

PAL

Precision Apex Locator


OPERATION MANUAL




OM-ER317E

Thank you for purchasing the PAL — Precision Apex Locator.
Please read this operation manual carefully and keep it for future reference.

■ Classifications of Equipment





- Type of protection against electric shock :
 - Internally powered equipment
- Degree of protection against electric shock :
 - Type B applied part 
- Method of sterilization or disinfection recommended by the manufacturer :
 - See 7.(2) Sterilization
- Degree of protection against ingress of water as detailed in the current edition of IEC 60529 :
 - Unit...IPX1 (Protected against vertically falling water drops)
- Degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide :
 - EQUIPMENT not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Mode of operation :
 - Continuous operation


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Cautions for Handling and Operation

- Read these cautions carefully and use only in accordance with operating instructions.
- The following indications are intended to avoid potential hazards that could result in personal injury or damage to the device. These indications are classified by degree of danger, damage, and seriousness. All indications concern safety and should be followed at all times.

| Class | Degree of Risk |
|--|--|
|  DANGER | Explains an instruction where death or serious injury may occur. |
|  WARNING | A hazard that could result in bodily injury or damage to the device if the safety instructions are not followed. |
|  CAUTION | A hazard that could result in light or moderate bodily injury or damage to the device if the safety instructions are not followed. |
|  NOTICE | General information needed to operate the device safely. |

|  DANGER |
|--|
| <ul style="list-style-type: none">• This product is powered by batteries. Only use the appropriate batteries as designated in this manual.• Be sure to replace four batteries of the same type from the same manufacturer at the same time for use. Fluid leakage or rupture may occur by mixing and using different types of batteries or use of mixed old and new batteries or consumed and fully charged batteries.• This unit utilizes manganese dry batteries and alkali dry batteries, which cannot be re-charged. Do not attempt to charge these batteries. Attempts to re-charge these batteries could result in rupture of fluid leakage.• Do not disassemble or alter the device. |

WARNING

- This product is not waterproof. Do not spill water or a chemical solution onto or into the unit. Water or solution could result in fire or electric shock due to a short-circuit or rusting.
- If you should notice battery fluid leakage within the unit, deformation of the unit casing or partial discoloring, immediately stop use and contact Brasseler USA.
- Should battery fluid get into your eyes, immediately wash eyes thoroughly with clean water and see your doctor. Failure to do so may result in loss of sight.
- Should the battery fluid leak and adhere to skin or clothing, immediately wash the exposed skin thoroughly with clean water until fluid is completely washed away. Failure to do so may result in skin complications.
- If you do not intend to use the product for a prolonged period of time, remove the batteries from the unit to avoid fluid leakage.

CAUTION

- Exercise sufficient care in using the product by giving patient safety first priority.
- The product is to be used only for dental treatment by qualified personnel.
- Buy commercially available batteries designated in this Manual. Thoroughly read each battery manufacturer's manual before using the respective batteries.
- Do not use or leave the product in a high-temperature environment such as under direct sunlight, enclosed in a car, near a fire, or near a stove.
- Check the product before use by rotating it, paying attention to looseness, vibration, noise and temperature (heat generation). If any abnormal condition is found, immediately stop use and contact Brasseler USA.

- Do not drop the unit or allow other significant impacts to the unit.
- Pay attention to the direction of batteries when setting. Forcible setting in the wrong direction may cause damage and fluid leakage due to a short circuit.
- Do not allow conductive materials such as wires, safety pins, etc., to enter into the battery case.
- If chemical, solvent or antiseptic solution is deposited on this product, immediately wipe it away. Otherwise, discoloration or deformation may occur.
- The system functions normally in an environment where the temperature is 0-40°C (32-104°), humidity is 10-85% RH, atmospheric pressure at 500-1060hPa, and where the Control Unit is not exposed to moisture or condensation. Malfunction may occur if used outside of these levels.

NOTICE

- The unit consumes electricity very slightly even when the power supply is off. If you do not intend to use the product for a prolonged period of time, remove the batteries from the unit.
- If batteries are consumed to the extent this product cannot operate, replace with new batteries as soon as possible. If spent batteries are kept in this product, fluid leakage may occur. In particular, pay attention to the manganese dry batteries from which fluid is more easily leaked due to its structure as it gets older.
- When disposing of the unit, follow the instructions of your local government for disposal, as they contain materials which may be considered industrial waste.
- When the power is on, do not leave the measuring terminals short-circuited. The auto power off function will not work while recognizing that it is measuring, and the batteries will continue to be consumed.

- This product has been designed on the assumption that manganese dry batteries or alkali dry batteries are used. Chargeable batteries such as nickel-cadmium batteries and nickel metal hydride batteries of the same shape can also be used, but are, however, limited by the following.
 - This product does not have charging function.
 - Even if nickel-cadmium batteries and nickel metal hydride batteries are fully charged, they have lower voltage than manganese batteries or alkali dry batteries; therefore, the battery level indicator may display slightly less than full charge. This is due to a difference in battery voltage, and is not a product failure.
- Users are responsible for operational control, maintenance and inspection.
- Store the system in a place where the temperature is at -10 - 60°C (14 - 140°), humidity at 10 - 85% RH, atmospheric pressure at 500 - 1060 hPa, and the system is not subject to dust, sulfur, or salinity.
- When trouble is found, contact Brasseler USA for assistance.

1. Features

- Lightweight and compact device.
- New manganese dry batteries can operate continuously for approximately 40 hours. (This depends on the operating conditions such as battery manufacturer and temperature)
- This unit includes a large and user-friendly LCD panel.
- Energy Saving - The power of the unit automatically turns off when not used for 10 minutes. (Auto power-off function)
- Four AAA batteries (1.2V) are included. Re-chargeable batteries (nickel-cadmium batteries, nickel metal hydride batteries) can be also used.

2. Specifications

<Unit>

| | |
|-----------------|--|
| Type | NE181 |
| Power Source | DC6V |
| Operating Hours | About 40 hours (when using manganese dry batteries) |
| Dimensions | W80mm x D80mm x H95mm |
| Weight | 185g |

3. Component Names



Fig. 1

- | | |
|--------------------------|--------------------------|
| 1. Control Unit | 5. Lip Hook3 pcs. |
| 2. Probe | 6. Tester |
| 3. File Clip3 pcs. | 7. Batteries2 pack |
| 4. Extension Cord | (2 batteries in 1 pack) |

*Key and LCD Panel

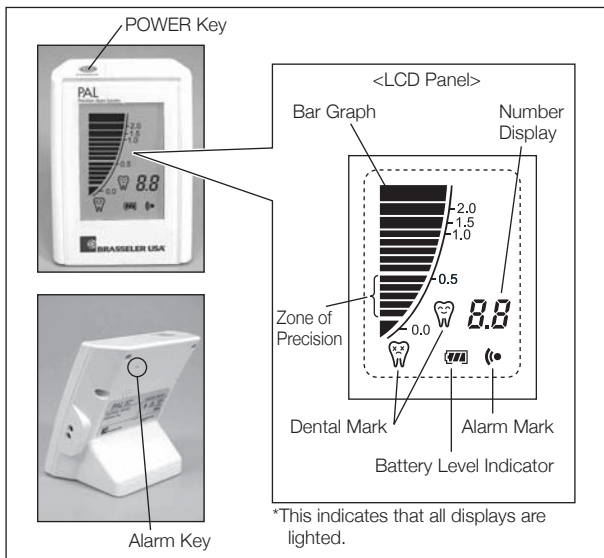


Fig. 2

*POWER Key

- When the POWER key is pressed for approximately one second or longer, the alarm sounds, the power is turned ON, and the liquid crystal display lights up.
- When the system is ON and the POWER key is pressed for about one second or longer, the alarm sounds, the power is turned OFF, and then the liquid crystal display lights off.

*Bar Graph

LCD



Displays the present position of the top of the file.

*Zone of Precision

LCD



Displays the position of the file tip from .5 mm to .0 mm away from the apical constriction.

*Number Display

LCD



Displays the present position of the top of the file by number.

*Dental Mark

LCD



This display indicates that the file is at a depth within the "Zone of Precision" (.5 mm to .0 mm from the apical constriction).



This display flashes as a warning that the file has reached a canal depth past the apical constriction.

*Alarm Key

- The alarm sound volume can be adjusted. (See 6. Alarm Sound Volume Control)

LCD

The present alarm mark is displayed.



High volume



Medium volume



Low volume

• Battery Level Indicator

LCD

Displays the approximate amount of battery life remaining.



Full charge or nearly full charge.



About 30-80% remains.



Less than 30% remains.



(Slowly flashing)
Extremely low voltage. Replace with new batteries.

Notice

The battery remaining mark indicates approximate available battery voltage. When using rechargeable type batteries such as nickel-cadmium batteries and nickel metal hydride batteries, these have lower voltage than manganese dry batteries and alkali dry batteries even when fully charged. Therefore, the battery level indicator may display slightly less than full charge. This is due to a difference in battery voltage and is not a failure of the product or batteries. Low battery voltage can affect the accuracy of an apex locator.

4. Installation and Assembly

(1) Installing Batteries

- 1) Remove the batteries after sliding the battery cover on the back of the unit in the direction of the arrow.
(Fig. 3)



Fig. 3

- 2) Install the new batteries according to the polarity indication (positive (+), negative (-)) in the battery box. (Fig. 4)



Fig. 4

Caution

- Do not reverse positive (+) and negative (-).
- If you encounter resistance when inserting batteries, check the battery direction. Do not apply excessive force when inserting batteries.

- 3) Close the battery cover.

(2) Probe Connection

Insert the probe into the probe connector at the side of the unit. (Fig.5)



Fig. 5

(3) File Clip Connection

Connect the plug of the file clip to the plug of either probe. (Fig. 6)

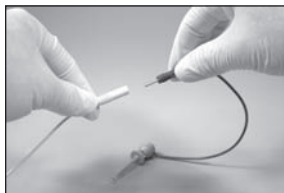


Fig. 6

(4) Lip Hook Connection

Connect the lip hook to the plug of the other probe. (Fig. 7)

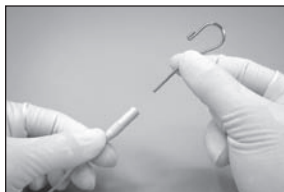


Fig. 7

(5) Extension Cord Connection

Use this for extension between the file clip or lip hook and probe if necessary. (Fig. 8)

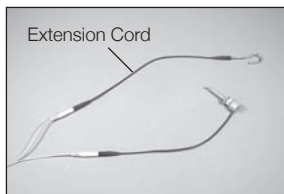


Fig. 8

5. Operating Procedures

(1) Inspection before use

Be sure to carry out an operation check with a tester before use to confirm that it operates properly.

- 1) Press the power key for about one second or longer to turn ON power. (Liquid crystal display lights up)
- 2) Pinch either one of the electrodes on the tester with a file clip. (Fig. 9)



Fig. 9

- 3) Expose a lip hook to the other electrode on the tester. (Fig. 10)



Fig. 10

- 4) Check that the number display on the liquid crystal display reaches within "0.2 to 0.9."
- 5) Remove the tester when measurement has ended.

! Caution

- Prevent the tester and file clip from being moistened or prevent the electrode on the tester from touching skin. Otherwise, correct measurement cannot be made.
- If the number display is still out of "0.2 to 0.9" or not properly displayed, check the following.

- Check whether the probe, file clip, and extension cord are securely connected.
- If there is no problem with connection of the respective cords, disconnect all of the respective cords and directly insert the electrode on the tester into the probe connector. (Fig.11)



Fig. 11

- If the number displayed is within "0.2 to 0.9" at this time, a cord (s) may be broken. Contact Brasseler USA.
- If the number display is out of "0.2 to 0.9" or not properly displayed at this time, there may be an abnormality in the main body. Contact Brasseler USA.

(2) Use

- 1) Hang the lip hook on the corner of the patient's mouth. (Fig. 12)
- 2) Press the power key for about one second or longer to turn ON power. (Liquid crystal display lights up)
- 3) Pinch the metallic shaft of the file inside the root canal with a file clip. (Fig. 13)
- 4) Carry out root canal end-measurement.

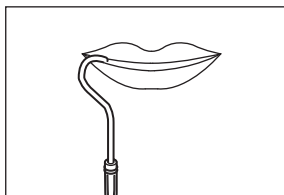


Fig. 12

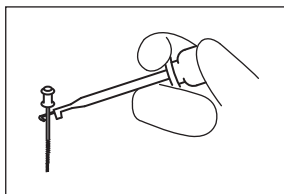


Fig. 13

Caution

Set the target value of the bar graph to 0.5.

- 5) When work is completed, press the power key for about one second or longer to turn OFF the power. (Liquid crystal display lights off)

Notice

After approximately 10 minutes of not being used, the apex locator (display shows “● ●”), the system will automatically Power OFF. (Auto-Power OFF function)

- 6) Remove the probes etc.

Caution

When removing the probe, be sure to only grab the connector; do not pull the cord alone.

6. Alarm Sound Volume Control

The alarm sound volume can be controlled at three levels: “High Volume,” “Medium Volume,” and “Low Volume.”

- 1) Lightly push the alarm key with the thin bar. (Fig. 14)
- 2) The alarm mark on the LCD panel changes, and the alarm volume changes.
- 3) The alarm volume is adjusted each time the alarm key is pressed.



Fig. 14

Caution

- Do not push the alarm key with excessive force.
- Avoid using a hard bar such as metal for the thin bar. Otherwise, the alarm key may be damaged.
- Do not insert the thin bar into the speaker by mistakenly confusing it with the alarm key. Otherwise, the speaker may be damaged.



Notice

The sound level is retained, even if the power is turned off.

7. Cleaning / Sterilization

(1) Cleaning

If debris sticks on the unit, probe, file clip, lip hook, or extension cord then, soak a clean cloth in water and squeeze cloth tightly to drain water. Use the cloth to wipe away dirt. After that, wipe off with an alcohol soaked clean cloth.

Caution

To clean the product, do not use any solvent such as benzine or thinner.

(2) Sterilization

- Autoclave sterilization is recommended.
- Autoclave sterilization required after each patient as noted below.
- Items to be autoclaved: file clip, lip hook, extension cord

Caution

Do not autoclave any parts (the unit, and probe) other than those that can be subjected to autoclave sterilization.


■ Autoclave Procedure

- 1) Wipe away debris on the surface of the file clip and lip clip with a clean, damp cloth followed by wiping with disinfecting alcohol. (Refer to 7.(1) Cleaning)
- 2) Insert into an autoclave pouch. Seal the pouch.
- 3) Autoclavable up to a max. 135°C (275°F).
Ex) Autoclave for 20 min. at 121°C (250°F) or 15 min. at 132°C (270°F).

Caution

- If the sterilizer has a drying process that exceeds 135°C, the drying process should be bypassed for these items.
- Place instruments in the middle or top shelves of the autoclave.
- Autoclaving with other instruments stained with chemical solution can result in discoloration.
- File clip, lip hook and extension cord are consumables. When they are discolored by repeated autoclave sterilization, they can be replaced.

8. Changing Batteries

- If the battery level indicator flashes slowly, immediately replace with new batteries.
- When replacing the batteries, be sure to observe the “ Caution on Changing Batteries” below. Note that Brasseler USA shall not be held liable for any malfunction or failure resulting from misuse or not following recommended procedures.

Caution on Changing Batteries

- Be sure to turn OFF the power when changing batteries.
- Do not open any part other than the battery cover.
- Use only batteries designated by Brasseler USA.

If recommended batteries are not used, breakage, fluid leakage or rupture could occur.

Designated batteries: AAA cell Manganese dry batteries, Alkali dry batteries 1.5V Nickel cadmium batteries, Nickel metal hydride batteries 1.2V

- * Use reliable manufacture batteries.
- Be sure to replace all four batteries simultaneously and with batteries that are of the same type from the same manufacturer. Fluid leakage or rupture may occur by mixing and using different types of batteries or use of mixed old and new batteries or spent and fully charged batteries.
- Do not work with wet hands. This may cause trouble due to short-circuiting of batteries and moisture infiltrating this product.

■ Changing Batteries

- 1) Turn OFF the power.
- 2) Remove the batteries after sliding the battery cover on the back of the unit in the direction of the arrow.
(Fig. 15)
- 3) Remove old batteries.
- 4) Set new batteries according to the polarity indication (positive (+), negative (-)) in the battery box. (Fig. 16)



Fig. 15



Fig. 16

! Caution

- Do not reverse positive (+) and negative (-).
- If you encounter resistance, be sure that the batteries are being placed in the proper direction. Do not use excessive force when inserting the batteries.

- 5) Close the battery cover.

! Caution

The used nickel-cadmium batteries, nickel metal hydride batteries are recyclable, but their disposal may be regulated by the country within which they are being used.

9. Troubleshooting

If a problem occurs, check the following items. If none of these are applicable or the problem is not remedied after recommended action has been taken, contact Brasseler USA for assistance.

| Problem | Cause | Solution |
|---|--|---|
| The power will not turn ON. | No batteries are inserted. | Insert batteries. |
| | Are batteries inserted according to the polarity indication (positive (+), negative (-)) in the battery box? | Set batteries according to the polarity indication (positive (+), negative (-)) in the battery box. |
| | Are the batteries spent/fully consumed? | Replace with new batteries. |
| When the power is turned ON, the system immediately turns back OFF. | Is the battery level indicator flashing slowly? | Replace with new batteries. |
| Bar graph is not displayed. | Is the probe connected? | Connect the probe. |
| Number display becomes “- -” during operation. | Are the probe, file clip and extension cord connected? | Connect probe, file clip and extension cord. |

| | | |
|--|--|---|
| Number display becomes "E0." | Internal abnormality. | Insert the batteries, or re-turn ON the power. If it is still displayed, contact Brasseler USA. |
| When measured with a tester, the number display on the LCD is out of "0.2 to 0.9" or not properly displayed. | Are the probe, file clip and extension cord connected? | Connect the probe, file clip and extension cord. |
| | Are the probe, file clip and extension cord broken? | Disconnect all of the respective cords and directly insert the electrodes on the tester into the probe connector. If the number display is displayed to reach within "0.2 to 0.9" at this time, a cord(s) may be broken. Contact Brasseler USA. |
| | Abnormality in main body. | Disconnect all of the respective cords and directly insert the electrodes on the tester into the probe connector. If the number display is out of "0.2 to 0.9" or not properly displayed at this time, there may be an abnormality in the main body. Contact Brasseler USA. |

10. Warranty

Brasseler USA warrants the handpiece against defects in manufacturing workmanship and materials. Brasseler USA reserves the right to analyze and determine the cause of any problem. Warranty is voided should the handpiece not be used in accordance with this manual.

11. Disposing Product

- Please consult with Brasseler USA regarding disposal requirements.
- Spent or fully consumed nickel-cadmium batteries and nickel metal hydride batteries are recyclable, but their disposal may be regulated by the country within which it is used.

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