



Micromotor for Laboratory Work
ULTIMATE XL-F

OPERATION MANUAL




Powerful Partners®



Thank you very much for purchasing ULTIMATE XL-F.
Please read this Operation Manual carefully regarding the instructions for use, handling method,
and maintenance and inspection prior to use and store it in a place where users can review it
anytime.

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⚠ IMPORTANT INSTRUCTIONS AND WARNING-Electric Devices

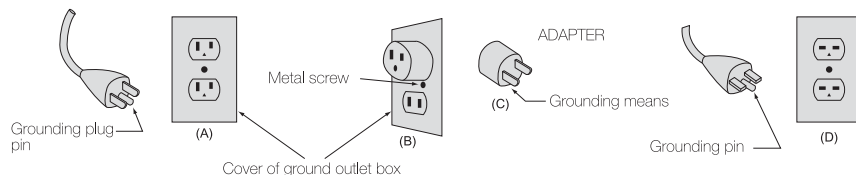
⚠ WARNING!

When using electric tools, basic safety precautions should always be followed to reduce the risk of fire, electrical shock and personal injury, including the following. Read all these instructions before operating this product and save these instructions.

A. GROUNDING INSTRUCTIONS

- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This tool is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.
- Do not modify the plug provided - if it will not fit the outlet, have the proper outlet installed by a qualified electrician.
- Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment grounding conductor to a live terminal.
- Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.
- Use only 3-wire extension cords that have 3-prong grounding plugs and 3-pole receptacles that accept the tool's plug.
- Repair or replace damaged or worn cord immediately.
- This tool is intended for use on a circuit that has an outlet that looks like the one illustrated in Sketch A in Figure (below) (120V). The tool has a grounding plug that looks like the plug illustrated in Sketch A in Figure (below). A temporary adapter, which looks like the adapter illustrated in Sketches B and C, may be used to connect this plug to a 2-pole receptacle as shown in Sketch B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician. The green-colored rigid ear, lug, and the like, extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box.

Grounding Method



- USE PROPER EXTENSION CORD. Make sure your extension cord is in good condition.

When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. Table (below) shows the correct size to use depending on cord length and nameplate ampere rating. If in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.

Minimum gauge for cord

Ampere Rating	Volts	Total Length of cord			
		7.5m(25ft.)	15m(50ft.)	30m(100ft.)	45m(150ft.)
	120V				
	240V	15m(50ft.)	30m(100ft.)	60m(200ft.)	90m(300ft.)
More Than	Not More Than	Cord Number			
0	6	#18	#16	#16	#14
6	10	#18	#16	#14	#12
10	12	#16	#16	#14	#12
12	16	#14	#12	Not Recommended	

B. OTHER WARNING INSTRUCTIONS

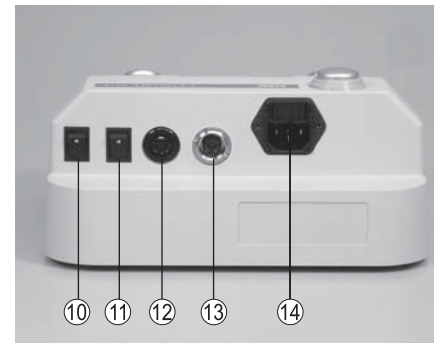
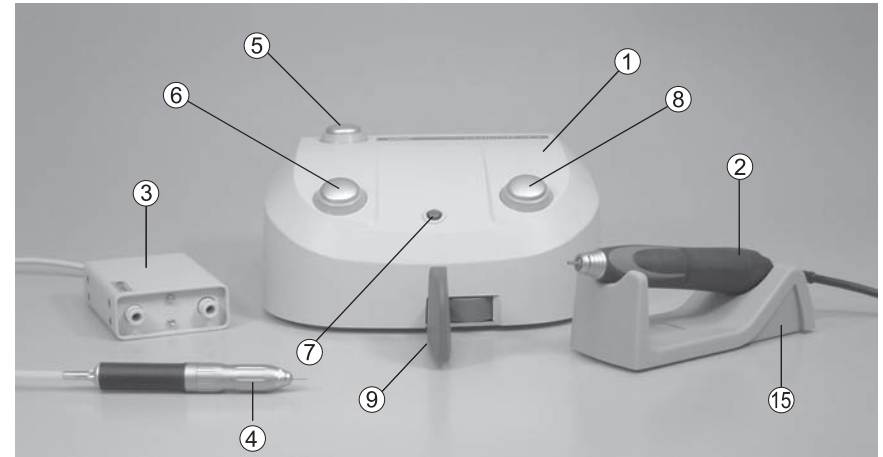
- For your own safety read instruction manual before operating tool.
- Wear eye protection.
- Replace cracked wheel immediately.
- Always use guards and eye shields.
- Do not over tighten wheel nut.
- Use only flanges furnished with the grinder.
- REMOVE ADJUSTING KEYS AND WRENCHES. From habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.
- KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.
- DON'T USE IN DANGEROUS ENVIRONMENT. Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well lighted.
- Risk of injury due accidental starting. Do not use in an area where children may be present.
- DON'T FORCE TOOL. It will do the job better and safer at the rate for which it was designed.
- USE RIGHT TOOL. Don't force tool or attachment to do a job for which it was not designed.
- WEAR PROPER APPAREL. Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewelry that might get caught in moving parts. Nonslip footwear is recommended. Wear protective hair covering to contain long hair.
- ALWAYS USE SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses. Also use face or dust mask if cutting operation is dusty.
- SECURE WORK. Use clamps or a vise to hold work when practical. It's safer than using your hand and it frees both hands to operate tool.

- **MAINTAIN TOOLS WITH CARE.** Keep tools sharp and clean for best performance and to reduce the risk of injury to persons. Follow instructions for lubricating and changing accessories.
- **DISCONNECT TOOLS** before servicing; when changing accessories, such as blades, bits, cutters, and like.
- **REDUCE THE RISK OF UNINTENTIONAL STARTING.** Make sure switch is in off position before plugging in.
- **USE RECOMMENDED ACCESSORIES.** Consult the owner's manual for recommended accessories. The use of improper accessories may cause risk of injury to persons.
- **NEVER LEAVE TOOL RUNNING UNATTENDED.** TURN POWER OFF. Don't leave tool until it comes to a complete stop.
- For recommended operating speed for various applications, please follow the instructions of bur manufacturers.
- The system functions normally in the environment where the temperature is at 0-40°C, humidity at 10-85% RH, atmospheric pressure at 500-1060hPa, and no moisture condensation in the Unit. Use at outside of these limits may cause malfunction.
- Store the system in the place where the temperature is at -10-60°C, humidity at 10-85% RH, atmospheric pressure at 500-1060hPa, and the system is not subject to air with dust, sulfur, or salinity.
- Severe shock – Eg. Dropping Control Unit, or the Micromoto – may cause damage.
- Never move Chuck Control Ring to the direction of LOOSEN while motor is running.
- Activation of Circuit Breaker means too much load is applied to the motor beyond the capacity the motor takes. This circuit breaker is designed to protect the motor, but it is desired to perform the grinding work without activating the circuit breaker.
- Care should be taken not to drop micromotor handpiece on floor or hard work surface in order to avoid damage caused by impact shock.

C. Important Instructions and Warning on ULTIMATE XL-F.

- No lubrication is required to either motor or handpiece because ball bearings impregnated with grease in both motor and handpiece.

1. Component Names



- ① Control Unit
- ② Motor Handpiece
- ③ Turbine Adapter (option)
- ④ Air Turbine (option)
- ⑤ Main Switch
- ⑥ Turbine / Motor Selector Switch
- ⑦ Power Indicator
- ⑧ Forward / Reverse Selector Switch
- ⑨ Speed Control Pedal
- ⑩ Maximum Engine Speed Setting Switch
- ⑪ Auto Cruise Switch
- ⑫ Turbine Adapter Connector
- ⑬ Motor Connector
- ⑭ Fuse Box
- ⑮ Handpiece Stand

2. Set up of Control Unit

(1) Mounting of Motor

Insert the motor cord plug locator into ⑬ Motor Connector aligning it with the groove of the connector, and tighten the motor cord plug nut to fix. (Fig. 1)



Fig. 1

(2) Connecting of Power Cord

Securely insert the plug of Power Cord in to Connector Box at the back of the unit aligning it with the configuration. (Fig. 2)



Fig. 2

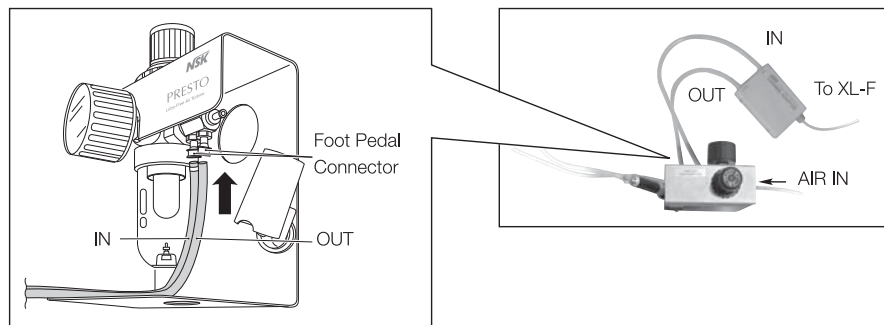
(3) Mounting of the Air Turbine (option)

Insert the plug of the ③ Turbine Adapter into the ⑫ Turbine Adapter Connector at the back of the unit. (Fig. 3)

Insert two hoses from the ③ Turbine Adapter into the openings for foot pedal connection in the air line kit. (Fig. 4)



Fig. 3



Foot Pedal Connector

Fig. 4

3. Operation Procedure

- ① Connect the power cord to connector.
- ② Preset the maximum rotation speed with the Maximum Engine Speed Setting Switch (ON : 40,000min⁻¹ (rpm), OFF : 30,000 min⁻¹(rpm).
- ③ Select ⑪ Auto cruise or Variable by the Auto Cruise Switch.
- ④ Turn the ⑤ Main Switch on, and the ⑦ Power Indicator lamps.
- ⑤ Push the ⑨ Speed Control Pedal right to run the motor. The rotation speed can be variably controlled within the preset maximum rotation speed range according to the degree of depression of the Speed Control Pedal.
- ⑥ Each time Forward/Reverse Selector Switch is depressed, the direction changes between ⑧ FORWARD and REVERSE

※ Auto cruise mechanism

To run the motor at a fixed speed without pushing the ⑨ Speed Control Pedal, push the ⑪ Auto Cruise Switch to "Auto" and keep on pushing the ⑨ Speed Control Pedal for a second at a proper speed. Push the pedal again to cancel it, (if it is unnecessary, turn the ⑪ Auto Cruise Switch off).

4. Operation Procedure of Air Turbine (Option)

- ① Each time the Motor/Turbine Selector Switch is pressed, the motor and turbine change by turns.
- ※ In case of no turbine, nothing changes except beeps.
- ② • When Auto cruise mechanism is OFF:
Push the ⑨ Speed Control Pedal, and the turbine rotates. Stop pushing the pedal, and the turbine stops.
• When Auto cruise mechanism is ON:
Push the ⑨ Speed Control Pedal for a second, and the turbine continues to move even if the pedal is not pushed. Push the pedal again to cancel it.
- ※ Even if ⑧ Forward/Reverse Selector Switch is pushed while using the air turbine, it will be neglected only with the beeps of electronic sounds.
- ③ Push the ⑥ Motor/Turbine Selector Switch again, and the motor will be available.

5. Protective Circuit for Motor

When the motor is operated with a load exceeding the limit or the handpiece is in an unrotatable condition, the circuit to protect the motor and unit operates to stop the power supply to the motor, whereby the ⑦ Power Indicator goes on and off.

How to reset the protective circuit

It can be reset by depressing the ⑨ Speed Control Pedal again after eliminating the cause of the error.

6. Memory Function

When the main switch is turned on, the rotation direction and the Motor/Turbine selections made when the main switch was last turned off are restored. Special attention should be given to the rotation direction.

7. When Abnormal Conditions Occur

When problems connected with the motor or unit occurs, the ⑦ power supply to the motor will stop and the power indicator flashes. Unlike being stopped by the protection circuit, the motor will not start even when the pedal is depressed. If such a problem occurs, please ask for repair service.

8. Replacement of Fuse

Fuse is located in ④ Fuse Box . Release ratchet clamp located on the right-and-left the Fuse Box and pull it out to change the fuse (T3.15A250V). (Fig.5)



Fig.5

When the fuse come down, Insert new fuses (T3.15A250V) into the fuse box and then push the fuse box into the original position until hearing a sound click.

(230V 12001-16010 T1.6AL/250V)

※ Fuse: Order No. (120V): 12001-31510

※ Fuse: Order No. (230V): 12001-16010

⚠ CAUTION

Fuse is burned out when a short circuit occurs or when over-voltage is flowed into the primary current source. If the cause is uncertain, return the product to an authorized NSK's service shop for inspection.

9. Vacuum-coupled Mode

On some dental tables with vacuum dust collector, the motor may be used while being coupled with a dust collector. When such a dust collector * is used, power consumption of ULTIMATE XL-F can be regulated so that the vacuum-coupled function can work. If you need coupling with a vacuum dust collector, select the mode as follows:

How to select the mode

While pressing ⑧ Forward / Reverse Selector Switch, turn on ⑤ Main Switch, and the mode can be selected. A long beep indicates vacuum-coupled mode and 2 short beeps indicate non-coupled (energy-saving) mode.

* Each time the switch selection is made, the mode changes between vacuum-coupled mode and non-coupled mode.

* A currently known dust collector is KAVO EWL-560.

10. Handling of Motor and Handpiece

(1) Insertion or Removal of Bur

The chuck is opened by turning the Bur Lock Ring to an 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. 6)

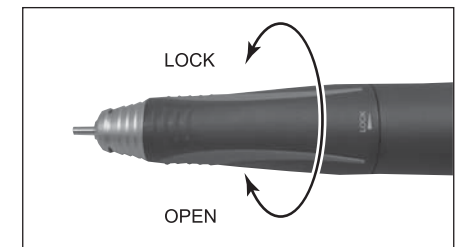


Fig. 6

⚠ CAUTION

- Do not turn the Ring during rotation.
- Do not turn a motor, when it has not attached bur or the Ring Open position. It may be reasons for the failure or overheating of the handpiece.

(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. 7)

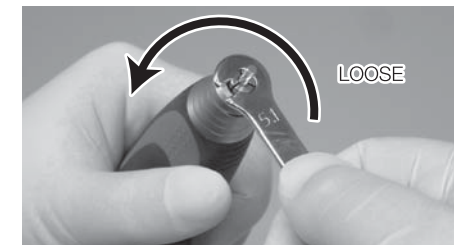


Fig. 7

※ If a bur having a large diameter of a cutting part is used under a high torque, the chuck may rotate in the close direction and the bur may be stuck and cannot be removed. In this case, align the nose's slit and spindle's spanner position (flat part), and apply an L spanner to fix the spindle. Open the ring and turn the chuck counterclockwise with the provided spanner wrench to remove it. (Fig.8)



Fig.8

(2) Cleaning of Chuck

To keep accuracy for the 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.

(Unit / Motor)

Trouble		Cause/Check	Remedy
The motor and handpiece do not run. The power indicator flashes.	The power indicator flashed in 5 to 6 seconds after depressing the pedal.	Check that the chuck ON/OFF ring is not open. Try to turn the bur with your finger.	Set the chuck ON/OFF ring to the LOCK position. If the bur does not turn, it will affect the motor or handpiece. Please ask for repair service.
	The motor handpiece comes to a stop under a heavy load.	It returns to normal immediately if tried again.	The protection circuit is started. The motor must not be used to activate the protection circuit.
	The power indicator remains flashing even when the power is switched on again.	The unit is hot to touch.	Start the unit again after stopping operation and letting it cool for 10 minutes. Check the operation of the unit, and if it operates normally, there is no problem.
		The unit is not hot to touch.	There is a malfunction in the internal memory. Please ask for repair service.

(Handpiece)

Trouble		Cause/Check	Remedy
The handpiece does not run with the chuck tightened.		Entry of foreign matter in the ball bearings or seizure.	Send it to your dealer. Ask for repair.
Heat is generated during rotation.		Entry of foreign matter in the ball bearings, causing wear of the bearings.	Same as the above.
Vibration or noise occurs during rotation.	Same as the above.		Same as the above.
	A bent bur is used.		Replace the bur.
Runout of the bur is heavy.	Dust may be stuck in the chuck or spindle.	Clean the inside of the chuck and spindle.	
	The chuck is worn.	Replace the chuck.	
	The ball bearings are worn.	Send it to your dealer.	
The bur comes out		The chuck is loose.	Tighten the chuck securely. (See 10. Handling of Motor and Handpiece.)

(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. 9)

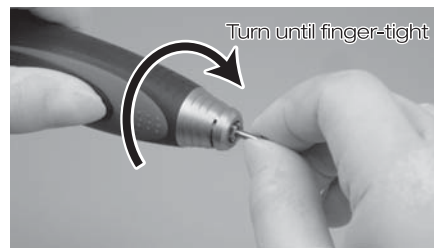


Fig. 9

CAUTION

Before using the handpiece, make sure to pull the rotating instrument (bur, etc.) to check that it is securely mounted.

(3) Disconnecting and Connecting of Motor Cord to Motor

Remove the cord nut at the rear end of the motor, and the motor cord connector can be pulled out. For connection, align the connector pin and the hole in the motor cord connector, and insert the connector straight until it stops. Then, tighten the cord nut.(Fig.10)

※When inserting the connector, do not turn or twist it.



Fig. 10

(4) Disconnecting Handpiece from Motor

The handpiece and motor are screwed at the midpoint. Firmly grasp the motor outer case and the handpiece outer case and turn it counterclockwise to disconnect. (Fig. 11).



Fig. 11

CAUTION for Handpiece connection

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. Reconnect the handpiece and tighten securely. (Fig. 12)

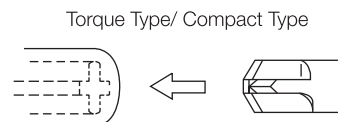


Fig. 12

11. Specification

Control Unit

Model	NE230
Power supply	AC120V 50-60Hz AC230V 50-60Hz
Weight	3.8kg
Dimensions	W230x D292x H113mm

Handpiece Stand

Model	Handpiece Stand
Weight	120g

Motor Handpiece

1) Torque Type

Model	UMXL-TP 2M
Speed	1,000~40,000 min ⁻¹
Max. Torque	8.7 N · cm
Weight	215g (exclude the code)
Dimensions	L151x ø 29mm
Code Length	2.0m

2) Compact Type

Model	UMXL-C 2M
Speed	1,000~40,000 min ⁻¹
Max. Torque	6 N · cm
Weight	181g (exclude the code)
Dimensions	L144 x ø27mm
Code Length	2.0m

12. Troubleshooting

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

(Unit / Motor)

Trouble	Cause/Check	Remedy
The Power Indicator does not light up.	Check that the power plug is connected.	Insert the power plug correctly.
	Check that the fuse has not burnt out.	Replace it with a specified fuse. If the reason the fuse has blown is unknown, ask for an inspection.
	Check the power switch for malfunction.	Ask for repair.
The motor and handpiece do not run. The power indicator flashes.	The power indicator soon starts flashing even though the pedal is depressed.	If the signal from the motor is not transmitted to the unit, a problem will occur. Check the motor cord again to determine if it is damaged and is connected correctly. If the motor cord is damaged or the cause is not determined, please ask for repair service.
	The motor handpiece sometimes starts turning if the pedal is depressed several times.	The trouble could be from the brake circuit. Please ask for repair service.
	The motor handpiece starts turning immediately when the pedal is depressed.	The problem could be due to the excess current in the detection of the circuit. Stop operating the motor for a while.