

MF — 830

Microforge

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Precautions in Handling

This is a high precision instrument for performing micron-level work with accuracy and is fine-tuned. Pay special attention to the points mentioned below so that the instrument can be used safely over a long period of time.

1. Be careful not to drop the instrument onto your hands or legs so as to avoid injuries.
2. Handle with care so as not to jar or shock the instrument.
3. Do not loosen the clamps of the instrument. Do not disassemble or modify the instrument by yourself.
4. Avoid staining the instrument with blood, chemicals or water. Do not install it in a place where there is a chance of such staining.
5. Stains from blood or chemicals should be removed with organic solvents such as alcohol. Avoid sterilization by boiling.
6. Do not place the instrument in a humid place.
7. Install the instrument on a horizontal plane. Do not install it in an unstable place where there is a danger of shocks or vibrations.
8. Do not expose the instrument to dust or direct sunlight.
9. Do not install the instrument in a place adjacent to monitors or speakers that are highly magnetic.
10. Use the specified power input to use the instrument.
11. As to the thickness of the platinum wire, normally a 100 μ m or 150 μ m platinum wire is used. If any other platinum wires are used, it may cause a failure in the circuit board. In the event of such a failure, be aware that there is no guarantee that the failure can be recovered.
12. As to the material of the heater wire, always use a platinum wire for the heater wire to be fitted to this instrument. If the heater wire made of a different type of material is used, it may cause a failure in the circuit board. In the event of such a failure, be aware that there is no guarantee that the failure can be recovered.
13. Do not touch the light bulb to avoid being burnt as it will emit heat when the illumination system is on. If the light bulb went out, exchange it for a new one after it is completely cooled down.
14. When processing, attaching, or detaching the micropipette, handle it carefully as the tip of the micropipette is very sharp.
15. The micropipette is processed by the application of heat. While the heater is on, do not touch the heater when replacing the heater with a new one. Turn off the main power supply and wait until the heater cools down.
16. The coarse/fine unit of a microscope focus adjustment knob employs a built-in gearbox for the sake of size reduction. Please note that slight defocusing may be infrequently observed during fine focus operation.
17. If further assistance is required, please consult with your local Narishige representative.

The design of the product is under constant review and whilst every effort is made to keep the instruction manual up to date, the right is reserved to change specifications and equipment at any time without prior notice.

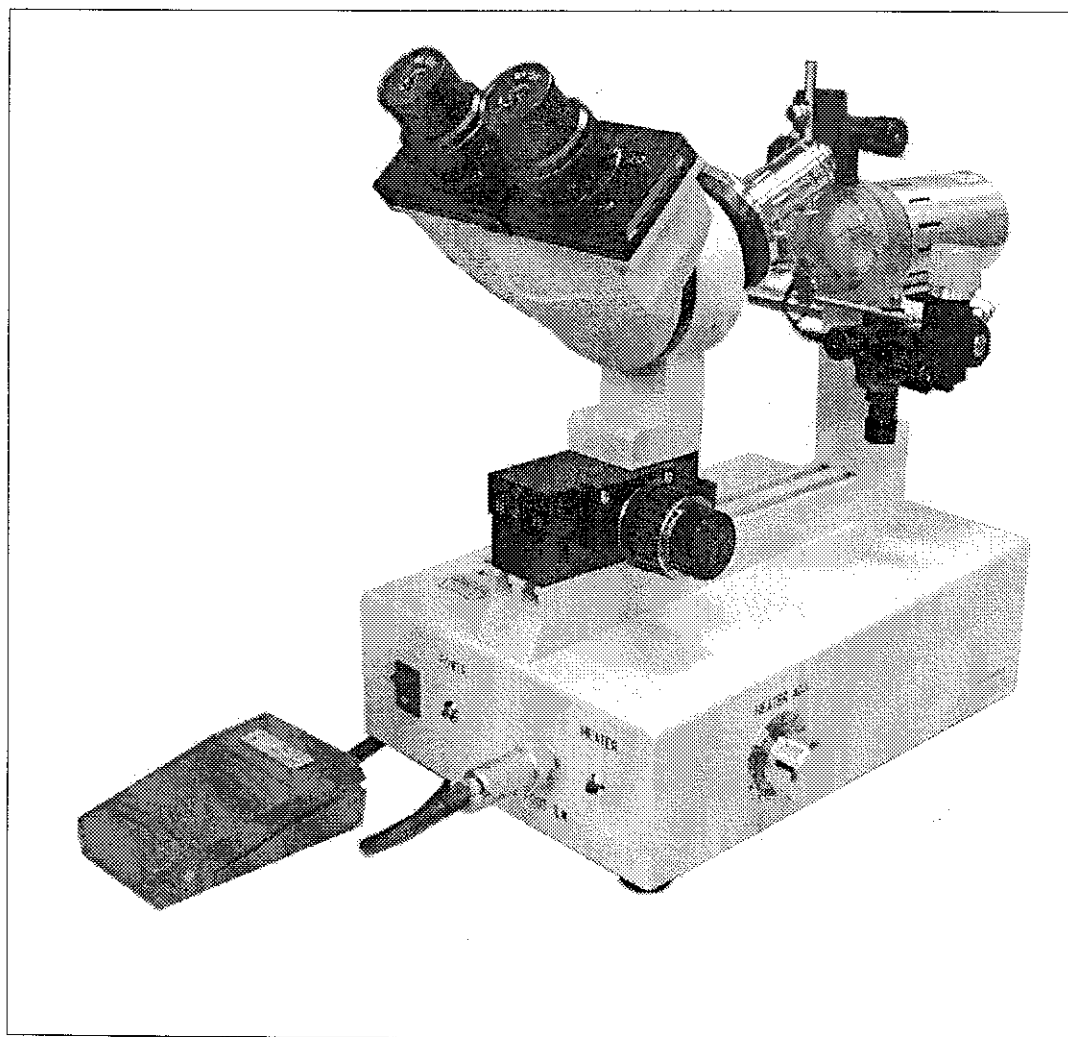
General Description

Thank you for purchasing the Narishige MF-830 Microforge.

The MF-830 is suitable for fire-polishing microelectrodes, by which jagged edges of the tips of glass capillaries are eliminated with surface tension caused by bringing the heated platinum wire close to the tips of glass capillaries to heat and dissolve the glass in order that the microelectrode tips can adhere to cell membranes and the cell electrical potentials can be recorded without causing damage to them.

To improve the operational efficiency, it is equipped with both the heater and the lamp adjusting knobs in front and with each independent manipulator for positioning the heater and for the microelectrode. Additionally, the heater manipulator is capable of fine movement in the vertical directions to ensure easy access to the microelectrodes.

Other features include lenses with magnifying power of approximately 500 to produce microelectrodes, improved electrical stability of the internal power source and compliance to European standards, thus the MF-830 is designed to be easy-to-use.



Items Supplied

The housing case of this instrument comes complete with the items listed on this page. Should any of the undermentioned items be missing in the housing case at the time of purchase, please contact your local Narishige representative.

<input type="checkbox"/> MF-830 Main Unit(Assembly of Power Supply, Microscope and Illumination units)	1
<input type="checkbox"/> Eyepiece (x 15, without graticule)	1
<input type="checkbox"/> Eyepiece (x 15, with graticule)	1
<input type="checkbox"/> Objective (x 5)	1
<input type="checkbox"/> Objective (x 35)	1
<input type="checkbox"/> Heater Unit	1
<input type="checkbox"/> Air Nozzle	1
<input type="checkbox"/> Footswitch	1
<input type="checkbox"/> Spare Heater (100 μ m)	1
<input type="checkbox"/> Spare Bulb	1
<input type="checkbox"/> Power Cable	1
<input type="checkbox"/> Allen Wrench	2

Exterior Features

① Power switch

It turns on/off the main power supply. The pilot lamp on the right side of the switch lights up when it is on.

② Footswitch input terminal (FOOT S.W.)

Jack port for footswitch connector

③ Heater lamp (HEATER)

A pilot lamp to be lit when the heater generates heat.

④ Light adjusting knob (LIGHT. ADJ)

It adjusts the output (brightness) of the light.

⑤ Heater adjusting knob (HEATER. ADJ)

It adjusts the heater output (heating value).

⑥ Power input port (Fuse housing/switchover of input voltages)

Jack port for the power cable. Replacing the fuse as well as changing the input voltage can be conducted at this section as well.

For details, refer to Chapter 6 – Maintenance – Exchange of fuse and – Change of working voltage.

⑦ Light connecting terminal (LIGHT)

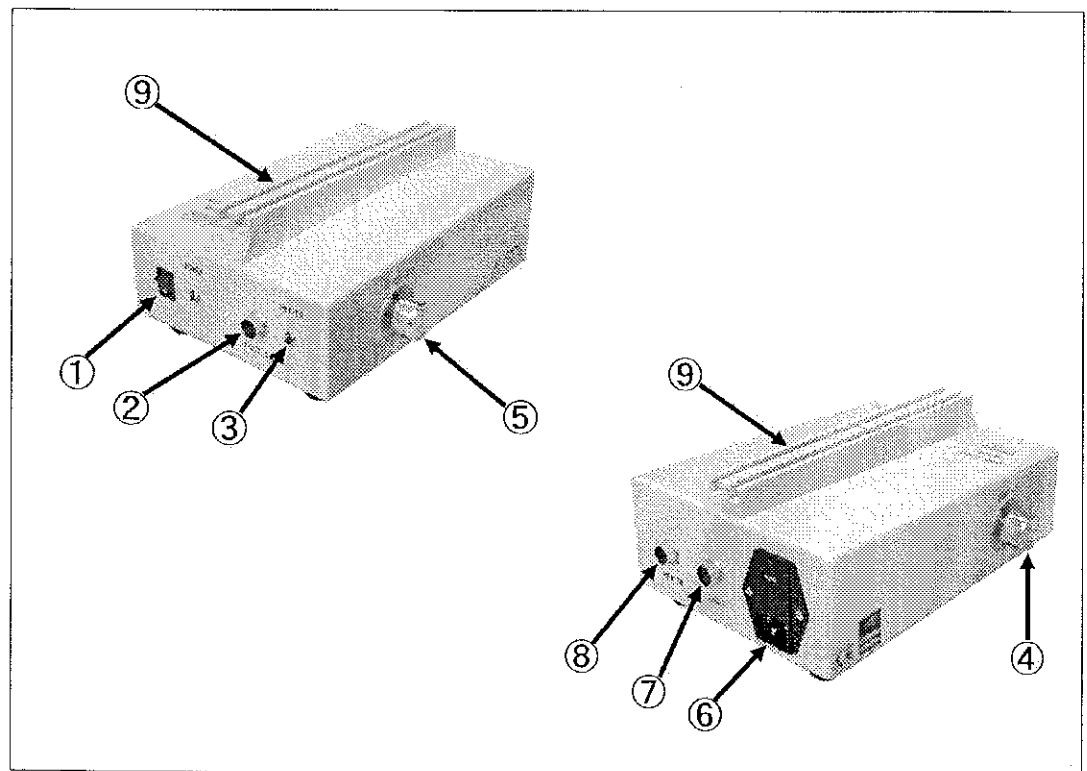
Jack port for the connector of the lamp housing.

⑧ Heater connecting terminal (HEATER)

Jack port for the heater connector.

⑨ Mounting rail

It is used for mounting both the microscope and illumination system. For details, refer to Chapter 4 – How to assemble.



⑩Footswitch

It turns the heater on/off.

⑪Eyepieces (x 15)

They are used for viewing the forging process. One with graticule and the other without graticule.

⑫Objectives (x 5 and x 35)

They are used for viewing the forging process.

⑬Microscope focusing knob

It is used for adjusting the forward and backward (Y-axis) movement to focus the microscope.

⑭Platinum wire heater (100 μ m in diameter)

It is used to forge and fabricate microelectrodes.

⑮Heater manipulator

Three-dimensional manipulator exclusively used to adjust the heater position.

⑯Heater vertically-adjustable fine drive unit

It is used to perform fine movement in the up and down directions to bring the heater close to the microelectrode with ease. It also functions as a connecting unit to fix the heater manipulator to the illumination column.

⑰Electrode holder

It is used to mount the microelectrode/glass capillary

⑱Electrode manipulator

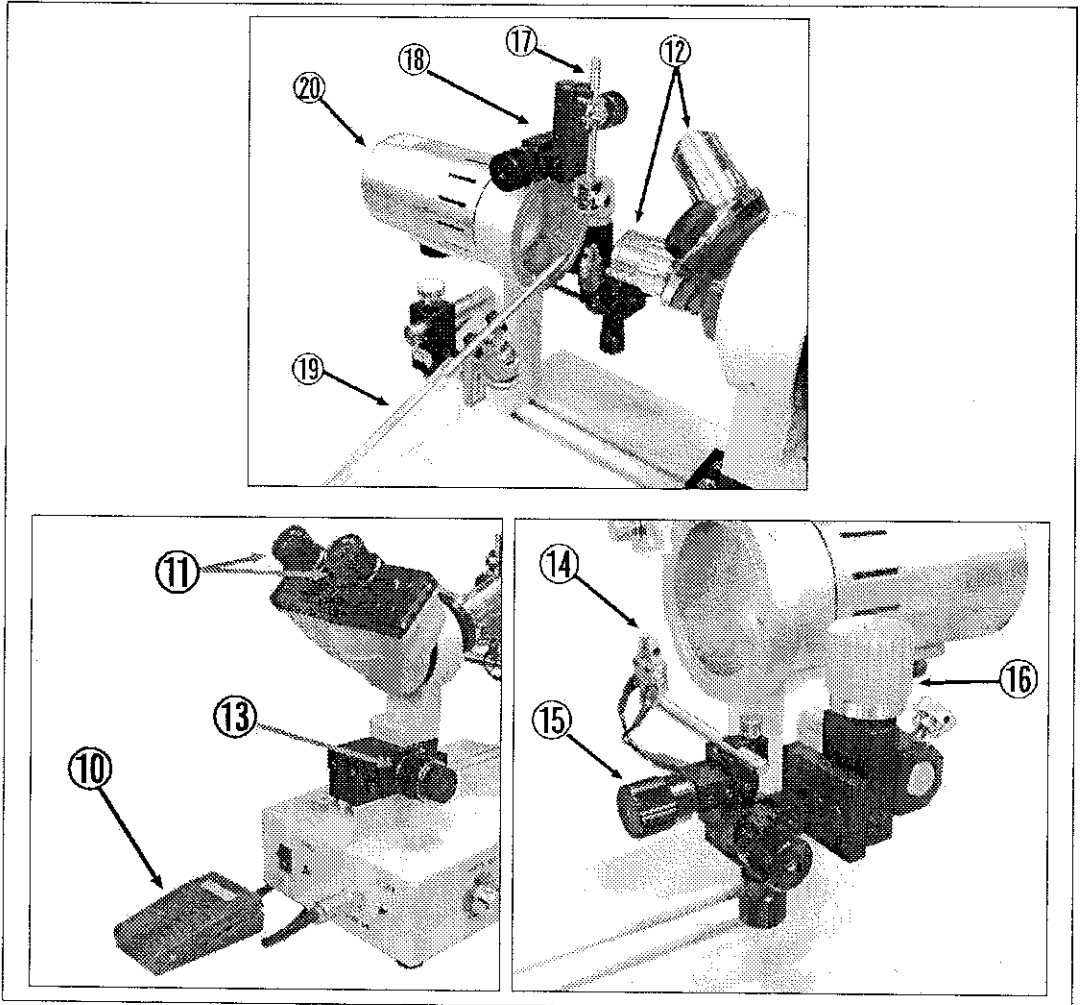
It is exclusively used to adjust the position of a microelectrode.

⑲Air nozzle

With the end of the hose in your mouth, blow into it to prevent the shape of a micropipette from being deformed by upward flow of hot air. It is also used to cool the electrode as one of fabricating techniques as necessary.

⑳Transmitted illumination system

It keeps the field of view of the microscope bright and clear while viewing the microforging process.



How to Assemble

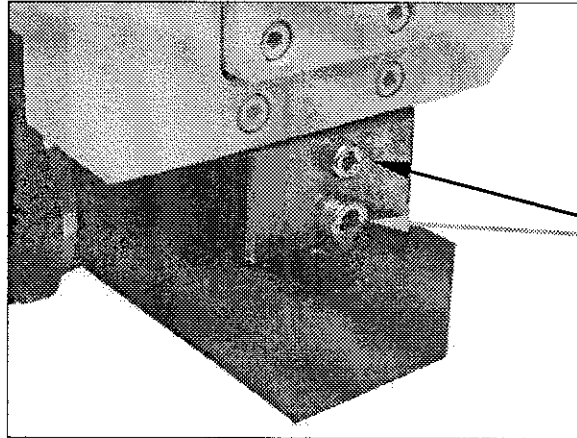
(1) Removing the Stopper for transportation

This instrument comes factory-equipped with the Stopper to protect the slider unit of the microscope from damage in transit. Use the following procedure to remove the Stopper.

Caution !

CAUTION!

Do not rotate the microscope focus adjustment knob before removing the Stopper, or it may cause breakage of the knob.

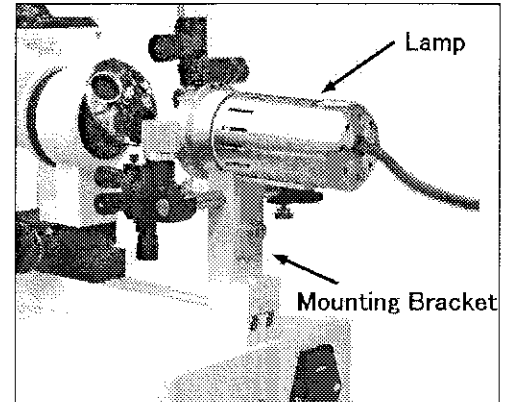
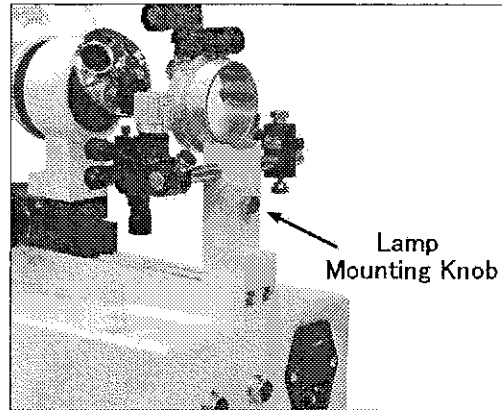


Loosen the two mounting screws of the Stopper on the front of the microscope using the supplied Allen Wrench and remove the Stopper.

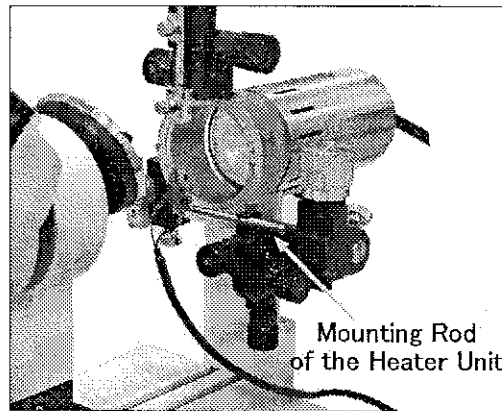
Mounting Screws of the Stopper

(2) Attaching the Transmitted Light Illuminator

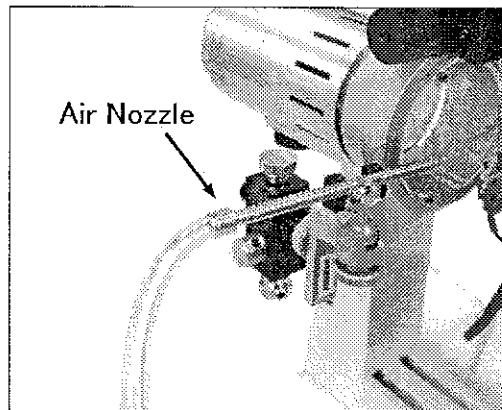
1. Loosen the Lamp Mounting Knob to remove it.
2. Align the Mounting Hole on the column with the Mounting Hole on the Mounting Bracket attached to the Lamp and fasten the Lamp Mounting Knob.



(3) Attaching the Heater Unit/Air Nozzle

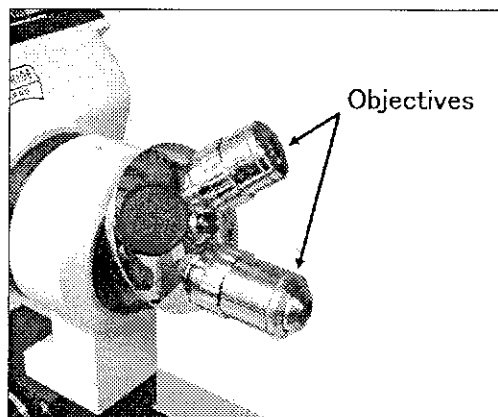


1. Attach the Mounting Rod of the Heater Unit to the Manipulator and set the Heater Unit to an easy-to-operate position.



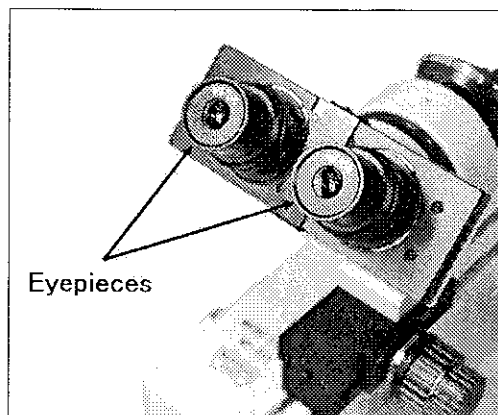
2. Attach the Air Nozzle to the Ball Joint.

(4) Microscope Assembly



1. Attaching the Objectives

Screw the Objectives in the two Mounting Holes out of the three Mounting Holes on the Revolving Nosepiece.



2. Insert the Eyepieces into the Body Tube.

(5) Connecting the cables

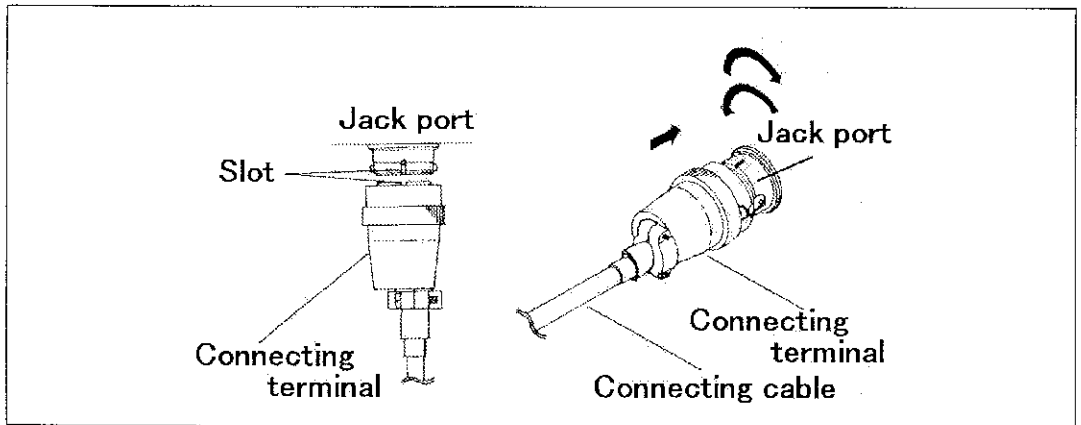
CAUTION!

Be sure to turn off the main power source before starting the procedure. Do not turn the power supply back on until all the cables are connected.

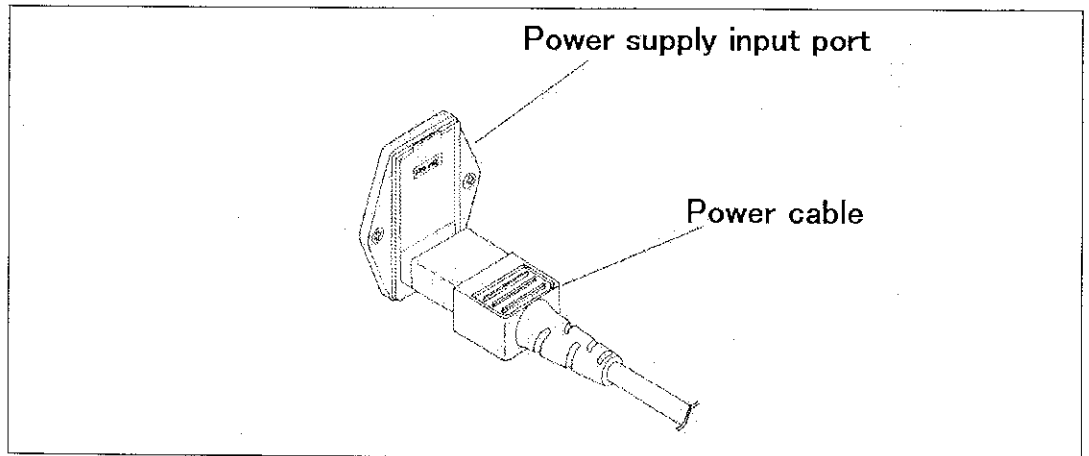
Connecting the heater connecting cord: Insert the connecting terminal of the heater connecting cord extending from the heater, with the grooved part facing upward, into the connecting terminal marked "HEATER" on the back of the base (main body). Turning the knob counterclockwise, push it as far as it will go and then turn the knob clockwise to lock it, as illustrated.

Connecting the transmitted illumination unit: Insert the connecting terminal of the transmitted illumination connecting cord extending from the transmitted illumination unit, with the grooved part facing upward, into the connecting terminal marked "LIGHT" on the back of the base. Turning the knob counterclockwise, push it as far as it will go and then turn the knob clockwise to lock it, as illustrated.

Connecting the footswitch: Insert the connecting terminal of the transmitted illumination connecting cord extending from the footswitch, with the grooved part facing upward, into the connecting terminal marked "FOOT S.W." at the front of the base. Turning the knob counterclockwise, push it as far as it will go and then turn the knob clockwise to lock it, as illustrated.



Connecting the power cable: Make sure the voltage indicated on top of the power input port at the back of the base agrees with the working voltage. If they are in exact agreement, plug in the power cable. If they are not in agreement, be sure to switch the input voltage to the appropriate one before plugging in the cable. For switching the input voltage, refer to "Maintenance" - Change of the working voltage.



How to Operate

(1) Turn the power on

Make sure the instrument is assembled properly in conformity to Chapter 4 — "How to assemble" and adjust both the light adjusting knob and the heater adjusting knob to the minimum (zero point) before turning on the power. Make sure the pilot lamp located on the right side of the power switch illuminated. Be aware that even if the knob is set to the minimum, the lamp may be slightly lit.

(2) Setting a microelectrode

Fit a microelectrode to the electrode holder. Operate the control knob of the electrode manipulator to the maximum and then attach the electrode holder to the electrode holder mount.

(3) Focusing the microelectrode

Under a low magnification (5x objective), lower the electrode slowly with the electrode manipulator. Operating the microscope focusing knob, focus the electrode in the field of view of the microscope. If the electrode should not appear in the field of view, try moving the electrode right and left using the electrode manipulator to place it in the field of view.

CAUTION!

The coarse/fine unit of a microscope focus adjustment knob employs a built-in gearbox for the sake of size reduction. Please note that slight defocusing may be infrequently observed during fine focus operation.

(4) Focusing the heater

Operate the heater manipulator to focus the heater in the center of the field of view. In this procedure, do not use the microscope focusing knob for the same purpose.

(5) Focusing the electrode and the heater under a high magnification

Under a high magnification (35 x objective), focus the electrode and the heater in the center of the field of view. In this procedure, the space between the heater and the electrode is of importance. Operate the heater vertically-adjustable fine drive unit to bring the electrode to the most preferred position considering the rate of expansion with heat generated by the heater.

CAUTION!

The coarse/fine unit of a microscope focus adjustment knob employs a built-in gearbox for the sake of size reduction. Please note that slight defocusing may be infrequently observed during fine focus operation.

(6) Forging and fabricating the electrode

Turn the footswitch on and let the heater generate heat by controlling the heater adjusting knob in order to fire-polish the tip of a microelectrode. Feeding air through the air nozzle can diffuse excess heat.

Maintenance

1. Heating Filament Replacement

This instrument uses a platinum wire of 100 micron diameter. The calorific value corresponding to the output of voltage will vary when the condition of the platinum wire changes, e.g. using a platinum wire of 150 micron diameter and making the length of a wire longer or shorter. This wire may be, therefore, cut off when the heater adjusting dial is set to the graduation over around 75. Besides, when used in a long period of time, the heating filament is oxidized and deteriorated. In the respective cases, the filament needs to be exchanged.

CAUTION!

Turn the power supply off to cool down the heating filament before exchanging the heating filament. Do not turn it on until all the procedures are completed.

CAUTION!

Length of the platinum wire

When the platinum wire of the heater unit is cut short, the resistance is reduced loading the circuit and thus causing breakage of the circuit board. To avoid this, be sure and set the platinum wire within sight to be 8mm or longer.

CAUTION!

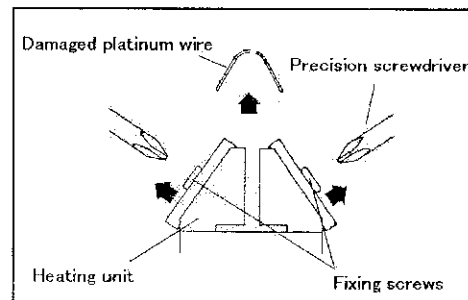
Thickness of the platinum wire

Normally a 100 μ m or 150 μ m platinum wire is used. If any other platinum wires are used, it may cause a failure in the circuit board. In the event of such a failure, be aware that there is no guarantee that the failure can be recovered.

CAUTION!

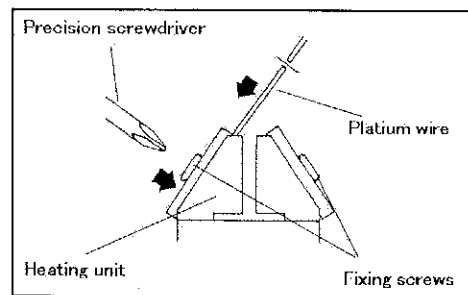
Material of the heater wire

Always use a platinum wire for the heater wire to be fitted to this instrument. If the heater wire made of a different type of material is used, it may cause a failure in the circuit board. In the event of such a failure, be aware that there is no guarantee that the failure can be recovered.



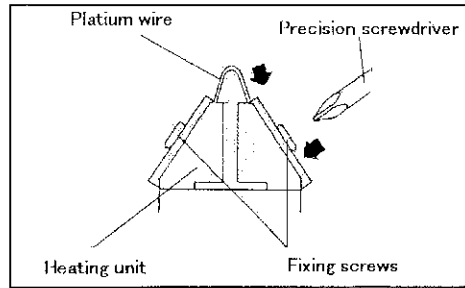
(1) Detach the heating unit from the heating unit manipulator. It would be easier to exchange if the connecting terminal is moved from the base.

(2) Loosen the fixing screws for the filament to remove the damaged filament.



(3) Clamp one end of the spare filament to the heating unit.

(4) Bend the filament in arch and cut it off in an appropriate length.



(5) Clamp the other end to the heating unit.

(6) Finally, reset the heating unit to the heating unit manipulator.

CAUTION!

It is not recommended to touch the spare filament directly with your finger. This may stick impurities to the filament and thus cause oxidation. It is recommended to use a pair of tweezers.

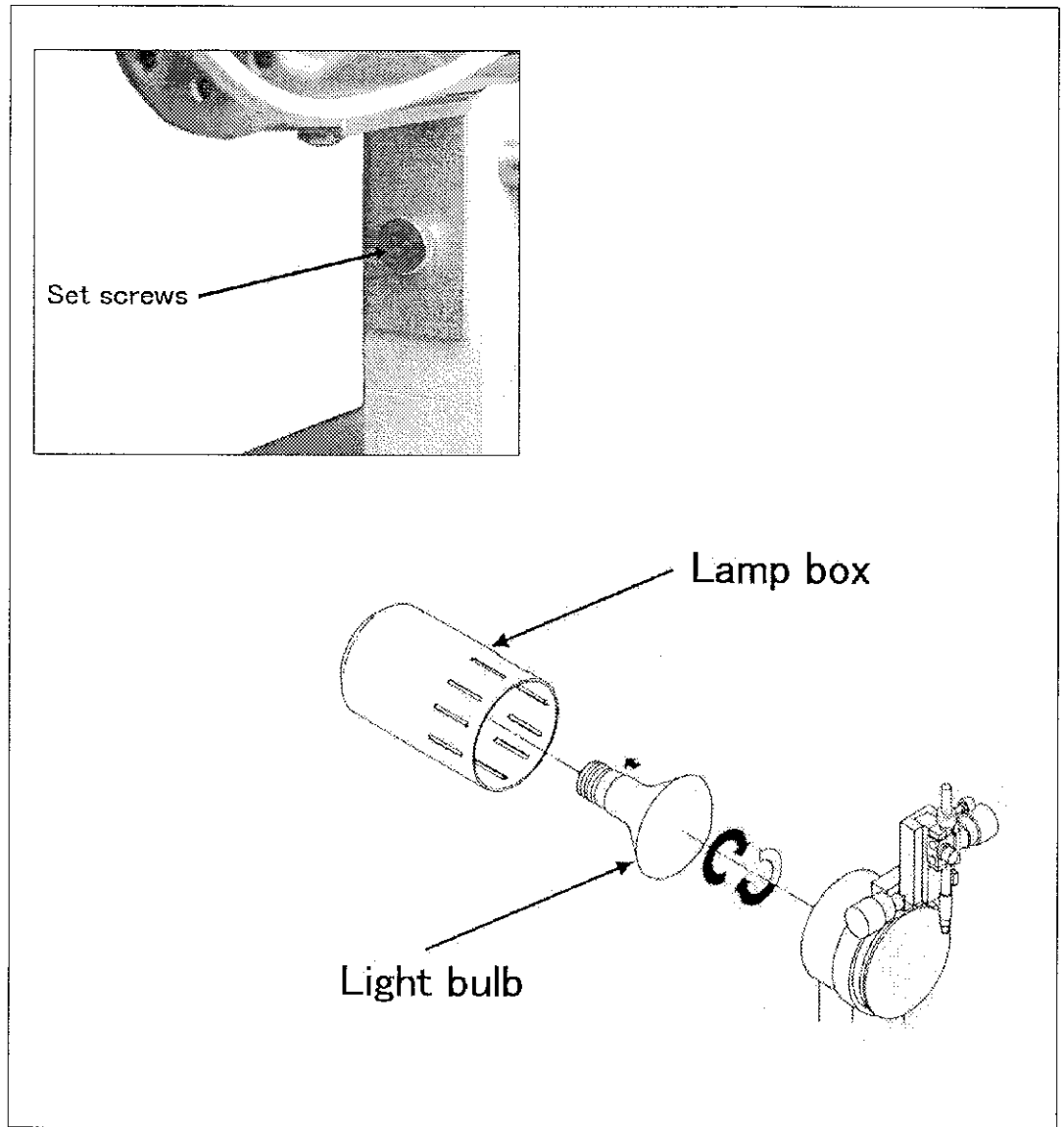
2. Exchange of light bulb

Commercially available light bulbs can be used for this instrument provided that they are compatible in specifications, rating and size. For replacing the light bulb, follow the procedure given below.

CAUTION!

Be sure to turn the power supply off to cool down the heated bulb before exchanging bulbs. Do not turn it back on until all the procedures are completed.

- (1) Remove the mounting knob at the lamp support to detach the lamp housing.
- (2) Remove the old bulb by turning it counterclockwise.
- (3) Make sure the specifications and the rating of a new bulb agree to those of the replaced one. Insert the new bulb into the socket of the lamp housing by turning it clockwise.
- (4) Put the lamp housing back to the lamp support and fix it with the mounting knob.



3. Exchange of fuse

The fuse is fitted to the power input port. For replacing the fuse, follow the instructions given below.

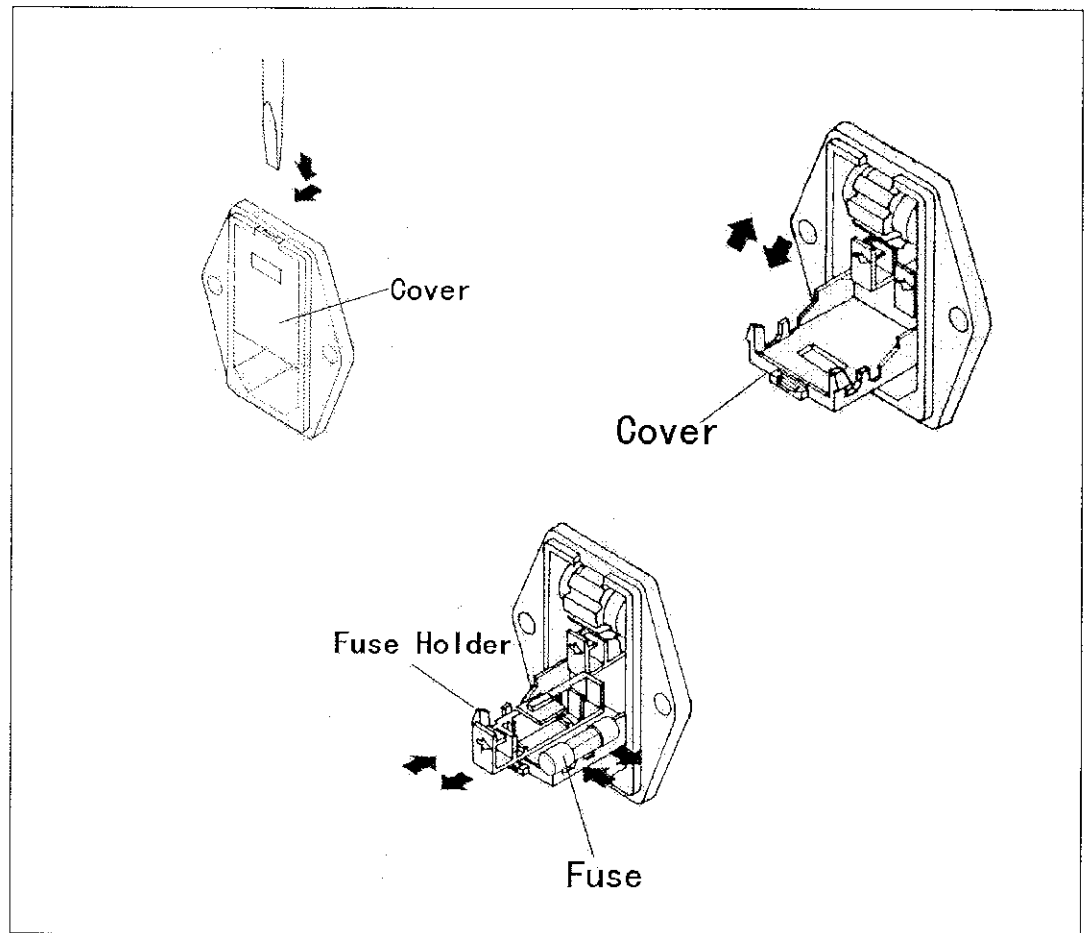
CAUTION!

Turn the power off and unplug the power cable before replacing the fuse. With the cable on the port, the cover can not be opened. Do not turn the power back on until all the procedures are completed.

- (1) Put a flatblade screwdriver in the slot on top of the power input port to pull it towards you and open the cover, as illustrated.
- (2) Pull out the fuse holder and replace the blown fuse with a new one which is equal in capacity to the blown fuse.
- (3) After replaced with a new fuse, attach the fuse holder properly in line with the direction of the indicated arrow.
- (4) Close the cover and finish the procedure.

CAUTION!

Be sure to use a new fuse which is equal in capacity to the blown one when replacing the fuse. Do not make changes to the voltage setting unit while replacing the fuse.



4. Change of working voltage

This instrument is made for use with such working voltages as AC100V, 120V, 220V and 240V. Voltage setting unit is incorporated into the power input port. When changing the working voltage, follow the instructions given below.

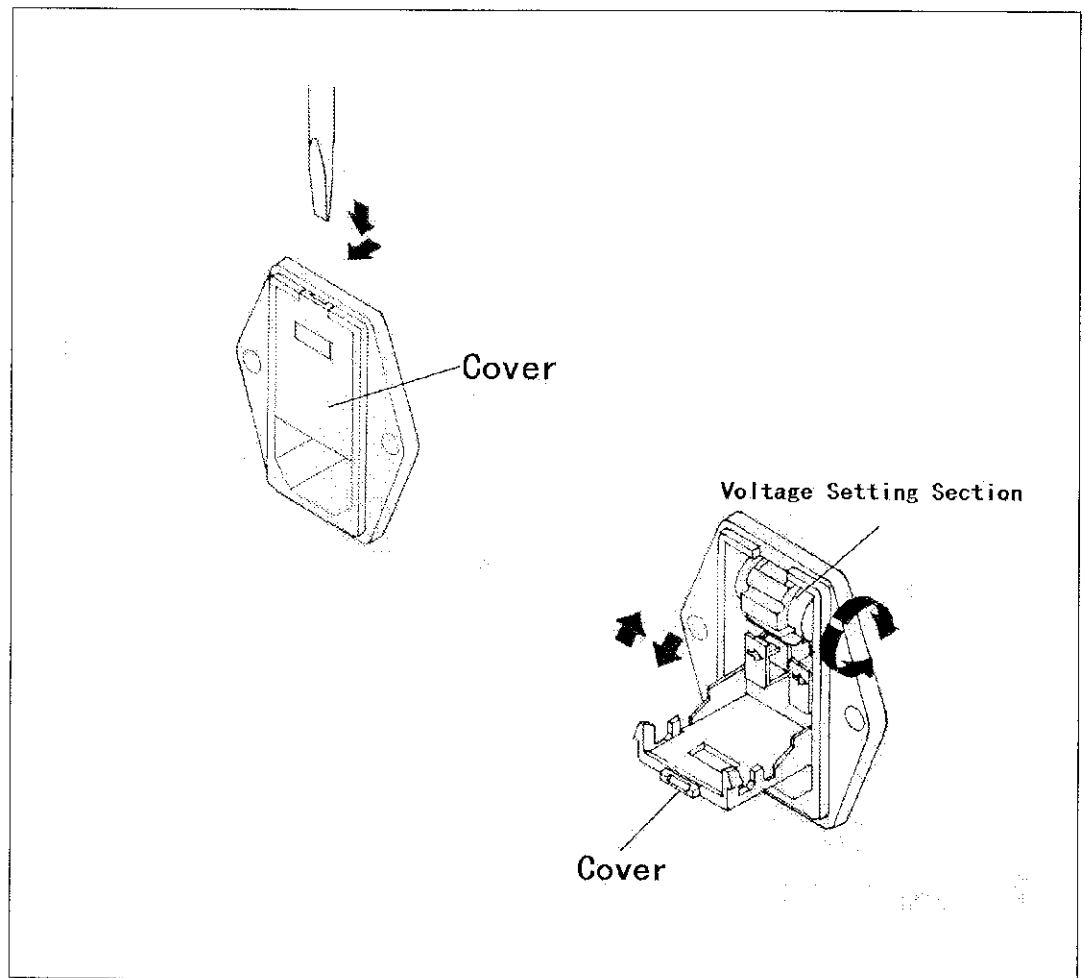
CAUTION!

Turn the power off and unplug the power cable before changing the working voltage. With the cable on the port, the cover can not be opened. Do not turn the power back on until all the procedures are completed.

- (1) Put a flatblade screwdriver in the slot on top of the power input port to pull it towards you and open the cover, as illustrated.
- (2) Make a new setting of the proper working voltage by scrolling the voltage selector.
- (3) Make sure it is set to the correct voltage and then close the cover to finish the procedure.

CAUTION!

Ensure that the working voltage value agrees to the reset voltage value. If set to a wrong voltage, it may cause a breakdown.



Specifications

- Designation : Microforge
- Model Name : MF-830
- Dimensions : 300(W) x 200(D) x 300(H)mm
- Weight : 5.6 Kg
- Working Distance
- Heater Manipulator
- X-axis Movement Range 14mm
- Y-axis Movement Range 14mm
- Z-axis Movement Range 14mm
- Heater Vertically-Adjustable Fine Drive Unit: Movement Range 20mm
- Electrode Manipulator
- Y-axis Movement Range 12mm
- Z-axis Movement Range 28mm
- Microscope Focusing Movement Range 30mm
- Magnification:
- Eyepiece x15
- Objective x5 / x35
- Total Magnification x75 / x 525
- Light Bulb 100/110V 25W
- Heater Platinum Wire Heater /100 μ m in diameter
- Working Voltage: AC100V, 120V, 220V, 240V (Rating) \pm 10%
- Power Consumption 35VA
- Fuse: 2A 250V 2pieces (ϕ 5 x 20mm)
- Components
- MF-830 Main Unit (Assembly of Power Supply Unit, Microscope Unit and Illumination Unit) 1
- Eyepiece (x15, without graticule) 1
- Eyepiece (x15, with graticule) 1
- Objective (x5) 1
- Objective (x35) 1
- Heater Unit 1
- Air Nozzle 1
- Footswitch 1
- Accessories
- Spare Heater(100 μ m in diameter) 1
- Spare Bulb 1
- Allen Wrench 2
- Power Cable 1

Consumables (optionally available)

- Platinum Wire Heater : 100 μ m x 1m (Model Name: PT-A)
- Light Bulb for MF-900 : 100/110V 25W (Model Name: MF-900L3)