 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% UT; 1 cycle and 70% UT; 25/30 cycles sine phase at 0° 0% UT; 250/300 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of devices require continued operation during power mains interruptions, it is recommended that devices be powered form an uninterruptible power supply or a battery
Rated Power frequency magnetic field IEC 61000-4-8	30 A/m 50Hz or 60Hz	30 A/m 50Hz or 60Hz	Power frequency magnetic field should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note: UT: rated voltage(s); E.g. 25/30 cycles means 25 cycles at 50Hz or 30 cycles at 60Hz			

Guidance and manufacturer's declaration – electromagnetic immunity			
The **E-connect S** is intended for use in the electromagnetic environment specified below. The customer or the user of the **E-connect S** should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**

Conducted dis-turbances induced by RF fields IEC 61000-4-6	3 V 0.15 MHz – 80 MHz, 6 V in ISM bands be-tween 0.15 MHz and 80 MHz, 80 % AM at 1 kHz	3 V	Portable and mobile RF communications equipment should be usedno closer to any part of the **E-connect S**, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Radiated RF EM fields IEC 61000-4-3	3 V/m, 80 MHz – 2,7 GHz, 80 % AM at 1 kHz	3V/m	**Recommended minimum separation distances** See the RF wireless communication equipment table in "Recommended minimum separation distances"
Proximity fields from RF wireless communication equipment IEC 61000-4-3	See the RF wireless communication equipment table in "Recommended minimum separation distances"	Complies	

Recommended minimum separation distances

Nowadays, many RF wireless equipments have being used in various healthcare locations where medical equipment and/or systems are used. When they are used in close proximity to medical equipment and/or systems, the medical equipment and/or systems' basic safety and essential performance may be affected. The **E-connect S** has been tested with the immunity test level in the below table and meet the related requirements of IEC 60601-1-2:2014. The customer and/or user should help keep a minimum distance between RF wireless communications equipments and the **E-connect S** as recommended below.

Test frequency (MHz)	Band (MHz)	Service	Modulation	Maximum power (W)	Distance (m)	Immunity test level (V/m)
385	**380-390**	**TETRA 400**	**Pulse modulation 18Hz**	**1.8**	**0.3**	**27**

450	**430-470**	**GMRS 460 FRS 460**	**FM ± 5 kHz deviation 1 kHz sine**	**2**	**0.3**	**28**
710	**704-787**	**LTE Band 13, 17**	**Pulse modulation 217Hz**	**0.2**	**0.3**	**9**
745						
780						
810	**800-960**	**GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5**	**Pulse modulation 18Hz**	**2**	**0.3**	**28**
870						
930						
1720	**1700-1990**	**GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS**	**Pulse modulation 217Hz**	**2**	**0.3**	**28**
1845						
1970						
2450	**2400-2570**	**Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7**	**Pulse modulation 217Hz**	**2**	**0.3**	**28**
5240	**5100-5800**	**WLAN 802.11 a/n**	**Pulse modulation 217Hz**	**0.2**	**0.3**	**9**
5500						
5785						

WARNING

1. Use of accessories and cables other than those specified or provided by the manufacturer of **E-connect S** could result in increased electromagnetic emissions or decreased electromagnetic immunity of **E-connect S** and result in improper operation.
   Cable information:

Cable Name	Cable Length (m)	Shielded or not	Remark
Adapter Cable	1.2	No	/
Measuring Wire	1.5	No	/

2. Use of **E-connect S** adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, **E-connect S** and the other equipment should be observed to verify that they are operating normally.

13.Statement

Service Life

The service life of E-connect S series products is 3 years.

Maintenance

MANUFACTURER will provide circuit diagrams, component part lists, descriptions, calibration instructions to assist to SERVICE PERSONNEL in parts repair.

Disposal

The package should be recycled. Metal parts of the device are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. The lithium batteries are disposed as special refuse. Please deal with them according to the local environmental protection laws and regulation.

Rights

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