



Motor Handpiece System for Root Canal Enlargement

ENDO-MATE DT2



OPERATION MANUAL

CE 0197 MADE IN JAPAN

OM-E0851E 000

<https://stomshop.pro/>

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1 User and Indications for Use

User: Qualified professional (dentist)

Indications for use: Root canal enlargement

2 Precautions for Handling and Operation

- Please read these precautions 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
⚠ DANGER	Hazard that could result in personal death or serious injury if the safety instructions are not correctly followed.
⚠ WARNING	Hazard that could result in serious injury or damage to the device if the safety instructions are not correctly followed.
⚠ CAUTION	Hazard that could result in light or moderate injury or damage to the device if the safety instructions are not correctly followed.
NOTICE	General product specification information highlighted to avoid product malfunction and performance reduction.

⚠ DANGER

- Use the specified battery for this product. Never use any other battery than those that NSK specifies.
- Do not attempt to disassemble the product nor tamper with the mechanism except as recommended by NSK in this operation manual. This may result in an injury, electric shock or fire.
- Do not handle the AC adaptor and motor cord with wet hands. Wet hand contact with electricity may result in an electric shock.

⚠ WARNING

- Do not use AC adaptor other than genuine products made by NSK. Use of other cords may result in electric shock, fire or breakdown. Do not connect any other accessories that are not specified by NSK.
- If you find battery fluid or deformation, breakage or partial discoloring of the control unit casing, immediately stop use and contact your authorized NSK dealer. Continued use may result in electric shock or fire.
- If there is an abnormality such as smoke or smell of burning plastic from the product, turn off the power immediately, unplug the power cord from the outlet, and contact your dealer. Continued use may result in an electric shock or fire.

WARNING

- If the leaking battery fluid gets into your eyes, immediately wash eyes thoroughly with clean water and see your doctor. Failure to do so may result in loss of sight.
- If the battery fluid leaks and adheres 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.
- This product (except for contra angle head handpiece) is not waterproof. To prevent electric shock or fire due to a short-circuit or rusting, do not splash water or chemicals on it. If they are on the product, wipe them off immediately.
- Do not operate close to patients with cardiac pacemakers as there is a danger that it may affect the pacemaker.
- Do not allow any impact on to the product. Dropping may result in an injury and may cause overheating or fire due to failure of the internal component.
- If the product has not been used for a long period, remove the battery from the product to avoid fluid leak.
- When installing the product, provide space of approximately 10 cm around the control unit for easy access to the inlet and the power cord.
- 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.

Precautions for Handling and Operation

▲ CAUTION

- When operating the product always consider the safety of the patient.
- Do not use other than by the users or for the intended uses noted in this manual.
- Observe the allowable rotation speed and specified torque that the file manufacturer specifies for use.
- Operators and all others in the area must wear eye protection and a mask when operating this product.
- If the product functions abnormally during using it, stop using the product immediately and contact your authorized NSK dealer.
- This device is for indoor use only.
- Keep the control unit on a level surface.
- 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. This may cause overheating or fire due to failure of the internal circuit.
- Prior to clinical use, check the product by rotating it for looseness, vibration, noise and overheating. If any abnormalities are found, stop using the product immediately and contact your authorized NSK dealer.
- Perform maintenance according to “6 Post-use Maintenance” when using the product for the first time after purchasing or repairing.
- Before changing the contra angle head or File, turn off the power of the control unit. Changing with the power kept on may cause unintended rotation if the motor handpiece ON/OFF button is accidentally pressed.
- Pay attention to the direction of the battery 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. This may result in overheating or fire due to a short-circuit.
- 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 end user shall be responsible for any judgment that relates to the application of this product to a patient.
- Users are responsible for the operational control, maintenance and continual inspection of this product.
- ENDO-MATE DT2 needs special precautions regarding EMC and needs to be installed and put into service according to the “11 EMC Information (Electromagnetic Compatibility Information)”.
- Portable and mobile RF communications equipment can affect ENDO-MATE DT2.
- The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of ENDO-MATE DT2 as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of ENDO-MATE DT2.
- ENDO-MATE DT2 should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, ENDO-MATE DT2 should be observed to verify normal operation in the configuration in which it will be used.

NOTICE

- Fully-charged rechargeable battery, in general, discharge gradually over time even though it is not used. It is recommended to recharge the battery 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.
- Try to recharge the battery only after they have been used as much as possible. If the battery is repeatedly used for short periods and recharged, the so-called memory effect could result in a shorter usage time than indicated. If this happens, battery performance can be recovered by fully draining and then fully recharging the battery several times. (This product includes a refresh mode for this purpose.)
- The used nickel metal hydride battery is recyclable. When disposing of it do not disassemble the battery and dispose of the product according to laws and regulations. Alternatively, return it to your dealer.
- 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.
- No special training is required for this device.
- When disposing of the control unit, 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.

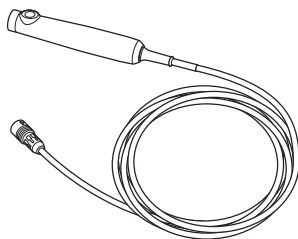
3 Product Description

3-1 Package contents

①



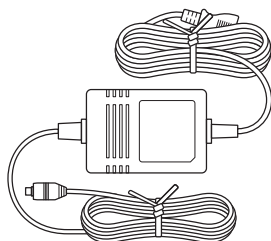
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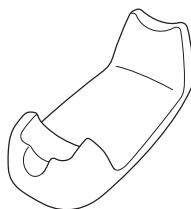
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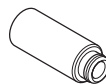
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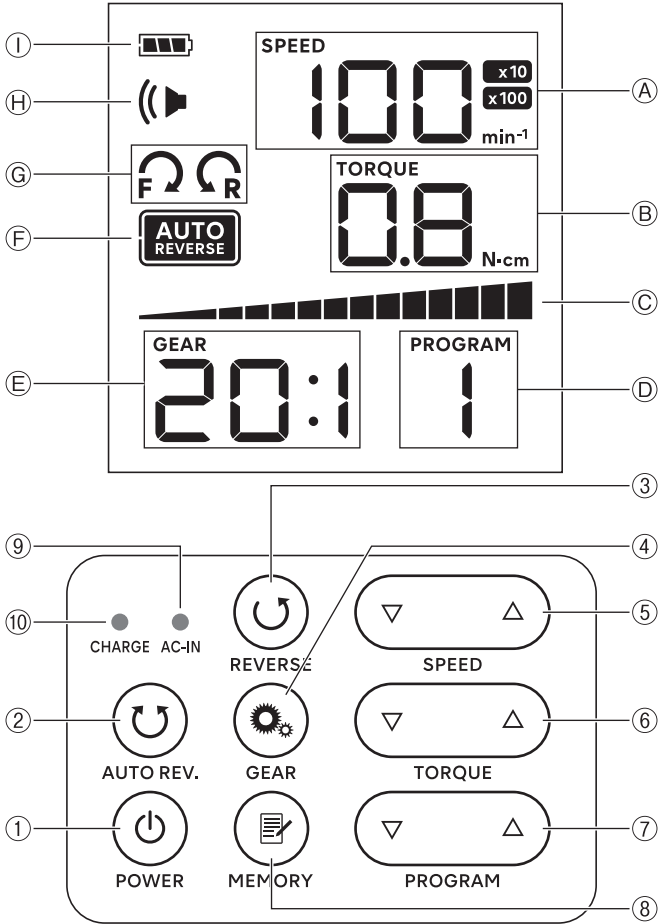
⑥










No.	Part Name	Quantity
①	Control unit	1
②	Motor handpiece	1
③	Contra angle head (MP-F20R)*	1
④	AC adaptor	1
⑤	Handpiece stand	1
⑥	F-type spray nozzle*	1







*Included only in standard set





3-3 Control panel



No.	Key	Name	Display	Function
①		POWER Key	-	Turn on/off the power and the LCD display by keeping pressing this key for more than 1 second.
②		AUTO REVERSE Key	(F)	<p>Select an auto reverse mode. The key changes over to AUTO REVERSE, AUTO REVERSE OFF and AUTO STOP each time it is pressed. If this key is kept pressed, it is fast-forwarded.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"> AUTO REVERSE </div> <div style="margin-right: 10px;">⇒</div> <div style="border: 1px dashed black; padding: 5px; margin-right: 10px;"> AUTO REVERSE </div> <div style="margin-right: 10px;">⇒</div> <div style="border: 1px solid black; padding: 2px;"> AUTO REVERSE </div> </div> <p>AUTO REVERSE OFF ⇒ AUTO STOP</p> <p>*No display</p>
③		REVERSE Key	(G)	<ul style="list-style-type: none"> Switch the rotation direction of the file. The key changes over to the forward rotation  and reverse rotation  each time it is pressed. It can also be changed while the file is in motion. The alarm sounds during reverse rotation. Resolve the battery memory effect by turning on the power while pressing this key. (See “7-1 Battery refresh”.)
④		GEAR RATIO Key	(E)	<ul style="list-style-type: none"> Select a gear ratio according to the contra angle head used. The key changes over to 1:1 > 4:1 > 10:1 > 16:1 > 20:1 > 1:1, and so on each time it is pressed. If this key is kept pressed, it is fast-forwarded. The gear ratio cannot be changed while the file is in motion.
⑤		SPEED Key	(A)	<ul style="list-style-type: none"> Select the rotation speed. If the speed is to exceed the upper limit or fall below the lower limit, the alarm sounds. The unit is “min⁻¹”. “x10” or “x100” is displayed depending on the rotation speed. If this key is kept pressed, it is fast-forwarded. The rotation speed can also be changed while the file is in motion. Perform calibration by pressing ▽ and △ at the same time. (See “4-7-1 Calibration”.)

Product Description

No.	Key	Name	Display	Function
⑥		TORQUE Key	Ⓑ	<ul style="list-style-type: none"> • Select a torque limit value. When it reaches the maximum value, "--" is displayed. • If the torque limit value is to exceed the upper limit or fall below the lower limit, the alarm sounds. • If this key is kept pressed, it is fast-forwarded. • The unit is "Ncm".
⑦		PROGRAM Key	Ⓓ	<ul style="list-style-type: none"> • Select a program number from 1 to 9. • If the PROGRAM key is kept pressed, it is fast-forwarded.
			Ⓗ	<ul style="list-style-type: none"> • Adjust the alarm sound volume by keeping pressing ▽ and △ at the same time. (See "5-4 Alarm sound volume control".)
				Volume high
				Volume low
				Limited off Volume OFF: Alarm when rotating in reverse or when torque limit value reached Volume low: Alarm at confirmation or error
⑧		MEMORY key	-	Preset program settings (rotation speed, torque limit value, gear ratio, auto reverse mode). (See "5-3 Programs".)
⑨	-	AC IN Lamp	-	This lamp lights, when the power is supplied from the AC adaptor, regardless of the ON or OFF position of the power.
⑩	-	CHARGE Lamp	-	This lamp lights or flashes while the battery is being charged or in the refresh mode (see "7-1 Battery refresh"), or in an error condition, regardless of the ON or OFF position of the power.

No.	Key	Name	Display	Function	
-	-	Charge indicator	①		Full charge or nearly full charge.
					30% - 80% remains.
					Less than 30% remains. In case of this condition, the auto reverse function may not activate. (See "5-2 Auto reverse function".)
					The battery is not loaded, or the battery voltage is extremely low. Charge the battery.
-	-	-	©	The bar graph shows the degree of load applied to the motor while the file is in motion.	

NOTICE

- Charge indicator indicates the voltage of the battery. When load is applied to the motor handpiece, the mark of remaining amount of the battery appears to become lower.

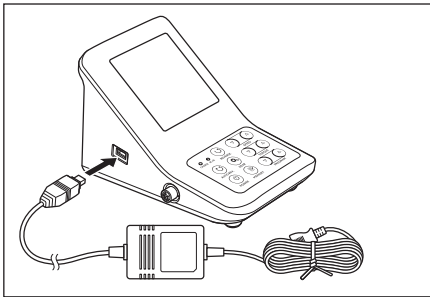
4 Preparation for Use

⚠ CAUTION

- To prevent cross contamination between patients, use a disposable barrier sleeve and barrier film that meet local regulations.

4-1 Connecting AC adaptor

Insert the jack of the AC adaptor into the AC power cord connector socket with the ⇒ mark of the jack cast down.



4-2 Charge (If the battery is used)

This product uses AC adaptor to charge the battery.

Before starting use, check the charge status of the battery. The battery status can be checked on the charge indicator.

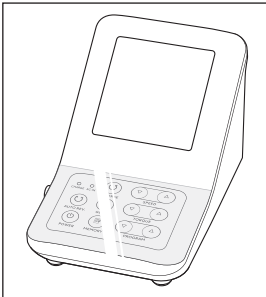
- 1 Firmly insert the AC adaptor into a power supply.
- 2 The AC IN lamp lights in green.
- 3 The CHARGE lamp illuminates and charging starts (battery voltage is measured and charging starts only when necessary). The charge indicator on the LCD display shows animation while charging.
* There is no need to turn on the power.
- 4 When the CHARGE lamp turns off, charging has been completed.

▲ CAUTION

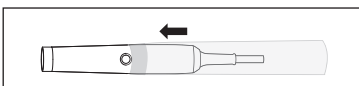
- Do not connect with an outlet that does not match specifications. Doing so may cause a malfunction.
- Since the AC IN lamp lights to indicate that the supply power is on, it does not go out even after a charge is completed. See the CHARGE lamp to check the charging conditions.
- The charging normally takes approximately 5 hours, but it depends on the battery use conditions, age of the battery, air temperature, and other factors.
- The temperature of the battery is measured during charging. Proper charging cannot be performed if the charger is placed in an environment which is subject to sharp temperature change (next to window, subject to direct sunlight, near air outlet or fan heater). Place it in a place where temperature change is minimal.
- The charging may not be started in the following cases.
 - The temperature of a battery is too low or too high. (less than 0°C or more than 40°C.)
 - When the battery voltage is high enough (This does not mean that the battery is fully charged.)
 - A battery is not connected
 - The voltage of a battery is abnormal (See “8–1 Error code”).
- Battery is 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.

4–3 Attaching barrier film

Apply disposable barrier film to a surface where you touch it, such as keys of the control unit, in order to prevent cross contamination during use.

**4–4 Connecting and disconnecting the motor handpiece****■ Connecting**

- 1 Attach the disposable barrier sleeve to the motor handpiece (including the cord plug) and secure the end of the motor side of the barrier sleeve with the barrier film.

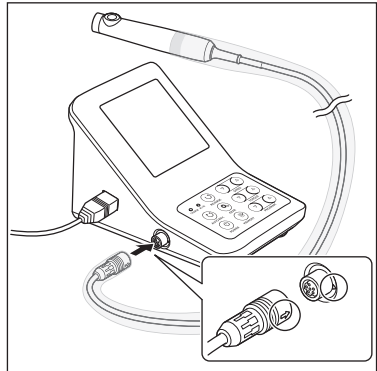


Preparation for Use

NOTICE

- Use of a barrier sleeve with a width of 35 mm or greater is recommended.

- 2 Align the ⇒ mark of the motor handpiece cord plug with the ▲ mark of the motor handpiece connector socket and insert the plug until it locks.



■ Disconnecting

Hold the plug and pull it out. Do not twist in any direction.

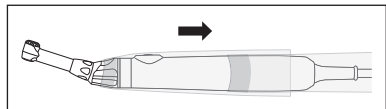
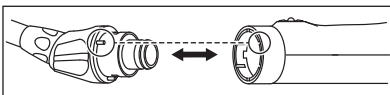
⚠ CAUTION

- Be sure that there is no damage on the new barrier film and barrier sleeve before use. Do not use it if it is damaged.
- For details of the barrier sleeve and barrier film, see the operation manual issued by manufacturer.

4-5 Connecting and disconnecting the contra angle head

■ Connecting

- 1 Align the positioning pins of the contra angle head with the positioning slots of the motor handpiece and insert the head until they click. The contra angle head could be connected with the motor handpiece at 6 adjustable head positions.
- 2 Attach a disposable barrier sleeve to the contra angle head and secure the end of the barrier sleeve with the barrier film.



■ Disconnecting

When removing the contra angle head, pull it out axially.

▲ CAUTION

- Before connecting and disconnecting the contra angle head, turn off the power.
- Check that the contra angle head is securely assembled to the motor handpiece.

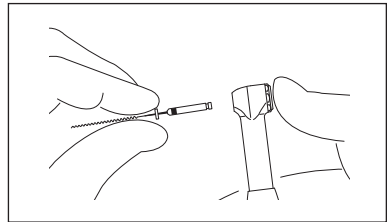
NOTICE

- Mount the lubricated contra angle head to the motor handpiece. Calibration cannot be performed correctly if lubrication is not done. See “4-7-1 Calibration” for calibration.

4-6 Inserting and removing the file

■ Inserting

- 1 Insert the file until it is correctly secured in place.
- 2 Depress the push button and insert the file into the chuck until the file “notch” mechanism engages. Release the button.
- 3 Confirm that the file is secure by gently pulling and pushing the file without depressing the push button.



■ Removing

Depress the push button to open the chuck and remove the file.

▲ CAUTION

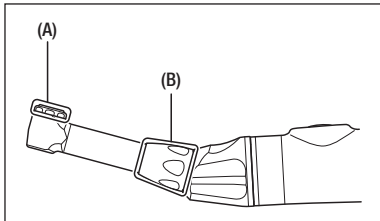
- Before mounting and removing the file, turn off the power.
- Always keep the file shank clean. Dirt or debris in the chuck could cause poor file concentricity or low chuck retention force.
- Do not use files with problems listed below as the file may break, seize up or disengage from the chuck.
 - Bent, deformed, worn, rusted, broken, deficient file.
 - File which is cracked on the edge or axis.
 - Non-ISO (EN ISO) standard, or tampered file.
- When replacing files, be sure to wipe any dirt from the file insertion port surface with a dry cloth before attaching a new file.

Preparation for Use

4-7 Check before treatment

Before using, rotate outside the oral cavity of the patient for checking that nothing is abnormal. If you notice anything unusual when checking, such as rattling, vibrations, abnormal sounds, or overheating, immediately stop usage, and contact your dealer.

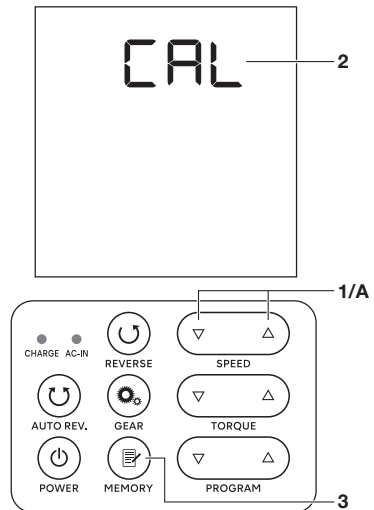
- 1** Make sure each component is securely connected.
- 2** Insert the AC adaptor into a power supply if it is not connected.
- 3** Make sure the head cap (A) and union nut (B) of the contra angle head are firmly tightened.
- 4** Turn on the control unit and make sure the LED display is illuminated.
- 5** Calibrate as instructed in "4-7-1 Calibration".
- 6** Operate the motor handpiece for 1 minute and check for looseness, abnormal vibration, or abnormal noise.
- 7** Stop the motor handpiece and check for abnormal heating of the motor handpiece and contra angle head surface.



4-7-1 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.

- 1 Press and hold the SPEED keys (▽, △) simultaneously for 1 second or longer.
- 2 An alarm sounds and the LCD display shows "CAL".
- 3 Press the MEMORY key.
- 4 The motor handpiece starts rotating. Wait until the motor handpiece stops and the LCD display returns to normal.



A: Press and hold simultaneously for 1 second or longer.



If you want to stop this process, turn off the power.

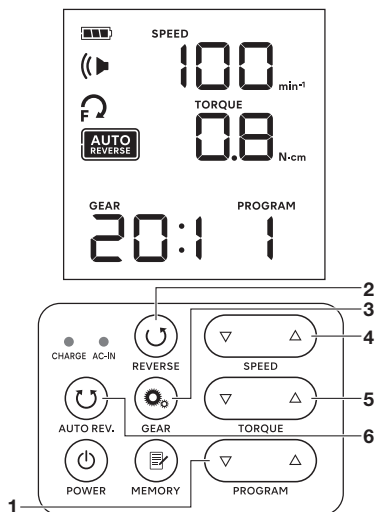
NOTICE

- Mount the lubricated contra angle head to the motor handpiece. Calibration cannot be performed correctly if lubrication is not done.
- This function is not activated unless this product is powered by the AC adaptor.
- Do not touch or apply 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 Operation Procedure

5-1 Standard operation

- 1 Select a program number. (1-9)
- 2 Select the rotation direction.
 -  Forward rotation
 -  Reverse rotation
- 3 Select the gear ratio of the handpiece to be used.
- 4 Set the rotation speed recommended by file manufacturers.
- 5 Set the torque limit value recommended by file manufacturers. (Only for the forward rotation)



(Setting range)

Gear ratio	Rotation speed (min ⁻¹)	Torque limit (N-cm)
20:1 Reduction	100-650	0.8-6.5
16:1 Reduction	120-800	0.6-5.2
10:1 Reduction	200-1,300	0.4-3.2
4:1 Reduction	500-3,200	0.1-1.3
1:1 Drive	2,000-13,000	- -

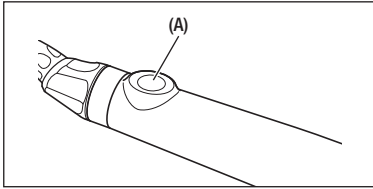
- 6 Select the auto reverse mode. For details, see “5-2 Auto reverse function”.

 : AUTO REVERSE

 : AUTO REVERSE OFF

 : AUTO STOP

- 7 Press the ON/OFF button (A) to start the motor handpiece.



There are 2 operations.

- ① Alternate operation
Press (A) for less than 1 second: Rotation starts
Press again: Rotation stops
- ② Intermittent operation
Press and hold (A) for 1 second or more: Rotates while it is pressed
Release: Rotation stop

■ Operation during motor handpiece rotation

Adjustable: Rotation speed, torque limit value, rotation direction

Non-adjustable: Gear ratio, auto reverse mode, program number

CAUTION

- Observe the allowable rotation speed and specified torque that the file manufacturer specifies for use.

NOTICE

- If 10 minutes pass without operation of the ON/OFF button, 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.

5-2 Auto reverse function

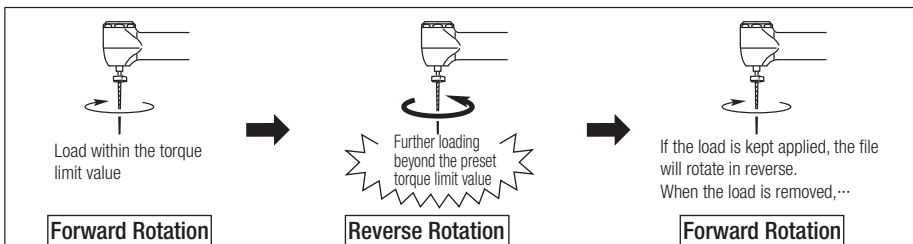
When the motor handpiece starts and its load reaches approximately half of the preset torque limit value, the alarm sounds.

The alarm sound changes when the load approaches the torque limit value.

When a further load exceeds the torque limit value, the following 3 modes can be selected:

■ **AUTO REVERSE**

The motor handpiece rotates in reverse when the torque limit value is exceeded. When the load is removed, the motor handpiece returns to forward rotation automatically.



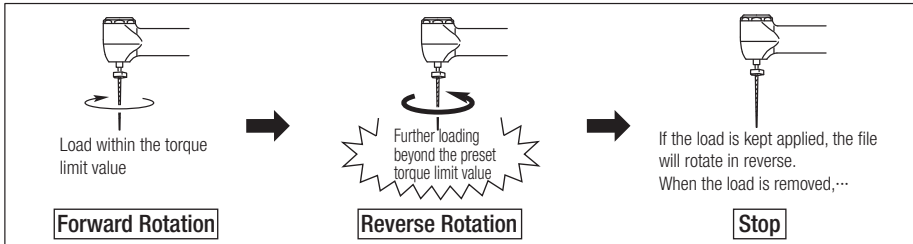
Operation Procedure

■ AUTO REVERSE OFF





The motor handpiece stops without reverse rotation when the torque limit value is exceeded. In this instance, the LCD display shows “- - -” and the rotation speed alternately. To rotate it again (forward rotation), remove the load and press the ON/OFF button twice.

■ AUTO STOP **AUTO REVERSE**

The motor handpiece rotates in reverse when the torque limit value is exceeded. When the load is removed, the motor handpiece stops. If you want it to rotate (forward rotation) again, re-press the ON/OFF button.



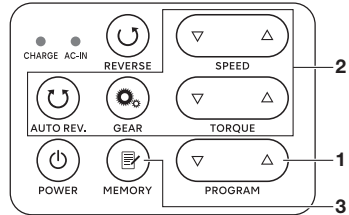
NOTICE

- When reverse rotation is set, this Auto Reverse Function is not activated.
- If the battery goes down (when charge indicator mark “, ” appears), actual load may not reach the preset torque limit value (in the case of operation by the battery). In this case, this auto reverse function will not be activated. When high torque is required, use the AC adaptor or use this product in a condition where the battery is not significantly consumed (when charge indicator mark “, ” appears).
- If a load is continually applied to the motor handpiece, it may automatically stop to prevent overheating (the torque limit value indicates “O.H” on the LCD display.) 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.

5-3 Programs

The settings (rotation speed, torque limit value, gear ratio, auto reverse mode) can be memorized in the selected program number.

- 1 Select a program number.
- 2 Adjust the rotation speed, torque limit value, gear ratio and auto reverse mode by each key according to your needs.
- 3 Memorize setting (Memorizing is complete when long beep sounds).



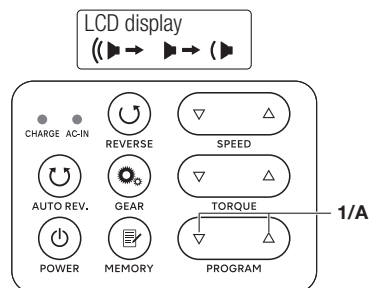
NOTICE

- The program cannot be memorized while the motor handpiece is in motion or when the rotation direction is set to the reverse rotation.
- The rotation direction is not memorized in the program.
- Settings will not be memorized unless the MEMORY key is held down for 1 second or longer. Settings will not change if the program number is changed with the PROGRAM key without pressing the MEMORY key.

5-4 Alarm sound volume control

The alarm sound volume can be controlled at three steps of “Volume high, Volume low and Limited off.” (Default setting: Volume high)

- 1 Press and hold the PROGRAM keys (▽, △) simultaneously for 1 second or longer.
- 2 The alarm mark on the LCD display changes, and the sound volume changes.
- 3 Release the PROGRAM key when the sound volume reaches your required level and the required sound level is set up.



A: Press and hold simultaneously for 1 second or longer.

NOTICE

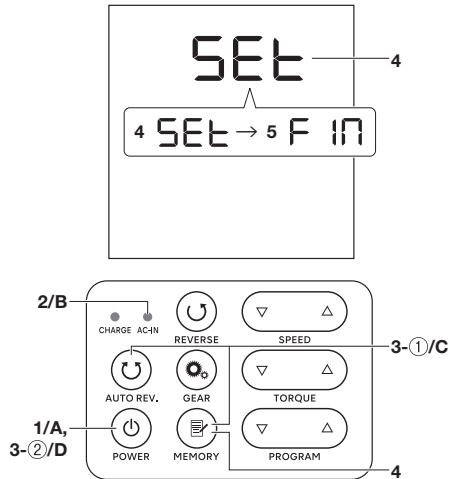
- The sound level is retained, even if the power is turned off.
- If “5-5 Initialization of program (factory-set configuration)” is executed, the sound is set to “Volume high.”

Operation Procedure

5-5 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.

- 1 Turn off the control unit.
- 2 Connect the AC adaptor and confirm that the AC IN lamp lights up.
- 3 While pressing the AUTO REVERSE key and MEMORY key simultaneously (1), press and hold the POWER key for 1 second or longer (2).
- 4 Release the keys when the LCD display indicates "SEt", and re-press the MEMORY key while this is displayed.
- 5 Initialization is completed, when "Fln" is displayed.



A: ON→OFF

B: Illuminated

C: Press and hold simultaneously for 1 second or longer.

D: Press and hold for 1 second or longer.

NOTICE

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

6 Post-use Maintenance

6-1 Preparation for maintenance

- 1 Wear eye protection glasses, a mask, and gloves to prevent infection.
- 2 Turn off the control unit.
- 3 Remove the motor handpiece cord plug from the control unit.

⚠ WARNING

- Maintain the contra angle head and the file properly as follows. Improper maintenance may cause infection, product failure, and injuries from overheating:
 - Be sure to clean the contra angle head and the file immediately (within 30 minutes) after use to remove residue.
 - Be sure to disinfect the contra angle head and the file, within 2 hours after cleaning.

⚠ CAUTION

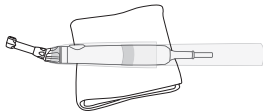
- Do not clean, immerse, or wipe the product with electrolyzed-oxidizing water (strong acidic water, super acidic water), strong acidic and strong alkaline liquid solution, solvent containing chlorine, benzene, or thinner.
- Follow any additional local directives, standards, and guidelines for cleaning, disinfection, lubrication and sterilization.

6-2 Cleaning and disinfection

[[For contra angle head]]

[Cleaning of Casing]

- 1 Remove the file from the contra angle head.
- 2 Remove all debris on the surface of the product with wipes (Minuten Wipes:ALPRO).
- 5 Wipe the debris on the surface of the contra angle head with a cloth moistened with water.



- 3 Remove the disposable barrier sleeve from the contra angle head and the motor handpiece.



- 4 Remove the contra angle head from the motor handpiece.

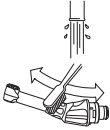
Post-use Maintenance

- 6** Clean the surface of the contra angle head under running water with a soft bristled brush for more than 20 seconds.

Water temperature: $\leq 38^{\circ}\text{C}$

Water quality: Water available as drinking water

Water amount: ≥ 3.5 L/min

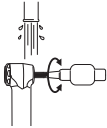


- 7** Clean the file insertion hole for more than 20 seconds with a wire (ISO 16409 size 4 (wire thickness 0.7mm)) under running water.

Water temperature: $\leq 38^{\circ}\text{C}$

Water quality: Water available as drinking water

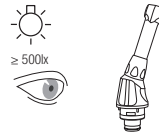
Water amount: ≥ 3.5 L/min



- 8** Wipe the residual moisture on the surface of the contra angle head with a dry cloth.



- 9** After cleaning, under appropriate lighting ($\geq 500\text{lx}$), inspect the contra angle head for contamination. If any visible contamination remains, repeat the process from the procedure No. 6 until it is visually clean.



[Cleaning and Disinfection of Interior]

⚠ CAUTION

- Before cleaning and disinfecting the interior, be sure to clean the casing.

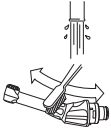
Adaptor (ADS 2: Miele/63500: Melag) is to be prepared customers.

- 1** Clean the surface of the contra angle head under running water with a soft bristled brush for more than 20 seconds.

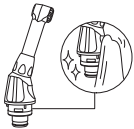
Water temperature: $\leq 38^{\circ}\text{C}$

Water quality: Water available as drinking water

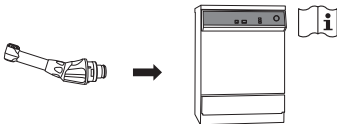
Water amount: ≥ 3.5 L/min



- 2** Wipe the contact part of the contra angle head and adaptor (ADS 2: Miele/63500: Melag) with disinfectant wipes (Minuten Wipes: ALPRO).



- 3** Attach the contra angle head to the adaptor (ADS 2: Miele/63500: Melag) of the washer-disinfector.



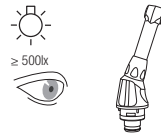
- 4** Clean and disinfect the contra angle head.

- 5** Remove the contra angle head from the adaptor (ADS 2: Miele/63500: Melag) of the washer-disinfector.

- 6** Wipe the residual moisture of the contra angle head with a dry cloth or blow it off with filtered clean compressed air ($\leq 0.35\text{MPa}$) until there is no moisture in the interior and exterior of the contra angle head.



- 7** Under appropriate lighting ($\geq 500\text{x}$), inspect the contra angle head for contamination. If any visible contamination remains, repeat the process from procedure No. 2 until it is visually clean.



- 8** Proceed to the section "6-3 Lubrication" and "6-4 Sterilization".

CAUTION

- Use a cleaning and disinfecting device (washer-disinfector) complying with DIN EN ISO 15883 (e.g. Miele washer-disinfector G7781 / G7881; Melag Melatherm), operating with a maximum pH value of 10.5 (e.g. neodisher, Dr. Weigert) and equipped with an appropriate adaptor. Proof of suitability for the process must be obtained from the washer-disinfector manufacturer.
- Perform automated cleaning and disinfection according to the operation manual of washer-disinfector.
- When using a washer-disinfector, dry the product completely. Remaining moisture causes internal corrosion and inadequate lubrication.
- When cleaning the contra angle head with washer-disinfector, using a neutral enzymatic detergent (pH 7.0 - 8.0) is recommended.

Post-use Maintenance

⚠ CAUTION

- Immediately after cleaning, disinfecting and drying cycle is complete, the contra angle head must be removed from the washer-disinfector (within 1 hour) to prevent corrosion.
- After using the washer-disinfector, dry the product completely. Remaining moisture causes internal corrosion, etc.
- After cleaning and disinfecting the contra angle head, be sure to perform “6–3 Lubrication” and “6–4 Sterilization”.

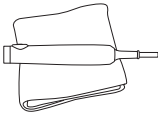
[[For motor handpiece]]

⚠ CAUTION

- The motor handpiece cannot be cleaned with washer-disinfector.

[Cleaning]

- 1 Wipe the debris on the surface of the motor handpiece with a cloth moistened with water.

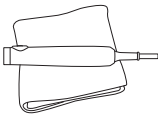


- 2 Under appropriate lighting ($\geq 500\text{lx}$), inspect the motor handpiece for contamination. If any visible contamination remains, repeat the process from procedure No. 1 until it is visually clean.



[Disinfection]

- 1 Wipe the surface of the motor handpiece with disinfectant wipes (Minuten Wipes:ALPRO).



[[For handpiece stand]]

[Cleaning]

- 1 Wipe the surface of the handpiece stand with a cloth moistened with water.

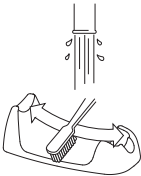


- 2 Clean the surface of the handpiece stand under running water with a soft bristled brush for more than 20 seconds. Then rinse the handpiece stand for more than 5 seconds.

Water temperature: $\leq 38^{\circ}\text{C}$

Water quality: Water available as drinking water

Water amount: $\geq 3.5\text{L/min}$



- 3 Wipe the surface of the handpiece stand with a dry cloth.



- 4 After cleaning, under appropriate lighting ($\geq 500\text{lx}$), inspect the handpiece stand for contamination. If any visible contamination remains, repeat the process from procedure No. 2 until it is visually clean.



[Disinfection]

- 1 Wipe the surface of the handpiece stand with disinfectant wipes (Minuten Wipes:ALPRO).



[[For control unit]]

[Cleaning]

- 1 Remove the barrier film from the control unit.



- 2 Wipe the surface of the control unit with a cloth moistened with water.

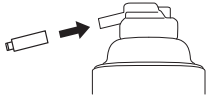


Post-use Maintenance

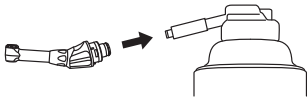
6-3 Lubrication

Lubricate the contra angle head using the F-Type nozzle and the PANA SPRAY Plus.

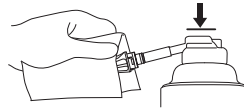
- 1 Shake the PANA SPRAY Plus at 2 or 3 times.
- 2 Screw the F-Type Spray Nozzle into the PANA SPRAY Plus by turning it 10 times or so.
- 4 Spray until the oil coming out of the tip of the contra angle head is clear of any debris or foreign substance.



- 3 Attach the F-Type spray nozzle to the rear end of the contra angle head.



Spray time: 2 or 3 seconds
Number of spray: 1 time



- 5 Remove the F-Type spray nozzle from the contra angle head then remove the F-Type spray nozzle from the PANA SPRAY Plus.
- 6 If excess oil comes out of the contra angle head, leave the contra angle head vertically for a while.

⚠ CAUTION

- Be sure to use the PANA SPRAY Plus when lubricating the contra angle head.
- Lubricate only contra angle head. Do not lubricate products other than contra angle head.
- Shake the PANA SPRAY Plus 2-3 times well before use.
- Be sure to securely connect the contra angle head to the F-Type spray nozzle when lubricating the contra angle head. Otherwise, it may cause improper lubrication to the contra angle head and the oil may flow backward.

6-4 Sterilization

Use a steam sterilizer to sterilize the contra angle head. After each patient treatment, sterilize the contra angle head as follows.

Sterilizable equipment: contra angle head

- 1 Insert the contra angle head individually into a sterilization pouch that conforms to ISO 11607-1, and seal the pouch.
- 2 Sterilize the contra angle head. Conduct sterilization as follows.

Type	Gravity Displacement	Pre-Vacuum (Dynamic Air Removal)
Temperature	132°C(0/+4°C)	134°C(0/+4°C)
Full Cycle Time	≥15min	3-18 min
Drying Time	≥30min	≥30min

▲ CAUTION

- Follow local rules, regulations, and guidelines according the reprocessing of devices.
- Do not sterilize the motor handpiece.
- Do not sterilize the contra angle head with other instruments even when it is in a pouch. This is to prevent possible discoloration and damage to the contra angle head from chemical residue on other instruments.
- Do not heat or cool the contra angle head quickly. Rapid change in temperature could cause damage to the contra angle head.
- Be sure to use sterilizers that can perform sterilization up to 135°C. In some sterilizers, the chamber temperature may exceed 135°C. Do not use these sterilizers as failure of the contra angle head could occur. Contact the sterilizer manufacturer for detailed information about cycle temperatures.
- Clean the contra angle head prior to disinfect. If blood remains on the internal surface it can become clotted and cause contra angle head failure.
- Keep the product in suitable atmospheric pressure, temperature, humidity, ventilation, and sunlight. The air should be free from dust, salt and sulphur.
- Do not touch the contra angle head immediately after autoclaving as it will be very hot and must remain in a sterile condition.
- Steam sterilization is recommended for the contra angle head. The validity of other sterilization methods (such as plasma sterilization or EOG sterilization) is not confirmed.
- Immediately after sterilization is complete (within 1 hour), remove the contra angle head from the sterilizer. Failure to do so may cause corrosion.

NOTICE

- NSK recommends Class B sterilizer as stated in EN 13060.
- For details, confirm the operation manual issued by manufacturer of the sterilizer.

6-5 Storage

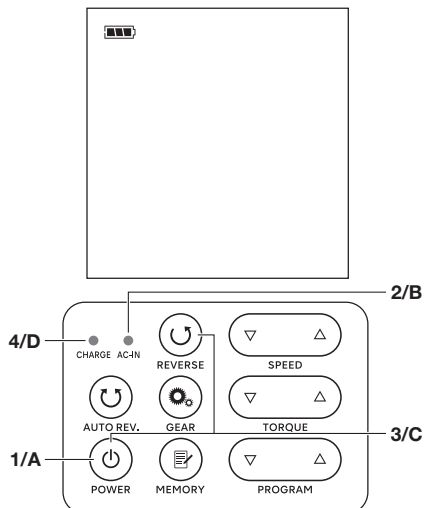
Store the products in a clean place. Keep the contra angle head in a sterilization pouch until next use.

7 Maintenance

7-1 Battery refresh

Nickel-metal-hydrate battery 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.

- 1 Turn off the control unit.
- 2 Connect the AC adaptor and confirm that the AC IN lamp lights up.
- 3 Press and hold the POWER key for more than 1 second, while pressing the REVERSE key.
- 4 The alarm sounds for a length of time, and the refresh mode is activated. At this time, the charge indicator on the LCD display is animated in the direction opposite to display at the time of charging. At the same time, the CHARGE lamp flashes slowly.
- 5 Leave it as it is. The battery is discharged and recharged automatically.



- A:** ON→OFF
- B:** Illuminated
- C:** Press and hold simultaneously for 1 second or longer.
- D:** Flash

Press and hold 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 unless this product is powered by the AC adaptor.
- It takes about maximum of 5 hours to discharge the battery.
- It takes 5 hours to discharge and 5 hours to recharge. Therefore, total of about 10 hours are required.
- This function is not required for each charging. Try this function, if the operating time is shortened even if the battery is 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 the “memory effect.” However, it cannot be solved completely at one time due to characteristics of the battery. We recommend you repeat this process a few times as necessary.

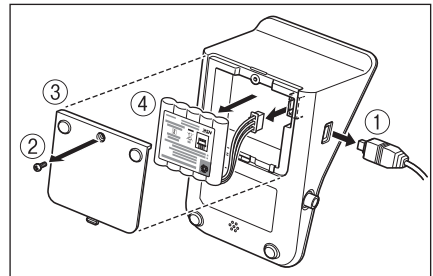
7-2 Changing the battery

ENDO-MATE DT2 uses rechargeable battery. It can be recharged 300-500 times depending on the use conditions of the control unit. If charge time and use time (for which the “memory effect” described in “7-1 Battery refresh” is not applicable) becomes short or power is weak, the battery may have reached the end of their life. In such a case, ask your dealer to replace the battery or replace it with a new one yourself. When replacing it yourself, be sure to observe the following “CAUTIONS ON CHANGING BATTERY.” Note that NSK shall not be held liable for any malfunction or failure resulting from your not following the “CAUTIONS ON CHANGING BATTERY.”

▲ CAUTIONS ON CHANGING THE BATTERY

- Do not open any part other than the battery cover.
- Be sure to always use genuine NSK battery. Use of non-genuine battery can result in breakage, fluid leakage, rupture, or other problems.
- Do not work with wet hands. This may cause trouble due to short-circuiting of the battery and moisture infiltrating this product.
- Do not connect the AC adaptor while the battery is removed from the control unit.
- If the battery fluid leaks and gets in your eyes or on your skin or clothing, immediately wash your eyes and skin thoroughly with running water and see your doctor. Failure to do so may result in vision loss or skin complications.

- 1 Turn off the power, and disconnect the AC adaptor (①).
- 2 Remove the screw securing the battery cover on the bottom side of the control unit using a Phillips screwdriver (②).
- 3 Remove the battery cover (③).
- 4 Take out the old battery, and pull out the cord (④).

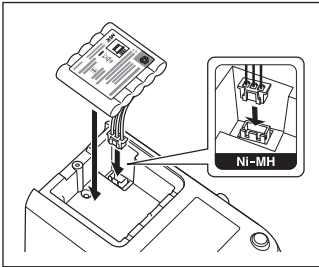


▲ CAUTION

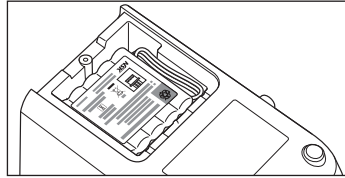
- Make sure to remove the AC adaptor before changing battery. Otherwise, it may cause a malfunction.
- Make sure to pull out the cord by holding the connector. Otherwise, it may cause a break in the cord.

Maintenance

- 5 Insert the connector of the cord of the new battery into the connector in accordance with the polarity indication label inside the battery chamber.



- 6 Refer to the figure below and place the battery into the battery chamber with care so as not to catch the cord.



⚠ CAUTION

- If it is difficult to insert the connector onto the battery, the polarity may be incorrect. Do not insert it by force.
- After the connector is inserted into the port, lightly pull the battery cord to confirm that it is firmly inserted.

- 7 Close the battery cover, and secure it in place with the screw.

- 8 Be sure to always charge before use.

NOTICE

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

7-3 Periodical Maintenance Checks

Every 3 months, perform periodical maintenance checks, referring to the check sheet below. If any abnormalities are found, contact your authorized NSK dealer.

Points to check	Details
Contra angle head	Make sure the head cap and union nut are not loose.
Rotation	Rotate the motor/handpiece and check for abnormalities such as abnormal vibration, noise, and overheating.

8 Troubleshooting

8-1 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 display. 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 again, refer to the following table and take appropriate actions.

NOTICE

- If battery is replaced while the AC adaptor is connected, an incorrect error code may be displayed.

Error code	Type of error	Cause	Action
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 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
E-C	Low voltage of the battery	The voltage of the battery is too low (The life of the battery or not inserted.)	Put the battery into the battery chamber, or replace with new battery.
E-d	High voltage of the battery	The voltage of the battery is too high. (Malfunction of circuit)	Contact your dealer.
E-E	Outside battery working temperature range	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 battery.

Troubleshooting

Error code	Type of error	Cause	Action
CE0	Calibration error. 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	Calibration error. Below the lower limit.		
E-F	Abnormal heat generation from the battery	The battery generates abnormal heat.	Replace the battery. If the heat generates from the new battery, malfunction of the circuit may be suspected. Contact your dealer.

8-2 Problems and actions

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	Action
The power is not turned on.	The AC adaptor is not connected.	Check the connection.
	The plug of the AC adaptor is not inserted into the outlet, or there is no electricity in the outlet.	Check the connection.
	The battery is empty.	Charge the battery or use the AC adaptor.
	No battery is inserted.	Insert the battery, or use the AC adaptor.
	The fuse has burnt.	Contact your dealer.
AC IN lamp does not light.	The AC adaptor is not connected.	Check the connection.
	The plug of the AC adaptor is not inserted into the outlet, or there is no electricity in the outlet.	Check the connection.
	The fuse has burnt.	Contact your dealer.
	The AC adaptor's fuse has burnt.	Contact your dealer.

The battery charger does not work. (The CHARGE lamp does not light.)	No battery is inserted.	Insert the battery.
	The battery is fully charged or in a state near full charge.	No problem
	The temperature of the battery is low.	If the temperature of the battery is less than 0°C (32°F), the battery is not rechargeable. Charge the battery in a warm room. (Be careful about moisture condensation.)
	The temperature of the battery is high.	It is normal that the battery become a little bit warm right after charging. If the battery is hot under normal operating conditions, not right after charging, there may be an abnormality. Contact your dealer.
	An error code is displayed.	See “8–1 Error code”.

[Motor handpiece]

Problem	Cause	Action
The motor handpiece does not rotate.	The motor handpiece cord 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. (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.	Check the connection.
Alarm sounds and motor handpiece does not rotate, even if the power is on.	Power has been turned on while pressing ON/OFF button.	Check the ON/OFF button status.
	There is a short circuit within the ON/OFF button.	Contact your dealer.

9 After-sales Service

9-1 Warranty

NSK products are warranted against defects in manufacturing, workmanship and materials. NSK reserves the right to analyze and determine the cause of any problem. Warranty is voided should the product not be used in accordance with this manual or has been tampered with by unqualified personnel or has had non NSK parts installed. Replacement parts are available for seven years beyond discontinuation of the model.

9-2 Spare parts list

Model	REF	Remarks
ENDO-MATE DT adaptor	U480	230V
Handpiece stand	Z095205	-
Rechargeable battery	U421070	-
F-Type spray nozzle	Z256090	-

9-3 Option parts list

Model	REF	Remarks
Connection Cord Clip	C876509	-
Cord	C876021	For MPA/MPAS

[Contra angle head]

Model	REF	Gear Ratio	Remarks
MP-F20R	Y110044	20:1 Reduction	Mini Head 360° rotation
MP-F16R	Y110096	16:1 Reduction	Engine file in conformance with ISO 1797-1 (EN ISO 1797-1) Type1 Ø2.35mm shank
MPA-F16R	Y110097	16:1 Reduction	Mini Head 360° rotation Engine file in conformance with ISO 1797-1 (EN ISO 1797-1) Type1 Ø2.35mm shank. For connection to Apex Locator

MPAS-F20R	Y110046	20:1 Reduction	Mini Head 360° rotation
MPAS-F16R	Y110098	16:1 Reduction	Engine file in conformance with ISO 1797-1 (EN ISO 1797-1) Type1 Ø2.35mm shank (Short shank file). For connection to Apex Locator

- Files are not included.
- Do not connect the contra angle head other than listed above.

9-4 Disposing product

In order to avoid the health risks of operators handling the disposal of medical equipment, as well as the risks of environmental contamination caused thereof, a surgeon or a dentist is required to confirm the equipment is sterile. Ask specialist firms who are licensed to dispose of specially controlled medical wastes, to dispose the product for you.

10 Specifications

10-1 Specifications

[Control unit]

Model	NE316
Rated input	DC20V 0.5A
Output	DC7V 0.4A
Charging time	approx. 5 hours
Dimensions	W93 x D147 x H100mm
Weight	440g

[Motor handpiece]

Model	EM13M2
Rated input	DC7V 0.4A
Dimensions	∅20 × L108.5mm
Weight	95g (including motor handpiece cord)

[AC adaptor]

Model	NE169
Rated input	AC230V 50/60Hz
Dimensions	W70 x D110 x H58mm
Weight	974g



[Contra angle head]

Model	MP-F20R
Gear Ratio	20:1 Reduction
File Type	Engine file in conformance with ISO 1797-1 (EN ISO 1797-1) Type1 ∅2.35mm shank
Chuck Length	9.4mm
File Motion	360°Rotation

	Temperature	Humidity	Pressure
Use Environment	10-40°C	10-85% RH*	700-1060hPa
Transportation and Store Environment	-10-50°C	10-85% RH*	500-1060hPa

*No Condensation

10-2 Classification 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 “6-4 Sterilization”
- Degree of protection against ingress of water as detailed in the current edition of IEC 60529: IPX0
- 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


























10-3 Operation principle

This system consists of the contra angle head, the control unit with the motor handpiece, and the AC adaptor. By operating the ON/OFF button of the motor handpiece, power is supplied to the motor and the file attached to the contra angle head rotates.

Specifications

10-4

Symbol

	TUV Rheinland 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.		Type B conforming component
	Follow the waste of electric and electronic equipment (WEEE) Directive (2012/19/EU) to dispose of the product and accessories.		Authorised representative in the European community.
	Consult operation instructions.		This product can be sterilized in a steam sterilizer at 135°C. *for detail see "6-4 Sterilization".
	Manufacturer		Marking on the outside of Equipment or Equipment parts that include RF transmitters or that apply RF electromagnetic energy for diagnosis or treatment.
	Class II equipment.		Short-circuit-proof safety isolating transformer.
	This conforms to CE European Directive of "Medical equipment directive 93/42/EEC."		For indoor use only.
	Catalog number		To identify fuse boxes or their location.
	Date of manufacture		This product can be cleaned using a washer-disinfector.
	Humidity limitation		Serial No.
	fragile / handle with care		Temperature limitation
	This is the correct upright position of the distribution packages for transport and/or storage		atmospheric pressure limitation
	Direct current (connection for power supply)		keep dry
			Caution, Consult operation instructions.


11 EMC Information (Electromagnetic Compatibility Information)

Guidance and manufacturer's declaration - electromagnetic emissions		
The ENDO-MATE DT2 is intended for use in the electromagnetic environment specified below. The customer or the user of the ENDO-MATE DT2 should assure that is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR11	Group 1	The ENDO-MATE DT2 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class B	The ENDO-MATE DT2 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	

EMC Information (Electromagnetic Compatibility Information)

Guidance and manufacturer's declaration - electromagnetic immunity			
The ENDO-MATE DT2 is intended for use in the electromagnetic environment specified below. The customer or the user of the ENDO-MATE DT2 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	$\pm(2,4)$ 6 kV contact $\pm(2,4)$ 8 kV air	$\pm(2,4)$ 6 kV contact $\pm(2,4)$ 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output	± 2 kV for power supply lines ± 1 kV for input/output	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	± 1 kV line(s) to line(s) ± 2 kV 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	$<5\% U_t$ ($>95\%$ dip in U_t) for 0.5 cycle $40\% U_t$ (60% dip in U_t) for 5 cycles $70\% U_t$ (30% dip in U_t) for 25 cycles $<5\% U_t$ ($>95\%$ dip in U_t) for 5 sec	$<5\% U_t$ ($>95\%$ dip in U_t) for 0.5 cycle $40\% U_t$ (60% dip in U_t) for 5 cycles $70\% U_t$ (30% dip in U_t) for 25 cycles $<5\% U_t$ ($>95\%$ dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the ENDO-MATE DT2 requires continued operation during power mains interruptions, it is recommended that the ENDO-MATE DT2 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: U_t is the a.c. mains voltage prior to application of the test level.			

EMC Information (Electromagnetic Compatibility Information)

Guidance and manufacturer's declaration - electromagnetic immunity			
The ENDO-MATE DT2 is intended for use in the electromagnetic environment specified below. The customer or the user of the ENDO-MATE DT2 should assure that it is used in such an environment.			
Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC61000-4-6	3Vrms 150 kHz to 80MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the ENDO-MATE DT2, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Radiated RF IEC61000-4-3	3V/m 80MHz to 2.5 GHz	3 V/m	<p>Recommended separation distance</p> $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz}$ $d = 2.3 \sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz}$ <p>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 metres (m).</p> <p>Field strengths from fixed RF transmitters as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
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.			
<p>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 ENDO-MATE DT2 is used exceeds the applicable RF compliance level above, the ENDO-MATE DT2 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the ENDO-MATE DT2.</p> <p>b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.</p>			

EMC Information (Electromagnetic Compatibility Information)

Cables and accessories	Maximum length	Complies with	
Motor handpiece cord AC adaptor	1.5 m Plug side : 1.8m Unit side : 1.8m	RF emissions, CISPR11, Harmonic emissions, Voltage fluctuations/ flicker emission Electrostatic discharge (ESD) Surge Voltage dips, short interruptions and voltage variations on power supply input lines Power frequency (50/60Hz) magnetic field Conducted RF Radiated RF	Class B/ Group 1 IEC61000-3-2, Class A IEC61000-3-3 IEC61000-4-2 IEC61000-4-5 IEC61000-4-11 IEC61000-4-8 IEC61000-4-6 IEC61000-4-3

Recommended separation distances between portable and mobile RF communications equipment and the ENDO-MATE DT2

The ENDO-MATE DT2 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ENDO-MATE DT2 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ENDO-MATE DT2 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		
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 1.2 \sqrt{P}$
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.