Micromanipulators

Care and Maintenance

INSTRUCTION SHEET

Serial No._____

091313

World Precision Instruments

OTHER POPULAR WPI PRODUCTS

High intensity source for fiber optic illumination

The **Z-LITE** Fiber Optic Illuminator provides reliable, uninterrupted high-intensity light for microscopes. **Z-LITE** allows a continuous range of subdued or concentrated lighting controlled by a rotary dimmer on the front panel. **Z-LITE** may be used with a ring light and single or bifurcated flexible fiber bundles, enabling the light beam to be placed exactly where needed. Forced air cooling prolongs lamp life. Lamp color temperature is 3350°K. An interlock switch automatically cuts off power when front panel is opened to replace bulb.

Z-LITE	Z-Lite Fiber Optic Illuminator (115 V, 60 Hz, beige case)
Z-LITE-Z	Z-Lite Fiber Optic Illuminator (230 V, 50 Hz, black case)
Z-LITE-186	Z-Lite Illuminator & Bifurcated Light Guide
Z-LITE-Z186	Z-Lite Illuminator & Bifurcated Light Guide

LIGHT GUIDES AND ACCESSORIES

500186	Bifurcated Light Guide (with lenses)
R-8-8-WPI01	Ring Light Guide for PZM and PZMIII Series*
13338	Ring Light Adapter (48 mm ∅) for PZM, PZMII, PZMIII
502015	Ring Light Adapter for PZMIV
5475	Adapter for SMA-terminated Fiber Optic Cables

**Ring Light Guide requires adapter #13338 for use with PZM, PZMII and PZMIII, included with each PZMIII and PZMIV microscope.*

Economy Surgical Instruments

503721-12	Iris Forceps, straight, serrated tips, 10 cm (Pack of 12)
503722-12	Iris Forceps, curved, serrated tips, 10 cm (Pack of 12)
503731-12	Webster Needle Holder, 5 in., straight, (Pack of 12)
503706-12	Tuff Cut Scissors, plastic handles, 18 cm (Pack of 12)
503707-12	Tuff Cut Scissors, plastic handles, 14.5 cm (Pack of 12)
503708-12	Iris Scissors, 11.5 cm, straight (Pack of 12)
503709-12	Iris Scissors, 11.5 cm, curved (Pack of 12)

All sales are final on disposable instrument packs.

CONTENTS

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.

INTRODUCTION

Your micromanipulator is a precision instrument. It has been calibrated at the factory and is ready for use. As with any delicate mechanical device, it needs your care and attention for long term accurate performance. The following are some helpful hints to make this possible.

Notes and Warnings

CAUTION: When handling a micromanipulator, set it down gently. Dropping it (even a short distance) can be damaging to the general alignment and adjustment.

CAUTION: When not in use, adjust the three (X-Y-Z) guide surfaces in such a way that they are not exposed and cover the manipulator with a plastic bag. Dirt is your biggest enemy.

CAUTION: If the manipulator is not in use for a prolonged time, occasionally work the three surfaces repeatedly back and forth to keep the grease pliable. Never oil the guide surfaces and under normal use you should not have to apply grease for many years.

CAUTION: When using the motorized version always be sure to check that the edge of the micrometer is aligned with the red dots on the motor housing in each axis before using the manual control for coarse positioning. Running the motorized axes repeatedly against either end limit can damage the motor. Be advised that this damage is not covered by any warranty.

CAUTION: When using the dual tool holder micromanipulators, Models **MD4R** and **MD4L**, be careful not to twist the revolving, spring-loaded axes too hard or too far. This may damage the spring.

INSTALLING THE TILT BASE

Fig. 1—(Left) M3 Tilting Base.

Fig. 2—(Right) The M3301 is installed on an M3 Tilting Base with an optional 5 lb. weight (WPI# 5464).

To install the **M3** Tilting Base, remove the ring clamp by removing the two screws with the Allen wrench provided. Attach the manipulator to the tilting base by using the two screws provided with the **M3**. Only two screws are required, because two holes are used with a right-handed manipulator, and the other two holes in the tilting base are used for the left-handed version.

ADJUSTING THE ANTI-DRIFT TENSION ON MICROMANIPULATORS

Fig. 2 shows a side view of the **M3301L** manual micromanipulator. Depending on the angle of application and the weight carried on any one guide-way, you may experience some drift. This can be easily corrected. Follow the procedure on the following pages to tighten the drag on the coarse manual slides.

In this manual, you can see how to adjust the anti-drift tension on the **M3301**, but the procedure is similar for the **DC3001R**, **DC3001L**, **MD4R**, **MD4L**, **MMJR** and **MMJL**. A micromanipulator axis may begin to move gradually under its own weight even if it's not being touched. This phenomenon is referred to as mechanical drift. It occurs from normal use of the of the manipulator axes over time. Each coarse axis control (shown below) of the micromanipulator has its own separate adjustment to counteract drift. What follows is the basic procedure to eliminate drift in each of the axes through adjustment of the anti-drift tension.

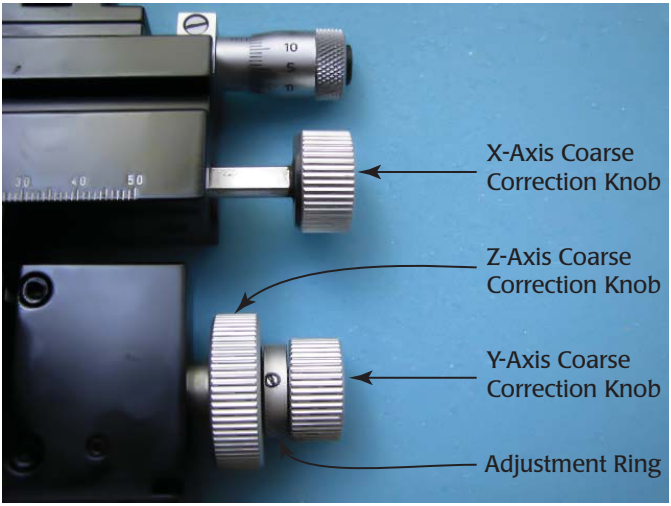

Fig. 3—The adjustment controls are labeled on an M3301 micromanipulator.

Adjusting the X Coarse Axis Drift

1. The first step is to rotate the X-Axis Coarse Correction knob clockwise until the x-axis reaches the end of its travel in the fully extended position as indicated by the black arrow in Fig. 4. This is necessary, because it provides better access to the knob. In step 2, you will use a pair of pliers to secure this knob while loosening the black locking nut so that the adjustment can be made.

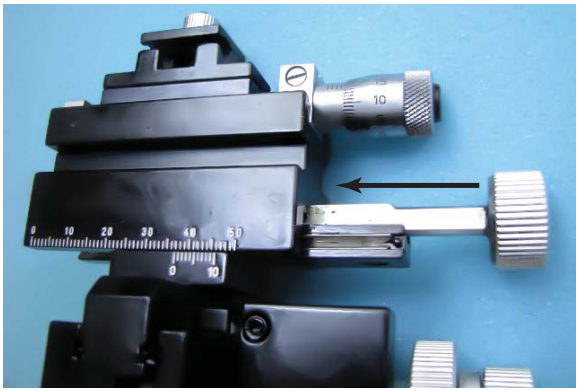

Fig. 4—Fully extend the X-axis away from adjustment knob.

2. Use a pair of pliers to secure the X-Axis Coarse Correction knob to prevent it from rotating (Figure 3). Don't grab the knob with the pliers directly, because the jaws will cut into the aluminum knob. Instead, take a piece of paper and fold

it about ½″ wide over upon itself 5 or 6 times to make it thicker. Then, wrap it around the knob to protect the knob.

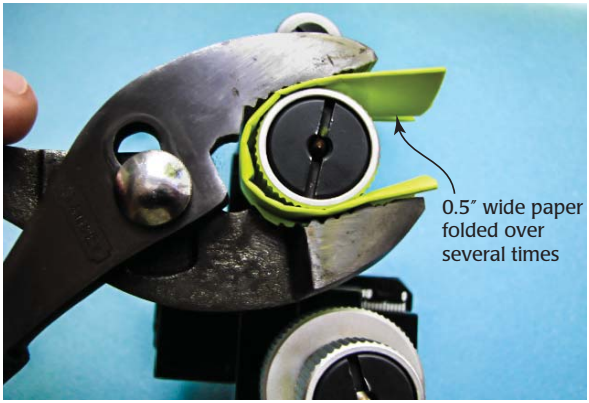

Fig. 5—Wrap the knob with a thick layer of papers so the pliers do not gouge the aluminum knob.

3. If you are right-handed, hold the pliers in your left hand. With your right hand insert the special tool (WPI# **502105**) (Fig. 6) into the black slot on the end of the knob. Prevent the silver knob from turning, and rotate the tool counter-clockwise to unscrew the black locking nut (Fig. 7).

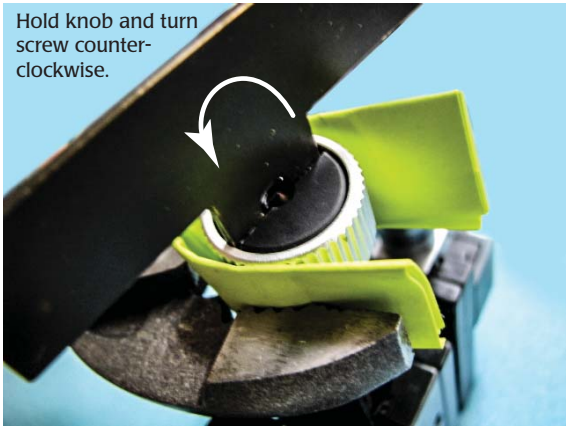

Fig. 6—(Left) 502105 Manipulator Adjustment Tool

Fig. 7—(Right) The outer ring of the knob remains stationary, while you turn the inner screw counter-clockwise.

4. Once the black locking nut is loose, the silver knob can be freely tightened or loosened to adjust the amount of resistance to drift. To prevent the axis from moving while making the tension adjustment, use your left hand to hold the

body of the axis securely while adjusting the silver knob (clockwise to increase tension) with your right hand. At some point you will feel the resistance of the knob increase as it begins to compress against the spring steel and nylon friction components. Adjustment is somewhat arbitrary. When the amount of tension feels about right, use the **502105** tool to re-tighten the black locking nut to secure the adjustment. Then, test the anti-drift tension.

5. Test the drift resistance of the axis by pushing on it with your hand to see how easily it moves. A good technique for doing this is to push on the axis body with your left thumb while providing a counteracting force on the lower part of manipulator using your right hand (Fig. 8). When the tension is adjusted correctly, it will not be easy to move the axis by pushing it.

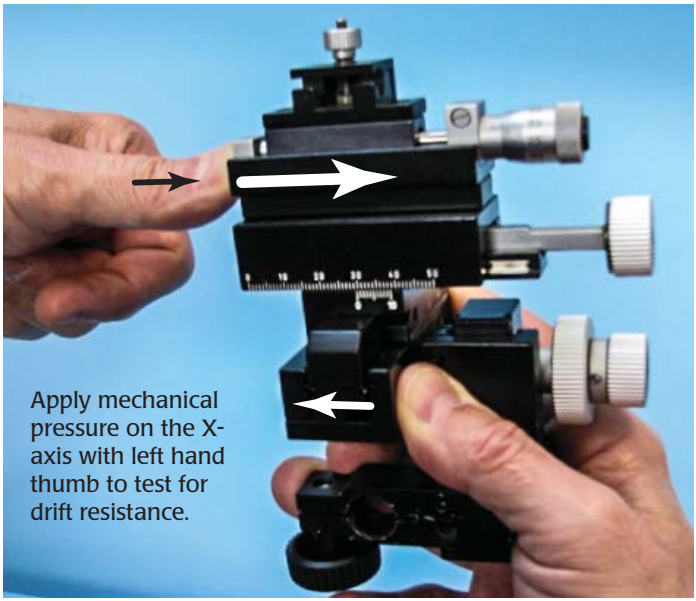

Fig. 8—To test the drift resistance, press on the x-axis. It should not move easily.

NOTE: The correct amount of drift resistance depends upon the working orientation of the manipulator, the load on the axis, and personal preference.

6. If the action feels too tight or too loose, unscrew the black locking nut again and re-adjust the tension accordingly. It may be necessary to repeat this procedure several times. Typically, the goal is to get the tension just tight enough to prevent the axis from drifting under its own weight (while loaded), but not any tighter than necessary to achieve this end. The correct amount of tension often occurs within a narrow range of adjustment. If you make it too tight, the knob will be harder than necessary to turn and the friction components will wear faster. This procedure requires patience!

Adjusting the Y-Axis Drift

The adjustment of the Y-axis tension is performed with essentially the same techniques as that described for the X coarse axis. The Y-axis is controlled by the Y-Axis Coarse Correction Knob shown in Fig. 3.

If the manipulator is operated in standard position (with the electrode clamp located above the manipulator body as shown in Fig. 2, then the Y-axis does not typically have a tendency to drift unless the manipulator body is tilted to the left or right relative to the vertical plane passing parallel through the X-axis.

Adjusting the Z Axis Drift

The Z-axis is notorious for drifting, since it is subject to gravitational forces generated by the weight of the entire manipulator body and the load.

The adjustment to counteract drift on the Z-axis is performed differently than either the X or Y axes. The Z-axis is controlled by the Z-Axis Coarse Correction Knob shown in Fig. 3. However, the tension is adjusted by rotating the Adjustment Ring.

1. Locate the set screw on the Adjustment Ring (Figure 6).

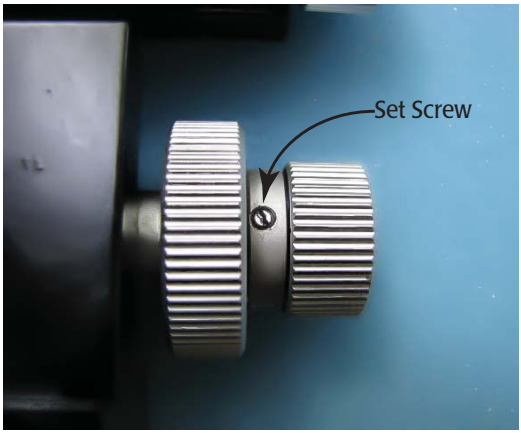

Fig. 9—The set screw is located on the adjustment ring.

2. Using a small flat blade screwdriver, loosen the set screw by turning the screw counterclockwise. This will free the Adjustment Ring to allow it to be rotated.

3. Adjust the tension on the Z-axis. The Adjustment Ring may be difficult to turn manually, because access is limited by the larger diameter Z-axis and Y-axis Correction Knobs which surround it. Once the set screw has been loosened, It may be easier to turn the Adjustment Ring if you keep the screwdriver blade inserted into the screw and orient the flat blade perpendicular to the direction of the turn. (Fig. 10).

Fig. 10—The flat blade of the screwdriver should be positioned perpendicular to the adjustment ring to make the ring easier to rotate.

4. The perpendicular position of the screwdriver creates a leverage point for using the screwdriver to amplify the force applied to turn the ring.

CAUTION: Don't unscrew the setscrew too much or it will fall out.

CAUTION: Be careful not to let the screwdriver blade slip out of the screw slot, which could damage the slot or cause personal injury.

TIP: With older manipulators, the Adjustment Ring may be too tight to turn, even using the screwdriver technique just described. If this is the case, remove the Y-axis Correction Knob to gain better mechanical access for the use of pliers.

To remove the Y-axis Coarse Correction Knob, remove its black locking nut with the **502105** tool. Then, turn the knob counter-clockwise to remove it altogether. Note the order and orientation of the nylon and spring washer friction components. When the Z-axis tension adjustments are complete, re-install the friction components and the Y-axis Coarse Correction Knob in reverse order of disassembly. Then, re-adjust the Y-axis tension.

World Precision Instruments, Inc.

USA

International Trade Center, 175 Sarasota Center Blvd., Sarasota FL 34240-9258

Tel: 941-371-1003 • Fax: 941-377-5428 • E-mail: sales@wpiinc.com

UK

1 Hunting Gate, Hitchin, Hertfordshire SG4 0TJ

Tel: 44 (0)1462 424700 • Fax: 44 (0)1462 424701 • E-mail: wpiuk@wpi-europe.com

Germany

Zossener Str. 55, 10961 Berlin

Tel: 030-6188845 • Fax: 030-6188670 • E-mail: wpide@wpi-europe.com

China & Hong Kong

WPI Shanghai Trading Co., Ltd.

Rm 20a, No8 Dong Fang Rd., Lu Jia Zui Financial District, Shanghai PRC

Tel: +86 688 85517 • E-mail:chinasales@china.wpiinc.com

Internet

www.wpiinc.com • www.wpi-europe.com • www.wpiinc.cn