INSTRUCTION MANUAL

MF200

Microforge with 40× Long Working Distance Objective

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CONTENTS

DISCLAIMER: The intent of this document is to provide a thorough discussion of the operation of the MF200 Microforge, however, it is not intended to instruct in the complex field of intracellular experimentation.

ABOUT THIS MANUAL

The following symbols are used in this guide:

This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.

This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and TIPS contain helpful information.

Fig. 1—MF200 System

INTRODUCTION

The MF200 Microforge is a versatile device designed specifically for the fabrication of glass micropipettes and other related tools. Originally designed by Dr. Ming Li of the Department of Pharmacology, University of South Alabama, it has been extensively improved to provide greater accuracy and ease of use. It is simple, durable and reliable. Ideal for patch pipette polishing, it can also be used for other fabrication procedures such as pipette tip size reduction, contact stretching to sharpen large bore pipettes, carbon fiber electrode sealing and the production of a variety of pipette configurations including those for *in vitro* fertilization. Its simplicity and ease of use result from two key features:

- Utilization of a microscope to manipulate the pipette
- Unique design of the filament holder that permits attachment of the heating element directly to the microscope objective.

These features enable precise fabrication specifications to be easily met.

CAUTION: The Microforge Control Unit (power) and the heating filaments have been carefully matched to provide rapid filament response at optimum heat intensity. Use of either of these components with alternate power units or heating filaments may result in severe damage to any or all of these components.

Fig. 2—MF200 Startup Kit

INSTRUMENT DESCRIPTION

Parts List

After unpacking, verify that there is no visible damage to the instrument. Verify that all items are included:

MF200-1 or **MF200-2 Complete Microforge** 110 V/220 V (includes microscope):

(1) **W30S-LED** Microscope (See **W30S-LED** Instruction Manual included for set up, assembly and operating instructions.)

(1) **MF200** Microforge (See parts list below.)

MF200-M1 or **MF200-M2 Microforge** 110 V/220 V (microscope not included):

(1) **MF200** Microforge Control Unit
(1) **14470** AC to 12 VDC converter with power cord (USA only)
(1) **75006** MF-200 Startup Kit, including:
  (1) **800292** 40× Long Working Distance Objective
  (1) **75050** Lucite and glass pipette holder
  (1) **300696** Filament Adjustment Assembly for 40× and 25× LWD objectives
  (1) **75040** One pair of heating filament connecting cables
  (1) **MF200-H2** H2 Heating Filament
  (1) **MF200-H3** H3 Heating Filament
  (1) **MF200-H4** H4 Heating Filament
  (1) **503513** Eyepiece with Linear Reticle
  (1) **500883** Reticle 1 mm/200 div. and 90º/18 div.
(1) **MF200** Instruction Manual

Unpacking

Upon receipt of this instrument, make a thorough inspection of the contents and check for possible damage. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed damage should be reported at once to the carrier and an inspection requested. Please read the section entitled "Claims and Returns" on page 23 of this manual. Please contact WPI Customer Service if any parts are missing at 941-371-1003 or customerservice@wpiinc.com.

Returns: Do not return any goods to WPI without obtaining prior approval (RMA # required) and instructions from WPI's Returns Department. Goods returned (unauthorized) by collect freight may be refused. If a return shipment is necessary, use the original container, if possible. If the original container is not available, use a suitable substitute that is rigid and of adequate size. Wrap the instrument in paper or plastic surrounded with at least 100 mm (four inches) of shock absorbing material. For further details, please read the section entitled "Claims and Returns" on page 23 of this manual.

Description

The complete **MF200-1** (110 V) and **MF200-2** (220 V) systems include both the Microforge and matched microscope (WPI Model **W30S**); the **MF200–M1** (110 V) and **MF200-M2** (220 V) include the Microforge only.

Optics

The MF200 is the only commercial microforge that includes a 40× long working distance objective (LWD). This LWD objective is the most powerful currently available on any commercially produced microforge. Its 40× magnification is essential when polishing pipettes as small as half a micron (0.5 µm) in diameter. A linear eyepiece reticle is provided with this system for measureing pipette tip dimensions. An optional angular reticle is available. See page 17 for details. Optional accessories (including a 25× LWD objective for the **W30S-LED** microscope) further expand the **MF200** system functionality.

Fig. 3— MF200 System (not shown: 12 V DC power converter for Microforge Control Unit).

Positioning and Focus

Finding and moving the pipette tip under the microscope objective is simple. With a conventional microforge, it is difficult and time consuming to position both the heating filament and pipette in the viewing area using independent micromanipulators. A unique feature of the **MF200** is the heating filament, inserted into the Filament Adjustment Assembly, which is directly attached to the microscope's objective and (using the horizontal and vertical adjustment knobs of the assembly) can be easily maneuvered to any position within the viewing area. Once the correct focus is obtained, the filament will remain fixed and within focus, and attention can be turned towards positioning the pipette that rests on the microscope stage. The X-Y-Z movements of the microscope stage adjustment controls its position relative to the heating filament. This design makes the positioning and microforging of pipettes extremely easy. The stage of the **MF200 W30S-LED** microscope has a high quality rail that ensures precise, smooth and stable control of the pipette's movement. The **MF200** system configuration eliminates the need and expense of an additional micromanipulator to control pipette movement.

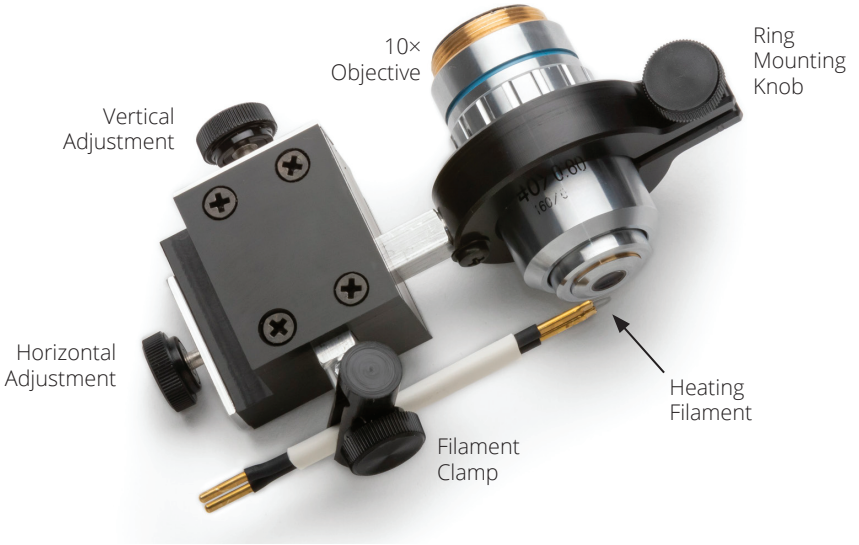


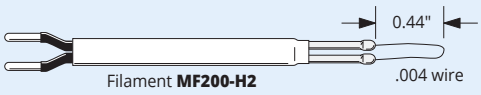
Fig. 4—Filament Adjustment Assembly

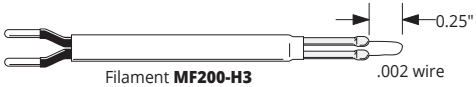
Heating Filaments

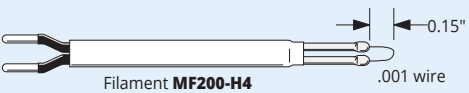
Low heat capacity and low thermal expansion of the filaments are key design features of the **MF200** Microforge. The low heat capacity of the filament allows it to reach fire polishing temperatures without excessive heat. This permits the pipette tip to be brought close to the filament during polishing without fear of collapsing the pipette tip and eliminates the need for an auxiliary air cooling system. The low thermal expansion characteristic of the filament ensures minimal displacement of the filament during heating. This feature takes much of the guesswork out of tip placement in relation to the filament. Three functionally distinct heating filaments are provided to meet diverse application needs.

Filaments

Filament	Gauge	Material	Application
H2	0.004″	Platinum/iridium wire	Large gauge, long: can be formed into a variety of shapes (reformed) for fabrication of pipettes up through the 100–200 µm range. Reforming the filament can result in a greater heated surface area to present to the pipette tip. For large pipettes, it is best used with the 10× standard objective on the model **W30S**-LED microscope (optional Filament Adjustment Assembly required) or the optional 25× LWD objective.
H3	0.002″	Platinum/iridium wire	Medium gauge, short: for polishing patch clamp pipettes or larger pipettes up to 3–5µm.
H4	0.001″	Platinum/iridium wire	Small gauge: for polishing patch clamp pipettes.







Microscope

The microforge has been matched with WPI research grade microscope model **W30S-LED** to provide an uncomplicated and complete system with excellent performance. The Filament Adjustment Assembly supplied with the microforge has been designed to fit both the 40× LWD objective (included), the objective supplied with the **W30S-LED**, and the optional 25× LWD objective for the **W30S-LED** microscope. The Filament Adjustment Assembly will fit most other microscopes with a focal length of 160 mm.

Power Controller (Control Unit)

The **MF200** is powered by a 12 VDC adapter to supply power to the Control Unit. The Control Unit is compact and lightweight, and its output power is electrically stable and reproducible. Fluctuations in the mains voltage input will not affect the output to the filament. This ensures the same polishing results day to day at the same settings. A push button polish switch on the Control Unit turns the heating filament on and off.

An optional foot switch (WPI #**MF200-FS**) is available for complex fire polishing. Use of the optional foot switch leaves the hands free to move the pipette and control the variable heat adjustment on the Control Unit.

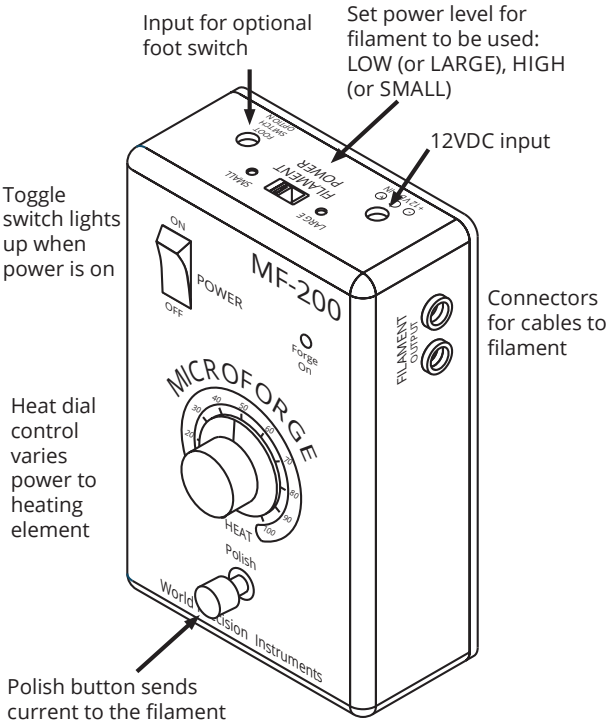


Fig. 5—Microforge Control Unit

OPERATING INSTRUCTIONS

Positioning the Micropipette Holder

Position the Pipette Holder on the microscope stage as if it were a slide.

Mounting the Filament Adjustment Assembly to the Microscope

1. Rotate the turret out and attach the objective you want to use to an open location on the microscope turret
2. Place a glass electrode on the slide and focus on it to gauge the working distance of the objective (see "Appendix A: Microscope Objective Information (W30S-LED)" on page 18 for working distances for the **W30S-LED**).
3. Slide the objective ring onto the objective, leaving the set screw loose enough so it can be rotated on the objective.
4. Center the horizontal filament adjustment to the center of its travel. This is set so that a little over 1 cm of the square bar is visible (Fig. 6).

Fig. 6—Mounting the Filament Adjustment Assembly

5. Slide the filament into the filament clamp so that the tip of the filament wire is located near the center of the objective lens. Tighten the filament clamp so that the plastic section holding the filament can be rotated under tension.
6. Adjust the vertical adjustment knob (filament focus) so that the filament is closer (clockwise) to the objective lens than the working distance of the object is to the glass tip. (If the objective working distance is 5 mm, then set the filament distance to 2 mm).
7. Rotate the microscope turret back to the normal working position.
8. Rotate the filament adjustment assembly about 90° and focus on the glass tip (Fig. 7).

Fig. 7—Objective in position

9. While looking at the glass tip, move the filament side to side until you see the shadow of the filament in the microscope. Stop and adjust the vertical adjustment knob (filament focus) so that the filament moves down (counter clockwise) and into focus. Adjust the horizontal adjustment knob (filament centering). The optimal distance to the glass tip depends on the forging application (Fig. 8).

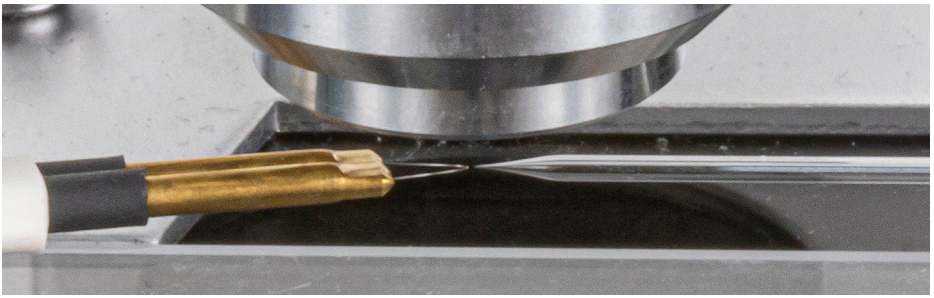


Fig. 8—Filament in position

TIP: The filament clamp and base plate attached to the vertical filament adjustment can be angled slightly outward (toward the user) and the filament angled slightly inward. This angle facilitates better viewing of the filament under the microscope.

System Setup

1. Attach both of the microforge connecting cables to the filament by fitting the socket end of each cable into the filament plugs. The cables are interchangeable and can be used for either plug.
2. Take the free end of each cable and insert each into one of the two Filament Output receptacles located on the side of the Microforge Control Unit. Again, it does not matter which cable is connected to each receptacle. The connecting cable wires from the Microforge Control Unit are not polarized, so reversing these cables will do no harm.

Basic Operations for Using the MF200

This section describes the final preparations and general instructions for using the **MF200.** Specific instructions are detailed for some of the **MF200** common uses in "Applications" on page 12.

NOTE: Remember that (because of microscope optics) any object seen through the microscope objective is a reverse image of the object and will appear reversed in orientation. For example, the heating filament (attached to the left side of the objective) will appear through the microscope as coming from the right.

1. Turn on the power to the microscope.
2. Choose the desired filament. See "Heating Filaments" on page 6.
3. Mount and connect the heating filament. See "Mounting the Filament Adjustment Assembly to the Microscope" on page 8.
4. Bring the filament into focus:
   a. Without using the microscope, adjust the position of the filament by moving it in or out and side to side until the filament wire is centered approximately 3 mm below the objective.
   b. Looking through the microscope, move the filament in the filament clamp until its shadow appears. Some vertical adjustment may also be required to bring the shadow into the field.
   c. Using the vertical adjustment knob, bring the filament into clearer view. With the horizontal adjustment knob, position the end loop of the filament to the far right side of the visual field.
5. Power up the **MF200** unit. To do this, connect the AC/DC converter to the power input jack on the Microforge Control Unit and the wall socket. A light in the POWER switch indicates that the unit is powered up.
   - Pressing the Polish push button switch sends current through the filament and turns on the Forge On lamp.
   - Turning the HEAT dial from 0 to 100 (an arbitrary numbering scale) varies the amount of power applied to the filament.
   - An optional foot switch (WPI #**MF200-FS**) leaves the hands free to vary the filament heat intensity while positioning the pipette. Some microforging techniques will require this two handed approach.

CAUTION: Since the working distance of the 40× LWD objective is only 3 mm, the objective lens may be damaged by prolonged exposure to the heat produced by the heating filaments. If, for example, the heat is set to 99%, the larger filament should be used in short bursts. For longer exposure times, lower heat settings should be used.

NOTE: The underside of the Microforge Control Unit and the AC/DC converter become warm to the touch during use. This is normal and no action is required.

6. Position the heating filament and the pipette:
   a. With the Power on, depress the Polish button several times at various heat settings to see the expansion of the filament loop and determine approximately where the pipette should be positioned in relation to it.
   b. Position a pipette by first adjusting the stage of the microscope down and away from the objective to provide sufficient room for mounting the pipette safely on the pipette holder.
   c. Place the pipette in the Pipette Holder.
   d. Position the pipette using the horizontal adjustment on the microscope stage so that the pipette tip is slightly past the center of the objective.
   e. Raise the stage until the filament is a few millimeters from the objective. (Fig. 8.)
   f. Slowly move the pipette back and forth, in and out, while looking through the microscope until the shadow of the pipette is observed.
   g. Adjust the vertical position of the stage until the pipette is clearly visible and in focus.
   h. Position the pipette tip in relation to the heating filament as required by the application.
7. Adjust the Filament Power Select switch and Heat dial.

CAUTION: It is not necessary to operate the unit at high power with the Heat dial set at 100 if the system is used properly. This can cause the filaments to burn out prematurely.

NOTE: Whenever changing filaments, turn off the power. When switching power levels, always set the Heat dial to 0.

The Filament Select slide switch on the side of the Control Unit is marked LARGE (or LOW) and SMALL (or HIGH). It controls the maximum power to the filament. The Heat dial provides a range of power up to the maximum as determined by the Filament Select switch. Always begin with the dial at the low end of the range and increase the heat only as necessary and by small increments. The lowest power and heat setting that can be used to accomplish a task should be used. Higher heat than necessary may shorten filament life, as well as increase the possibility of overheating the pipette tip.

Filament Power Switch

Filament	LARGE (or LOW) Power Position	SMALL (or HIGH) Power Position
H2	When polishing large pipette tips, the **H2** filament works best. In most cases LOW power will perform satisfactorily. Tips of 100 µm and larger may require switching the power to HIGH. See “Fire Polishing Large Bore Pipettes” on page 14.	Will rapidly decrease filament life as the Heat dial approaches 100. Restrict time at high heat to a minimum.
H3 **H4**	Best for polishing patch pipettes.	HIGH power may be required for pipettes above 0.5 µm.

Applications

Choice of filaments, power and heat settings for each application vary with the use. If the desired result is achieved, the choice of parameters is acceptable. Always use the least amount of heat possible in order to prolong the life of the filaments.

The distance that should be maintained between the filament and the pipette tip during microforging varies depending on the tip bore, filament, power, heat settings and application. With the exception of the applications in which a glass bead is formed on the filament, the tip should not come in contact with the filament. In general, it is best to begin with the tip at a safe distance from the filament and move toward it, as necessary.

The formation of a glass bead on the filament is required for certain applications. See "Microforging Beveled Injection Pipettes" on page 15. It is not required for the other applications described in this manual, however, a glass bead on the filament may be used for other applications, if desired.

Fire Polishing the Patch Clamp Pipette

Fire polishing is a two step process, involving coating the pipette and polishing it.

Step 1: Coat the Single Channel Patch Clamp Pipette.

Coat the single channel patch clamp pipette with Sylgard 184 before polishing. (This is a simple and effective coating method described by Dr. Li.)

WARNING: Always wear safety glasses during this procedure. Never point the pipette at anyone. The pipette can be forcefully shot out of its holder if not tightly secured.

1. Briefly, fit the pipette into a pipette holder, which is connected to a low pressure, clean air source. Force air through the pipette at a pressure greater than 20 PSI (for an 0.5 µm ID pipette) in order to prevent the Sylgard from entering the pipette tip during the coating process.
2. After mixing the Sylgard, dip the pipette tip into the coating and remove it.
3. With the low pressure air supply still applied, place the pipette tip over a heat gun for two seconds in order to cure the Sylgard.
4. Remove the air supply from the pipette. The pipette is now coated and the tip is ready to be polished following the procedure for the whole cell patch clamp pipette as described in Step 2.

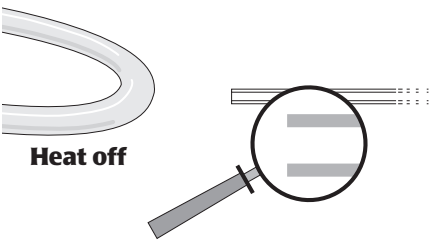
Step 2: Fire Polish the Single Channel and Whole Cell Patch Clamp Pipette

1. Choose and install the desired filament. (See "Filament Power Switch" on page 11.)
2. Turn on the Control Unit power.
3. Hold down the Polish button and adjust the Heat Dial from low to high while

observing the expansion of the filament under the microscope. A slight movement of the filament indicates that it has sufficient heat and will provide excellent polishing results in most cases.

NOTE: A red hot filament is unnecessary and undesirable and will decrease the life of the filament. It also heats the tip too quickly, making it difficult to control the degree of polishing. In addition, a red hot large filament could permanently damage the 40× objective.

4. Place the pipette to be polished in the pipette holder.
5. Adjust the microscope stage until the pipette is in position with sufficient distance to account for filament expansion (Fig. 9).



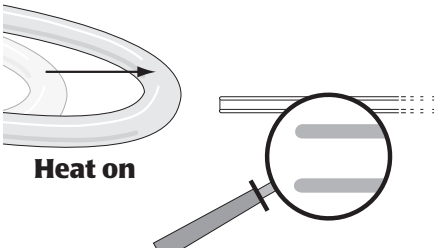


Fig. 9—(Left) Untreated tip
Fig. 10—(Right) Fire polished tip

6. Press Polish and observe the expansion movement of the filament (Fig. 10).
7. Determine the appropriate Heat dial setting and then fine tune the position of the tip. A minimal change in the shape of the tip typically yields good polishing results.

Fire Polishing a Pipette Tip

To fire polish a pipette tip, follow the instructions under "Step 2: Fire Polish the Single Channel and Whole Cell Patch Clamp Pipette" on page 12.

Tip Size Reduction

Tip size reduction creates a holding pipette by rounding the tip ends and reducing the length of the pipette tip (Fig. 11).

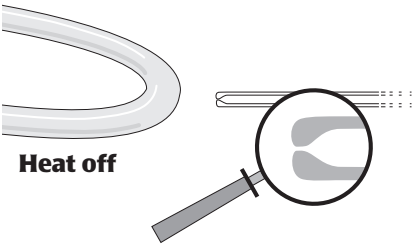


Fig. 11—(Right) Tip size reduction

1. Choose and install the desired filament. (See “Filament Power Switch” on page 11.)
2. Turn on the Control Unit power.
3. Select the appropriate Filament power.
4. Press the Polish button and set the Heat dial to a setting at which the filament just starts to glow red. Release the Polish button.
5. Place the pipette to be reduced in the pipette holder. Adjust the microscope stage until the pipette is in position with sufficient distance to account for filament expansion.
6. Turn on the heat by pressing the Polish button and observe the melting of the tip. Maintain the heat until the desired opening size is obtained.

   TIP: If the process is too slow, move the tip closer to the filament. (It is better to do this operation very slowly in stages, in order to avoid making the tip too small.)

Fire Polishing Large Bore Pipettes

To fire polish large bore tips (100–200µm), the **H2** filament can be shaped or reformed to be slightly larger than the pipette tip. (See Fig. 12 and 13.)

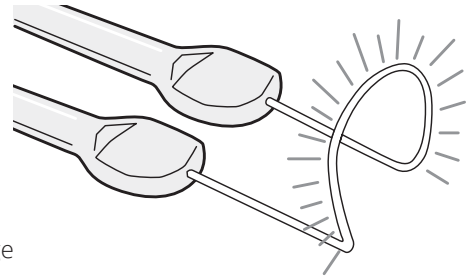


Fig. 12—(Right) Reshaped filament

This effectively provides an increase in the heated surface area presented to the tip with a resulting increase in the heat directed to the large bore tip. This is necessary to melt the thicker glass of a large bore pipette. Larger bore tips generally require the use of the 10× objective.

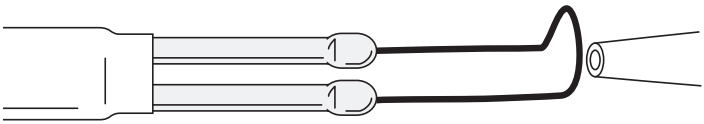


Fig. 13—Reshaped filament with large bore tip

Under some circumstance, it may be possible to use the 25× LWD objective. After reforming the filament, proceed to microforge as described in “Fire Polishing a Pipette Tip” on page 13.

Tip Reduction of Large Bore Pipettes

The reformed **H2** filament described in "Fire Polishing Large Bore Pipettes" can also be used for tip size reduction of large bore pipettes. To reshape the tip end and reduce its size, reform the filament so that the tip will fit inside the filament outline (Fig. 14) and proceed to microforge, described in "Tip Size Reduction" on page 13.

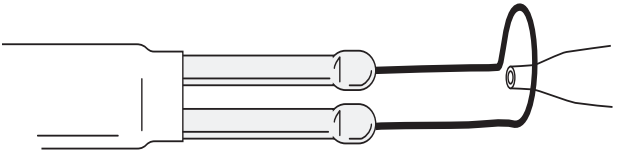


Fig. 14—Reshaped filament reduces large bore tip

Reducing Overall Filament Expansion

Reforming or shaping the **H2** filament as shown in Fig. 15 can also be used as a means to reduce overall filament expansion.

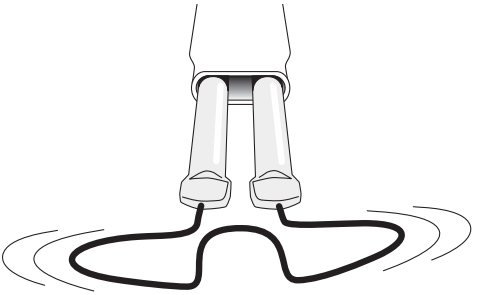


Fig. 15—Alternate filament shape

Microforging Beveled Injection Pipettes

Frequently, a beveled large bore pipette is not sharp enough to penetrate a cell without causing damage to the surrounding area. With the **MF200** and the **H2** heating filament, a sharp point can be formed on a beveled tip to assist in the penetration of the cell with minimal damage, using a two step process. First form a glass bead on the filament, and then sharpen the beveled edge of the pipette.

Step 1: Form Glass Bead on the Filament

For this application, first form a glass bead around the filament by coating the midpoint of the filament with a small amount of glass.

1. Position a small scrap pipette in the pipette holder.
2. Adjust the microscope stage until the pipette is in position to allow the tip to touch the filament during expansion.

3. Set the dial so the filament starts to glow red. Press Polish and coat the center of the filament with glass until a bead about twice the diameter of the filament is formed.

4. Release the Polish button. Remove the scrap pipette from the holder.

Step 2: Sharpen the Beveled Edge of the Pipette

1. Place the beveled pipette in the pipette holder. With the pipette tip far from the heat, press Polish and adjust the heat until the glass bead is molten (Fig. 16).

Fig. 16—(Left) Glass bead formed on filament
Fig. 17—(Right) Pipette tip close to glass bead

2. With heat off, move the tip very close to the glass bead (Fig. 17).

3. Press the Polish button. The filament expands, touching the tip of the beveled glass. As glass the bead becomes molten and the beveled tip makes contact with the bead, quickly pull the tip away and simultaneously release the Polish button to turn off the heat. (Fig. 18).

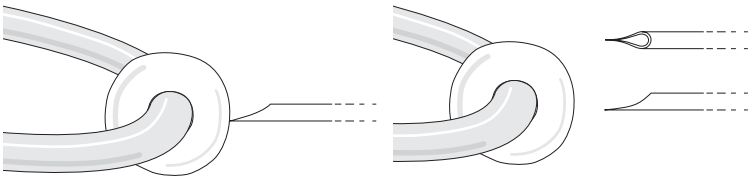


Fig. 18— (Left) Filament expands and contacts the tip
Fig. 19—(Right) Pipette has a sharp tip

4. The resulting tip (Fig. 19) has a very sharp point for clean cell penetration.

MAINTENANCE

The requirements for the maintenance and storage of the **MF200** are minimal. Care should be taken to protect the filaments. Store them in their original container when not in use. In general, it is advisable to keep the **MF200** in an area with minimal dust and particulates as would be appropriate for any microscope or similar apparatus.

ACCESSORIES

Part Number	Description
500883	Optional Angular Reticle (19 mm)
500292	15× Eyepieces (pair)
MF200-FS	MF200 optional foot switch
500329	25× Long Working Distance objective (5 mm): fits most microscopes with a 160 mm Focal Length

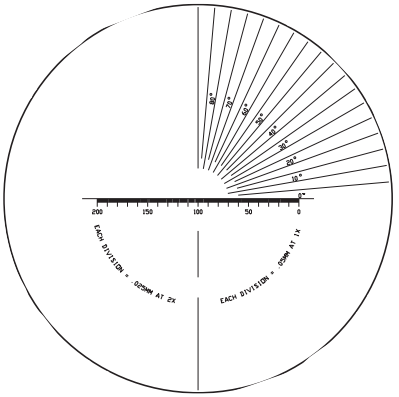


Fig. 20—Angular eyepiece reticle, for use in place of the Linear Reticle installed in 503513.

SPECIFICATIONS

AC POWER MODULE . . . . . 100 240 VAC 50/60Hz
FILAMENTS (3) **H2, H3, H4**
FILAMENT "ON" CONTROL. . . . . Push button or Optional Foot Switch
FILAMENT ADJUSTMENT ASSEMBLY . . . . . Mounts on 40× and 25× Long Working Distance Objectives
OBJECTIVE. . . . . 40× Long Working Distance (3 mm)
EYEPIECE. . . . . 10× (pair)
RETICLE (10× eyepiece for **W30S-LED** only). 1.25 µm/division (at 40×): 0–90° angle at 5°/division (optional)
GLASS HOLDER . . . . . Mounts on microscope stage
DIMENSIONS (Control Unit) . . . . . 10.2 × 17.8 × 4.8cm (4 × 7 × 1⅞in.)
SHIPPING WEIGHT . . . . . 1.4 kg (3 lb.)
MICROSCOPE. . . . . See Model **W30S-LED** Instruction Manual
SHIPPING WEIGHT . . . . . 7.3 kg (16 lb.)

For **W30S-LED** microscope specifications, refer to the **W30S-LED** Instruction Manual.

APPENDIX A: MICROSCOPE OBJECTIVE INFORMATION (W30S-LED)

DIN Plan Achromat (160 mm) Information **RMS THREAD**

Magnification	N.A.	Approx. Field of View	Approx. Working Distance	Body Diameter	Approx. Depth of Focus
4×	0.10	4.5 mm	17 mm	22.9 mm	~90 µm
10×	0.25	1.8 mm	5 mm	23.0 mm	~15 µm
25× LWD	0.50	0.72 mm	5 mm	23.5 mm	~5 µm
40× *	0.65	0.45 mm	0.35 mm	23.0 mm	~20 µm
40× LWD	0.65	0.45 mm	3 mm	23.5 mm	~20 µm
100× (oil) *	1.25	0.18 mm	contact	NA	<1 µm

* Do not use with microforge — working distance is too small and damage may occur.

APPENDIX B: EXCHANGING W30S-LED RETICLE

1. Locate the WPI reticle in the bag marked 500883.
2. Remove the reticle retaining ring at the top of the inverted reticle eyepiece and remove the linear reticle

Fig. 21—Loosen the reticle ring.

NOTE: Do not loosen or open the larger section of the eyepiece.

Fig. 22—The reticle ring was removed.

3. Drop in the new angular reticle with the text side down and gently shake the eyepiece to center the reticle glass in the reticle seat built into the eyepiece.

Fig. 23—Insert the reticle with the text on the bottom side of the reticle.

4. You can check the text orientation by holding the eyepiece up to a ceiling light while keeping it inverted. Look through the front of the eyepiece to view the reticle. If the text is backwards then the glass needs to be remove inverted and inserted again.
5. Insert the retaining ring and tighten it. The glass may move off center, if it does then loosen the retaining ring move the glass by tapping the eyepiece with your finger. Then retighten the retainer.

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DECLARATION OF CONFORMITY

WORLD PRECISION INSTRUMENTS, LLC.
Telephone: (941) 371-1003 Fax: (941) 377-5428
e-mail wpi@wpiinc.com

DECLARATION OF CONFORMITY CE

We: World Precision Instruments, Inc.
175 Sarasota Center Boulevard
Sarasota, FL 34240-9258, USA

as the manufacturer/distributor of the apparatus listed, declare under sole responsibility that the product(s):

MF200

To which this declaration relates is/are in conformity with the following standards or other normative documents:

Low Voltage Directive (Safety) 2014/35/EU:

- **EN 61010-1:2010+A1:2019**

EMC Directive 2014/30/EU:

- **EN IEC 61326-1:2021**
- **EN IEC 61326-2-3:2021**
- **EN IEC 61000-3-2:2019+A1:2021**
- **EN IEC 61000-3-3:2013+A2:2021**

Issued On: December 12, 2022

Cory Boyes / Director of Design and Development

Europe Representative
Mr Andrew Waldes
Managing Director
World Precision Instruments Germany GmbH,
Pfingstweide 16, 61169 Friedberg, Germany

F-QC-006 Rev D

WARRANTY

WPI (World Precision Instruments, Inc.) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*