

**OPERATION MANUAL**

**Thank you for purchasing our product "MIO".**

Please read this manual before use to operate the device safely.  
Please store this operation manual in a place where the use can see it at all times.

**SAFETY CAUTIONS AND WARNING INDICATORS**

- Before use always thoroughly read the safety cautions and operate the device properly.
- These indicators are intended to allow you to operate the product safely and prevent danger to you or other persons and damage from occurring. These indicators are classified according to the degree of danger or damage and seriousness. The content of all items relate to safety so should always be observed.

| Classification of Precautions | Degree of Danger or Damage and Seriousness  |
|-------------------------------|---|
| <b>WARNING</b>                | Explains a cautionary item where personal injury or physical damage may occur.        |
| <b>CAUTION</b>                | Explains a cautionary item where minor to medium injury or physical damage may occur. |
| <b>NOTICE</b>                 | Explains an item that should be observed for safety reasons.                          |

**WARNING**

- Use eye protectors, polishing box, vacuum for safety and health when operating this unit.
- Be careful not to get water on the unit, since there is danger of a short circuit or electric shock.
- Never disassemble or modify the device, since it may seriously affect to its quality and safety. In case of breakdown please send to the dealers you purchased from.
- Care should be taken not to drop micromotor or units on floor. Make sure to place the units on even and stable surfaces.
- When unusual situation occurred, including smoking or smelling like resins burning, turn off main switch immediately and pull off plug then request for repairing it immediately.
- Care should be taken not to leave motor cord near gas burner. Do not try to repair burned motor cord. Replace it with new one since there is danger of fire or electric shock as a result of short circuit.
- Do not unplug an electric cord with wet hands since there is danger of electric shock.
- Follow the instructions of bur manufacturers for recommended operating speed. Otherwise it may cause personnel injury by bur breakage.
- Do not use bent, worn, or damaged burs, because it may cause personnel injury by bur breakage.
- Operate a handpiece in as low speed as possible when using a disc, otherwise it may cause personnel injury by breaking the disc into pieces and fall around.
- Be sure to dress a grindstone before using it, because it is occasionally not well-balanced even if it is brand-new. Using an imbalanced grindstone may cause personnel injury by cracking and breaking it into pieces.
- Set speed with a Speed Controller before operating. Make sure that speed is fixed within torque speed allowance for each bur.
- Be aware not to get caught by the rotating bur. Getting caught may scratch your skin and cause injury.
- Always disconnect motor cord connector before doing maintenance on the handpiece.

**CAUTION**

- An unit should be used under the condition there is no condensation and of temperature from 0 to 40°C.
- Make sure that there is no flammable gas or liquid around the control unit or motor before using them. Using them near flammable materials may cause fire.
- Never lubricate bearings, motor or handpiece. Since the bearings are pre-lubricated, additional lubrication could cause heat generation or malfunction.
- Care should be taken when use the handpiece which needs to be lubricated. Do not connect with the motor and stand the handpiece right after lubricated it. It could have the excess fluid flow into the motor and could cause damage to it. Connect the only handpiece that is wiped off excess fluid completely.
- Prior to use always operate and inspect device with care for looseness, vibration, noise, and heat. If anything unusual is found, do not use. Contact your dealer.
- Never move Chuck Release Ring to the direction of Loosen while motor is running, because it may cause damage to the handpiece or motor. Please make sure that a motor stops completely before replacing burs.
- Use as low speed as possible for burs which have bigger heads (ø4 mm and above).
- Try as much as possible not to operate a handpiece with heavy load that may activate protection circuit. Operating under heavy load could cause bur breakage, or premature wear of handpieces.
- A chuck must be removed and cleaned once a week. If not, dirt or debris will accumulate in a chuck, and this causes vibration of burs or chuck to loosen.
- Do not place equipment so that it is difficult to operate the Power Switch.
- Leave enough space for ventilation around the equipment.

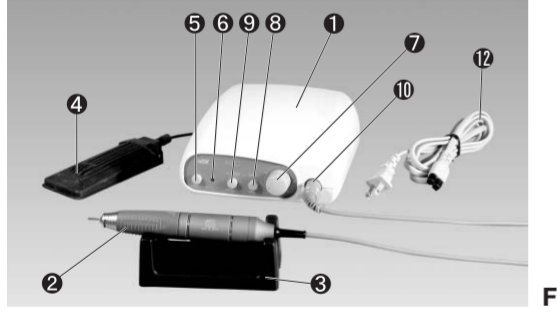
**NOTICE**

- Always keep shanks clean. Dirt or debris in a chuck could cause bad concentricity of bur or poor chuck retention force.
- Mount a cutting bur or a bur blank on a handpiece even while not operating.
- Responsibility of operation and inspection of devices belong to users (Dental Laboratory, Hospital).

**Features**

- Lab. Motor Basics Highlighted
- User Safety Design
- Gentle Start, Soft Electronic Switching
- Quick Motor Response
- Smoothly Adjustable Motor Speed
- Stable Rotation
- Superb Bur Concentricity
- Works on AC100-240V Supply

**Parts Nomenclature**



1 Control Unit 2 Motor Handpiece 3 Handpiece Stand 4 Foot Pedal (FC-11) 5 Power Switch 6 Pilot Lamp 7 Speed Control Knob 8 Forward/Reverse Selection Switch 9 Foot/Hand Selection Switch 10 Motor Cord Connector 11 Power Cord Receptacle 12 Power Cord 13 Foot Pedal Connector

**Connecting the cords**

- Motor cord plug  
Align and Insert firmly the motor cord plug into 10 Motor Cord Connector (Fig.3).
- Foot pedal cord  
Align and insert firmly the foot pedal cord plug into 13 Foot Pedal Connector on the back of the unit (Fig.4).
- Power cord  
Align and insert firmly the power cord plug into 11 Power Cord Receptacle on the back of the control unit (Fig.4).

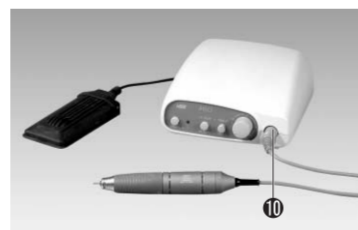


Fig.3

**Operation Procedures**

- Connect Power Cord to a AC100-240V supply.
- Push out 9 Foot/Hand Selection Switch and set 7 Speed Control Knob at its minimum position.
- Turn on 5 Power Switch. Make sure 6 green Pilot Lamp on the right side of switch is on.
- Select the direction of motor rotation by 8 Forward/Reverse Selection Switch.

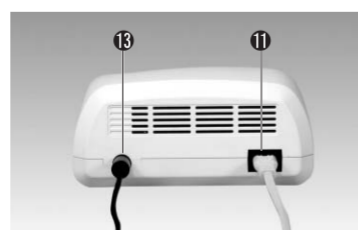


Fig.4

**Operation-1 Manual Operation**

Proceed the above-mentioned steps of (1) ~ (4). Push in 9 Foot/Hand Selection Switch to Hand. The motor starts running. Select the desired speed by 7 Speed Control Knob. To stop the motor, push 9 Foot/Hand Selection Switch to Foot.

**Operation-2 On/off operation by Foot pedal**

Proceed the above-mentioned step ~ (4). Push 9 Foot/Hand Selection Switch to Foot. Step on Foot Pedal. The motor starts and runs at speed set beforehand by 7 Speed Control Knob.

**Protective Circuit for Motor**

Electronic Circuit Breaker functions to protect the control unit and the motor when overloaded or when run under a situation that the handpiece is not able to turn. It stops the motor, terminating motor power supply.

**Protective Circuit Resetting**

Manual operation-Push out 9 Foot/Hand Selection Switch, and Protective Circuit is reset.  
On/off operation by Foot pedal-Turn back the Foot Pedal to a stop position. Then Protective Circuit is reset.  
When the motor is overloaded, and the protective circuit in the primary circuit functions.

**CAUTION**

Fuse burns out when short circuit occurs or when excess current flows in the primary circuit. If the cause is uncertain, return to the authorized NSK's service shop for inspection.

**Handling of motor handpiece**

**1. Insertion or removal of a bur**

The chuck is opened by turning the Bur Lock Ring to at open position. The chuck is loosened and the bur can be removed. By turning the ring in the LOCK direction, the chuck is closed and the bur can be mounted. At this time, turn the ring until it clicks (Fig.5).

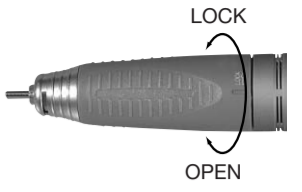


Fig.5

**2. Cleaning and Replacement of Chuck**

**(1) Removal of Chuck**

To remove the chuck, open the ring and turn the chuck counterclockwise with the provided spanner wrench (Fig.6).

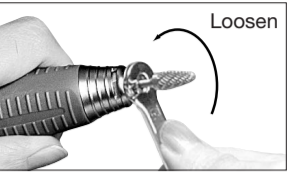


Fig.6

**(2) Cleaning of Chuck**

Remove and clean the chuck as frequently as possible in the ultrasonic cleaner. Clean at least once a week.

**CAUTION**

Neglecting to clean the chuck for a long time is very dangerous because wax, gypsum, etc., accumulate in the chuck and the bur is caught insecurely, causing runout.

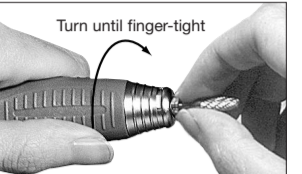


Fig.7

**(3) Insertion of Chuck**

Thinly apply oil before insertion. Open the ring, insert the dummy bur or the bur in use into the chuck, and turn the chuck clockwise by hand until it stops. Then, lock the ring, and the chuck could hold the bur securely (Fig.7).

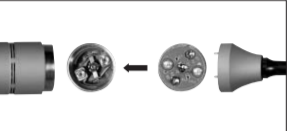


Fig.8

**3. Connection of Motor Cord to Motor**

Insert the cord nut pins into the holes on the motor, aligning the marked pin to the marked hole (molded + marking) and non-marked pin to non-marked hole. If the marked one is connected to the non-marked one, the motor runs in the reverse direction (Fig.8).

**4. Replacement of Carbon Brush**

When replacing carbon brush with a new one, refer to the instruction of "Replacing Carbon Brushes" inserted in the package of carbon brush and always replace with a new pair.

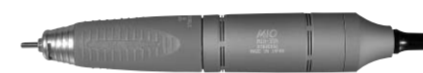
**CAUTIONS WHEN CONNECTING MOTOR AND HANDPIECE**

When connecting the handpiece to the motor, turn the handpiece clockwise and tighten firmly. If the clutch is not engaged properly the handpiece cannot be tightened completely. In such case, Do Not Force. Loosen the handpiece and turn the bur briefly to re-position the drive dog. Re-connect the handpiece and tighten securely.

**Optional Micromotor Handpiece series and spare parts**

**Standard Type MR 35,000min<sup>-1</sup>(rpm)**

Mio MR (with straight cord)



Features:  
Suits for wide range of applications from grinding and polishing. High torque micromotor handpiece is well balanced in holding.

**Specification**

|                    |                                     |
|--------------------|-------------------------------------|
| Speed              | 3,000-35,000min <sup>-1</sup> (rpm) |
| Torque             | 380gf-cm                            |
| Dim. of Motor Hpc. | ø24.5 x L143.3mm                    |
| Weight             | 191g                                |
| Chuck              | Std. ø2.35mm (exchangeable)         |

**Standard Type MR-E 35,000min<sup>-1</sup>(rpm)**

Mio-35EM&SCD



Features:  
Suits for wide range of applications from grinding and polishing. High torque micromotor is well balanced in holding.

**Specification**

|               |                                     |
|---------------|-------------------------------------|
| Speed         | 3,000-35,000min <sup>-1</sup> (rpm) |
| Torque        | 380gf-cm                            |
| Dim. of Motor | ø24.5 x L77.2mm                     |
| Weight        | 104g                                |

| Products | Cat.#    | Model / Description   |
|----------|----------|---|
|          | E235-015 | Standard motor Mio35M (less motor cord)   |
|          | E236-015 | E type Standard motor Mio35EM (less motor cord)                                 |
|          | H203     | Ring type Handpiece MR (exchangeable with optional chuck)                       |
|          | H178     | E type Handpiece for precision Lab work VR-E (exchangeable with optional chuck) |
|          | E235-012 | Straight Motor Cord for Standard Motor Mio-35SCD (1.2m)                         |
|          | H203-180 | CHH 2.35 ø2.35 chuck  |

**Troubleshooting**

Please check following points before sending back the instruments for repair.

**Troubleshooting and Countermeasures for Motor and Control Unit**

| Trouble                       | Check Points  | Probable Causes                        | Countermeasures                   |
|-------------------------------|---|--|-----------------------------------|
| Motor Handpiece does not run. | Pilot Lamp does not light when power switch is ON.  | Power cable is unplugged.              | Connect power plug.               |
|                               |   | Reset lamp lights.                     | Reset the systems.                |
|                               | Motor does not run when Foot / Hand Selection Switch is selected or Foot Control is operated. | Chuck is at open position.             | Set Chuck Ring at close position. |
|                               |   | Motor cord is loosely connected.       | Check connection.                 |
| Speed does not increase.      | Foot Control Cable is loosely connected.  | Check connection.                      |                                   |
|                               | Carbon Brushes are worn out.  | Replace with new carbon brushes.       |                                   |
|                               | Motor cord is broken.   | Replace with new motor cord or repair. |                                   |
|                               | Control unit malfunctions.  | Need to be repaired.                   |                                   |

**Troubleshooting and Countermeasures for Handpiece**

| Trouble  | Probable Causes                                      | Countermeasures  |
|--|--|--|
| Handpiece does not run with chuck closed.                  | Foreign particles may be in ball bearing.            | Damaged ball bearing should be replaced at service center.     |
| Handpiece heats up while running.                          | Excessive wear or penetration of foreign particles.  | Damaged ball bearing should be replaced at service center.     |
| Vibration or excessive noise from handpiece while running. | -ditto-  | -ditto-  |
|  | Off-centered or bent bur is used.                    | Replace with a new bur (User).                                 |
| Bad bur concentricity.                                     | Foreign particles or dirt stuck in chuck or spindle. | Clean chuck or spindle (User).                                 |
|  | Worn chuck.  | Replace with a new chuck.                                      |
| Bur slips out.   | Worn bearings.                                       | Damaged ball bearing should be replaced at service center.     |
|  | Loose chuck.   | Tighten the chuck securely. (See Handling of motor handpiece.) |