USER'S GUIDE

ENDODONTIC MOTOR

ENDOEST MOTOR-MINI

EndoEst Motor Mini

CE
0476

Congratulations!

! On buying the device, be sure to check the delivery set, presence and correctness of the Quality Warranty Card filling, the acceptance certificate and product selling marks.

! Please, thoroughly read the user's guide before using the device. Keep the User's guide for future use.

! Please, address to the manufacturer if you have some questions when using the device.
Hotline: +7(495)663-22-11 (extension 170),
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CJSC GEOSOFT DENT
(Russia)

CONTENTS

1. GENERAL INFORMATION

1.1. The device brief summary:

"EndoEst Motor - Mini" is a compact device combining endodontic motor with microprocessor control for working with rotating Ni-Ti instruments and apex-locator for localization of root canal apical constriction (apex) during endo-motor operation.

The device is manufactured in several versions according to table 1.
Table 1.

<table>
<tr><td rowspan="2">Version of the device</td><td colspan="3">Options</td></tr>
<tr><td>Function of RECIPROCAL file rotation</td><td>Function of APEX LOCATION</td><td>Operating area LED illumination</td></tr>
<tr><td>Basic</td><td rowspan="3">No</td><td>No</td><td rowspan="2">No</td></tr>
<tr><td>Apexlocation</td><td rowspan="3">Yes</td></tr>
<tr><td>Apexlocation - L</td><td>Yes</td></tr>
<tr><td>Reciprocation</td><td>Yes</td><td>No</td></tr>
<tr><td>Reciprocation - L</td><td></td><td>Yes</td></tr>
</table>

1.2. Field of application:

The device is designed for use in dentistry (endodontics) and can be used only in hospitals by medical specialists licensed to practice dentistry.

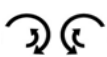
The manufacturer is not responsible for the device misuse.

1.3. The device functional capabilities:

Table 2. The list of programs endo-motor

Programs		Mode of rotation	The name of the file system, under which adapted the program
Basic, Apexlocation Apexlocation -L	Reciprocation Reciprocation/-L		
1 ,2, 3, 4, 5			— *(programmable)*
r			
—	6		**T-FILE** (GLOBAL TOP)
	7		**ONE FILE** (GLOBAL TOP)
	8		**RECIPROC** (VDW)
	9		**WAVEONE** (DENTSPLY Maillefer)

"Continuous" rotation mode - instrument constantly rotates clockwise or counterclockwise, respectively



"Reciprocal" rotation mode - instrument alternately rotates clockwise and counterclockwise with clearly fixed speed and rotation angle in both directions: with a big rotation angle when moving forward (clockwise or counterclockwise, respectively) and with a small when moving back.

1.4. Contraindications

Do not use the device on patients with pacemakers.

1.5. Safety measures and warnings

! Use the device only with the "Geosoft Dent" authentic accessories *(see part 3. "Accessories").*

! Do not dismount and do not change the device construction anyhow. **In the case of the device integrity damage warranty is considered to be invalid**. The device power source should be changed by authorized service departments only.

! Avoid any liquid ingress into the device case.

! Do not use the device close to inflammables. The device is not operational in the presence of inflammable anesthetic mixtures with air, oxygen or nitrogen oxides.

! Use only sterile and disinfected device components. The device should be sterilized and disinfected directly before the first device use and also after each patient in order to avoid cross infection *(for more details see part 9 "Caring for the device. Information on sterilization and disinfection").*

! Be sure to lubricate and sterilize the micro-motor head before its use after previous patient. Avoid lubricant ingress into the micro-motor expanded parts.

! Use cofferdam when working in patient's oral cavity.

! In case of any abnormality in the endo-motor functioning (*noise, shakiness, vibrations*), stop using the device immediately and try to find the cause of malfunction, basing on the information represented in the part 11.

! This endo-motor has function of the file limit torque which lessens probability of break during its use. In spite of it, files may break down because of wrongly set limit torque value in the program or because of worn-out files use. Carefully follow manufacturer's instructions concerning use of the endodontic instruments and avoid use of worn-out and damaged files.

! Do not use instruments of "continuous" rotation in "reciprocal" movement and vice versa.

! Do not use curved, deformed or not corresponding to the ISO file. Use of such a file may result in injury.

! Always clean the shank of file to be set. Mud penetration into the head clutch may cause loss of concentricity and the file clutch power worsening, loss of the apex-locator contact.

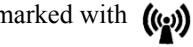
! Do not start the micro-motor until the file is securely fixed in the clutch head.

! Avoid inadvertent contact with rotating micro-motor parts and/or rotating file.

! In some cases apex determination with apex-locator may be not enough accurate and reliable *(see part 8. "The fundamental operating instructions of the apex-locator").* Make an X-ray image and base on the information received from both methods before using the mixed

mode (*endo-motor and apex-locator*).

! The device requires special safety precautions with regard to electromagnetic compatibility (EMC), and the EMC information contained in this manual must be strictly adhered to during installation and operation. It is especially important not to use the device near fluorescent lamps, radio transmitters or remote controls, portable or mobile radio frequency communications equipment.

! The apex-locator malfunction is possible when using it in the area of strong electromagnetic interference (EMC). Don't use the device close to electromagnetic waves emitting equipment. Malfunctions may take place close to the equipment marked with  symbol.

! Do not use this device in conjunction with other equipment, or as part of other equipment.

! Do not use the accessories, transducers and cables other than those listed below. This may result in increased emissions or decreased immunity performance of the device. The manufacturer guarantees the electromagnetic compatibility of the following elements: *Apex-locator cable with maximum length 105 cm; Mains charger (model DN500) with a maximum cable length 1.8m*

! The device normally operates at temperatures 10-35°C, relative air humidity not more than 80%, atmosphere pressure (101±3) kPa. Any violation of the pointed restrictions may lead to the device failure.

1.6. Side effects:

Not found out.

2. DELIVERY SET

The device delivery set is represented in table 3. *Table 3.*

Position name	Number of pieces for modification	
	Basic	Apexlocation / -L, Reciprocation / -L
Control unit with head	1	1
Apex-locator cable *(micro pin 2 mm, single)*	—	1
Apex-locator lip clip	—	1
Cable for external apex-locator connection *(2x micro pin 2 mm)*	1	—
Charger stand	1	1
Mains charger	1	1
User's guide	1	1
Torque card	1	1

3. ACCESSORIES

1. Micro-motor head
GE99.124.000
Miniature head SCHD05-C-1M with friction fixing

2. Seal ring for the head (3 pcs)
GE99.133.000
Additional silicon seal ring for head
GE99.124.000

3. Adapter for lubrication
GE99.161.000
Adapter for lubrication
micro-motor head GE99.124.000

4. Apex-locator cable
GE99.162.000
Cable for apex location. Length - 100± 3 cm
Plug - micro pin (2 mm)

5. Lip clip «Oral Hook" (3pcs/1 pc)
GE99.062.000 / GE99.123.000
Is used as passive electrode during apex location.
Should be fixed on patient's lip.

6. Cable for external apex-locator connection
GE99.165.000
Cable for external apex-locator connection
(micro pin (2 mm) – micro pin (2 mm).
Length - 15±5 cm

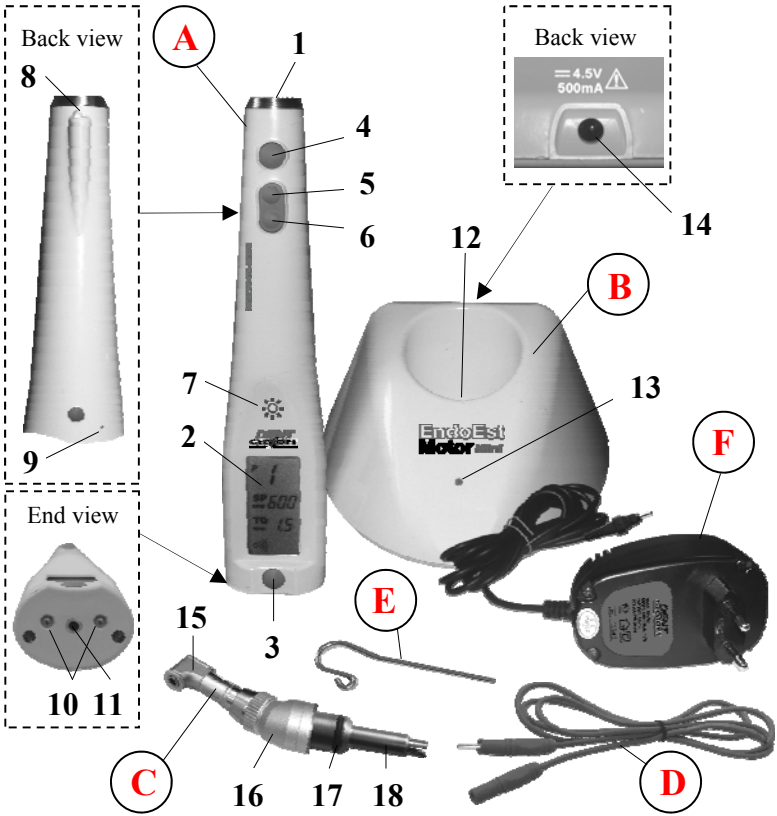
7. Mains charger
GE99.049.000
Input voltage: (220±10%) V~50/60Hz.
Output voltage: 4,5V; 500 mA.
Plug - 3,5 mm

! Accessories are shipped apart at extra cost

4. THE DEVICE OUTWARD APPEARANCE

Outward appearance of the «EndoEst Motor-Mini" is represented in the figure 1.

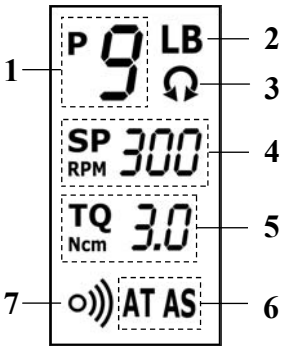
Fig.1. EndoEst Motor-Mini



where: **A**. **Control unit:** 1. Socket of the head;
2. LCD display *(see fig.2);*
3. Button «POWER/SET»: Power switch on/off; adjusted parameter selecting;
4. Button «START/STOP»: the micro-motor start/stop;
5. Button «+»: adjusted parameter value increase;
6. Button «-»: adjusted parameter value lessening ;
7*.Touch button «✲»: on/off of LED illumination;
8*.Operating area LED illumination;
9. Button «Reset»; 10. Contacts for battery charging;
11. Socket micro Jack for apex-locator cable connecting ;
B. Charger stand:
12. Socket of charger; 113. Indicator of battery charge;
14. Socket of the mains charger.
C. Micro-motor head
15. Head; 16. Adapter; 17. Silicon seal ring; 18. Rod.
D. Apex-locator cable E. Lip clip F. Mains charger

** only for modifications «Apexlocation-L» and «Reciprocation-L»*

Fig. 2. The display symbols description



1 - indicator of selected program «1» - «9»;
2 - «LB» battery discharge indicator;
3 - indicator "reciprocal rotation" *(active only modifications «Reciprocation/-L»)*;
4 - indicator of the instrument preset rotation speed value (rpm);
5 - indicator of the instrument limit torque preset value (Ncm);
6 - indicator "Auto twist"/"Auto stop";
7 - indicator of sound signal switch on "Sound".

5. SPECIFICATIONS

Electrical and maintenance device specifications answer the requirements of: EN 60601-1:2006, EN 80601-2-60:2012, EN 60601-1-2:2015

- Protection from electric shock : Device is of Class II (including the Mains Charger). Device has integrated a power source element. Applied part BF type
- Protection from dust and moisture : (level) IP41;
- The device life time - 5 years

5.1. Control unit & head

- Power source - Li-Po battery (3,7V; 700 mAh);
- Monochrome LCD display - 16*32 mm;
- Micro-motor head: model SCHD05-C-1M (miniature, with friction fixing), transmission ratio 1:1, file fixing - locking pattern;
- Range of the file rotation speed adjustment in the “continuous” rotation mode - from 200 to 600 rpm (by increment 50 rpm);
- Accuracy of rotation speed stabilization when load applying -±10%;
- Range of the file limit torque adjustment in the “continuous” rotation mode - from 0,2 to 3,5 Ncm (by increment 0,1 Ncm);
- Accuracy of the preset limit torque - ±15% ;
- Max. rotation speed in the “continuous” rotation mode at the torque 3,5Ncm - 250 rpm;
- Max. limit torque in the “continuous” rotation mode at the speed 600 rpm - 1,6 Ncm;
- Average operation time in the “continuous” rotation mode with new fully charged battery without recharging – 6 h;
- Time of the device operation in the “sleep” mode until the device automatic power switch off – 2h±1 min;
- The device battery charge period – 1,5±0,5 h;

- The battery life cycle - not less 300 recharge cycles;
- Overall dimensions - (196*32*23) ±3 mm , Weight –115±10 g;

5.2. Charger stand

- Overall dimensions - (98*98*60) ±3 mm; Weight -175±10 g;

5.3. Mains charger

- Model- DN500 (Geosoft Dent);
- Input /Output voltage - (220±10%)V, ~50/60Hz / 4,5 V; 500 mA.

6. MAKE READY

After the device transportation at temperature below +5 °C, you should let it warm up for an hour at room temperature before switching it on.

6.1. Battery charging

Chargeable lithium-polymeric (Li-Po) battery is the "EndoEst Motor-Mini" source power. Before the first device use it is necessary to fully charge the battery.

The battery should be charged in the following way:

- Connect the mains charger (*F)* to the stand (*B),* insert the charger cable into the socket (*14-fig.1)* on the stand case;
- Connect the mains charger to the mains supply socket 220 V;

Attention! *Do not use mains chargers of other types. Use only the charger in the device set of delivery.*

- Insert the device control unit *(A)* into the charger socket *(12-fig.1)* on the charger stand *(B)*.
Red light (*13-fig.1)* indicates that battery is being charged. When the battery is fully charged, indicator changes color to yellow-green.

Fig.3

Attention! *BEFORE you place the control unit at the charger stand socket, you must make sure of the same front position by the both, providing that the display side of the control unit will meet the face side of the stand socket. To avoid a breakdown of device, you should NEVER place the control unit to face the back side of the charger stand.*

Note: *Standard time for the battery charging is about 1,5 hours, however, it depends on the battery current charge, level of its wear, temperature. Operation and charge time of the old battery is shorter than of a new one. In the case of meaningful reduction of the device operation duration you should address to the service department to replace the old battery for a new one.*

6.2 Indication of the battery discharge

When the battery charge is lower than minimally allowable level (<20%), warning "*LB"* indicator *(2-fig.2)* appears on the device display.

Having seen such an indicator, charge the battery according to the p.6.1.

Otherwise, when the battery charge falls to the critic level (<10%), the device switches off automatically. You will see "*LB"* indicator displaying when you try to switch the device on again.

Attention! *When discharged, charge the device power supply in time. Exclude the battery full discharge.*

6.3. Power saving function

To increase time between the battery charges and to extend the device life time, the device has power saving function - automatic switch off in 2 h. after the last device operating controls activation while the motor doesn't rotate.

6.4. The device switching on

Press the button *«POWER/SET" (3-fig.1)* to switch on the device.

6.5. Calibration of the system micro-motor

The calibration function allows you to check and compensate for the friction system of the micro-motor.

The calibration function is activated automatically after power off the device. At the same time on the display screen will display "C" (abbr. Calibration).

During calibration, the micro-motor is available in the entire speed range provided by the program. The whole calibration procedure takes about 6.5 seconds.

Note: *The calibration system micro-motor should be carried out each time at the beginning and after lubrication, sterilization or replacement heads*

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

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

6.6. The device setting

All settings of the device should be carried out only when the micro-motor doesn't rotate.

6.6.1. Torque and speed programming in the "continuous" rotation mode

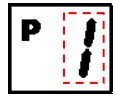
The device has 6 programs for user to independently program speed and limit torque for different Ni-Ti instruments "continuous" rotation: five programs "1" - "5" for files with right-hand thread and one program "r" for files with left-hand thread.

The procedure for programming the speed and torque:
1. Select the program **"1"** *(see p.6.6.1.1.)*
2. Program the necessary speed value *(see p. 6.6.1.2)*
3. Program the necessary limit torque *(see p. 6.6.1.3)*
4. Repeat steps 1-3 for all the rest programs **"2" - "5", "r"**

6.6.1.1. Program selection

- Be sure that there are no flashing on and off elements on the display.
Otherwise, activate the *program indicator* on the display. To do it press the button "*POWER/SET" (3-fig.1)* in the short run until the current program number starts flashing on and off *(fig.4);*

Fig.4



- Use the buttons *"+" (5-fig.1)* or *"-" (6-fig.1)* to select the necessary program. Press one of the indicated buttons in the short run to get to the next/previous program number or hold the button down for fast search of necessary program on the display.
One can move in the programs according to cyclic scheme: 1-2-3-4-5-r-6-7-8-9-1…...

6.6.1.2 Speed programming

The device has the instrument rotation speed programming within the limits of 200 - 600 rpm in the mode of the instruments "continuous" rotation.
The speed value is set for each program («1» - «5», «r») individually.

To change the current setting:

- Activate the *speed indicator* on the display. To do it press the button "*POWER/SET" (3-fig.1)* in the short run until the preset speed value starts flashing on and off *(fig.5);*

Fig.5

- Use the buttons *"+" (5-fig.1)* or *"-" (6-fig.1)* to increase/lessen speed. Press one of the indicated buttons in the short run to change

speed by increments of 50 rpm or hold the button down to get through the all speed ranges.

***Note**: Maximally allowed instrument rotation speed value depends on the preset limit torque (see p. 6.6.1.3). Maximal speed values at preset limit torque are indicated in the Table 4:*

Table 4

Preset limit torque, Ncm	0,2-1,6	1,7-1,8	1,9-2,0	2,1-2,2	2,3-2,5	2,6-2,8	2,9-3,3	3,4-3,5
Maximal speed, rpm	600	550	500	450	400	350	300	250

When the speed is more than maximally allowed, the preset value of limit torque will lessen automatically.

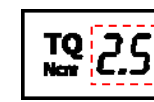
***Attention!** When selecting rotation speed for the instrument, follow the Ni-Ti instrument manufacturer's recommendations (see the Torque card enclosed). Do not preset speed value on the display more than maximally allowed by the manufacturer.*

6.6.1.3. Limit torque programming

The device has the instrument rotation limit torque programming within the limits of 0,2 - 3,5 Ncm in the mode of the instruments "continuous" rotation.
The limit torque value is set for each program («1» - «5», «r») individually.

To change the current setting:
- Activate the *torque indicator* on the display. To do it press the button "*POWER/SET" (3-fig.1)* in the short run until the preset torque value starts flashing on and off (fig.6);

Fig.6



- Use the buttons *"+" (5-fig.1)* or *"-" (6-fig.1)* to increase/lessen limit torque. Press one of the indicated buttons in the short run to change limit torque by increments of 0,1 Ncm or hold the button down to get through the all torque ranges.

***Note**: Maximally allowed limit torque value depends on the preset rotation speed (see p. 6.6.1.2). Maximal limit torque values at preset speed are indicated in the Table 5:*

Table 5

Preset speed, rpm	200-250	300	350	400	450	500	550	600
Maximal limit torque, Ncm	3,5	3,3	2,8	2,5	2,2	2,0	1,8	1,6

When the limit torque is more than maximally allowed, the preset value of speed will lessen automatically.

***Attention!** When selecting rotation limit torque for the instrument, follow the Ni-Ti instrument manufacturer's recommendations (see the Torque card enclosed). Do not preset torque value on the display more than maximally recommended by the manufacturer in any case to avoid the instrument break during the canal preparation.*

6.5.2. Adjusting the volume of sound signals

This device provides a sound indication in accordance with table 6 and 4 volume level of the sound signal: loud, medium, light signals and sound is muted.

On default the device factory settings have medium sound signals activated.

Table 6

Action	Type of sound signal	Possibility of switching off
Power switching on/off	One-time signal.	Yes
Pressing the active buttons	One-time short signal.	Yes
Pressing not active buttons	Two-time short signal.	Yes
Currently torque > 50% of the set value in the "continuous" rotation mode or >75% - in the "reciprocal" rotation mode	Short discontinuous signal	Yes
Auto stop function activation - when attaining limit torque - when attaining the apex	Long signal.	 Yes No
Working with micro-motor in the mode of reverse rotation	Discontinuous signal like “rattle”	Yes
Operation of integrated apex-locator	Discontinuous signal	No
Checking the apex-locator electrical circuit continuity	Frequent discontinuous signal	No

To change the current setting:

Fig.7

- Activate *“Sound” indicator* on the display. To do it press the button “*POWER/SET” (3-fig.1)* in the short run until the indicator starts flashing on and off *(fig.7);*

- Use the buttons *“+” (5-fig.1)* or *“-” (6-fig.1)* for adjusting the volume of sound signals . Changing the sound indication will occur in a circular pattern.

After the sound signal is muted, *“Sound”* indicator should go down and flash when activating again.

6.6.3. «Auto twist" / "Auto stop" functions switching on/off.

This device has two programmable functions that activate when attaining preset limit torque of the instrument rotation: "Auto twist" or "Auto stop" (*for the functions detailed description see p.7.8.*)

On default in the "continuous" rotation mode the device factory settings have activated "Auto twist" function (AT).

To change the current setting:

- Activate «*Auto twist/Auto stop" indicator* in the display. To do it press the button "*POWER/SET" (3-fig.1)* in the short run until the indicator of active function starts flashing on and off *(fig.8);*

Fig.8

- Use the buttons *"+" (5-fig.1)* or *"-" (6-fig.1)* to switch functions. When selecting function "Auto stop", *"AS"* indicator flashes, when selecting "Auto twist" function indicator *"AT"* flashes on.

In the "reciprocal" mode of the instruments rotation this setting is not supported. The micro-motor always stops operating automatically when attaining the preset limit torque of the instrument.

Settings saving: All the user preferences save automatically after the device switching off.

6.7. Fixing the micro-motor head *(fig.9)*

- Insert the head (*C)* rod into the socket *(1-fig.1)* on the device control unit *(A)* until bumping;
- For more reliable fixation turn the head around its axis one time;
- If it's necessary to change the turning angle of head, just turn it in the necessary direction.

Attention! *Be sure to lubricate and sterilize the micro-motor head before using it after each patient (See part 9 "Caring for the device. Information on sterilization and disinfection").*

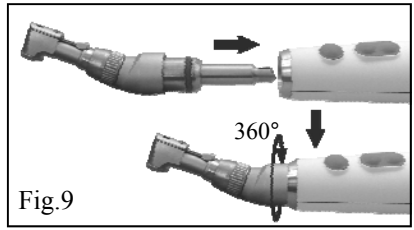


Fig.9

Note: *To disconnect the head from the control unit take the case head and pull it.*

6.7. Fixing Ni-Ti instrument (file) *(fig.10)*

- Shift the file fixing lever on the head over the far right position *(position "open");*
- Set the file in the clamping hole until bumping, slightly turning the file until matching it with the fixing mechanism;

- Recover the place of the fixing lever *(position "close");*
- Slightly pull the file and be sure that it's reliably fixed.

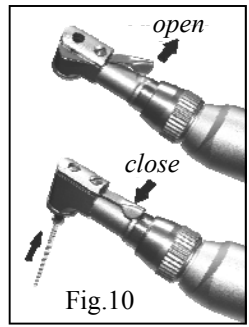


Fig.10

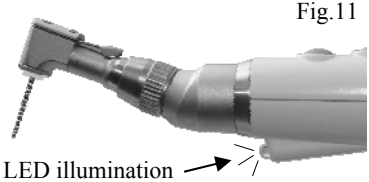
Attention! *Use only sterile files. Sterilize files according to the User's guide of the files manufacturer.*

Note: *To take the file from the head shift the fixing lever over the position "open" and take the file out.*

6.8. Led illumination switching on/off *(fig.11)*
(only for modifications «Apexlocation-L» and «Reciprocation-L»)

- LED illumination on/off is accomplished by twice pushing on the touch button« ☼ » *(7-fig.1)* when micro-motor doesn't rotate.

Fig.11



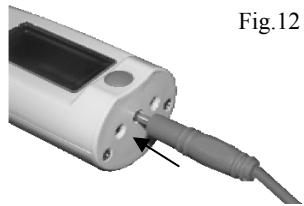
The LED (8-fig.1) on the control unit should come on or off respectively.

Note: *When putting the control unit with the LED illumination switched on in main charger, LED illumination turns off automatically. When removing the control unit from main charger it turns on again.*

6.10. Apex-locator cable and lip clip connection *(fig.12,13) (only for modifications «Apexlocation/-L» and «Reciprocation/-L»)*

- Connect the apex-locator cable *(D)* plug to its counterpart on the device control unit end view *(to the socket 11-fig.1)*
- Insert the apex-locator lip clip *(E)* into the cable socket until bumping.

Fig.12



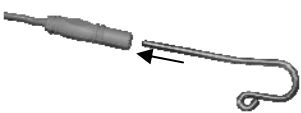


Fig.13

Attention!

Be sure to sterilize the apex-locator lip clip before its use after every patient (see part 9 "Caring for the device. Information on sterilization and disinfection").

Note: *To disconnect the apex-locator cable from the control unit, take*

the isolating part of the cable plug and pull it with small effort.

Attention! *Do not disconnect the cable, holding its wire to avoid cable breakdown. Avoid wire twisting.*

6.11. Checking the apex-locator electrical circuit continuity *(fig.14)*

You will hear *frequent discontinuous sound signal* when there are no breaks of the apex-locator electrical circuit continuity, closing working file with apex-locator lip clip when the device power is on and micro-motor doesn't operate.

Fig.14

If it doesn't happen - the apex-locator electrical circuit continuity is broken and it's out of service.

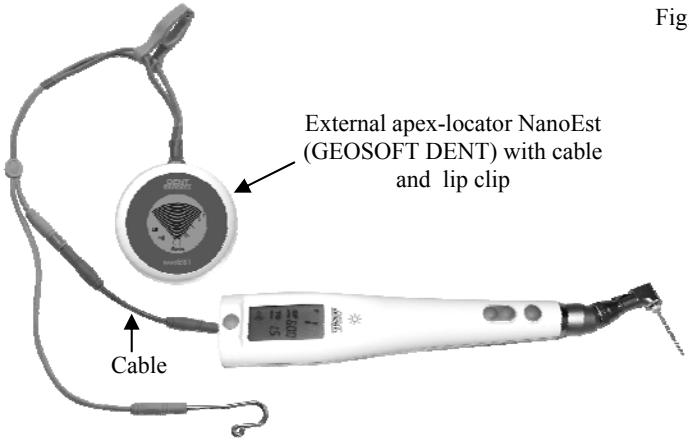
Note: *To find and correct malfunctions in the case of the apex-locator electrical circuit break see part 11 "Troubleshooting" (Table 8).*

6.12. External apex-locator connection *(fig.15) (only for modification «Basic»)*

- Plug one connector of cable to its counterpart on the device control unit end view. *(see. fig.11)*
- Free connector of the cable plug to cable of the external apex-locator* (instead of file clip).

**Compatible apex-locator models: NanoEst, EndoEst-Apex 02, EndoEst-3D, EndoEst produced by JSC GEOSOFT DENT and other manufactures' models, compatible with connector micro pin 2mm.*

Fig.15



7. USING

7.1. Switch the device on pressing the button "*POWER/SET" (3-fig.1).*
7.2. Calibrate system micro-motor *(see p. 6.5).*
7.3. Activate the needed program by pressing the buttons *«+» (5-fig.1)* or *«-» (6-fig.1) (for detailed information see p.6.6.1.1).*
7.4. When needed, change the device current settings *(see p.6.6)*

7.5. To work in mixed mode *(endo-motor and apex-locator)* connect the cable with apex-locator lip clip (or external apex-locator) to special socket on the device control unit *(see p.6.10, 6.12)*, check the apex-locator electrical circuit continuity *(see p.6.11)* and place the lip clip on patient's lip.

Attention! *Before working in mixed mode "Endo-motor and Apex-locator", take a careful look at the apex-locator fundamental operating instructions in the part 8 of the User's guide.*

7.6. If necessary, turn on the LED illumination on the control unit using the touch button «☼» *(for detailed information see p.6.9).*

7.7. Micro-motor start/stop:

Variant 1:
- To start the micro-motor press the button *"START/STOP" (4-fig.1)* in the short run and release it.
- Press the pointed button once again to stop the micro-motor rotation.

Note: *If the micro-motor is continuously rotating 10 minutes in the "continuous" rotation mode or 3 minutes in the "reciprocal" rotation mode , the micro-motor switches off automatically.*

Variant 2:
- To start the micro-motor press and hold down the button *"START/ STOP" (4-fig.1).*
- Release the button to stop the micro-motor rotation.

7.8. Function "Auto twist"/"Auto stop" when limit torque attaining

If during the micro-motor rotation the current limit torque attains preset value, function activated in the device setting mode *(see p.6.6.3)* activates automatically*:*

A) If the function «**Auto twist"** is activated in the setting mode

When attaining the preset limit torque, the micro-motor makes several rotations backwards *(counterclockwise)* and then, when the file is unloaded, it returns to its initial state *(rotating clockwise) - see fig.16.*

Fig.16

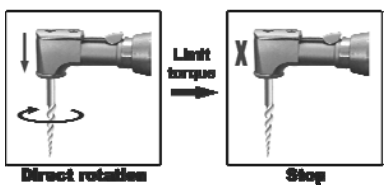
Herewith the micro-motor backwards rotation will follow with sound signal like "rattle".

Note: *The micro-motor rotation stops automatically (see p. B), if in the result of «Auto twist" function activating, the load is not removed from the file.*

B) If the function "**Auto stop"** is activated in the setting mode

When attaining the preset limit torque, the micro-motor stops rotating automatically *(see fig.17)*, what is followed with *one-time sound signal.*

Fig.17



- Use the button *"START/STOP"* to restart the micro-motor directly *(see p.7.7)*.

7.9. The integrated apex-locator operation. Function "Auto stop-Reverse" when apex attaining *(only for modifications «Apexlocation/-L» and «Reciprocation/-L").*

- The apex-locator switches on automatically when closing the apex-locator electrical circuit in patient's oral cavity during the micro-motor rotation *(fig. 18)*.

Fig.18

The apex-locator operation is followed with *discontinuous sound signal* depending on the file top location area:

1 area (from 3,0 to 1,6) - rare discontinuous signal
2 area (from 1,5 to 0,6) - discontinuous signal of average frequency
3 area (from 0,5 to the apex) - frequent discontinuous signal

Having attained the apex point, the micro-motor stops automatically. This process is followed with *one-time sound signal* and then the micro-motor starts rotating backwards *(see fig.19)*.

The micro-motor backwards rotation is followed with *sound signal like "rattle".*

Fig.19. Function "Auto stop-Reverse" when apex attaining

a) in the mode of "continuous" rotation

b) in the mode of "reciprocal" rotation

- The apex-locator switches off automatically when opening the apex-locator electrical circuit *(removing lip clip from patient's lip, removing file from patient's tooth etc.)*.

7.10. The device switching off

The device switches off automatically (*see p. 6.3 "Power saving function")*

- *Press and hold down* the button "*POWER/SET" (3-fig.1)* for about 2 seconds for the device forced switching off.

8. THE FUNDAMENTAL OPERATING INSTRUCTIONS OF THE APEX-LOCATOR

For more accurate apex-locator measurement results, please, follow these rules:

1. Carefully isolate the studied tooth and working file from saliva. We recommend to use cofferdam, cotton swabs, saliva ejectors;
2. Work only in rubber gloves;
3. Use the file, corresponding to the root canal width in the apical area (usually ISO 10-20);
4. Do not use unclean or oxygenized files;
5. Use electroconductive gel for root canals (e.g. RC-Prep, Canal +) *(recommended);*
6. Prevent any contact of an instrument with metals in oral cavity (amalgam restorations, crowns, brackets etc.);
7. Do not touch the working file metallic parts and patient's mucosa with wet hands;
8. Provide wet contact of lip clip electrode with cavity.

Attention!!! *There is a possibility of measurements accuracy fall-off in the following cases:*

1. Root canal with large apical constriction

Root canal that has exceptionally large apical constriction due to a lesion or incomplete development cannot be accurately measured; the measurement results will be less than the actual length.

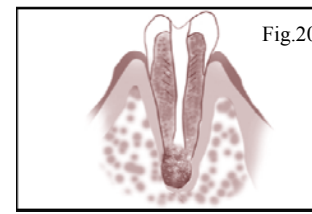
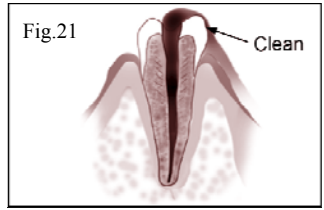


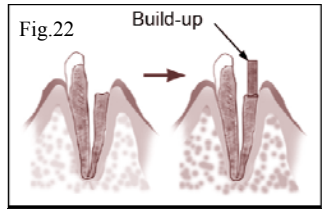
Fig.20

2. Root canal with blood, saliva or a chemical solution overflowing from the opening



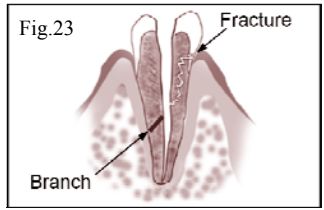
If blood, saliva, or a chemical solution overflows from the opening of the root canal and contacts gums, this will result in electrical leakage and an accurate measurement can not be obtained. Wait for bleeding to stop completely. Clean the inside and opening of the canal thoroughly to get rid of all blood, saliva and chemical solutions and then make a measurement.

3. Broken crown



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

4. Fractured tooth. Leakage through a branch canal



Fractured tooth will cause electrical leakage and an accurate measurement cannot be obtained.

A branch canal will also cause electrical leakage.

5. Retreatment of a root canal, filled with gutta-percha

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

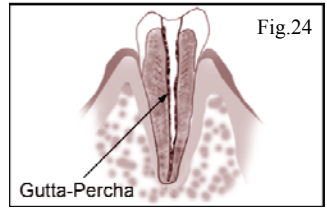


Fig.24

6. Crown or metal prosthesis touching gingival tissue

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

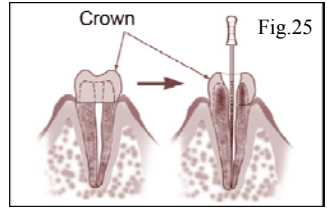


Fig.25

7. Cutting debris on tooth. Pulp inside canal

Thoroughly remove all cutting debris on the tooth. Thoroughly remove all the pulp inside the canal.

Otherwise an accurate measurement cannot be obtained.

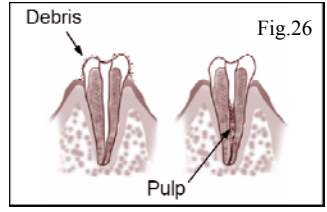


Fig.26

8. Caries contacts with gum

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

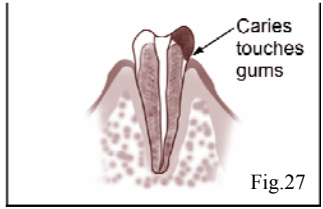


Fig.27

9. Blocked canal

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

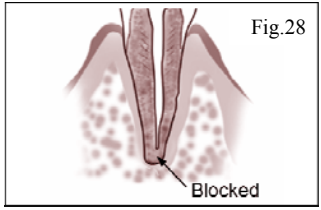


Fig.28

10. Extremely dry canal

If the canal is extremely dry, the meter will not move until it is quite close to the apex. In this case, try to moisten a canal with saline.

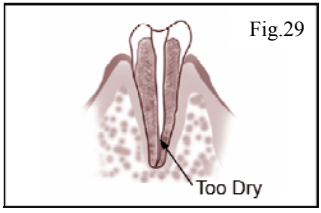


Fig.29

9. CARING FOR THE DEVICE. INFORMATION ON STERILIZATION AND DISINFECTION

9.1. The micro-motor head lubricating

The micro-motor head *(C) (1- Fig.30)* should be lubricated before each sterilization time.

For the lubrication of the head it is recommend to use a standard aerosol can with a lubricant *(3- Fig.30)* and a special rubber adapter *(2 - Fig.30).*

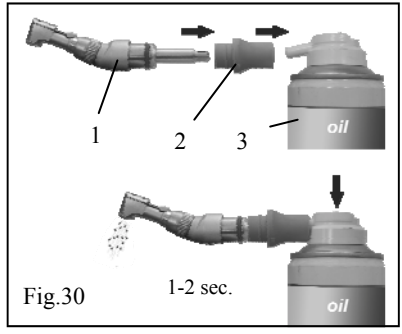


Fig.30

Attach the adapter to an aerosol can and insert the rod of the head to the free hole of the adapter until it stops *(see Fig. 30)*.
The work piece must be lubricated for about 1-2 seconds until the lubricant starts to flow out of the clamping head. During lubrication the head must be hold safely. Before installing the head on the micro-motor all excess lubricant must be carefully removed.

Attention! *Avoid lubricant ingress into the micro-motor exposed parts. Do not lubricate other device components.*

Note: *The adapter for lubrication micro-motor head is not included in the delivery set and is acquired apart at extra cost (see part 3 "Accessories").*

9.2. Pre-sterilization cleaning and sterilization

All the device components, having direct contact with patient's mucosa *(the micro-motor head (C) and the apex-locator lip clip (E)),* are subject to pre-sterilization cleaning and sterilization.

According to the regulatory documents, the pre-sterilization cleaning should be carried out by hand or mechanically, using ultrasound in special wash liquids. The method of mechanical cleaning must correspond to the user's guide, attached to the ultrasound equipment. It is recommended to use ultrasound baths "UltraEst", "UltraEst-FSM" or "UltraEst-M" manufactured by the "Geosoft-Dent".

The belongings sterilization should be carried out directly before the first device use and after every patient to avoid cross infection.

All the belongings pointed should have autoclave sterilization. The vapor pressure in the sterilization chamber is 0,2 MPa at the temperature equal to 135ºC during 20 minutes.

Attention! *Taking into account the conditions above, the sterilizable components can stand not more than 250 sterilizing cycles.*

Other sterilization methods in the regulatory documents are allowed to use.

Attention! *It is expressly prohibited to carry out any thermal treatment (in autoclave, dry-air sterilizer, glass-perlen sterilizers etc.) of any other device components not indicated in this point.*

9.3. Disinfection

All the device components are to be disinfected.

The device disinfection should be carried out before the first use and after every patient to avoid cross infection.

Disinfection must be carried out by chemical method of the device surface wiping with a napkin wetted in the ethanol and wrung according to the corresponding regulatory documents.

Attention!
1. To avoid the disinfectant ingress into the device case it's expressly prohibited to disinfect the control unit case (A) and/or the device stand (B) by dipping it into any solutions.
2. Prevent any disinfectant ingress into the metal sockets.

10. MAINTENANCE

10.1. Battery servicing

- When discharged, charge the battery in due time *(see p. 6.1 and 6.2).* Exclude the battery full discharge.
- Replace the battery in due time in the case of durability yield.

Note: *Replace the battery once in two years period for its optimal operation.*

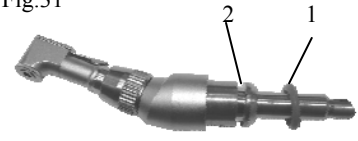
Attention! *It's only specialists of authorized service departments who should replace the battery. Do not open the device to replace the*

battery yourself. It may be unsafe. Besides, in the case of device opening by user, warranty is considered to be invalid.

10.2. Replacing the seal ring on the micro-motor head

When damaged, replace the seal ring on the micro-motor head *(C) (15 -fig,1).*

Fig.31



To replace the seal ring:
- Disconnect the micro-motor head *(C)* from the control unit case *(A);*
- Pull the damaged ring (*1-fig.31*) out of the landing slot (*2-fig.31*) on the micro-motor head rod and take the ring from the rod;
- Take the new ring and place it instead of the old one, acting in reverse sequence;
- Fix the head to the control unit (*see p. 6.6*).

Note: *The replaceable seal ring is not in the delivery set and is acquired apart at extra cost. (see part 3 "Accessories")* .

11.TROUBLESHOOTING

Table 7. General malfunctions

Malfunction	Cause	Action
The device doesn't switch on. *"LB"* displays	• The battery is discharged	• Charge the battery *(see p.6.1)*
The device switches off automatically	• Power saving function activates • The battery is discharged • The program hung. The WDT timer ("watch dog timer") activated	• *See p.6.3* • Charge the battery *(see p.6.1)* • Switch on the device *(see p.6.4)* and continue working.
The battery gets charged very quickly but the device using time until the moment of battery recharging dropped off.	• The battery resources are exhausted. The battery is out of use.	• Address the department service to replace the battery
The battery does not charge	• There is a bad contact between the control unit and stand and/or stand and mains charger • Absence of voltage in the net • The mains charger is broken	• Check the connections • Check if there is voltage in power line • Replace the mains charger or address to the service department

Continuation of Table 7

Malfunction	Cause	Action
Sound problems	• Sound signal volume level doesn't set correctly	• Check the device settings *(see p.6.6.2)*
When working with micro-motor the head turns over a lot	• The silicon seal ring on the micro-motor head is damaged	• Replace the seal ring on the micro-motor head *(see p.10.2)*
Atypical sound in the micro-motor head *(crack, squeal)*	• The micro-motor head is out of service	• Replace the micro-motor head or address the service departments
The apex-locator doesn't operate *(no typical sound signal, «Auto stop-Reverse" function doesn't operate)*	• The apex-locator electrical circuit continuity is broken	• Check the apex-locator electrical circuit continuity *(see p.6.11)* . Correct the malfunction *(see table 8)*
The device does not react at the control unit buttons pressing	The program is hung. The WDT timer was not activated	• Restart the program: - Press "Reset*"(9-fig.1)* button using any thin subject (e.g. a needle). Herewith the device power switches off automatically. - Switch on the device power *(see p.6.4)*

Table 8. Troubleshooting in the case of the apex-locator electrical current continuity break.

№ p.	Action	Sound signal	
		Appeared	**Did not appear**
1	Check correctness and reliability of the apex-locator cable connecting with the control unit and lip clip fixing in cable socket (*see p.6.10*). Check the apex-locator circuit (*see p.6.10*).	OK	See p.2
2	Check correctness and reliability of the micro-motor head fixing in the control unit socket (*see p.6.7*) and the file fixing in the head clutch (*see p.6.8*). Check the apex-locator circuit (*see p.6.11*).	OK	See p.3
3	Check the apex-locator circuit having directly closed the apex-locator lip clip on the current-conducting part of the micro-motor head.	Most probably the working file is dirty or oxidized. Clean or replace the working file.	Most probably the apex-locator cable is damaged. Replace the cable.

If you have not found the necessary information, You may consult the manufacturer on the hotline phone: +7(495)663-22-11 (extension 170), E-mail: hotline @ geosoft.ru or address to the service department

12. STORAGE CONDITIONS, TRANSPORTATION AND USE

• The device should be stored in heated and ventilated locations at temperature from +5°C to +40 °C with relative air humidity of 80% (at +25° C) in the authentic package of the manufacturer.

• The device should be transported by any kinds of covered means of transport at temperature from -50 °C to +50°C with relative air humidity not more than 100% (+25°C) in the authentic package of the manufacturer.

• The device should be used only in heated and ventilated locations at temperature from +10°C to +35 °C with the relative air humidity not more than 80% at atmosphere pressure of (101± 3) kPa.

13. INFORMATION ON UTILIZATION

! Do not throw the device into the system of household rubbish. Utilize the device according to the utilization regulations of the country where it is used .

14. INFORMATION ON CERTIFICATION

CE
0476

EC Quality Assurance System Certificate:
Reg № MED 26039 of 31.05.2018 ("CERMET" (Italy))

15. SYMBOL DESCRIPTIONS

Symbol	Description
	Warning: Address to supporting documentation
	Type of protection against electric-shock hazard. Device of the II class
	Protection level from electrical shock: Applied part BF type
	Continuous current
	Only use the device with the mains charger provided
	Do not throw away the device into system of daily rubbish
SN	The device serial number
	Date of the device manufacturing
	Manufacturer
REV.	The device revision version
IP41	Ingress Protection Rating dust and moisture
	Consult the USER'S GUIDE
EC REP	European authorized representative
	Conformity mark of the device to Russian GOST
CE 0476	Mark of conformity to product quality and safety standards of the European Union (CE-mark)

APPENDIX

Electromagnetic Emissions and Immunity

Table 1

The device "EndoEst Motor-Mini" is intended for use in the electromagnetic environment specified below. The customer ore the user of the device should assure that it is used in such an environment.		
Emission test	**Conformity**	**Electromagnetic environment - guidance**
RF Emissions CISPR11	Group 1	The device "EndoEst Motor-Mini" 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 CISPR11	Class B	It is possible to use the device "EndoEst Motor-Mini" 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 EN 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions EN 61000-3-3	Not applicable	

Table 2

The device "EndoEst Motor-Mini" is intended for use in the electromagnetic environment specified below. The customer ore the user of the device should assure that it is used in such an environment.			
Immunity test	**Test level EN 60601-1-2**	**Compliance Level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) EN 61000-4-2	± 8 kV contact ± 2 kV air ± 4 kV air ± 8 kV air ± 15 kV air	± 8 kV contact ± 2 kV air ± 4 kV air ± 8 kV air ± 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 %.
Burst/Fast Transient EN 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5	±0,5; ±1.0; ±2.0 kV for scheme "line-to-ground » ±0,5; ±1.0 kV for scheme "line-to-line»	±0,5; ±1.0; ±2.0 kV for scheme "line-to-ground » ±0,5; ±1.0 kV for scheme "line-to-line»	Mains power quality should be that of a typical commercial or hospital environment.

Continuation of Table 2

Immunity test	**Test level EN 60601-1-2**	**Compliance Level**	**Electromagnetic environment - guidance**
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	Voltage dips: 0% U_T for 0.5 cycle (at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 0% U_T for 1 cycle 70% U_T for 25/30 cycles (at 0°) Voltage interruptions: 0% U_T for 250/300 cycle	Voltage dips: 0% U_T for 0.5 cycle (at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 0% U_T for 1 cycle 70% U_T for 25/30 cycles (at 0°) Voltage interruptions: 0% U_T for 250/300 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the device "EndoEst Motor-Mini" requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.
Magnetic field of power frequency (50Hz) EN 1000-4-8	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: U_T- level mains voltage prior to filing of the test exposure			

Table 3

The device “EndoEst Motor-Mini” is intended for use in the electromagnetic environment specified below. The customer ore the user of the device should assure that it is used in such an environment.

Immunity test	**Test level EN 60601-1-2**	**Compliance Level**	**Electromagnetic environment - guidance**
RF conducted EN 61000-4-6	3 V from 150 kHz to 80 MHz	3 V from 150 kHz to 80 MHz	Portable and mobile RF communications equipment should be used no closer to any part of the device “EndoEst Motor-Mini” , including cables, than the recommended separation distance calculated from that equation applicable to the frequency of the transmitter. Recommended separation distance: $d = 1,2 \sqrt{P}$ (from 150 kHz to 80 MHz) $d = 1,2 \sqrt{P}$ (from 80 MHz to 800 MHz) $d = 2,3 \sqrt{P}$ (from 800 MHz to 2.7 GHz) where: P - the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d - the recommended separation distance in meters (m)
RF radiated EN 61000-4-3	3 V/m from 80 MHz to 2.7 GHz	3 V/m from 80 MHz to 2.7 GHz	
Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 			

Table 4

Recommended working clearances between portable and mobile RF communication devices and the device "EndoEst Motor-Mini"

The device "EndoEst Motor-Mini" is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the device as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	**Separation distance according to frequency of the transmitter (m)**		
	from 150 kHz to 80 MHz $d = 1,2\sqrt{P}$	**from 80 MHz to 800 MHz** $d = 1,2\sqrt{P}$	**from 800 MHz to 2,7 GHz** $d = 2,3\sqrt{P}$
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

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be determined 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.

Notes: (1) At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. (2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

For notes

DECLARATION OF CONFORMITY

European Community Council Directive
93/42/EEC, 2007/47/EC

CE
0476

JSC "Geosoft-Dent"
5-6a, 2nd Troitsky per., Moscow 129090 Russia

Authorized Representative in European Union
DENTAL WORLD S.R.L.
Via Antichi Pastifici, 15-70056 Molfetta (BA). Italy

Declares that the products listed below comply with the requirements of Medical Device Directive Communities 93/42/EEC on medical equipment (taking into account the Directive amendments 2007/47/EC of the European Parliament) transposed in Italy by Dlgs. n. 46 of 24/2/1997 and by Dlgs. n. 37 of 25/1/2010, Annex II excluded point 3.4

Equipment:	**Endodontic motor**
Model names:	**EndoEst Motor-Mini**
Quality System:	**ISO 13485/2003**
Classification:	**Class IIa**
GMDN code:	**38763**

The compliance with the 93/42/EEC and 2007/47/EC Directive is under the monitoring of the Notified Body: **Kiwa Cermet Italia S.p.A.**
Via Cadriano, 23 – 40057 Cadriano di Granarolo Emilia (BO) – Italy

Signature: _____ Data 2018

Name: Gofshteyn Vladimir A
Position: General Director

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Version 04.06.18

THE GEOSOFT DENT EQUIPMENT

ENDOEST-MOTOR

ENDOEST MOTOR-MINI

ENDOEST-APEX

ENDOEST-3D

ENDOEST

NANOEST

LUMIEST

PULPEST

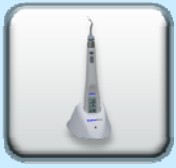
ESTUS LED-ALLADIN

ESTUS LED-ALLADIN MC

OBTUREST

GUTTAFILL

GUTTAEST-V/M



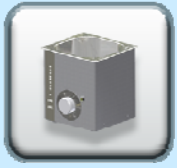
GUTTAEST

TERMOEST

TERMOEST-CERAMIC

ULTRAEST

ULTRAEST-FSM



ULTRAEST-M

FOTEST-LED