Multi Function Ultrasonic Scaler

Varios 970

Varios 970

iPiezo engine

OPERATION MANUAL

Please read this Operation Manual carefully
before use, and file for future reference.

Powerful Partners®

OM-E0464E 001

MADE IN JAPAN CE 0197

◆ Classifications of equipment
- Type of protection against electric shock:
  – Class I equipment
- Degree of protection against electric shock:
  – Type BF applied part: ⍓
- Method of sterilization or disinfection recommended by the manufacture:
  – See 12. Sterilization
- Degree of protection against ingress of water as detailed in the current edition of IEC 60529:
  – Foot Switch: 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

Intended to Use

This product is designed only for dental clinic /dental office use. This device generates ultrasonic waves intended for use in dental applications such as scaling, root canal treatment, periodontal and cavity preparation.

1. ⚠ Cautions for handling and operation

■ Read these cautions carefully and use only as intended or instructed.
■ Safety instructions are intended to avoid potential hazards that could result in personal injury or damage to the device. Safety instructions are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
⚠ 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.

⚠ WARNING

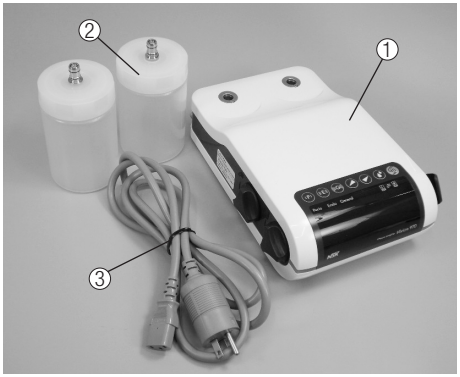
- TO PREVENT ELECTRIC SHOCK Do not unplug the power cord with wet hands.
- TO PREVENT ELECTRIC SHOCK Be sure to prevent water on the Control Unit.
- TO PREVENT ELECTRIC SHOCK Do not touch the handpiece backend electrical connections.
- TO PREVENT ELECTRIC SHOCK Use an electrical outlet that is grounded.
- If you feel any abnormality such as vibration, heat generation, abnormal noise, etc., prior or during the use of the unit, stop using it immediately.
- Do not turn the Power Switch without reason; it might blow out a fuse.
- This product is Medical Electrical equipment Electromagetic compatable (EMC).As described in the accompanying documentation.
- Portable and mobile RF communications equipment can affect Electrical Medical equipment. Do not use RF equipment in close proximity to the product.
- When installing the product, provide space of approximately 10cm around the Control Unit for easy access to the inlet and the Power Cord.

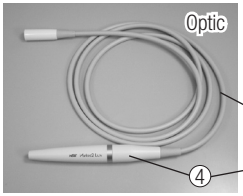
- USE ONLY NSK genuine tips when using NSK Varios Ultrasonic Scaler (Varios 970 or Varios 970 LUX) problems such as damage, failure and accident of Handpieces resulting from use of Non-NSK Tips are not included in the warranty. The following are the possible failure that could happen when using the Non-NSK Tips;
  - · Vibration failure caused by using non conforming screws.
  - · Patients accidental ingestion of broken tips.
  - · Damage of thread ridge of handpiece.
  - · You must use the tip within the power range described on the Tip-Power Guide. If you use it out of the power range, the tip might break or damage an operative site.
- When operating the product always consider the safety of the patient.
- Use by medical professional, such as doctor or dental hygienist, is intended.
- Check the vibration outside the patient's oral cavity before use. If any abnormalities are found, stop using immediately and contact your dealer.
- Do not drop or exsert an excessive shock to the Control Unit/Handpiece.
- To prevent possible tooth plane damage and handpiece overheating, Always use with sufficient water.
- Do not sterilize by ultraviolet light. Handpiece could discolor.
- Sterilize the Tip, Handpiece, and Tip Wrench by autoclaving. Wipe the Control Unit, AC Power Cord, Foot Switch, and Handpiece Cord including the cover.
- If chemical, solvent or antiseptic solution is deposited on this product, immediately wipe it away. Discoloration or deformation may occur if left.
- Do not disassemble or alter the handpiece/Control Unit.
- Keep away from patients with cardiac pacemakers.
- Keep away from explosive substances and flammable materials. Do not use for patients anesthetized under laughter gas. (Nitrus Oxide)
- Use the Fuse of specified rating. (120V: T630mAL 250V, 230V: T315mAL 250V)
- This product needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information.
- The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of this product as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of this product.
- This product should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, this product should be observed to verify normal operation in the configuration in which it will be used.
- If any water drops remain on the handpiece or handpiece cord after autoclaving, wipe them off., Staining may result if left.
- There is the judgment that applies this product to a patient in the user side.

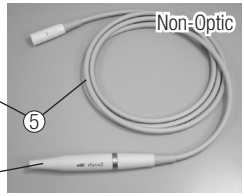
⚠ CAUTION

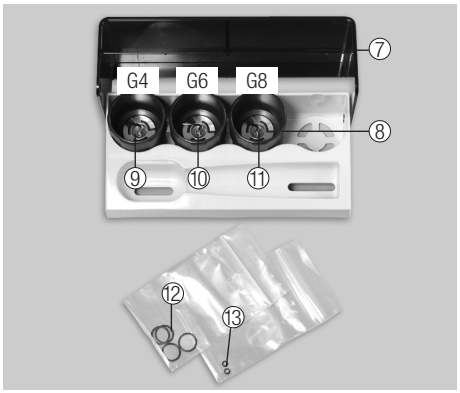
- During operation, high frequency oscillations in the handpiece and handpiece cord may affect computer and LAN Noise may be heard during operation near a radio receiver.
- Be sure to turn off the Power Switch after use. Remove the power plug and water inside of the Control Unit before storage.
- Users are responsible for operational control, maintenance and inspection.
- Clean/sterilize the product immediately after using it. Then store it. Leaving it non-sterile might lead to failure.
- When you have not used the product for long time and use it again, check the operation before use.
- Eye damage may result if the LED is stared directly into, Do not look into or turn it to the eyes of the patient.
- This product does not consider patient's age (except infants), gender, weight or nationality.
- No special training is required for this device.

2. Component Names

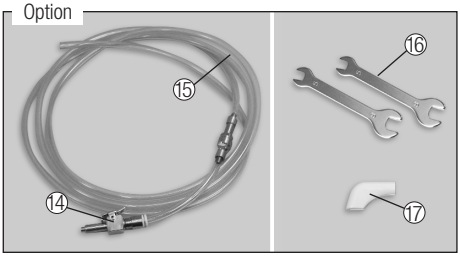








Option



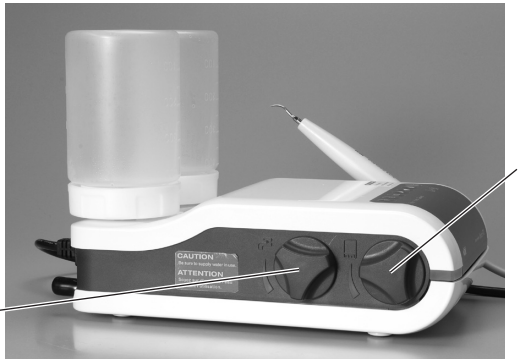
No.	Parts Name	Quantity
1	Control Unit	1
2	VA Bottle	2
3	AC Power Cord	1
4	Varios2 Handpiece (Optic or Non-Optic)	1
5	Handpiece Cord (Optic or Non-Optic)	1
6	Foot Switch	1
7	Sterilization Case	1
8	Tip Wrench	3
9	Tip G4	1
10	Tip G6	1
11	Tip G8	1
12	O-Ring (For VA Bottle)	4
13	O-Ring (For Handpiece Cord)	2
14	Water Connector (Option)	1
15	Water Tube (Option)	1
16	Spanner Wrench (5x8) (Option)	2
17	Tip Cover S (Option)	1
18	Tip-Power Guide	1*
19	Tip Card	1*
20	Tip Book	1*
21	Operation Manual	1*

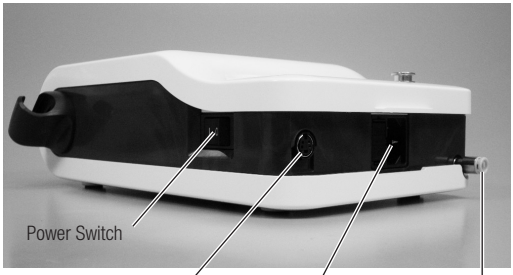
* These are not on photo above.

*** Operation Principle**

A sinusoidal electrical signal, at ultrasonic frequency (f > 20Khz), is delivered by the generator. This signal is applied to the 'piezoelectric ceramic' located inside the transducer. Piezoelectric ceramic converts this signal into mechanical vibrations. These vibrations are at the same ultrasonic frequency as the electrical signal. The mechanical vibrations are propagated towards the distal end of the transducer. The "TIP" insert, which is attached at the distal end of the transducer, vibrates at ultrasonic frequencies and makes it possible to achieve the aimed purpose.

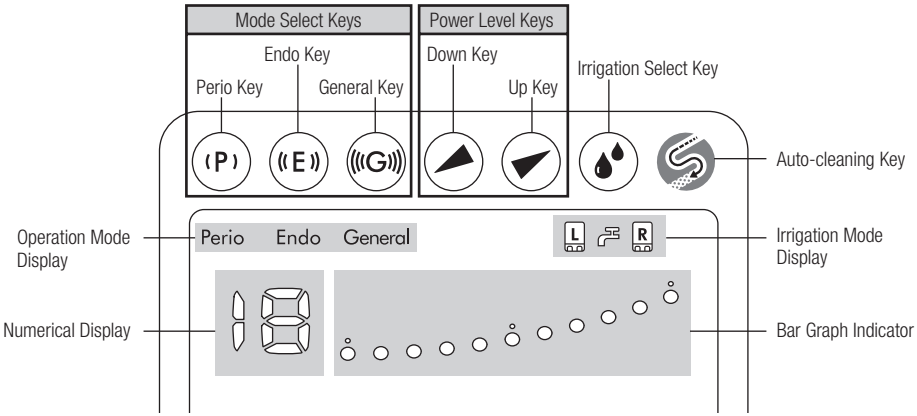
3. Name and Function of each part





<Bottom>

◆ Operation Panel and Display



✻ If you purchase the Optional products such as Water Tube and Water Connector you can use Tap Water.

Mode Select Keys

You can select Operation Mode to pressing this key. (Perio, Endo and General) The Control Unit can resume power level, water volume and irrigation mode for each Operation Mode.

Power Level Keys

Press key to select Power o/p Level . There are 11 levels (0 to 10). There is no output vibration at level 0 (zero). (Fig.1). The Bar Graph Indicator and Numerical Display will change simultaneously.

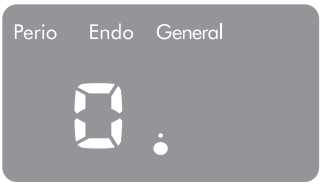


Fig.1

Irrigation Select Key

Press key to select 'R' or 'L' Bottle. Front panel display and Bottle Selection Indicator simultaneously change in position. Pressing the Irrigation Select Key for more than one second will select Tap Water Mode.

Auto-Cleaning Key

Press key to select Auto Cleaning Mode, For detail refer to 11. (4).

Bottle Water Adjustment Knob

Water Volume Adjustment can be made prior to the tip vibrating you can adjust the Water Volume during Bottle Irrigation or during a wait before Tip vibration start. If the setting is not applicable (too low or too high) for the Control Unit, it may beep. During the operation, Front Panel displays the current Power Level. However, keep turning the knob more than a second; it may change the Water Volume.

⚠ CAUTION

- Do not turn the knob fast. It may not sense the movement if it turn fast.
- Water Volume can set during 5ml/min to 45ml/min.
- Operation sound may different between Right and Left Bottle.
- During adjustment of water volume, Numerical Display indicate "–".

Tap Water Adjustment Knob

You can adjust Tap Water Adjustment Knob by this Knob. (Even the tip vibration).

4. Prior to Operating System

(1) Water System Setup

• Use of Bottle

1) Remove the Dust Cover from the Bottle Base Connector. (Fig. 2)
2) Remove the cap of the VA Bottle and fill solution to the desired level.
3) Close the cap of VA Bottle, check the Air Hole is clean and insert the Bottle Joint into the Bottle Base Connector until it clicks. (Fig. 3)

   To remove the Bottle, pull it up.

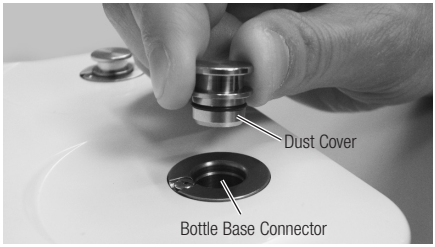


Fig.2

⚠ CAUTION

- Make sure the Bottle Joint and surrounding area is completely clean before installing the Bottle. Wipe the Bottle and Bottle Base Connector Area.
- Insert the Bottle straight. (Damage to seals may result).

⚠ NOTICE

- The Bottle calibrations are printed on both sides of the Bottle and can be read accurately from the fill position or mounted on the Control Unit.
- Mount the Dust Cover when not in use.

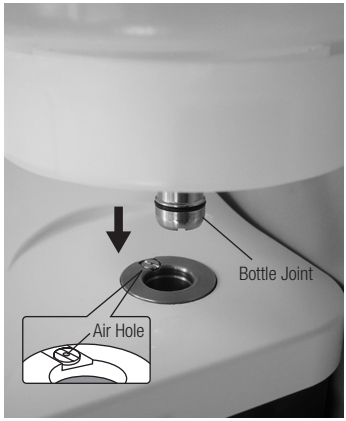


Fig.3

• Use of Tap Water (Option)

1) Remove the Cover from the Tap Water Connector. (Fig. 4)
2) Connect the filter side of the Water Tube deep into the Control Unit Tap Water Connector (Fig. 5).
3) Connect the water tube to the water outlet on the Dental Unit.

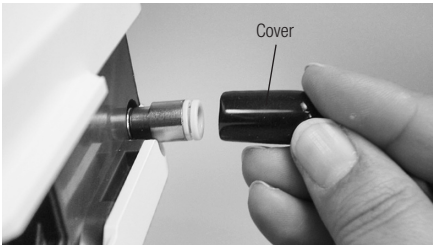


Fig.4

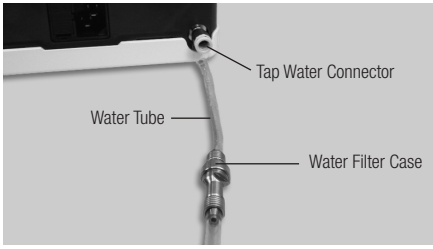


Fig.5

⚠ CAUTION

Ensure the water from the dental unit runs clear before connecting to the scalar.

⚠ NOTICE

- Insert the Water Tube firmly into Control Unit.
- Pushing the White Ring, (the Quick Connector Release Ring) on the Tap Water Connector, gently pull the tube to remove. (Fig. 6)
- When the water tube is not connected, mount the cover on the Tap Water Connector.

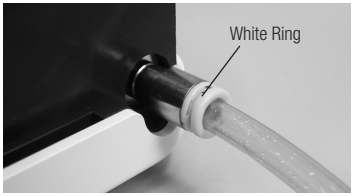


Fig.6

(2) Foot Switch Connection

Connect Foot Switch Plug and the Control Unit with [▲] mark on the upper surface of the plug. (Fig.7)

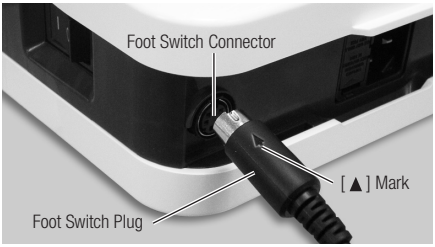


Fig.7

(3) Handpiece Cord Connection

Insert Handpiece Cord Plug into Control Unit. [▲] Mark side is upper surface. Do not insert it up-side-down. (Fig.8)

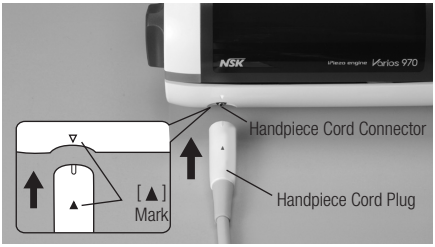


Fig.8

⚠ CAUTION

Check that the Handpiece Cord Plug is clean & dry before connecting. (Fig.9)

Fig.9

(4) Mounting Power Cord

Insert the Power Cord into the AC Power Cord Connection Jack at the back of the Control Unit. (Fig. 10)

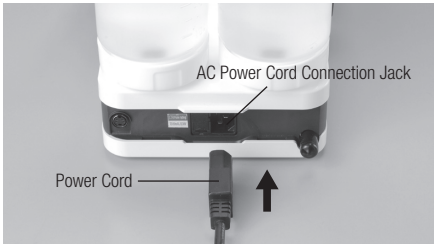


Fig.10

⚠ CAUTION

- Ensure Power is OFF on the Control Unit during the Power Cord Connection. It may cause Fuse to blow.
- Do not connect the cord in wall outlet before connecting AC Power Cord.
- Do not pull the AC Power Cord forcibly.
- Do not unplug the Power Cord or handpiece cord while pressing on the Foot Switch.

5. Mounting and Removing the Handpiece

Align the Dots on the Handpiece and the Handpiece Cord. Push handpiece into connector.

To remove the handpiece, grip the Handpiece and Handpiece Cord and pull to part handpiece and cord. (Fig. 11)

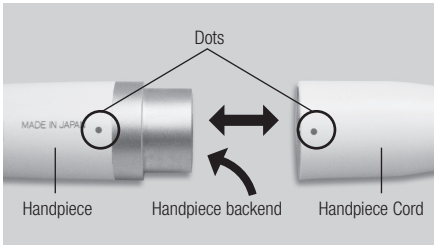


Fig.11

⚠ WARNING

To avoid Electrical Shock Do not touch the handpiece backend electrical contacts.

⚠ CAUTION

- Always confirm that the handpiece is correctly seated and locked into place.
- Do not connect or use Handpiece other than included one (Varios2 handpiece).

6. Mounting and Removing Tip

1) The Tip was installed to a Tip Wrench. Put Tip Wrench bottom and handpiece tip together.
2) Turn it clockwise until the Wrench clicks. (Fig. 13) Do not turn the handpiece cord.

✻ Attention for the top of Tip (Some of those are longer than Tip Wrench length.), it may cause injury.

To remove the Tip, turn counterclockwise with the Tip Wrench.

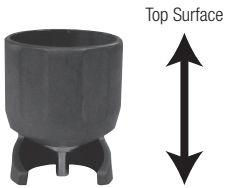
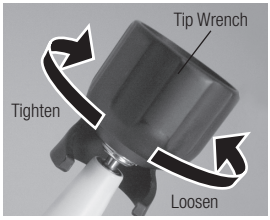


Fig.12



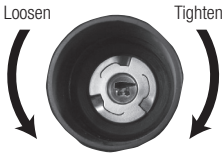


Fig.13

⚠ Caution for Tip Usage

- Check the Tip before use. (Flush, Damage, Bending or Rust)
- Do not exceed Maximum Power Level for Tip. Damage to tooth structure and Tip may result.
- Do not hit ceramic prosthesis with Tip during scaling. Tip Damage may result.
- Do not hit metal or prosthetic crown except for removing them. Tip could break and fall into mouth.
- Do not hit gingival, mucosa and/or skin. It could cause damage and/or burn injury.
- Do not sharpen and/or bend the Tip. Tip may damage and not generate enough vibration during scaling.
- During cutting, Tip will gradually wear away, as the Tip wears the stroke will get smaller and decrease cutting efficiancy When level drops too far, change the Tip.(tip card check)
- DO ENSURE When securing tip to use the tip wrench as supplied, inefficient cutting will result.
- DO ENSURE before attaching Tip, Cleanliness of the tip screw, inefficient cutting will result.
- To avid personal injury DO ENSURE tip is removed prior to disconnecting the handpiece or the handpiece cord.
- If you feel the Tip is not vibrating, remove it from an operative site, and press the Foot Switch again. If this does not improve the condition, Ensure the tip is secure, turn the power off and restart it.
- When mounting the Tip, always use groves and Tip Wrench as supplied.
- Ensure that water volume must be “0”, when you use Tip which does not appear of water.
- Tip Wrench is consumable For reliable operation replace annually.

7. Operating Procedures

(1) Water System Setup

• Use of Bottle

1) Check that the VA Bottle is filled to the proper level.
2) Make sure that the cap of the Bottle is secure and not leaking.

⚠ CAUTION

- DO ENSURE liquid temperature is below 35°C.
- Do not put liquid such as high acid water in the Bottle.

• Use of Tap Water

1) Ensure water tube is firmly connected.
2) Open the dental unit's water valve. (Set water pressure between 0.1-0.5MPa (1-5 kgf/cm^2)).

(2) Power On

Connect the AC Power Cord to the wall outlet. Turn the Power Switch on the Control Unit. Front Display will illuminate.

Fig.14

(3) Power Level Setting

DO ENSURE Power setting does not exceed the recommended Power Level (Tip-Power Guide included in the package.)

1) Select the Operating Mode with the Mode Select Keys on the Front Panel. The Indicator light over the selected mode will illuminate. (Fig. 15)

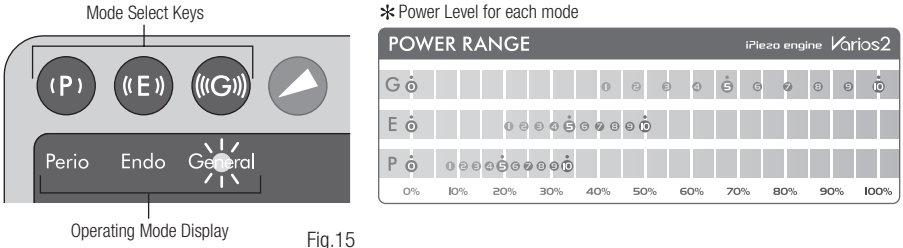


Fig.15

2) Set the power level with the Power Level Key on the Front Panel. The Bar Graph Indicator and Numerical Display will indicate the selected power level. (Fig. 16) Make sure the power level is set in the appropriate range for the attached Tip.

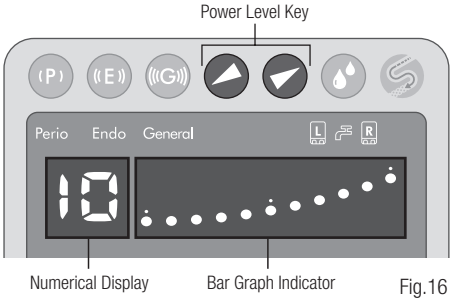


Fig.16

⚠ NOTICE

- Press & Hold the Power Level Key will increase or decrease the Power Level.
- If the Power Level is 0 (zero) and set the water volume, Tip will not oscillate but water comes out from the handpiece.

(4) Irrigation setting

Select the Irrigation Mode (L Bottle, R Bottle or Tap Water) with the Irrigation Select Key on the Front Panel. (Fig. 17)

Press & Hold the Irrigation Select Key to select Tap Water Mode.

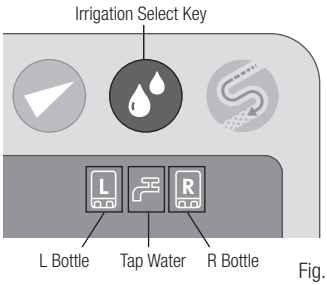


Fig.17

(5) Operate Varios 970 / 970 LUX

Tip vibration will begin when the Foot Switch is depressed. (For Varios 970 LUX, Handpiece LED will illuminate.)

• Water Supply Volume Adjustment

Turn the Water Adjustment Knob counterclockwise gradually to increase the supply volume. (Fig. 18) For detail, refer to P5 Bottle Water Adjustment Knob or P6 Tap Water Adjustment Knob.

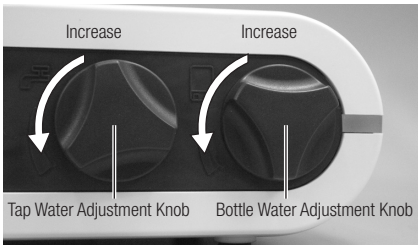
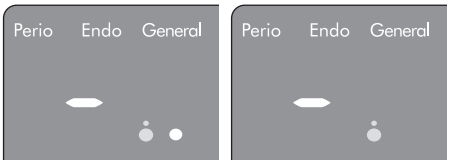


Fig.18

⚠ CAUTION

- While pressing the Foot Switch and switching the power 'ON'. The Control Unit will display "F" and sound a beep, for your safety the Control Unit will not operate. Remove your foot from Foot Switch to cancel and reset.
- Bar Graph Display (Fig.19)
  Minimum Irrigation -> One white and blue LED.
  No Irrigation -> Blue LED only
- Always use the water supply. If water supply is insufficient, handpiece will overheat and patient's tooth surface can be injured.
- Verify that the water spray is clean and of adequate volume before use.



Minimum irrigation No Irrigation

Fig.19

- If irrigation volume set low, sometimes irrigation water is difficult to come out from the Tip. When it happened, set volume again after setting up high volume.
- During Water Adjustment Knob operation;
  Numerical Display: Display "-"
  Bar Graph: Display current volume of water

(6) After the treatment

Release the Foot Switch and Power off the Control Unit.

• Use of Bottle

Thoroughly wash the Bottle (s) Water Supply system. Refer to page 11. (4) Auto Cleaning (Cleaning of Irrigation Tube).

⚠ CAUTION

When using medicated solutions, clean the entire Irrigation System thoroughly.

• Use of Tap Water

Close the dental unit's water valve.

⚠ NOTICE

- LED of the handpiece will remain 'On' for approx 5 seconds after Foot Switch is released. (Varios 970 LUX)
- At Power 'OFF' the
  When the Control Unit is Power off, the last mode settings in use are automatically retained in memory.

◆ Initialized Program (Factory Setting)

Press both Auto-Cleaning and Power Key on the Control Unit to initialize the Factory memory Setting. Do not release Auto-Cleaning Key until the beeping sound from the Control Unit. (Initial Mode is Perio)

	Power	Flow amount (L, R each)	Irrigation Mode	Initial Mode
Perio	1	10	L Bottle	●
Endo	1	10	L Bottle	
General	1	10	L Bottle	

◆ During the Handpiece operation :

Possible: Power Level and Water Volume adjustment.
Impossible: Operation Mode and Irrigation Mode setting, Auto Cleaning.

8. Provided Scaler Tips

G4

The end of the Tip is thin and for supragingival fine scaling and interdental scaling. The round cross-section allows tooth surfaces to be finished without causing damage. Set the level less than “Power 5” at G mode.

Apply the top of the Tip on the tooth plane and move it sideways finely in the same way as G8 Tip. (Fig. 20)

Fig.20

G6

Removal of supra and subgingival calculus. It provides easy access to interdental spaces and narrow pockets. Set the level less than “Power 5” at G mode.

Insert the top of the Tip into the periodontal pocket and move it slowly. The top of the Tip is sharp so that it could remove tartar on long coroner and retracted gingival. (Fig. 21)
Clean periodontal pocket at low power. (Set the level less than “Power 5” at P mode.)

Fig.21

G8

Removal of supragingival and interdental calculus. This Tip can be used in all quadrants and is very useful for the removal of hard calculus. Set the level less than “Power 7” at G mode.

Apply the top of the Tip on the tooth plane and move it sideways finely along the neck of tooth. (Fig. 22)

Fig.22

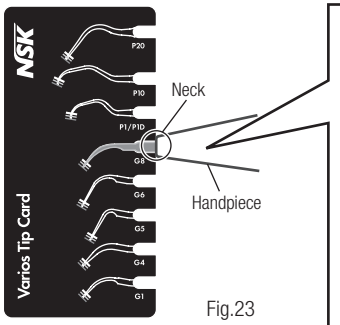
⚠ CAUTION

Tip is article of consumption. We recommend periodical replacement. About time of replacement, check the Tip Card.

◆ How to use the Tip Card

1) Place the neck of the Tip in the cut out.
2) Check wear of the Tip.
3) See the green, yellow and red line to check wear of the Tip. *See below what each color means. At NSK we recommend to replace a Tip when the Tip meets the yellow line (wear of 1mm) to guarantee safe and effective use.

Tip Card



Green: No wear - Tip is OK
Tip replacement is not necessary.

Yellow: Wear of 1mm - Tip is showing some wear
Tip replacement is recommended.

Red: Wear of 2mm - Tip is badly worn
Tip replacement is necessary.

Fig.23

* The Tip Card can be used to check the following tips : G1, G4, G5, G6, G8, P1/P1D, P10, and P20

⚠ CAUTION

Tips are consumables. The efficiency of dental scaling decreases approximately 25% when the top of the Tip wears 1 mm and approximately 50% when it wears 2 mm. In addition, the vibration condition changes owing to the wear, which may damage a patient's tooth surface. Check the Tip wear condition with the Tip Card periodically, and replace the Tip with a new one in good time.

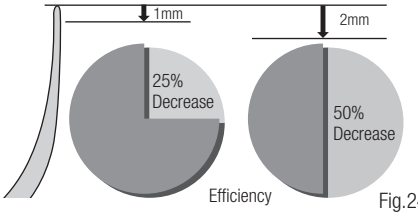


Fig.24

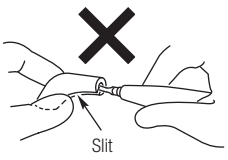
9. How to Use Tip Cover S (Option)

Grip the Tip Cover S and insert it to the Tip.
To remove, grip the Tip Cover S and the handpiece & pull. (Fig. 25)

✻ The Tip Cover S is not designed for use as a Tip changing tool.

⚠ CAUTION

Carefully insert the Tip into the Tip Cover S. Avoid injuring the fingers.



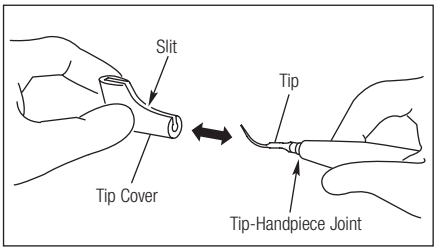


Fig.25

10. Handpiece Holder

While the Handpiece is not in use, put the Handpiece in the Handpiece Holder.
The Handpiece Holder is adjustable. (Fig. 26)

⚠ NOTICE

To prevent injury, always mount Scaler Tip Cover (S).

Fig.26

11. Care and Maintenance

(1) Cleaning of Optic Fiber (Varios 970 LUX)

Wipe the debris off the end of the Optic Fibers at the handpiece with alcohol soaked cotton swab. (Fig. 27)

⚠ CAUTION

Do not use any sharp pointed tools to clean the Optic Fiber End Face. In case the light degridation, contact your dealer.

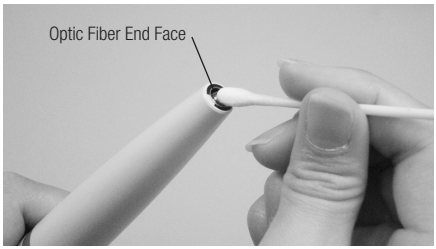


Fig.27

(2) Changing O-Ring

- **Handpiece Cord**
  An O-Ring is located in the Handpiece Cord Connector. Use a pointed tool to remove, and mount new O-Ring into the groove. (Fig. 28)
  * Optional O-Ring: Order No. 0311020080

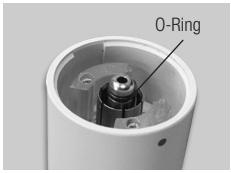


Fig.28

- **VA Bottle**
  Remove two O-Rings at the Bottle Joint with a pointed tool, and mount new O-Rings into the grooves. (Fig. 29)
  * Optional O-Ring : Order No. 0312090100

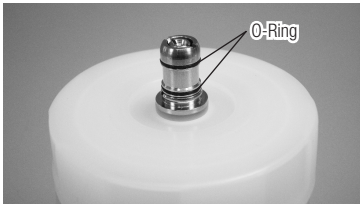


Fig.29

(3) Changing the Irrigation Pump

1) Remove the Bottle, the Power Cord, the Handpiece Cord and the Foot Switch from the Control Unit.
2) Turn back the Control Unit. Hang a finger on " Ⓐ " point and pull up the bottom cover to remove.

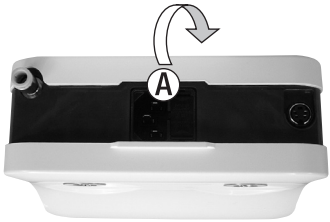


Fig.30

Picture below is shows inside of the Control Unit.

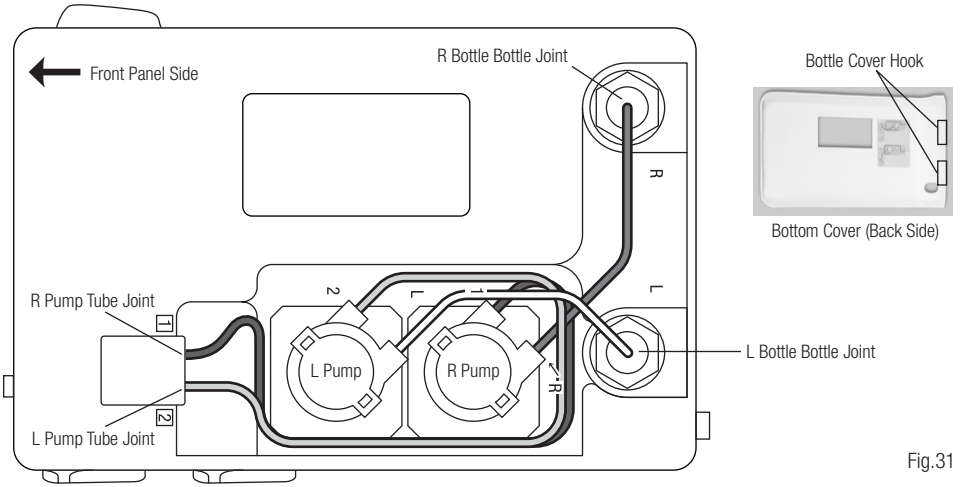
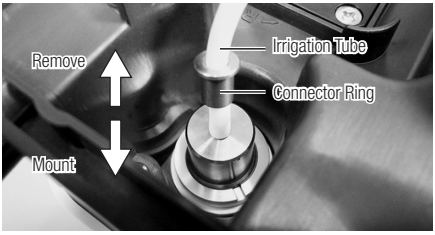


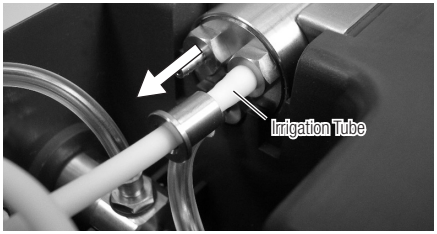
Fig.31

3) Remove the Irrigation Tube from the Control Unit. (Bottle side and Front Panel side.) (Fig. 32, 33)
4) Remove the Connector Ring from the Irrigation Tube. Do not dispose it. You can use the Rings to the replacement Irrigation Pump.
5) Turn the Irrigation Pump counterclockwise until it clicks and pull it out. (Fig. 34)
6) Mount the Connector Ring to the new Irrigation Pump. Observing Ring direction. (Fig. 35)
7) Align the replacement Irrigation Pump with the Drive Shaft. Turn clockwise until it clicks. (Fig. 34)
8) Mount the Irrigation Tube opposite procedure of removing (Fig.32). Connector Ring should firmly into the Control Unit until it stops. (Fig.36)



* Bottle side

Fig.32



* Front Panel side

Fig.33

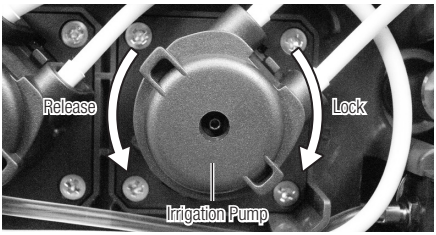


Fig.34

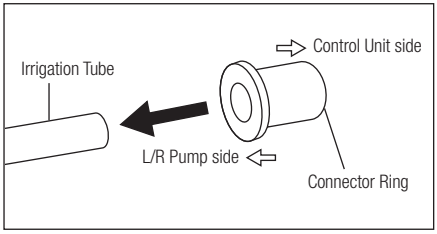
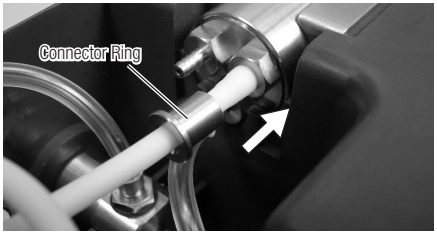


Fig.35



* Front Panel side

Fig.36

9) Align the Bottom Cover Hook and hole on the Control Unit. Mount the Bottom Cover.

* Optional Irrigation Pump: Order No. 10000643 (Not included the Connecter Ring.)

⚠ CAUTION

- If water is spilled out the irrigation pump, wipe it off and allow drying completely prior to use. If water gets inside the irrigation pump the roller may slip and fail to pump.
- Before replacing the Irrigation Pump, wipe off excess water on pump and Drive Shaft. The wet drive shaft and rollers can be slippery and cause improper operation.
- Wipe dirt and water off the Drive Shaft from bottom up. (Fig.37)
- Insert the replacement Irrigation Pump into the Drive Shaft straight (slow and soft) to prevent damaging rollers in pump.
- Run the replaced Irrigation Pump about 10 seconds on largest setting of Water Volume before operation to adopt Irrigation Tube to new pump.
- Ensure Irrigation tube has no kink or twists If tube is set incorrectly, Irrigation Water may not come out.
- Do not pull the tube when the bottom cover is closed.

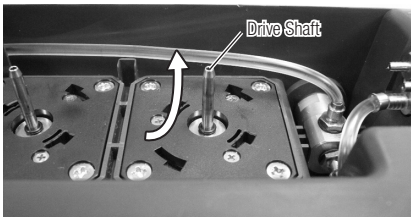


Fig.37

⚠ NOTICE

- Perform periodical cleaning for the Drive Shaft with socked alcohol cloth. Dirt on Drive Shaft may cause an incorrect pump operation.
- The pump is consumable. If the irrigation volume decreases markedly, replace pump.

(4) Auto Cleaning (Cleaning of Irrigation Tube (Use of Bottle))

⚠ NOTICE

- After each use, remove all the disinfectant solution and perform "Auto Cleaning" procedure. If you have not cleaned the system, it may become dirt disinfectant. And it is stuck in the tubing or some of the metal parts may be rusted.
- During Auto Cleaning, water comes out from the handpiece. Perform cleaning after turning handpiece into a cup.

1) Remove the 2 Bottles from the Control Unit.
2) Clean inside of the Bottle.
3) Half fill the bottle with purified water (DO NOT USE SALINE)

⚠ CAUTION

Use only distilled water for cleaning.

4) Install the cap on the Bottle, check the Joint Hole and surrounding area, Clean as required. After cleaning, install the Bottle Joint into the Bottle Base Connector. Install it until clicks into place. Improper connection may cause water leakage. Make sure the connection is tight.

⚠ CAUTION

- Before installing the Bottle, make sure the Air Hole and surrounding area are clean and free of dirt.
- Perform Auto-Cleaning without tip.
- Make sure the handpiece and handpiece cord are firmly attached.

5) To perform the Auto-Cleaning, keep pressing the Auto-Cleaning Key (more than 1 second).It takes 30 seconds per bottle to clean The Numerical Display will alternately displays “A” and “C”, the Bar Graph displays time remaining. Single display (Bar Graph Display) is 6 second. When five displays of Bar Graph disappeared, Bottle will be changing the other side.

To cancel the Auto-Cleaning, press Auto-Cleaning Key twice.

⚠ NOTICE

During Auto-Cleaning, LED of the handpiece does not illuminate. (Varios 970 LUX)

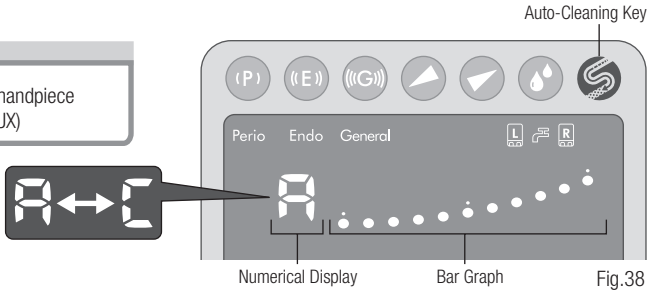


Fig.38

6) When the Auto-Cleaning is finished, the Control Unit returns to the settings prior to cleaning. Remove the both bottles from the Control Unit by pulling straight up. Clean thoroughly rinse and dry.

◆ **Following method is also available for cleaning. (Manual Cleaning)**

1) Remove the Bottle from the Control Unit.
2) Open the cap of the cleaned Bottle and fill it with distilled water.
3) Close the cap firmly and insert the Bottle Joint into the Bottle Base Connector on the Control Unit until it clicks. (Make sure air hole located on the Bottle Cap is not closed with dirt.)
4) Operate the Control Unit about 30 seconds with water supply at maximum setting.

⚠ NOTICE

The Control Unit does not perform in Auto-Cleaning in Tap Water.

(5) Changing Water Filter (Option)

If you use Tap Water, change the Water Filter as it may necessary.

1) Close the water valve of the dental unit.
2) Mount two Spanner Wrenches (5x8) and turn those as shown in Fig.39.
3) When the Water Filter case is separated, the Water Filter can be removed as shown in Fig. 40.
4) Replace with new (Order No. U387 042) and reassemble the filter in the reverse order.

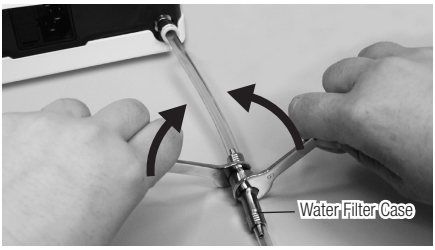


Fig.39

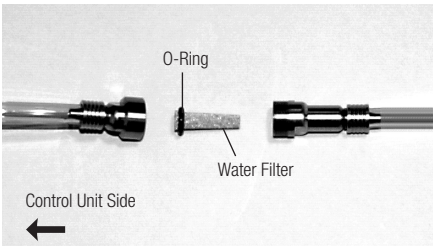


Fig.40

12. Sterilization

- Autoclave sterilization is recommended.
- Autoclave sterilization required first time you use and after each patient as noted below. Take handpiece out of the packing bag before sterilization.
- ONLY the Tip (except diamond coated Scaler tip), Handpiece and Tip Wrench can be autoclaved.

■ Autoclave Procedure

1) Remove the Tip after use. (Refer to 6. Mounting and Removing Tip)
2) Wipe dirt and debris from the products, and wipe clean with alcohol-immersed cotton swab or cloth. Do not use a wire brush.
3) Insert those into the Sterilization Case or an autoclave pouch. Seal the pouch.
4) Autoclavable up to max. 135˚C.
   Ex.) Autoclave for 20 min. at 121˚C, or 15 min. at 132˚C.
5) Keep the products in the Sterilization Case or autoclave pouch to keep it clean until you use it.

* Sterilization at 121°C for more than 15 minutes is recommended by ISO17664 and ISO17665-1.

⚠ CAUTION

- This product can not be cleaned and disinfected with a Thermo-Disinfector.
- Do not sterilize by ultraviolet ray. The handpiece could discolor.
- If autoclaved with other instruments stained with chemical solution, it could strip the plating and make the surface black.
- Do not autoclave any parts (the Control Unit, Power Cord, Bottle, Foot Switch, Handpiece Cord, O-Ring). Other than those that can be subjected to autoclave sterilization. Perform alcohol disinfection to the Control Unit, Power Cord, Foot Switch, Handpiece Cord including after every patient.
- Do not wipe with, or clean or immerse in, high acid water or sterilizing solutions.
- Do not sterilize diamond coated Scaler Tips for the reason of single use.

※ Sterilization Case

The Handpiece, Tip and Tip Wrench can be sterilized together using Sterilization Case.

Fig.41

1) Remove the Tip from the handpiece by using Tip Wrench.
2) Set the Tip Wrench with Tip into the Sterilization Case. (You can set four Tip Wrenches and Tips at once).
3) Remove handpiece from the Handpiece Cord, and clean (Refer to 12. 2))
4) Set the handpiece into the Sterilization Case.
5) Autoclavable up to max. 135˚C.
   ex.) Autoclave for 20 min. at 121˚C, or 15 min. at 132˚C.
6) Keep the products in the Sterilization Case or autoclave pouch to keep it clean until you use it.

13. Troubleshooting

When trouble is found, please check the followings prior to consulting your dealer.

Problem	Probable Cause	Cause	Solution
No / Poor vibration.	The Front Panel does not light, even if the Power Switch is ON.	The Power Cord or the Jack is disconnected.	Correctly insert the Power Cord or the Jack.
		The Fuse is burned out.	Contact dealer.
	The Tip does not generate vibration, in spite of depressing the Foot Switch.	The Tip is not tightened firmly.	Tighten the Tip until the Tip Wrench clicks.
		Worn Tip.	Replace the Tip.
		Power has not been correctly adjusted for the Tip.	Adjust the power on the Power Guide or Tip case label. Do not exceed.
		The Foot Switch is disconnected.	Connect the Foot Switch correctly.
		Failure of vibrator in the handpiece.	Contact dealer.
		Failure of internal components of the Foot Switch.	Contact dealer.
The Tip is bent or broken.	—	Power has not been properly adjusted for the Tip.	Adjust the power level the Power Guide or Tip case label. Do not exceed.
The Tip is flying away.	—	The Tip is not tightened firmly.	Tighten the Tip until the Tip Wrench clicks.
Noise from the handpiece.	—	Power has not been properly adjusted for the Tip.	Adjust the power level on the Power Guide or Tip case label. Do not exceed.
		The Tip is not tightened firmly.	Tighten the Tip until the Tip Wrench clicks.
		Failure of vibration in the handpiece or the Control Unit.	Contact dealer.
The handpiece is overheating.	—	Power has not been properly adjusted for the Tip.	Adjust the power level on the Power Guide or Tip case label. Do not exceed.
		The Tip is not tightened firmly.	Tighten the Tip until the Tip Wrench clicks.
		Failure of vibration in the handpiece or the Control Unit.	Contact dealer.
No Irrigation supply and/or unstable Irrigation supply (Use of Bottle)	The Irrigation Pump is running.	The tube twisted.	Straighten the twisted Irrigation Tube.
	The Irrigation Pump is stopping.	Time to replace Irrigation Pump. (Approx. 500hours after used.)	Replace with new Irrigation Pump (Refer to 11. (3) Changing the Irrigation Pump).
No / Poor water. (Use of Tap Water)	The water does not reach to the Control Unit.	—	Check the water circuitry and supply to the Control Unit. Water pressure : 0.1-0.5MPa (1-5kgf/cm^2)
	Check to see if water reaches the Control Unit.	The Water Adjustment Knob is closed.	Turn the Water Adjustment Knob and adjust to the appropriate volume.
		Disconnected Irrigation supply at low volume range. (less than 10ml/min.)	No problem. Turn the Water Adjustment Knob and increase the Irrigation volume.
		The Water Filter is clogged.	Replace with new Water Filter (Refer to 11. (5) Changing Water Filter (Option)).

Problem	Probable Cause	Cause	Solution
Water leakage.	Water is leaking from the joint between the Irrigation Tube and the Irrigation Connector.	The Irrigation Tube is not connected correctly.	Firmly insert the Irrigation Tube into the Irrigation Connector inmost.
	Water is leaking from the joint between the handpiece and the cord.	O-Ring at the handpiece cord is worn or damaged.	Replace with new O-Ring (Refer to 11 (2) Changing O-Ring •Handpiece Cord).
	Water is leaking from the Control Unit.	The water circuitry in the Control Unit is damaged.	Contact dealer.
Handpiece LED does not illuminate. (Varios 970 LUX)	Tip oscillates, but Handpiece LED turns on and off.	The handpiece is not connected into the Handpiece Cord correctly.	Firmly insert the handpiece into the Handpiece Cord inmost.
	Tip oscillates, but Handpiece LED does not turn on.	Disconnection in the Handpiece Cord, or failure in the Control Unit.	Contact dealer.
Start Beeping	Beeping while power on.	Depress Foot Switch.	Release the Foot Switch.
	Beeping while stopping vibration of Tips.	Abnormal heating of the Control Unit.	Stop the operation and leave until Control Unit becomes cool.

14. Protection Circuit

It may overheat inside when you use this Control Unit in more than Power 8 at G mode for long time.
In this case, Protection Circuit reduces the Power automatically. (Power 7)
Bar Graph Indicator from 8 to 10 flashes. (Fig.42)

After Protection Circuit is released, the flashes stop. However, Power Level can not automatically increase. If needed, increase manually.

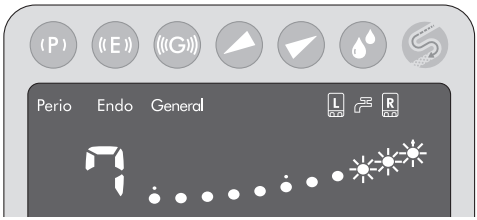


Fig.42

⚠ NOTICE

- During Protection Circuit function (during Bar Graph Indicator flash), the Control Unit can not increase the Power Level.
- If Power Level decreases less than 7, Bar Graph Indicator stops flashing. However, it the Power increase more than 8, flashes it again.

15. Error Code

If an operational problem occurs numerical Display shows the error code to allow an immediate problem diagnosis.

Error Code	Error	Check / Remedy
E 0	Self-Check Error	Contact dealer.
E 1	Circuit Failure	Contact dealer.
E 7	Does not vibrate	Contact dealer.
E 9	Handpiece Self Check Error	Confirm connection of the handpiece. Power on the Control Unit again. Leave the Control Unit until it become cool down and powers it again. When an error can not be eliminated, Contact dealer.
E 10	Circuit Failure	Contact dealer.

*"E" and the number alternately display on the Display.

16. Spare Parts

Model	Products	Order code
VA Bottle 400		Z1047001
Sterilization Case		Z1035001
Water Tube Set		U387 040
Water Connector		U378 030
Water Filter		U387 042
Spanner Wrench (5x8)		Y100 1301

Model	Products	Order code
Irrigation Pump		10000643
Tip Wrench (CR-10)		Z221 076
Tip Holder		Z221 080
Tip Cover S		Z217 851
O-Ring (for VA Bottle)		0312090100
O-Ring (for Handpiece Cord)		0311020080

135℃ Autoclavable at 135℃ max.

17. Disposing product

Consult with dealer from whom you purchased it about waste disposal.

18. Warranty

Manufacturer warrants its products to the original purchaser against defects in material and workmanship under normal practices of installation, use and servicing. Such expendable items as O-Rings and Irrigation Pump are not covered by this warranty.

Symbols

TUV Rhineland of North America is a Nationally Recognized Testing Laboratory (NRTL) in the United States and is accredited by the Standards Council of Canada to certify electro-medical products with Canadian National Standards.

Follow the waste of electric and electronic equipment (WEEE) Directive (2002/96/EC) to dispose of the product and accessories.

Consult operation instructions.

Manufacturer.

This conforms to CE European Directive of "Medical equipment directive 93/42/EEC."

Type BF applied part.

Authorised representative in the European community.

Protected against vertically falling water drops.

Autoclavable up to Max.135°C. *for detail see Sterilization.

Marking on the outside of Equipment or Equipment parts that include RF transmitters or that apply RF electromagnetic energy for diagnosis or treatment.

Guidance and manufacturer's declaration - electromagnetic emissions		
The Varios 970 / Varios 970 LUX is intended for use in the electromagnetic environment specified below. The customer or the user of the Varios 970 / Varios 970 LUX should assure that is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR11	Group 1	The Varios 970 / Varios 970 LUX 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 emmissions CISPR11	class B	The Varios 970 / Varios 970 LUX is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	class A	
Voltage fluctuations/flicker emissions IEC61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The Varios 970 / Varios 970 LUX is intended for use in the electromagnetic environment specified below. The customer or the user of the Varios 970 / Varios 970 LUX should assure that it is used in such an environment.			
Immunity test	**IEC60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV 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 transient/burst IEC61000-4-4	±2kV for power supply lines ±1kV for input/output	±2kV for power supply lines ±1kV for input/output	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1kV line(s) to line(s) ±2kV line(s) to earth	±1kV line(s) to line(s) ±2kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 secs	<5% Ut(>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Varios 970 / Varios 970 LUX requires continued operation during power mains interruptions, it is recommended that the Varios 970 / Varios 970 LUX be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: Ut is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity

The Varios 970 / Varios 970 LUX is intended for use in the electromagnetic environment specified below. The customer or the user of the Varios 970 / Varios 970 LUX should assure that it is used in such an environment.

Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Varios 970 / Varios 970 LUX, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC61000-4-6	3Vrms 150 kHz to 80MHz	3Vrms	$d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz
Radiated RF IEC61000-4-3	3V/m 80MHz to 2.5 GHz	3V/m	$d = 2.3\sqrt{P}$ 800MHz to 2.5GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80MHz and 800MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobiles radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Varios 970 / Varios 970 LUX is used exceeds the applicable RF compliance level above, the Varios 970 / Varios 970 LUX should be observed to verity normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Varios 970 / Varios 970 LUX.

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.

Cables and accessories	Maximum length	Complies with	
Handpiece cord	2 m	RF emissions, CISPR11,	Class B/ Group 1
Foot Switch	2.5 m	Harmonic emissions,	IEC61000-3-2
		Voltage fluctuations/ flicker emission,	IEC61000-3-3
		Electrostatic discharge (ESD)	IEC61000-4-2
		Electric fast transient / burst	IEC61000-4-4
		Surge	IEC61000-4-5
		Voltage dips, short interruptions and voltage variations on power supply input lines	IEC61000-4-11
		Power frequency(50/60Hz) magnetic field	IEC61000-4-8
		Conducted RF	IEC61000-4-6
		Radiated RF	IEC61000-4-3

Recommended separation distances between portable and mobile RF communications equipment and the Varios 970 / Varios 970 LUX.

The Varios 970 / Varios 970 LUX is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Varios 970 / Varios 970 LUX can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Varios 970 / Varios 970 LUX as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150kHz to 80MHz $d=1.2\sqrt{P}$	80MHz to 800MHz $d=1.2\sqrt{P}$	800MHz to 2.5GHz $d=2.3\sqrt{P}$
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 estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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