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NSK

Motor Handpiece System for Root Canal Enlargement

ENDO-MATE DT

CE 0197

OPERATION MANUAL



OM-E0202E

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CE 0197 The EU directive 93/42/EEC was applied in the design and production of this medical device.

Thank you for purchasing the ENDO-MATE DT.
This product is used in dental office only.
This product is used primarily for root canal enlargement. Read this Operation Manual carefully before use for operation instructions, care and maintenance. Keep this Operation Manual for future reference.

■ Classifications of equipment

- Type of protection against electric shock :
  – Class Ⅱ equipment: ⧈
- Degree of protection against electric shock :
  – Type B applied part: ⍋
- Method of sterilization or disinfection recommended by the manufacture :
  – See 8. Sterilization
- Degree of protection against ingress of water as detailed in the current edition of IEC 60529 :
  – Foot Control (Option) : IPX1 (Protected against vertically falling water drops)
- Degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide :
  – EQUIPMENT not suitable for use in the presence of a flammable anaesthetic 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 safety cautions thoroughly before use and operate the product properly.
■ These indicators are to allow you to use the product safely and prevent danger and harm to you and others. These are classified by degree of danger, damage and seriousness. All indicators concern safety, and always follow them.

Classification	Degree of danger or damage and seriousness
⚠DANGER	Explains an instruction where death or serious injury may occur.
⚠WARNING	Explains an instruction where bodily injury or damage to device may occur.
⚠CAUTION	Explains an instruction where possibility for minor to medium bodily injury or damage to device may exist.
⚠NOTICE	Explains an instruction that should be observed for safety reasons.

⚠ DANGER

- Use the specified batteries for this product. Never use any other batteries than those that NSK specifies.
- Do not disassemble or alter the device.

⚠ WARNING

- This product is not built as waterproof. Do not spill water or a chemical solution onto or into the motor handpiece or battery charger. Failure to do so may result in fire or electric shock due to a short-circuit or rusting.
- If you should notice battery fluid leak within the motor handpiece, deformation of the motor handpiece casing or partial discoloring, immediately stop use and contact your dealer.
- Should the leaking 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 and completely wash away the fluid. Failure to do so may result in skin complications.
- If you will not use the product for a long period of time, remove the batteries from the handpiece to avoid fluid leak.
- The system may present a possibility of malfunction when used in the presence of electromagnetic interference wave. Do not install the system in the vicinity of the device which emits magnetic waves.

⚠ 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.
- Use our recommended batteries only.
- Use the NSK AC adapter for this product. Never use any other AC adapters.

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- Do not use a bent, damaged, deformed or non-ISO-conforming file. Using such a file may result in personal injury due to its unexpected breaking or flying off during rotation.
- Do not use or leave the product in a high-temperature environment such as under strong direct sunlight, in a car under a blazing sun, by 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 even slightly at that time, immediately stop use and contact your dealer.
- Do not allow any impact on the shank. Do not drop the handpiece.
- Always clean the shank of the file to be installed. Allowing dirt to enter the chuck could cause loss of concentricity and deterioration of chucking force.
- Before changing the head or bur, turn off the power of the motor handpiece. Changing with the power kept on may cause unintended rotation by accidental touch of the ON/OFF button.
- 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. Discoloration or deformation may occur if left as it is.
- The system functions normally in the environment where the temperature is at 10-40˚C (50-104˚F), humidity at 10-85% RH, atmospheric pressure at 500-1060hPa, and no moisture condensation in the Control Unit. Use at outside of these limits may cause malfunction.

⚠ NOTICE

- During vibration, the motor handpiece and the motor handpiece cord may affect computer and LAN cable. Noise could be heard during operation near a radio receiver.
- The motor handpiece consumes electricity very slightly even when the power supply is off. In addition, fully-charged rechargeable batteries, in general, discharge gradually over time even though it is not used. It is recommended to recharge the batteries just before use.
- When the motor handpiece stops automatically by detecting a low battery voltage, turning on the power again after a while may not detect the low voltage immediately. This is not a failure, but due to battery characteristics. Since the voltage drop does not coincide with the remaining battery capacity, consider it only as a yardstick.
- Recharge rechargeable batteries after they deplete as much as possible. Repeating short-time use and subsequent recharging may shorten their operating time due to the “memory effect.” Batteries may recover after repeating complete discharge and full charge for a few times. (This product is equipped with a “Refresh Mode” for this purpose.)
- The used nickel metal hydride batteries are recyclable, but their disposal may sometimes not be permitted by the country. Return them to your dealer.
- When disposing of the control unit and foot control (Optional), follow the instructions of your local government for disposal, as they contain materials which may become industrial waste.
- When discarding the contra angle head and motor handpiece, dispose of them as medical waste.
- Users are responsible for operational control, maintenance and inspection.
- Store the system in the place where the temperature is at −10-60˚C (14-140˚F), humidity at 10-85% RH, atmospheric pressure at 500-1060 hPa, and the system is not subject to air with dust, sulfur, or salinity.
- When trouble is found, send to dealer.

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1. FEATURES

- Compact design.
- Able to operate for approx. 2 continuous hours at the rated load. (Dependent upon use conditions.)
- A large and eye-friendly LCD panel has been adopted on the control unit.
- Programmable up to 9 programs (memory setting).
- The auto reverse function is activated depending on the load. A wide variety of functions such as “auto reverse”, “auto stop” and “auto reverse off” are available. Combined with such functions nine different operation programs are memorable.
- The rotation of the motor handpiece can be activated by the ON/OFF button of the motor handpiece or the foot control (optional).
- The motor handpiece can be turned on and off by pressing the on/off button alternatively. In addition, ON by keep depressed and OFF by releasing it is possible.
- The motor handpiece softly starts. Since it makes a brief stop before it starts in the reverse rotation, there are no vibration and shocks during this changeover.
- The feedback circuit is built in. It maintains rotation at a constant speed even when the load on the motor handpiece changes.
- Has energy saving feature. The power of the motor handpiece automatically turns off when there are no operations for 10 minutes. (Auto power-off function)
- The contra angle heads provided for this product are all autoclavable up to 135ºC (excluding the motor handpiece).

2. SPECIFICATIONS

<Control Unit>

Model	NE131
Rated input	DC20V 0.5A
Output	DC7V 0.4A
Charging time	5hours approx.
Dimensions	W92 x D148 x H124mm
Weight	456g

<Motor Handpiece>

Model	EM13M
Rated input	DC7V 0.4A
Dimensions	ø20 x L108mm
Weight	92g (including motor handpiece cord)

<AC Adaptor>

Model	NE169
Rated input	AC120V 50/60Hz AC230V 50/60Hz
Dimensions	W70 x D110 x H58mm
Weight	120V : 934g 230V : 974g

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3. NAME AND FUNCTION OF EACH PART

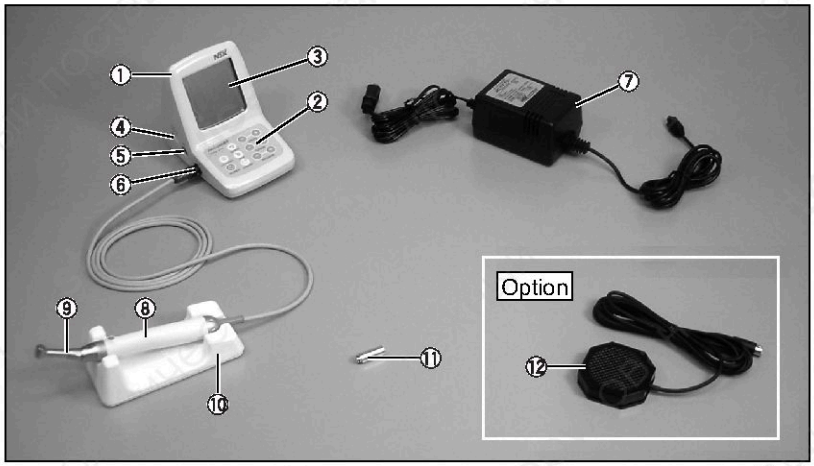


Fig. 1

①**Control Unit**

②**Operation Panel**

✻ See Fig. 2 “Operation Panel and LCD Panel. ”

③**LCD Panel**

- See Fig. 2 “Operation Panel and LCD Panel.”
- Error codes are displayed.

④**Power Cord Connector**

The AC adapter is connected.

⑤**Foot Control Connector**

The foot control (optional) is connected.

⑥**Motor Handpiece Connector**

The motor handpiece is connected.

⑦**AC Adaptor**

⑧**Motor Handpiece**

⑨**Contra Angle Head** (MP-F20R)

Only the standard pack.

⑩**Handpiece Stand**

⑪**F-type Spray Nozzle**

- This is used for lubrication.
- Only the standard pack.

⑫**Foot Control (Option)**

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∗ Operation Panel and LCD Panel.

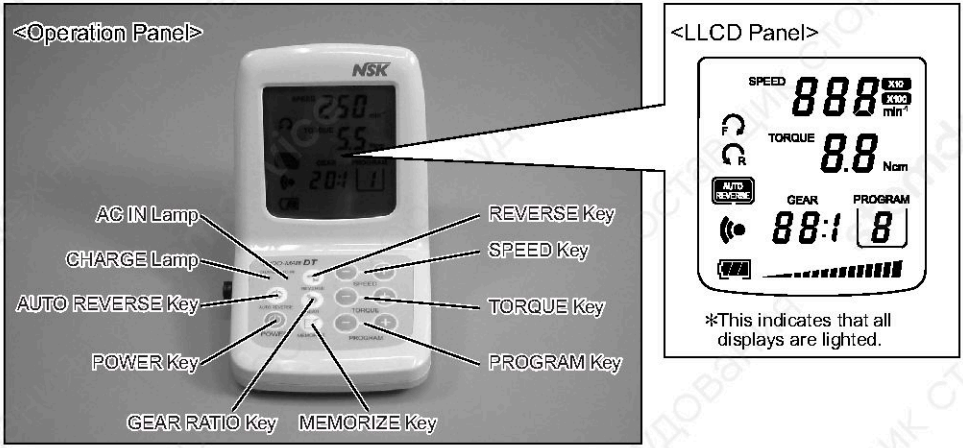


Fig. 2

● POWER Key

- Holding down the POWER key for more than one second turns on the power and the LCD panel lights.
- Holding down the POWER key for more than one second while the power is on turns off the power and the LCD display turnes off.

● SPEED Key

- The rotation speed can be changed.
- If the speed is to exceed the upper limit or fall below the lower limit, the alarm sounds.

LCD



The present rotation speed is displayed. The unit is (min^{-1}). " X10 or X100 " is displayed depending on the rotation speed.

● TORQUE Key

- The torque limit values can be changed.
- If the speed is to exceed the upper limit or fall below the lower limit, the alarm sounds.

LCD



The present torque limit value is displayed. The unit is (Ncm). When it reaches the maximum value, " ▬ ▬ " is displayed.

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● PROGRAM Key

• A program can be selected.

LCD



The present program number is displayed. The program number is available from 1 to 9.

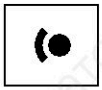
• The alarm sound volume can be adjusted. (See P.16 6. (5) “Alarm Sound Volume Control”)

LCD

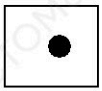
The present alarm mark is displayed.



Big sound volume



Small sound volume



Limited OFF (The alarm sounds with a small sound volume at the time of confirmation and error, while it does not sound at the time of reverse rotation and attainment of the torque limit value.)

● REVERSE Key

• The rotational direction of the file can be changed by this key. It can also be changed while the file is in motion.

• The alarm sounds during reverse rotation.

LCD

The mark of the current rotational direction is displayed.



Forward Rotation (F).



Reverse Rotation (R).

● GEAR RATIO Key

• A gear ratio can be selected by this key. If the correct gear ratio is selected according to the contra angle head in use, an adequate rotation speed and torque limit value can be set.

• The gear ratio cannot be changed while the file is in motion.

LCD



The present gear ratio is displayed. The gear ratio is available at (1:1, 4:1, 10:1, 16:1 and 20:1).

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• AUTO REVERSE Key

The auto reverse mode can be selected by this key. (See P.12 "*Auto Reverse Function.")

LCD

The present auto reverse mode mark is displayed.



AUTO REVERSING If the load is removed after auto reverse rotation, it returns to the normal rotation again.



AUTO STOP If the load is removed after autoreverse rotations, it stops.



AUTO REVERSE OFF Auto reverse rotation is not activated.
* There is no display.

• MEMORIZE Key

Press this key, if you want to change the present program setting (rotation speed, torque limit value, gear ratio, auto reverse mode) and have these changes memorized. (See P.14 6. (1) "Program")

• CHARGE Lamp (Orange)

This lamp lights or flashes while the batteries are being charged or in the refresh mode, (See P.15 6. (3) "Battery Refresh") and in an error condition, regardless of the ON or OFF position of the power.

LCD

The mark of the present remaining amount of the batteries is displayed regardless of the ON or OFF position of the power. The mark will be animated when the batteries are being charged or in the refresh mode (See P.15 6. (3) "Battery Refresh").



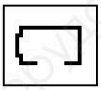
Full charge or nearly full charge.



About 30-80% remains.



Less than about 30% remains. In case of this condition, the auto reverse function may not activate. (See P.12 "*Auto Reverse Function")



Batteries are drained or in a remarkably low voltage. Charge the batteries.

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⚠ NOTICE

The mark of remaining amount of batteries indicates a voltage. When load is applied to the motor handpiece, the mark of remaining amount of batteries appears to become lower.

- **AC IN Lamp (Green)**

This lamp lights, when the power is supplied from the AC adapter, regardless of the ON or OFF position of the power.

- **Bar Display**

LCD



It displays the bar graph which shows the degree of load applied to the motor while the file is in motion.

4. HOW TO CONNECT EACH PART

(1) Connecting Motor Handpiece

Align the ➡ mark of the cord plug of the motor handpiece with the ▲ mark of the motor handpiece connector and insert the plug until it locks. (Fig. 3)

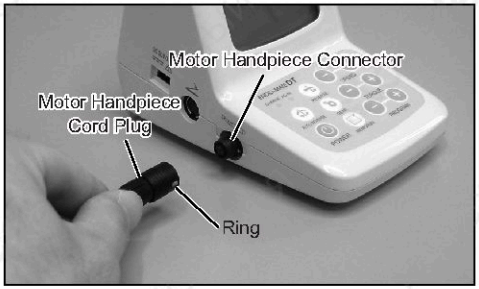


Fig. 3

⚠ NOTICE

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

(2) Connecting AC Adapter

Securely insert the jack of the AC adapter into the power connector with the ➡ mark of the jack cast down. (Fig. 4)

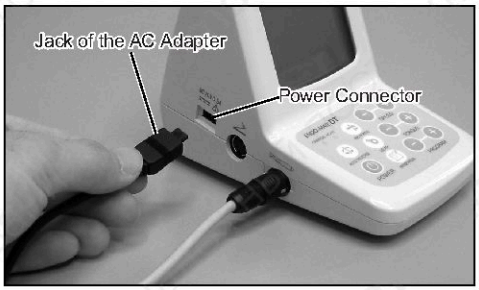


Fig. 4

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(3) Connecting Foot Control (Optional)

Securely insert the plug of the foot pedal (Optional) into the foot control connector with the ▲ mark of the plug cast down. (Fig. 5)

* Yosdo not have to connect the foot control, if you intend to use this product without the foot control.

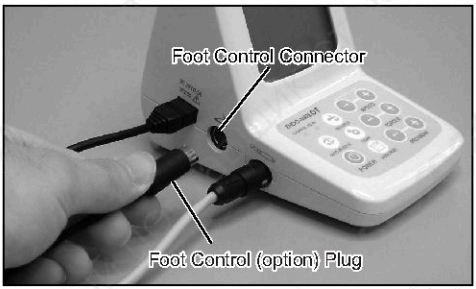


Fig. 5

5. HOW TO USE

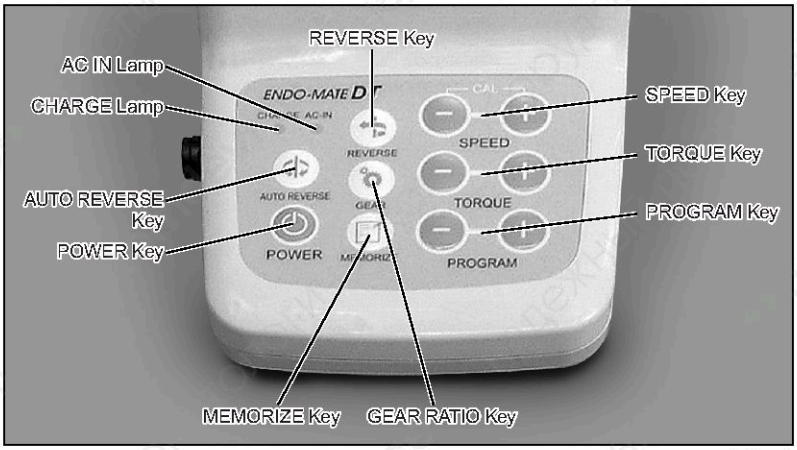


Fig. 6

(1) Charge (if batteries are used)

①Securely insert the plug of the AC adapter into a power supply.

②The AC IN lamp lights in green.

③The internal microcomputer checks the voltage of the batteries and starts charging, if necessary. If it starts charging, the CHARGE lamp lights, and the mark of the remaining amount of the batteries on the LCD panel will be animated.

* There is no need to turn on the power.

④When the CHARGE lamp turns off, charging has been completed.

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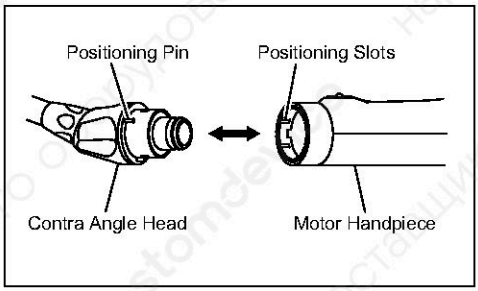
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⚠ CAUTION

- **Connect to AC120V or AC230V power supply only. Otherwise, it may cause a malfunction.**
- **Since the AC IN lamp lights to indicate that the supply power is on, it does not go out even after a charge is completed. See the CHARGE lamp to check the charging conditions.**
- **The standard charging time is about 5 hours, but it varies depending on use conditions of batteries, temperature and whether the batteries are new or old. Especially, old batteries may remarkably shorten both the charging and operating time.**
- **When charging a battery, the temperature of the battery is measured. Therefore, if this product is placed in an environment where the temperature changes rapidly (for example, near a window exposed to sunlight, near the outlet of a air conditioner, or heater.), the battery cannot be properly charged. Put this product in a place where the temperature varies little.**
- **In the following cases, it may not start charging:**
  - **The temperature of a battery is too low or too high. (less than 0˚C (32˚F) or more than 40˚C (104˚F).)**
  - **The voltage of a battery is sufficient. (This does not necessarily mean fully charged.)**
  - **A battery is not connected.**
  - **The voltage of a battery is abnormal. (See P.20 10. "ERROR CODE")**
- **Batteries are automatically charged depending on conditions, even when the power is on. But when the motor handpiece is used, charging is suspended to protect the battery.**

(2) Changing Contra Angle Head

- The contra angle head could be connected with the motor handpiece at 6 adjustable head positions. Align the positioning pins of the contra angle head with the positioning slots of the motor handpiece and insert the head until they click.
- When removing the contra angle head, pull it out axially. (Fig. 7)



* The contra angle head in the figure is MP-F20R. Fig. 7

⚠ CAUTION

- **When attaching and detaching the contra angle head, turn off the power beforehand.**
- **Check that the contra angle head is securely assembled to the motor handpiece.**

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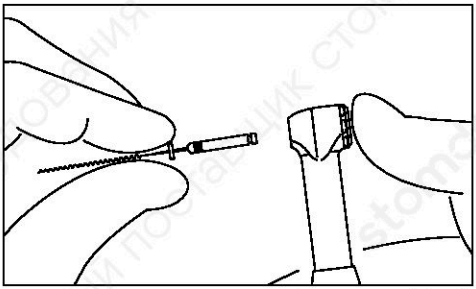
(3) Mounting and Removing File

①Insert the file into the chuck until it stops.

②Lightly turn the file until it engages with the latch mechanism. Push it inward to click.

• File Removal

Depress the push-button and pull out the file.



∗ The contra angle head in the figure is MP-F20R. Fig. 8

⚠ CAUTION

- **When attaching and detaching the file, turn off the power beforehand.**
- **After the file is locked in place, lightly pull out the file to make sure the file is locked.**
- **Always clean the shank of the file to be installed. Allowing dirt to enter the chuck could cause loss of concentricity and deterioration of chucking force.**

(4) Preparatory Operations

①Charge the batteries (See P. 9 5 (1) "Charge (if batteries are used)") or securely insert the plug of the AC adapter into a power supply.

②Hold down the POWER key for more than one second to turn on the power.

③Select a gear ratio by pressing the GEAR RATIO key. If the correct gear ratio is selected according to the contra angle head in use, an adequate rotation speed and torque limit value can be set.

④Select the rotational direction by pressing the REVERSE key. The key changes over to the forward rotation (F) and reverse rotation (R) each time it is pressed.

⑤Select the auto reverse mode by pressing the AUTO REVERSE key. The key changes over to AUTO REVERSING , AUTO STOP and AUTO REVERSE OFF each time it is pressed. (See P. 12 "∗Auto Reverse Function")

⚠ NOTICE

The GEAR RATIO key is fast-forwarded, when it is continuously held down.

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(5) Operation

① • If you press the ON/OFF button briefly, the motor handpiece starts. If you re-press the button, it stops. (Alternate operation)

• If you hold down the ON/OFF button for more than one second, the motor handpiece starts while the button is pressed. If you release the button, it stops. (Intermittent operation)

• If the foot control (Optional) is connected, stepping on the pedal starts the motor handpiece. Releasing the pedal stops it.

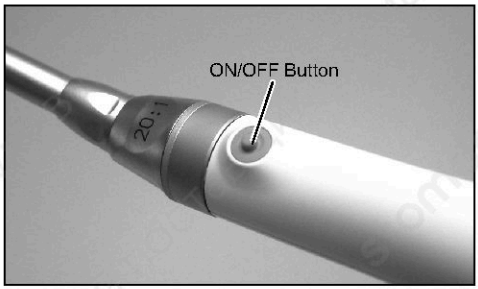


Fig. 9

②If you want to make fine adjustment on the rotation speed and torque limit value, press the SPEED key and TORQUE key respectively.

⚠ NOTICE

- **If the SPEED key and TORQUE key are continuously held down, they are fast-forwarded.**
- **If both ON/OFF button and foot control (Optional) are equipped, the one which rotation instruction is first given has priority. For example, if you step on the foot control (Optional) to start the motor handpiece, you cannot stop it by the ON/OFF button.**

✻ Auto Reverse Function

When the motor handpiece starts and its load reaches approximately half of the preset torque limit value, the alarm sounds. (at the time of on the bar display)
The alarm sound changes when the load approaches the torque limit value. (at the time of on the bar display)
When a further load exceeds the torque limit value, the following 3 modes can be selected:

AUTO REVERSING

The file rotates in reverse. When a load is removed, the file returns to normal rotation (forward rotation) automatically.

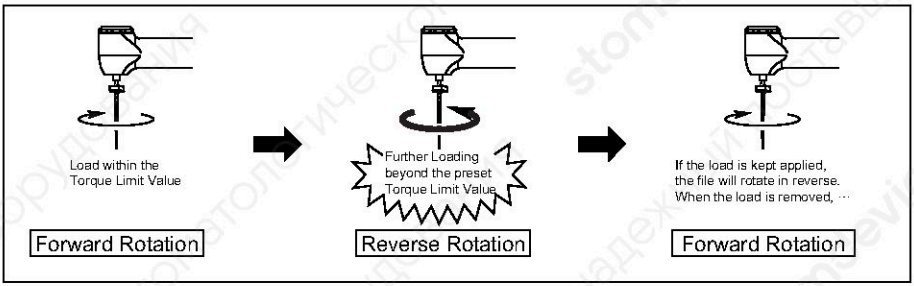


Fig. 10

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AUTO STOP

The motor handpiece starts in reverse. When a load is removed, the motor handpiece stops. If you want it to rotate (forward-rotate) again, re-press the ON/OFF button or re-step on the foot control (Optional).

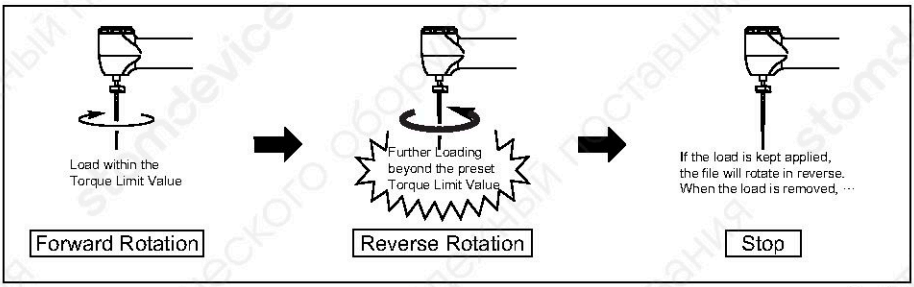


Fig. 11

AUTO REVERSE OFF

The motor handpiece stops without reverse rotation. In this instance, the LCD panel shows "– – –" and the rotation speed alternately.

⚠ NOTICE

- **When the reverse rotation (R) is set, this auto reverse function is not activated.**
- **When the batteries go down (when the mark of the remaining amount of the batteries indicates "[ ], [ ]"), the actual load may not reach the preset torque limit value. In this case (in the case of operation by batteries), this auto reverse function will not be activated. When high torque is required, use the AC adapter or use this product in a condition where the batteries are not significantly consumed (when the mark of the remaining amount of the batteries indicates "[ ], [ ]").**
- **If a load is continuously applied to the motor handpiece, it may automatically stop to prevent overheating. (The torque limit value indicates "OH" on the LCD panel). In this case, leave the motor handpiece for a while until it cools down.**
  When the display returns to normal, the motor handpiece can be used.

(6) Completion of Medical Treatment

When the treatment is completed, return the motor handpiece to the handpiece stand and hold down the POWER key for more than one second to turn off the power.

⚠ NOTICE

If 10 minutes pass without operation of the ON/OFF button and foot control (Optional), the power turns off automatically. (Auto power off function) However, the power does not turn off automatically if the motor handpiece is in motion, even if it is not used.

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6. CONVENIENT FUNCTIONS

(1) Program

You can change any preset values and have them memorized to your desired settings (rotation speed, torque limit value, gear ratio and auto reverse mode).

①Press the PROGRAM key until it turns to the program number which you want to have memorized.

②Adjust the rotation speed, torque limit value, gear ratio and auto reverse mode by each key according to your needs.

③Hold down the MEMORIZE key for more than one second. When the alarm sounds, memorization is completed.

⚠ NOTICE

- **The program cannot be memorized while the motor handpiece is in motion.**
- **The rotational direction is not memorized in the program. The program cannot be memorized if the rotational direction is set to the reverse rotation (R).**
- **If the PROGRAM key is kept pressed, it is fast-forwarded.**
- **The program is not memorized unless the MEMORIZE key is held down for more than one second. If the program number is changed by the PROGRAM key without pressing the MEMORIZE key, the initially memorized preset values remain. (Cancel function)**

(2) Initialization of Program (Factory-set configuration)

The program can be returned to the original state configured at the time of factory shipment, if setup becomes confusing.

①Turn off the power, when the power is on.

②Connect the AC adapter and confirm that the AC IN lamp lights up.

③Hold down the POWER key for more than one second, while pressing the AUTO REVERSE key and MEMORIZE key at the same time.

④Release the keys when the LCD panel indicates "SEt", and re-press the MEMORIZE key while this is displayed.

⑤Initialization is completed, when "F IN"is displayed.

⚠ NOTICE

- **This function is not activated unless this product is powered by the AC adapter.**
- **If this function is used, all programs will disappear and return to the originally set values. Record the present program details according as needed.**

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(3) Battery Refresh

Nickel-metal-hydrate batteries may result in a decrease in charging capacity, if additional charging (repeating a cycle of short-time use and recharging) is made. (Generally, this phenomenon is called a "memory effect.") This Battery Refresh function is to resolve this phenomenon.

①Turn off the power if the power is on.
②Connect the AC adapter and confirm that the AC IN lamp lights.
③Hold down the POWER key for more than one second, while pressing the REVERSE key.
④The alarm sounds for a length of time, and the refresh mode is activated. At this time, the mark of the remaining amount of the batteries on the LCD panel is animated in the direction opposite to display at the time of charging. At the same time, the CHARGE lamp flashes slowly.
⑤Leave it as it is. The batteries are discharged and recharged automatically.
⑥Hold down the POWER key for a while, when you want to stop this process. (At this time, the power does not turn on.)

⚠ NOTICE

- **This function is not activated, if not driven by the AC adapter.**
- **It takes about maximum of 5 hours to discharge batteries.**
- **It takes 5 hours to discharge and 5 hours to recharge. Therefore, total of about 10 hours are required. For example, if dental treatment is finished at 7 p.m. and the refresh mode is set, the batteries will be fully charged by 5 a.m. the next morning at the longest.**
- **This function is not required for each charging. Try this function, if the operating time is shortened even if the batteries are relatively new.**
- **Do not repeat activation and deactivation of the refresh mode in a short time. It may result in enhancement of the memory effect.**
- **This function is fully effective for solution of a "memory effect." However, it cannot be solved completely at one time due to characteristics of batteries. We recommend you repeat this process a few times according to need.**

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(4) Calibration

This function is to decrease fluctuation in the rotation speed of the motor handpiece and the difference in torque by the contra angle head.

①Lubricate the contra angle head with the PANA SPRAY (option). (Refer to the "P17 7. (1) Lubricating Contra Angle Head.")
②Turn off the power if the power is on.
③Connect the AC adapter and confirm that the AC IN lamp lights.
④Turn on the power.
⑤Hold down both buttons of the SPEED key simultaneously for more than one second.
⑥The LCD panel displays "CAL" with the alarm sound.
⑦Attach the contra angle head to the motor handpiece and press the MEMORIZE key.
⑧If the motor handpiece begins to rotate, leave it as it is until it stops.
⑨This process ends, if the rotation stops and the LCD panel display returns to its original state.
⑩If you want to stop this process, turn off the power.

⚠ NOTICE

- **Lubricate the contra angle head before Calibration.**
- **This function does not operate if AC adapter is not used.**
- **Do not touch or apply a load to the rotating shaft of the contra angle head. It obstructs accurate measurement.**
- **This function cannot completely absorb the individual difference of the actual motor handpiece and contra angle head.**

(5) Alarm Sound Volume Control

The alarm sound volume can be controlled at the three steps of "BIG VOLUME, SMALL VOLUME and LIMITED OFF."

①Keep holding down both buttons of the PROGRAM key simultaneously.
②The alarm mark on the LCD panel changes, and the sound volume changes.
③Release the PROGRAM key when the sound volume reaches your required level and the required sound level is set up.

⚠ NOTICE

- **The sound level is retained, even if the power is turned off.**
- **If P.14 6. (2) "Initialization of Program (Factory-set configuration)" is executed, the sound is set to "BIG VOLUME."**

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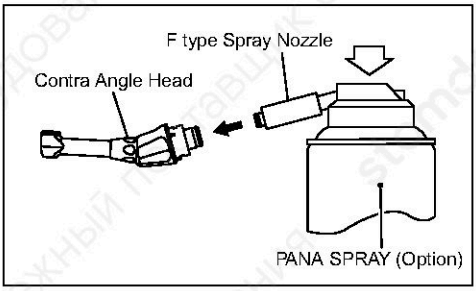
7. CLEANING

(1) Lubricating Contra Angle Head

- Lubricate the contra angle head only.
- Supply PANA SPRAY (option) after each use and/or before each calibration and autoclaving.

①Screw the F type spray nozzle onto the Pana-Spray nozzle by approx. 10 turns.

②Insert the F type spray nozzle into the rear part of the contra angle head and lubricate the head for 2-3 seconds. (Fig. 15)



* The contra angle head in the figure is MP-F20R. Fig. 12

(2) Cleaning Motor Handpiece

When the motor handpiece becomes dirty, wipe it off with a cotton cloth moistened with rubbing alcohol.

⚠ CAUTION

- **Do not lubricate the motor section of the motor handpiece.**
- **To clean the motor handpiece, do not use any solvent such as benzine and, thinner.**
- **Before mounting the lubricated contra angle head to the motor handpiece, wipe off extra oil. Stand on its end or lean it in the proper position for gravity draining. Mount it after excess oil has been drained.**
- **Hold the contra angle head securely to prevent it from flying off by the pressure of the spray.**
- **Supply lubricant until it comes out of the handpiece head (for approx. 2 seconds).**
- **Do not use a spray can upside down. In such a case, only spray gas comes out and oil is not sprayed.**

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8. STERILIZATION

- Sterilize the contra angle head only.
- For the sterilization method, we recommend the autoclave sterilization method.
- Sterilization required after each patient as noted below.

■ Autoclaving

① Brush the dirt off the surface of the contra angle head, and wipe it off with a cotton cloth moistened with rubbing alcohol. Do not use metal brush.
② Lubricate the head with the PANA SPRAY (option).
(Refer to the "P.17 7. (1) Lubricating Contra Angle Head.")
③ Insert the head into an autoclave pouch and seal it.
④ Autoclavable up to a max. 135˚C.
ex.) Autoclave for 20 min. at 121˚C, or 15 min. at 132˚C.

⚠ CAUTION

- **Do not apply high-temperature sterilization methods such as autoclave sterilization to any part other than the contra angle head.**
- **Skip dry cycle if the temperature could exceed 135˚C (275˚F).**
- **Since the bottom tray inside the chamber of the autoclave is close to a heater and the temperature in that place may locally exceed 135˚C (275˚F), place the head on the central or upper tray.**

9. CHANGING BATTERIES

The motor handpiece uses rechargeable batteries. They can be recharged 300-500 times, depending on the use conditions of the motor handpiece. If the operating time or recharging time becomes shorter or the rotation power becomes weaker, although the "memory effect" described in "⚠ NOTICE" is not applicable, the life of the batteries is suspected. In such a case, ask your dealer to replace the batteries or replace them with new ones by yourself. (Refer to the "■ Changing Batteries.") When replacing them by yourself, be sure to observe the following "⚠ CAUTIONS ON CHANGING BATTERIES." Note that NSK shall not be held liable for any malfunction or failure resulting from your not following the "⚠ CAUTIONS ON CHANGING BATTERIES."

⚠ CAUTIONS ON CHANGING BATTERIES

- **Do not open any part other than the battery cover.**
- **Be sure to purchase and use only the recommended batteries. Otherwise, batteries may cause damage, fluid leakage or explode.**
- **Do not work with wet hands. This may cause trouble due to short-circuiting of batteries and moisture infiltrating this product.**

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■ Changing Batteries

①Turn off the power. Remove the AC adapter.

②Remove the batteries after sliding the battery cover on the back of the control unit in the direction of the arrow. (Fig. 13)

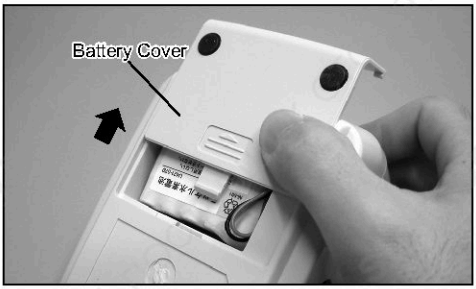


Fig. 13

⚠ CAUTION

Make sure to remove the AC adapter before changing batteries. Otherwise, it may cause a malfunction.

③Take out the old batteries, and pull out the cord, holding it at the connector. (Fig. 14)

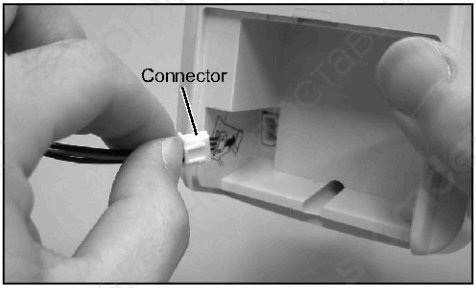


Fig. 14

⚠ CAUTION

Make sure to pull out the cord by holding the connector. Otherwise, it may cause a break in the cord.

④Insert the connector of the cord of new batteries into the connector in accordance with the polarity indication label inside the battery chamber, and place the batteries into the chamber with care so as not to catch the cord.

⚠ CAUTION

In case of difficult to insert the connector onto the battery, the polarity may be incorrect. Do not insert it by force.

⑤Close the battery cover. Make sure to charge the batteries before use.

⚠ NOTICE

The used nickel metal hydride batteries are recyclable, but their disposal may sometimes not be permitted by the country. Return them to your dealer.

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10. ERROR CODE

If the motor handpiece stops due to an abnormality such as a malfunction, overload, break or wrong use, it automatically checks the state of the control unit and detects the cause of the abnormality and displays an error code on the LCD panel. If an error code is displayed, turn on the power again and check whether the same error code is displayed. If the same error code is displayed, take action by referring to the instructions provided in the "Check/Remedy" column in the following table.

⚠ NOTICE

If batteries are replaced while the AC adapter is connected, an incorrect error code may be displayed.

	Error code	Error	Cause	Check/Remedy
During rotation of the motor handpiece	E-0	Self-Check error	Malfunction of circuit	Contact your dealer.
	E-1	Overcurrent	The motor handpiece is locked. (at the time of the auto reverse mode)	Remove load
	E-2	Overvoltage	Malfunction of circuit	Contact your dealer.
	E-4	Overheating of motor	High load was continuously applied to the motor handpiece for a relatively long time.	Leave it as it is until it cools down.
	E-5	Error of the brake circuit	Malfunction of circuit	Contact your dealer.
	E-6	The axle locks up	The motor handpiece is locked. (at the time of startup)	Remove load
At the time of charging	E-C	Low voltage of batteries	The voltage of batteries is too low (The life of batteries or not iserted.)	Put the batteries into the battery chamber, or replace with new batteries.
	E-d	High voltage of batteries	The voltage of batteries is too high. (Malfunction of circuit)	Contact your dealer.
	E-E	Beyond the range of working temperature	Beyond the range of working temperature or break in the thermistor in the battery section.	Use within the range of working temperature, or replace the batteries.
At the time of calibration	CE0	Beyond the upper limit	The operating life of the motor handpiece or contra angle has expired.	Replace the motor handpiece or contra angle head.
	CE1	Below the lower limit		
Other	E-F	Abnormal heat generation from batteries	The batteries generate abnormal heat.	Replace the batteries. If the heat generates from the new set of batteries, malfunction of the circuit may be suspected. Contact your dealer.

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11. TROUBLESHOOTING

When trouble is found, check the following again before contacting your dealer. If none of these is applicable or the trouble is not remedied even after action has been taken, a failure of this product is suspected. Contact your dealer.

<Control Unit, AC Adaptor>

Problem	Cause	Solution
The power is not turned on.	The AC adapter is not connected.	Check the connection.
	The plug of the AC adapter is not inserted into the outlet, or there is no electricity in the outlet.	Check the connection.
	The batteries are empty.	Charge the batteries or use the AC adapter.
	No batteries are inserted.	Insert batteries, or use the AC adapter.
	The internal fuse has burnt.	Contact your dealer.
AC IN lamp does not light.	The AC adapter is not connected.	Check the connection.
	The plug of the AC adapter is not inserted into the outlet, or there is no electricity in the outlet.	Check the connection.
	The internal fuse has burnt.	Contact your dealer.
	The AC adapter's fuse has burnt.	Contact your dealer.
The battery charger does not work. (The CHARGE lamp does not light.)	No batteries are inserted.	Insert batteries.
	The batteries are fully charged or in a state near full charge.	No problem
	The temperature of batteries is low.	If the temperature of batteries is less than 0˚C (32˚F), the batteries are not rechargeable. Charge the batteries in a warm room. (Be careful about moisture condensation.)
	The temperature of batteries is high.	It is normal that the batteries become a little bit warm right after charging. If the batteries are hot under normal operating conditions, not right after charging, there may be an abnormality. Contact your dealer.
	An error code is displayed.	See P.20 10. ERROR CODE.

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<Motor Handpiece>

Problem	Cause	Solution
The motor handpiece does not rotate.	The motor handpiece cord is not connected.	Check the connection.
	The foot control (Optional) is not connected.	Check the connection.
	There is a break in the motor handpiece or the motor handpiece cord.	Contact your dealer.
The motor handpiece does not rotate. (The error code "E - 1" is displayed.)	The contra angle head is clogged.	Clean or replace the contra angle head.
	There is a short circuit inside the motor handpiece or the motor handpiece cord.	Contact your dealer.
The motor handpiece does not rotate. ("- - -" and the rotation speed are displayed alternately.)	The contra angle head is clogged.	Clean or replace the contra angle head.
	There is a short circuit inside the motor handpiece or the motor handpiece cord.	Contact your dealer.
When turning on the power, the alarm sounds, and the motor handpiece does not rotate.	The power is turned on while pressing the ON/OFF button.	Check the ON/OFF button.
	There is a short circuit inside the ON/OFF button.	Contact your dealer.
	The power is turned on while pressing the foot control (Optional).	Check the foot control (Optional).
	There is a short circuit inside the foot control.	Remove the foot control, and rotate the motor handpiece by the ON/OFF button, or contact your dealer.
The motor handpiece keeps rotating. (The foot control (Optional) does not react.)	It is rotated by the ON/OFF button.	Stop the rotation by the ON/OFF button.
The motor handpiece keeps rotating. (The ON/OFF button does not react.)	It is rotated by the foot control (Optional).	Release your foot from the foot control (Optional) to stop, or pull out the plug of the foot control (Optional).

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12. CONTRA ANGLE HEAD (OPTIONAL)

Head	Model	Product No.	Specifications
	○MP-F20R	Y110-044	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35)
	●MP-F4R	Y110-047	
	○MPA-F20R	Y110-045	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35) • To connect with Apex Locator
	●MPA-F4R	Y110-051	
	○MPAS-F20R	Y110-046	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35) • To connect with Apex Locator
	●MPAS-F4R	Y110-052	
	○NML-F20R	Y110-053	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35)
	●NML-F4R	Y110-018	
	○NMA-F20R	Y110-054	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35) • To connect with Apex Locator
	●NMA-F4R	Y110-033	
	○NMAS-F20R	Y110-055	• Mini Head • 360˚rotation • 20:1 / 4:1 Reduction • For Ni-Ti files (ø2.35) • To connect with Apex Locator
	●NMAS-F4R	Y110-056	

✻ The incons beside of the models are showing reduction gear ratio of the head.
○20:1 Reduction, ● 4:1 Reduction
✻ Files are not included.

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13. WARRANTY

Manufacturer warrants its products to the original purchaser against defects in material and workmanship under normal practices of installation, use and servicing. Batteries etc. are expendable components, and are not covered by this warranty.

14. DISPOSING PRODUCT

- Please consult with dealer from whom you purchased it about waster despoil.
- The used nickel metal hydride batteries are recyclable, but their disposal may sometimes not be permitted by the country. Return them to your dealer.

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※ Specifications may be changed without notice.

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06.06.01 (M)