

NSK

Cordless Handpiece

ENDO-MATE TC



OPERATION MANUAL



OM-E0113E Rev.A

※ Specifications may be changed without notice.

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Powerful Partners®

06.04.01 (M)

Thank you for purchasing the ENDO-MATE TC.

This product is a cordless handpiece 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.





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SAFETY CAUTIONS

- 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, be sure to follow them.

Indications of Hazardous Conditions

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

- This product is designed specifically for use with rechargeable batteries. Do not use manganese or alkaline batteries. Using and charging these by error may cause a fluid leak or explosion.
- Always replace both batteries with the same type at the same time. Using batteries of different-types or an exhausted battery with a fully charged one may cause a fluid leak or explosion.

WARNING

- Do not handle the power cord with a wet hand. Failure to do so may result in an electric shock.
- 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 breakage due to rust formation.
- Do not disassemble or alter the motor handpiece.
- Do not drop the motor handpiece or battery charger. Place the battery charger on a flat and stable place.
- Should the battery fluid leak and get into your eyes, immediately wash eyes thoroughly with clean water and see your doctor. Failure to do so may result in less 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 a skin trouble.
- If you should notice a battery fluid leak within the motor handpiece, deformation of the motor handpiece casing or partial discoloring, immediately stop use and contact your dealer.
- If you will not use the product for a long period of time, remove the batteries to avoid fluid leak.

CAUTION

- Exercise sufficient care in using the product by giving patient safety first priority.
- The product is to be used for only dental treatment by qualified personnel.
- Use commercially available batteries recommended by us.
Read carefully the instruction manual by the battery manufacturer before use.
- Do not use a bent, damaged, deformed or non-ISO-conforming bur. Using such a bur may result in personal injury due to its sudden 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.
- Always clean the shank of the bur 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 on may cause unintended rotation by accidental touch of the ON/OFF switch.
- When inserting the motor handpiece into the battery charger, position the handpiece correctly. Pushing it into the charger forcibly in the incorrect orientation may cause damage.
- Be careful not to fall conductive parts such as wires and safety pins into the charging terminal area of the battery charger.
- Before inserting the motor handpiece into the battery charger, wipe it clean. If the charging terminal area becomes dirty, rust formation may prevent charging, or result in short-circuit.
- Do not lubricate the motor handpiece.
- Do not heat sterilize the motor handpiece. Do not autoclave.
- If you are using corrosive or harsh solutions please clean the motor handpiece etc. immediately after use. Failure to quickly clean the motor handpiece etc. can result in damage to the equipment or color changes of the case.

NOTICE

- The motor handpiece is designed with the commercially available AAA nickel metal hydride batteries (rechargeable). Ni-Cad batteries can also be used, but the charging time and operating time become significantly shorter since the charging current differs.
- The motor handpiece consumes electricity very slightly even when the power 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 automatically stops by detecting a low battery voltage, leaving it for a while and turning on the power again 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 a "memory effect." Batteries may recover after repeating complete discharge and full charge a few times.
- If you do not use the product for a long period of time, remove the batteries from the motor handpiece.

1. FEATURES

- Compact body.
- Operable continuously for approx. one hour at rated load. (Dependent upon use conditions.)
- The mode can be switched between ENDO (root canal enlargement) and PMTC (polishing).
- Only in the ENDO mode (root canal enlargement), the auto reverse function operates with a simple 5-level torque limiter.
- Since the set values of the ENDO mode (root canal enlargement) and PMTC mode (polishing) on the operation panel are stored in memory separately, there is no resetting inconvenience.
- Normal rotation operations of the motor handpiece include: pressing the switch turns on the handpiece and re-pressing the switch turns it off. In addition, temporary rotation operations are also available: pressing and holding the switch turns on the handpiece and releasing the switch turns it off.
- The motor handpiece softly starts. Since it makes a temporary stop and starts in the reverse rotation, there are no vibration and shocks during this changeover.
- Energy savings. The power of the motor handpiece automatically turns off when there are no operations for 10 minutes. (Auto power-off function)
- The battery lamp indicates low battery voltage.
- The feedback circuit, which keeps rotation at a constant speed even when the load on the motor handpiece changes, is built in.
- The contra angle heads provided for this product are all autoclavable at 135°C (excluding the motor handpiece).

2. SPECIFICATIONS

<Battery Charger>

Model	NE140
Input Voltage	AC 120 V \pm 10% 50/60 Hz AC 230 V \pm 15% 50/60 Hz
Input Power	5 VA
Output	DC 4 V
Charging Time	Approx. 90 min.

<Motor Handpiece>

Model	EM10M
Input Voltage	DC 2.4 V \pm 20%
Input Power	0.3 VA

3. PACKAGING CONTENTS

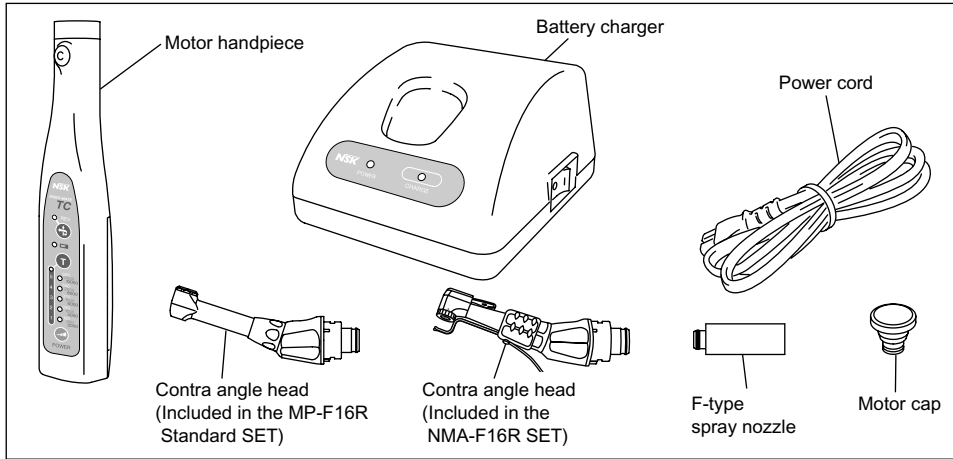


Fig. 1

4. ENDO MODE (ROOT CANAL ENLARGEMENT) APPLICATION

Turning on the power switch puts the handpiece into the ENDO mode (root canal enlargement). (The Torque lamp lights.)

(1) Operation Panel Details

This section describes the names and functions of each switch and lamp on the motor handpiece operation panel. For more detailed operations of the motor handpiece, refer to the "4. (2) Operating Motor Handpiece."

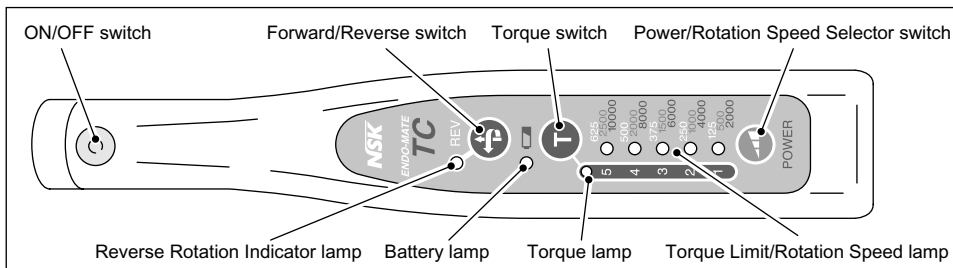


Fig. 2

● ON/OFF switch

Pressing this switch, when the power is on, rotates the motor handpiece, and re-pressing the switch stops the handpiece. (Normal rotation operation) Pressing and holding the switch for approx. one second or longer rotates the motor handpiece and releasing the switch stops the handpiece. (Temporary rotation operation)

● Forward/Reverse switch

Pressing this switch, when the power is on, rotates the motor handpiece in the reverse direction. Re-pressing the switch returns the rotation to forward. Pressing the switch, while the motor handpiece is in motion, stops rotation temporarily and resumes rotation in the opposite direction.

● Torque switch

Pressing this switch, when the power is on, allows for selection of the torque limit value. Pressing the switch while the motor handpiece is in motion lights the Torque Limit/Rotation Speed lamp for the present torque limit value, and pressing it again within 2 seconds allows for selection of the torque limit value. Pressing and holding the switch for 3 seconds or longer, when the motor handpiece is not in motion, can change the mode from the ENDO mode (root canal enlargement) to the PMTC mode (polishing).

● Power/Rotation Speed Selector switch

Pressing and holding this switch for 1 second or longer, when the power is off, turns on the power, and re-pressing and holding the switch for 2 seconds or longer turns off the power. Press the switch shortly, and the torque limit/rotation speed lamp shows the selected rotation speed. Re-push the switch within 4 seconds, and the rotation speed can be selected.

● Reverse Rotation Indicator lamp

This lamp lights while the motor handpiece rotates in the reverse direction. Pressing the Forward/Reverse switch while the motor handpiece is in motion makes the lamp flash until the reverse rotation stops.

● Battery lamp

This lamp lights when the battery charger is connected, and flashes when the battery voltage lowers. It also lights when an error occurs. (Refer to "13. OPERATION PANEL DISPLAY")

● Torque lamp

This lamp flashes while the motor handpiece is in motion.

● Torque Limit / Rotation Speed lamp

- When the motor handpiece stops, it lights the torque limit value lamp. (Fig. 3)
- While the motor handpiece rotates, it lights the current flow value lamp that shows the loading condition. (Fig. 3) Pressing the Torque switch or the Power/Rotation Speed Selector switch, while the motor handpiece is in motion, momentarily lights the set value lamp. (Pressing the switch before the momentarily lit lamp returns can also set the indicated value)
- To put out the current flow value lamp, turn off the power switch and press the Power/Rotation Speed Selector switch for 1 second or longer while pressing the Forward/Reverse switch. The torque limit value returns at "Level 1". To indicate the current flow value lamp, follow the same procedure, turn off the power switch and press the Power/Rotation Speed Selector switch for 1 second or longer while pressing the Forward/Reverse switch.
- When the rotation speed is displayed, only one lamp lights for the set value of the present rotation speed. When two lamps light simultaneously, it means that the rotation speed is between the two lit values. (Fig. 3)
- If one minute passes under a non-operational condition after the rotation of the motor handpiece stops, the lamp for the presently set values begins to flash slowly.

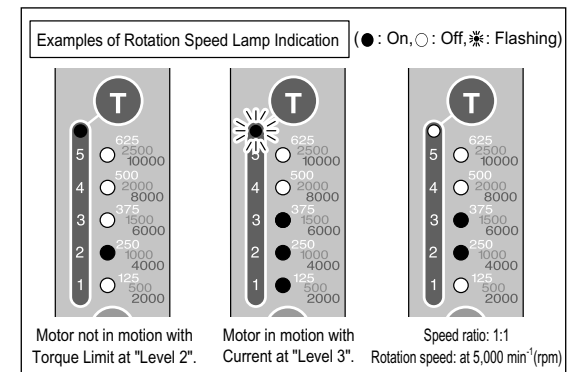


Fig. 3

(2) Operating Motor Handpiece

- Mount the contra angle head to the motor handpiece. (Refer to "7. CHANGING CONTRA ANGLE HEAD")
- Press and hold the Power/Rotation Speed Selector switch for 1 second or longer to turn on the power. When power is turned on, the display shows torque limit value.
- Press the Torque switch several times until the desired torque limit value can be selected. (Fig. 4) (Every time you press the switch, the Torque Limit/Rotation Speed lamp advances.)
- To set the rotation speed, press the switch to the rotation speed mode. Every pressing of the switch light on the Torque Limit/Rotation speed lamp advances. (Select the desired rotation speed corresponding to the ring color of the contra angle head used. (Fig.5))
- Select the rotation direction with the Forward/Reverse switch. Every time you press this switch, rotation changes from the forward rotation to the reverse rotation and vice versa. (The Reverse Rotation Indicator lamp is lit during the reverse rotation.) You can press this switch even while the motor handpiece is in motion.
- Pressing the ON/OFF switch rotates the motor handpiece and re-pressing it stops the handpiece. (Normal rotation operation) Pressing and holding this switch for approx. 1 second or longer rotates the motor handpiece while continuing to press it, and releasing the switch stops the handpiece. (Temporary rotation operation)
- Turn off the power by pressing and holding the Power/Rotation Speed Selector switch for 2 seconds or longer.

Torque Limit Value	Torque	Contra Angle Head Ring Color	Gear Ratio	Head Speeds (min ⁻¹ (rpm))									
5	3.7 N • cm	Blue	1:1	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	
4	3.0 N • cm			500	750	1,000	1,250	1,500	1,750	2,000	2,250	2,500	
3	2.3 N • cm	Green	4:1	125	190	250	310	375	440	500	560	625	
2	1.5 N • cm	White	16:1										
1	0.7 N • cm												

* Gear ratio: 16:1
* If releasing the torque limit value, Max. torque is 4.5 N•cm.

Fig. 4 * Consider the speeds above as approximate.

Fig. 5

CAUTION

Do not set the rotation speed higher than you need. When overloaded, it momentarily exceeds the selected torque limit value and the bur or the file could be broken.

NOTICE

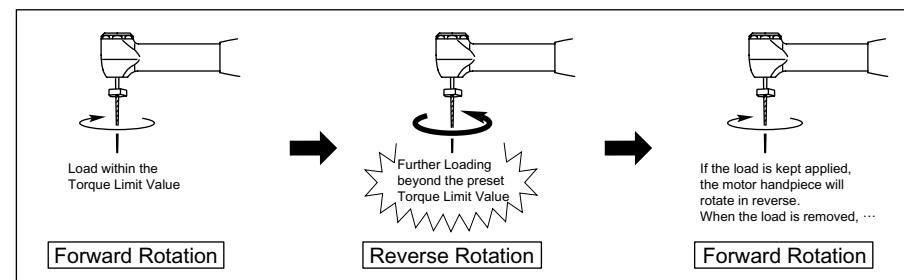
- If the Battery lamp flashes at no load during rotation, the battery voltage is low. Recharge the batteries. If the lamp flashes at overload, reduce the load.
- When the power is turned on, the mode is always returned to the ENDO mode (root canal enlargement). If operating in the PMTC mode by mistake, the bur or the file could be broken, because the auto reverse does not function in the PMTC mode (polishing).

* Auto Reverse Function

In the ENDO mode (root canal enlargement), the Torque Limit/Rotation Speed Lamp blinks when the load approaches, during the rotation in the forward direction, 75 % of the preset torque limit value. Further loading makes the motor handpiece to reverse its rotation. As soon as the load is removed, the motor handpiece makes either **AUTO REVERSING** or **AUTO STOP**. (Select either mode. The chosen mode is kept in the internal memory. You do not have to reset the mode every time you turn on the power switch.)

AUTO REVERSING

The motor handpiece resumes the forward rotation when the load is removed. The motor handpiece is set to this mode at the factory.



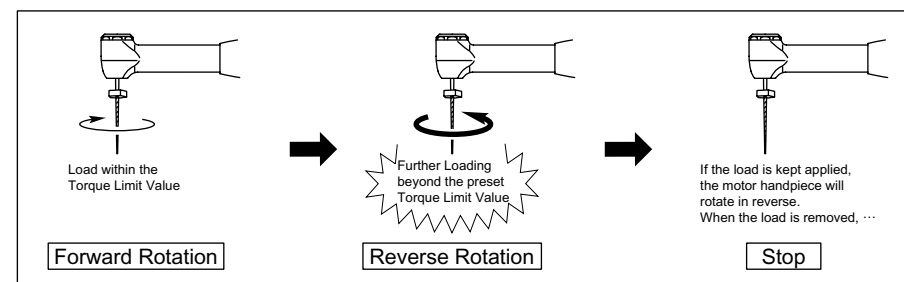
* The contra angle head in the figure is MP-F16R.

Fig. 6

AUTO STOP

The motor handpiece stops rotation, as soon as the load is removed. To start in the forward rotation, press the power switch again.

To select this **AUTO STOP** mode, turn off the power switch. Press the Power/Rotation Speed Selector Switch and the Torque Switch simultaneously for 1 second or longer. (The Torque Limit Value is reset to "1" and the Reverse Rotation Indicator Lamp slowly blinks.)



* The contra angle head in the figure is MP-F16R.

Fig. 7

To select **AUTO REVERSING** mode, turn off the power switch. Press the Power/Rotation Speed Selector Switch and the Torque Switch simultaneously for 1 second or longer.

NOTICE

If the battery depletes, in the reverse rotation, or in the PMTC (polishing) mode, the Auto Reverse System does not function.

* Auto Power Off Function

When the power is on and the motor handpiece is not in operation for more than 10 minutes, the power automatically turns off. However, the power does not turn off while the motor handpiece is in motion. Under this condition the power turns off when the batteries deplete to a certain low voltage level.

5. PMTC MODE (POLISHING) APPLICATION

Turning on the power and keep pressing the Torque switch for 3 seconds or longer puts the handpiece into the PMTC mode (polishing). (The Torque lamp goes out.)

(1) Operation Panel Details

This section describes the names and functions of each switch and lamp on the motor handpiece operation panel. For more detailed operations of the motor handpiece, refer to the 5. (2). "Operating Motor Handpiece."

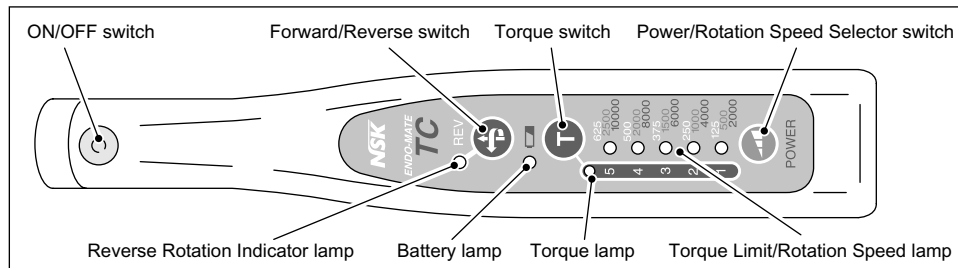


Fig. 8

● ON/OFF switch

Pressing this switch, when the power is on, rotates the motor handpiece, and re-pressing the switch stops the handpiece. (Normal rotation operation) Pressing and holding the switch for approx. one second or longer rotates the motor handpiece and releasing the switch stops the handpiece. (Temporary rotation operation).

● Forward/Reverse switch

Pressing this switch, when the power is on, rotates the motor handpiece in the reverse direction. Re-pressing the switch returns the rotation to forward. Pressing the switch, while the motor handpiece is in motion, stops rotation temporarily and resumes the rotation in the opposite direction.

● Torque switch

It does not work in the PMTC mode (polishing). When you want to return the mode to the ENDO mode (root canal enlargement), press and hold this switch for 3 seconds or longer.

● Power/Rotation Speed Selector switch

Pressing and holding this switch for 2 seconds or longer turns off the power. Each momentary pressing of the switch advances light on the rotation speed. (Once the power has been turned off, the mode is returned to the ENDO mode (root canal enlargement) when the power is turned on.)

● Reverse Rotation Indicator lamp

This lamp lights while the motor handpiece rotates in the reverse direction. Pressing the Forward/Reverse switch while the motor handpiece is in motion makes the lamp flash until the rotation stops once.

● Battery lamp

This lamp lights when the battery charger is connected, and flashes when the battery voltage lowers. It also lights when an error occurs. (Refer to "13. OPERATION PANEL DISPLAY")

● Torque lamp

The torque lamp goes out.

● Torque Limit/Rotation speed lamp

It lights the set value of the lamp at the present rotation speed. It flashes slowly while the motor handpiece rotates. Only one lamp lights or flashes. When two lamps light simultaneously, it means that the rotation speed is between the two lit values. If one minute passes under a non-operational condition after the rotation of the motor handpiece stops, the lamp for the presently set values begins to flash slowly.

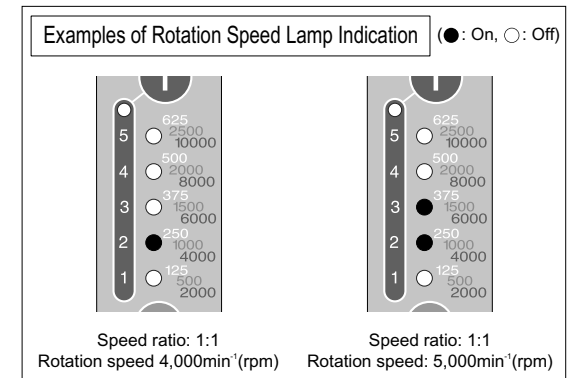


Fig. 9

(2) Operating Motor Handpiece

- ① Mount the contra angle head to the motor handpiece. (Refer to "7. CHANGING CONTRA ANGLE HEAD")
- ② Press and hold the Power/Rotation Speed Selector switch for 1 second or longer to turn on the power.
- ③ Press the Torque switch for 3 seconds or longer to enter the PMTC mode (polishing)
- ④ To set the rotation speed, press the Power/Rotation Speed Selector switch. (Every time you press the switch, lighting for the Torque/Rotation Speed lamp advances.) (Select the desired rotation speed corresponding to the ring color of the contra angle head used. (Fig. 10))
- ⑤ Select the rotation direction with the Forward/Reverse switch. Every time you press this switch, rotation changes from the forward rotation to reverse rotation and vice versa. (The Reverse Rotation Indicator lamp lights during reverse rotation.) You can press this switch even while the motor handpiece rotates.

Contra Angle Head Ring Color	Gear Ratio	Head Speeds (min ⁻¹ (rpm))									
		2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	
Blue	1:1										
Green	4:1	500	750	1,000	1,250	1,500	1,750	2,000	2,250	2,500	
White	16:1	125	190	250	310	375	440	500	560	625	

* Consider the speeds above as approximate.

Fig. 10

- ⑥ Pressing the ON/OFF switch rotates the motor handpiece and re-pressing it stops the handpiece. (Normal rotation operation) Pressing and holding this switch for approx. 1 second or longer rotates the motor handpiece while continuing to press it, and releasing the switch stops the handpiece. (Temporary rotation operation)
- ⑦ Turn off the power by pressing and holding the Power/Rotation Speed Selector switch for 2 seconds or longer.

⚠ NOTICE

- If the Battery lamp flashes at no load during rotation, the battery voltage is low. Recharge the batteries. If the lamp flashes at overload, reduce the load.
- When the power is turned on, the mode is always returned to the ENDO mode (root canal enlargement). If operating in the PMTC mode by mistake, the bur or the file could be broken, because the auto reverse does not function in the PMTC mode (polishing).

* Auto Reverse Function

The auto reverse does not function in PMTC mode. ENDO-MATE TC is not equipped with an emergency overload stop function. Stalling does not break it immediately, but it may shorten battery life or damage the motor handpiece. Do not intentionally stall the motor handpiece for a prolonged time.

* Auto Power Off Function

When the power is on and the motor handpiece is not in operation for more than 10 minutes, the power automatically turns off. However, the power does not turn off while the motor handpiece is in motion. The power turns off when the batteries are in a certain low voltage level.

6. CHARGING BATTERIES

- ① Insert the power cord jack into the inlet at the back of the battery charger. (Fig. 11)
- ② Insert the power cord plug into the outlet of the correct voltage.
- ③ Turn on the power switch. At this time, check that the power lamp lights. (Fig. 12)

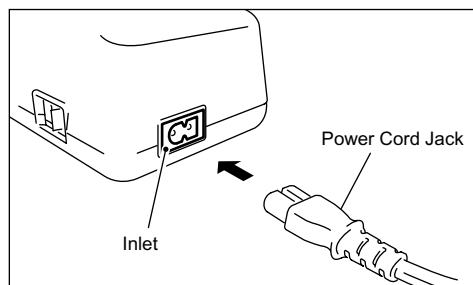


Fig. 11

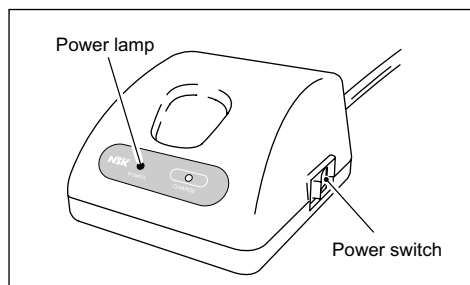


Fig. 12

⚠ CAUTION

If the power lamp or the charge lamp flashes, turn on the power switch once again. If they still flash, contact your dealer.

- ④ Remove the contra angle head from the motor handpiece and mount the motor cap onto it. (Refer to "10. MOTOR CAP") Insert the motor handpiece into the battery charger with the operation panel facing frontward. If the motor handpiece power is on, it will be turned off automatically when inserted into the battery charger. Charging starts with the charge lamp turned on. The battery lamp of the motor handpiece lights. (Fig. 13)

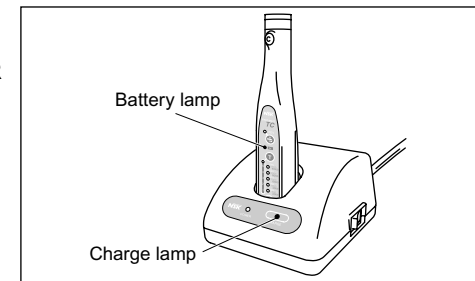


Fig. 13

- ⑤ Charge at full capacity is completed, when the charge lamp goes out. (The battery lamp remains to light.) If the motor handpiece is inserted into the battery charger with the switch on, the motor handpiece will start automatically when removed from the charger.

⚠ CAUTION

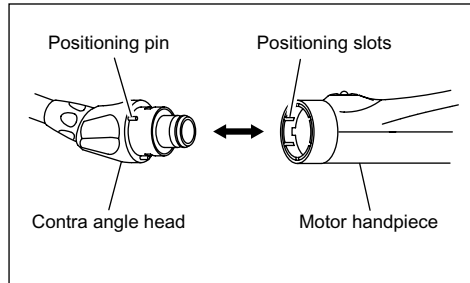
- Connect to AC 120 V or AC 230 V power supply only. Voltage variation within $\pm 10\%$ is permissible. Other voltage than these may result in damage.
- Never use the battery charger for other than the motor handpiece of this product.
- The charging normally takes approx. 90 minutes, but it depends on battery use conditions, battery freshness, ambient temperature, etc. Older batteries are especially prone to significantly shorter charging and operating times.
- Batteries may slightly heat during charging, but this is not a failure. If the handpiece is inserted or removed into/from the charger at short intervals, (approx. 5 minutes) charging cannot be properly completed and by touching the battery part you may feel hot. We recommend that you charge batteries at as long a cycle as possible.
- The motor handpiece will not start automatically removed from the battery charger after 3 hours charging with the power on.
- The power of the motor handpiece should not be turned on immediately after it has been removed from the charger, wait approx. 2 seconds or longer with the power off.

⚠ NOTICE

- Battery could be fully charged even if charge lamp do not light, depending on the remaining amount of the battery charge.
- When the handpiece is inserted onto the charger after it is not used for long with the battery inserted, the handpiece sometimes could not be charged. Try to put in and take out from the charger repeatedly, and the handpiece will start to be charged.

7. 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. 14)



* The contra angle head in the figure is MP-F16R. Fig.14

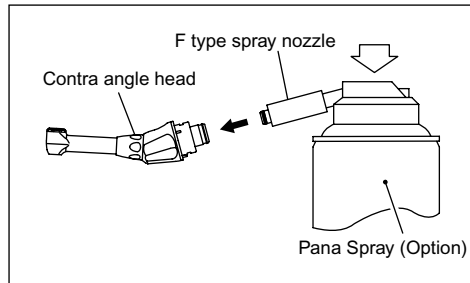
CAUTION

Check that the contra angle head is securely assembled to the motor handpiece.

8. CLEANING

(1) Lubricating Contra Angle Head

Lubricate the contra angle head only. Lubricate it before each autoclaving or once a day, using Pana-Spray lubricant (option). Screw the F type spray nozzle onto the Pana-Spray nozzle by approx. 10 turns. Insert 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-F16R. Fig.15

(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 handpiece.
- 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 completely drained.
- Hold the contra angle head securely to prevent it from flying off by the pressure of the spray.
- Hold the Pana-Spray (option) upright.
- When cleaning the motor handpiece, do not use any solvent such as benzine and, thinner.

9. STERILIZATION

Sterilize the contra angle head only.

For the sterilization method, we recommend the autoclave sterilization method. Autoclave 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 "8. (1) Lubricating Contra Angle Head.")
- ③ Insert the head into an autoclave pouch and seal it.
- ④ Autoclavable up to a max. 135°C (275°F).
ex.) Autoclave for 20 min. at 121°C (250°F), or 15 min. at 132°C (270°F).
- ⑤ Keep the handpiece in the autoclave pouch to keep it clean until you use it.

* Sterilization at 121°C for more than 15 minutes is recommended by EN13060 or EN554.

* Performing sterilization according to our instruction has minimal effect on the instruments. Life span is generally determined by wear and damage due to use.

CAUTION

- Do not heat sterilize the motor handpiece.
- Skip dry cycle if the temperature could exceed 135°C (275°F).
- Since the lowermost 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.

10. MOTOR CAP

When the contra angle head is removed from the motor handpiece for battery charging, lubrication, or sterilization, mount the motor cap onto the motor handpiece to prevent debris from entering. (Fig. 16)

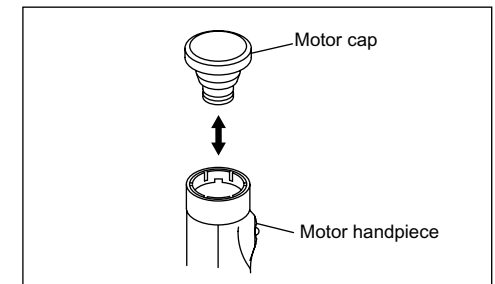


Fig. 16

11. SAFETY SYSTEM

The motor handpiece monitors temperature of the batteries. If the batteries could become abnormally hot, this system functions and the motor handpiece automatically stops. In such a case, wait until the motor handpiece cools. If this safety system functions repeatedly, either the batteries or motor handpiece is not in the normal operating condition. Contact your dealer.

12. 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 becomes shorter or the rotation speed becomes slower, 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." Please note that NSK shall not be 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.
- Use batteries designated by NSK.
- Designated Batteries : AAA (marking may be different)
nickel metal hydride batteries, 600-700 mAh, nominal 1.2 V
(Or Ni-Cad batteries, 200-300 mAh, nominal 1.2 V. However, please take note that the operating time shortens because of their capacity.)
- Do not use non-charging type batteries such as alkaline batteries and manganese batteries. Charging with these batteries may cause fluid leaks, explosion or chlorine gas generation.
- Should the battery fluid leak and get into your eyes, immediately wash thoroughly in clean water and see your doctor.
- 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 a skin disorder.
- Always replace two batteries of the same type by the same manufacturer at the same time. Using batteries of different-types, an exhausted battery with a fully charged one, or a new battery with an old one may cause a fluid leak or explosion.
- Do not work with wet hands. Failure to do so may result in rust formation on battery terminals or moisture intrusion inside, and could cause failure of the product.

◆ Changing Batteries

Prepare the small screwdrivers (Phillips, flatblade).

- ① Turn off the power of the motor handpiece.
- ② Remove the rubber cover from the battery cover with a thin flatblade screwdriver. (Fig. 17)
- ③ Remove the screw fixing the battery cover with a Phillips screwdriver. (Fig. 18)
- ④ Remove the battery cover by sliding it toward the charging terminal. (Fig. 19)
- ⑤ Remove old batteries.
- ⑥ Insert new batteries according to the polarity marking in the battery box. A mix-up between the plus and minus sides will not allow operation of the handpiece.
- ⑦ Attach the battery cover.
- ⑧ Tighten the screw with a Phillips screwdriver. Do not overtighten it.
- ⑨ Insert the rubber cover back into the screw hole of the battery cover in the originally inserted direction.

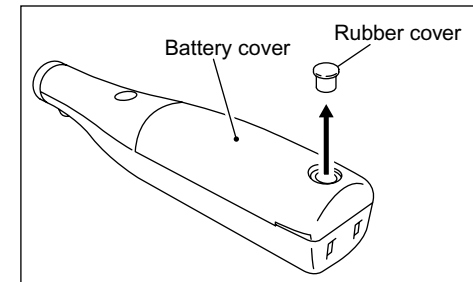


Fig.17

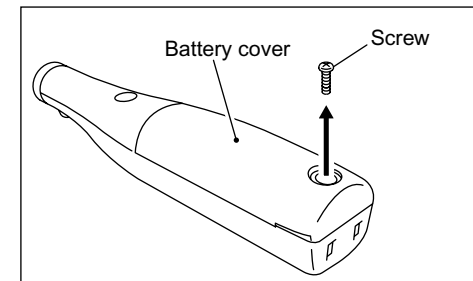


Fig.18

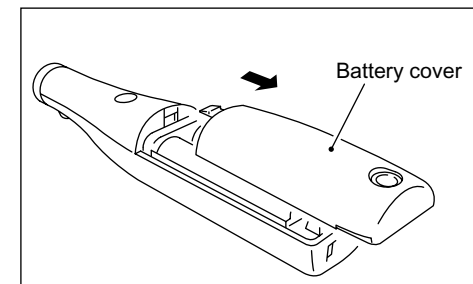


Fig.19

Changing of batteries is now completed. Charge them fully before use.

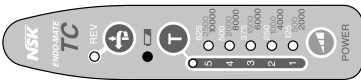
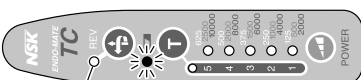
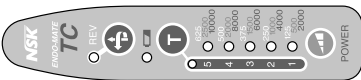
⚠ CAUTION

- Do not misplace the rubber cover and screw.
- The used nickel metal hydride batteries are recyclable, but their disposal may sometimes not be permitted by the country. Return them to your dealer.

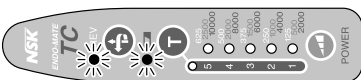
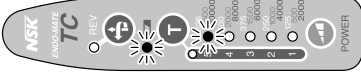
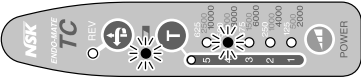
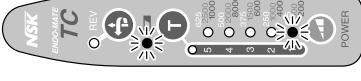
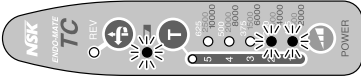
13. OPERATION PANEL DISPLAY

When any abnormal condition occurs in the motor handpiece, the operation panel displays it to allow you to locate the troubles.

<Normal Display>

Lighting Display (●On, ○Off, ✨Flashing)	Reason	Remedy
<p>Low Battery Voltage A</p> 	The battery voltage dropped below the discharge completion voltage. (Battery drain)	Recharge the batteries.
<p>Low Battery Voltage B</p>  <p>No specification No specification</p>	The battery voltage dropped below the voltage near discharge completion. (Temporary voltage drop due to battery drain or heavy loading)	Recharge the batteries, or remove the heavy load.
<p>Power Save Mode</p>  <p>Either one flashing</p>	Non-operational condition continued for 1 minute or longer when the rotation of the motor handpiece stopped.	Press any switch.

<Error Display>

Lighting Display (●On, ○Off, ✨Flashing)	Reason	Remedy
<p>Abnormal Battery Temperature</p> 	Abnormal temperature at the battery chamber. (Battery short circuit, over discharge, etc.)	If the lamps flash after the handpiece has been left for a while, contact your dealer.
<p>Abnormal Motor Voltage A</p> 	Abnormal motor voltage.	The circuit is damaged. Contact your dealer.
<p>Abnormal Motor Voltage B</p> 		
<p>Internal Memory Error A</p> 	Abnormal internal memory.	The internal memory is damaged. Contact your dealer.
<p>Internal Memory Error B</p> 		













14. TROUBLESHOOTING

When trouble is found, please check the following again before consulting 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.

Trouble	Probable Cause and Check	Solution
The motor handpiece power does not turn on.	Batteries have fully discharged. (Has the handpiece been left with batteries inserted for a long time?)	Recharge the batteries.
	Abnormal batteries. (Have the battery parts become hot?)	Cool the handpiece for a while and turn on the power.
	No batteries are inserted.	Insert batteries.
	The internal fuse has burnt.	Have your dealer examine the handpiece.
When the power of the motor handpiece is turned on, the battery lamp lights.	Low batteries.	Recharge the batteries.
The motor handpiece does not rotate. The operation panel does not light.	Power is not turned on.	Turn on the power.
The force of the motor handpiece is weaker than normal.	The batteries have become weak. (Is the battery lamp flashing?)	Recharge the batteries.
The auto reverse function does not work.	The batteries have become weak. (Is the battery lamp flashing?)	Recharge the batteries.
	The PMTC mode (polishing) is selected. (Has the torque lamp gone out?)	Select the ENDO mode (root canal enlargement).

Trouble	Probable Cause and Check	Solution
The maximum rotation speed of the motor handpiece is low.	The batteries have become weak. (Is the battery lamp flashing?)	Recharge the batteries.
The battery charger does not work. (The charge lamp does not light.)	The batteries of the motor handpiece have fully discharged. (Has the handpiece been left with batteries inserted for a long time?)	Insert and remove the motor handpiece into/from the battery charger several times.
	The power of the battery charger is turned on?	Turn on the power of the battery charger.
	Is the power cord plug inserted into the outlet?	Insert the power cord plug into the outlet.
	Is the power cord jack inserted into the inlet of the battery charger?	Insert the power cord jack into the inlet of the battery charger.
	Is the motor handpiece inserted into the battery charger in the correct orientation?	Insert the motor handpiece into the battery charger in the correct orientation.
The battery charger does not work. (The charge lamp lights but goes out soon.)	Has the motor handpiece part near the batteries become hot?	If the motor handpiece part near the batteries has become hot, the batteries have been fully charged.
The battery does not charge. (The charge lamp or the power lamp blink.)	The batteries of the motor handpiece have fully discharged. (Has the handpiece been left with batteries inserted for a long time?)	Insert and remove the motor handpiece into/from the battery charger several times. When the power lamp of the charger flashes, turn on the power switch again.
	Are such single-use batteries as alkaline or manganese cells used?	Replace with the specified battery (nickel-metal hydrogen battery 600-700 mAh 1.2V nominal).
	The charging terminal area of the battery charger has short-circuited.	Clean the charging terminal area of the battery charger. When the power lamp of the battery charger flashes, turn on the power switch again.

15. CONTRA ANGLE HEAD REFERENCE TABLE

Head	Model	Product No.	Specifications
	MP-F16R	Y110-096	<ul style="list-style-type: none"> For CA Ni-Ti files (ø2.35) Mini Head • 360° rotation Push button chuck • 16:1 Reduction Included in the Standard SET
	NMA-F16R	Y110-031	<ul style="list-style-type: none"> For CA Ni-Ti files (ø2.35) To connect with Apex Locator Mini Head • 360° rotation • 16:1 Reduction Included in the NMA-F16R SET
	NML-F16R	Y110-019	<ul style="list-style-type: none"> For CA Ni-Ti files (ø2.35) Mini Head • 360° rotation 16:1 Reduction
	TEP-F	Y110-023	<ul style="list-style-type: none"> For endodontic hand files 90° reciprocating action Push button chuck • 1:1 Drive
	TEQ-F	Y110-024	<ul style="list-style-type: none"> For CA endodontic files (ø2.35) 90° reciprocating action Push button chuck • 1:1 Drive
	VM-F	Y110-025	<ul style="list-style-type: none"> For endodontic hand files Vertical reciprocating action Push button chuck • 1:1 Drive
	ARS-F4R	Y110-017	<ul style="list-style-type: none"> Prophy head For screw-in cups 4:1 Reduction
	ARK-F4R	Y110-022	<ul style="list-style-type: none"> Prophy head For snap-on cups 4:1 Reduction
	NAC-F4R	Y110-020	<ul style="list-style-type: none"> Prophy head • Latch type For CA bur (ø2.35) 4:1 Reduction
	TEQ-F4R	Y110-030	<ul style="list-style-type: none"> Prophy head • 90° reciprocating action Push button chuck (ø2.35) 4:1 Reduction
	EVA-F	Y110-016	<ul style="list-style-type: none"> For Eva tips Vertical Reciprocating 1:1 Drive
	PR-F	H209	<ul style="list-style-type: none"> For Disposable Prophy Angles 4:1 Reduction

* Files and prophy cups are not included.

16. 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.