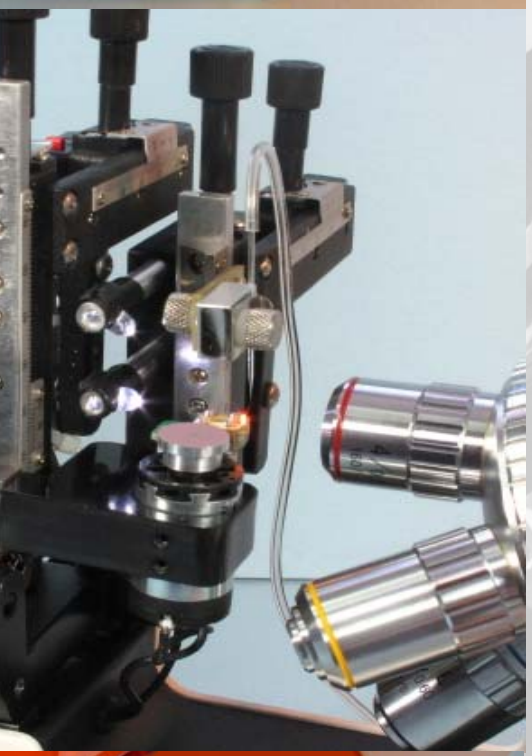

# Products and Applications for the Life Science Laboratory

*Microinjectors*
*Microperfusion Systems*
*Multi-Channel Microfluidic Pump*
*Multi-barrel Micropipette Pullers*
*Single Barrel Micropipette Pullers*
*Quartz Micropipette Puller*
*Microforge-Grinding Centers*
*Inverted Microscope Work station*

MDI®

**MicroData Instrument, Inc.**

# Contents




MDI®

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## Ordering Information

**How to Order**
Telephone orders must be confirmed in writing by fax or mail. All purchase orders must be signed by an authorized purchasing agent or person.

**Export Order**
Orders outside of the U.S.A. and Canada should be placed directly to this office or to the local representatives. Payment of U.S.A. currency must accompany all direct orders . Contact our sales department for quotation of shipping costs and payment options.

**Prices and Specification**
All prices are FOB factory. Prices and specification are subjects to change without notice. Shipping and insurance are additional.

**Minimum Billing**
Orders totalling less than $300.00 are charged an additional $15.00 for handling.

**Warranty**
All products are warranted to be free of defects in materials and workmanship for one year from date of shipment. Warranty becomes null and void because of abuse, disassembly, or unauthorized repair of product.

**Service**
Technical supports are available by directly calling the office. Repairs and modifications are also available for all our products.

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Standard catalog items may be returned within 15 days from receipt, but customer must pay all shipments. Returns after 15 days and before 30 days or will be subject to a 15% restocking charge. No return after 30 days. All return items and package should be maintained original condition and without damage. Used or contaminated pipettes, tubing and vials are not returnable. Modified or special order items are not returnable. Contact MicroData Instrument, Inc. for return authorization. Unauthorized return will be refused.

# Programmable Cell Microinjectors


PM 2000 Programmable Microinjector


PM 1000 Cell Microinjector

## Applications

- Microinjection into adherent cells or into free floating cells with cell holding output.
- Intracytoplasmic Sperm Injection (ICSI).
- Cell surgery, RNA, DNA transfer, chromosome dissection.
- Cytoplasm or nucleus extraction.
- Cell selection, pick up and movement.

## Features

- Precision and versatile pneumatic injection engine for cell surgery and cell physiological research.
- Accurate microinjection, suction, clearing , balancing and venting can be delivered from the cell injection port.
- Gentle sucking, cleaning, holding, releasing and pushing a cell can be delivered from another cell holding port.
- Highest repeatability with action sequences (for PM2000), pressure readings, savable timers and counters.
- All programming and actions are controlled by an advanced microprocessor.
- User-friendly keyboard, foot switch, remote mouse, full information LCD display and remote control port (for PM2000).

Utilizing an advanced microcontroller and precision pneumatic components, the PM2000 and PM1000 are just designed as two very precise and smart pneumatic engine for microinjection. The PM2000 and PM1000 can deliver from picolitter to unlimited wide range of liquid to a target and can be controlled precisely to pick up and transfer sperm. With a smooth and very fine adjustable suction, ejection and a computerize timing valve, every single sperm can be handled conveniently and precisely.

A 60 - 100 psi pressure input gas is the only gas source required for the PM2000 or PM1000 to produce a wide range of pressure and vacuum outputs. There are two output ports on the front panel, one for a cell injection (or suction) pipette and another for a cell holding pipette. The injection port can do clearing, injecting, sucking, venting and balancing capillary action for the injection pipette. The cell holding port can do gentle suction for holding a cell. Besides cell releasing function, a smart proportional and adjustable pressure can be produced to push a cell out off the tip gently or clear the holding pipette completely.

There is savable and programmable injection timer in both PM2000 and PM1000, which can be programmed from 10 millisecond to continue or manual control time. Besides injection timer, there are savable timers and counters for clear, clear hold and fill functions in the PM2000. There are smart 'Three Pulses then Continue' clear and clear hold function for the PM1000 manual control. All pressures are adjustable and their readings are savable for the PM2000. While in the PM1000, injection, balance and hold pressures are adjustable. Both microinjectors perform real-time data acquisition for pressure monitoring. For the PM2000's pressure mode, the suction vacuum generating pressure, injection pressure, balance pressure and hold vacuum will be displayed simultaneously as well as previous saved pressures on one LCD, while the PM1000 can display balance, injection and hold pressures in same time. Both are convenience for user to adjust and compare pressure settings. Monitor the input pressure is available in the PM2000.

The PM2000 allows the user to program custom-designed action sequences. Within each sequence, a user can save 4 pressure readings, 4 preset timers and 4 counters for corresponding actions. There are 12 programmable action steps in each sequence and total 63 programmable sequences.

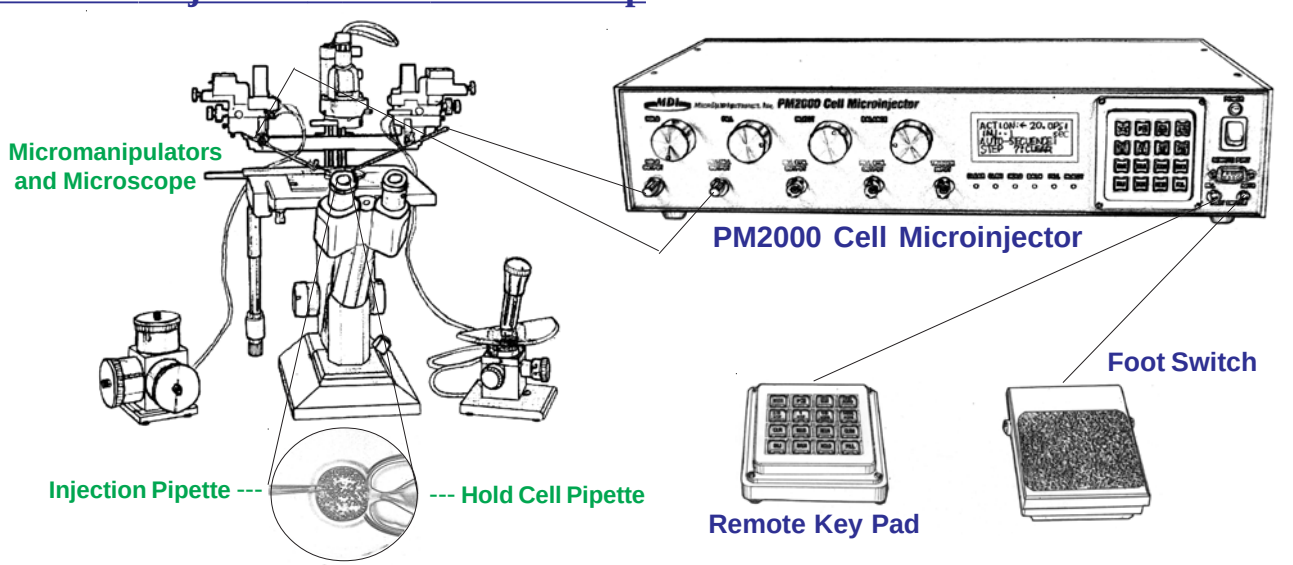
All 63 sequences will be saved even turn off the power. The last using sequence will be recovered automatically when turn on the power again. Therefore, a user can program all different pressures, timers, counters and action steps for different experiments (up to 63). The user can just turn on the power to continue the last experiment , or simply select a sequence number, any one of 63 different experiments can be precisely repeated on any time.

A simple and straightforward keyboard allows the user to program and perform actions for the PM2000 or PM1000. An LCD display window provides full information such as pressure, vacuum (PM2000), time, count, sequence steps (PM2000) and actions, etc. Besides key pad, there is a foot switch connector which can be used to control injection in both PM2000 and PM1000. There is another foot switch connector for triggering sequence steps on the PM2000 front panel. The remote port of a DB9 connector can be connected to a remote mouse switches, an optional remote keypad (PM2000) nearby the micromanipulators to form a very convenient microinjection work station. The remote control port can be connected as a computer interface port for cell electrophysiology applications (PM2000). Furthermore, there are BNC connectors in the PM2000 for the timing (injection, suction and sequence step) signal in and out to synchronize other electrophysiological instruments. While the PM1000 is very simple to use with adequate precision functions for cell surgery, the PM2000 will give users wider applications and more sophisticated programming functions.

## Specifications

| | PM2000 Cell Microinjector | PM1000 Cell Microinjector |
|---|---|---|
| LINE VOLTAGE | 100, 120 or 240 VAC | 100, 120 or 240 VAC |
| POWER CONSUMPTION | 35 Watts | 35 Watts |
| INPUT GAS PRESSURE | 60 - 100 psi | 60 - 100 psi |
| CLEARING PRESSURE | Same as input pressure | Same as input pressure |
| CLEAR HOLD PRESSURE | 0-3 psi ( regulated ) | 0-3 psi ( regulated ) |
| INJECTION PRESSURE | 0.1 - 60 psi ( regulated ) | 0.1 - 60 psi ( regulated ) |
| BALANCE PRESSURE | 0 - 10 psi ( regulated ) | 0 - 10 psi ( regulated ) |
| FILL VACUUM | 0" - 24" Hg ( regulated ) | 14" - 24" Hg ( not regulated ) |
| HOLD VACUUM | 0" - 25" of H2O ( regulated ) | 0" - 25" of H2O ( regulated ) |
| TIMER SETTING RANGE | 0.01 to 327.67 sec.(10 msec. resolution) CONTINUE or MANUAL control. | 0.01 to 327.67 sec.(10 msec. resolution), CONTINUE or MANUAL control. |
| COUNTER SETTING RANGE | 1 - 255 | No. |
| SAVABLE SEQUENCE/STEP | 63 sequences, 12 steps for each sequence. | No. |
| FOOT SWITCH PORT | 2 ( for injection and sequence trigger ) | 1 ( for injection ) |
| REMOTE CONTROL PORT | Remote mouse, DB9 interface, input trigger BNC | Remote mouse switches |
| OUTPUT SIGNAL PORTS | 2 BNCs ( for inject and fill signal output ) | No. |
| ACCESSORIES | One **IP- 1** ( 6' input tubing with connector ). Two **OP- 2** ( 3' output tubing with connector ). One **FSW** ( foot switch ). **MOUSE-2** (mouse). | One **IP- 1** ( 6' input tubing with connector ). Two **OP- 2** ( 3' output tubing with connector ). One **FSW** ( foot switch ). **MOUSE-1** (mouse). |
| OPTIONAL ACCESSORIES | **HOLD-1, HOLD-1.2, HOLD-1.5** 1, 1.2 or 1.5 mm O.D. pipette holder. **RK-1** rack mounting kits with handles. **PM-KP** remote control key pad. | **HOLD-1, HOLD-1.2, HOLD-1.5** 1, 1.2 or 1.5 mm O.D. pipette holder. **RK-1** rack mounting kits with handles. |

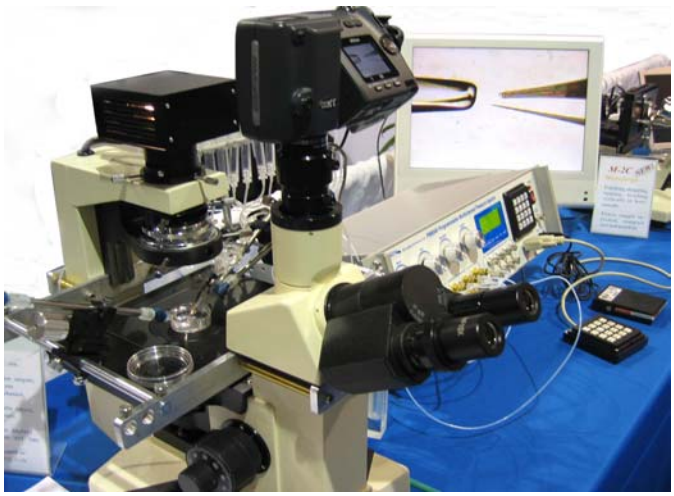
## Cell Microinjection Work Station Set Up



# Programmable Multi-Channel Pressure Injection Systems


**PM8000 8-Channel Pressure Injection System**


**PM6000 4-Channel Pressure Injection System**



The PM6000 and PM 8000 Programmable 4 and 8-Channel Pressure Injector systems are designed for single to eight channel intracellular injection and extracellular perfusion. They are excellent microinjection and perfusion engines for pharmacological drug testing, molecular biological DNA, RNA transferring, intracytoplasmic sperm injection and cell electrophysiological applications. Combining an advanced microcontroller and precise pneumatic components, these systems can simultaneously control up to eight injection micropipettes or eight perfusion vials and one cell holding pipette and one drain pipette.

The four (PM6000) or eight (PM8000) injection/perfusion output ports can be controlled separately or combined together to perform actions such as injection, capillary action balancing, suction or clear up. The cell holding output port can produce an adjusted gentle suction to hold a cell or eject a pressure to push a cell or completely clear the holding pipette. Another drain output port can simultaneously produce an adjusted suction to drain and clear out liquid before next channel microperfusion. Both PM6000 and PM8000 can deliver different quantity agents and drugs from picolitters to continued perfusion.

All output pressures and vacuums are regulatable and can be real-time displayed on the front panel display. Previous pressure readings can also be recovered on the display for setting comparison.

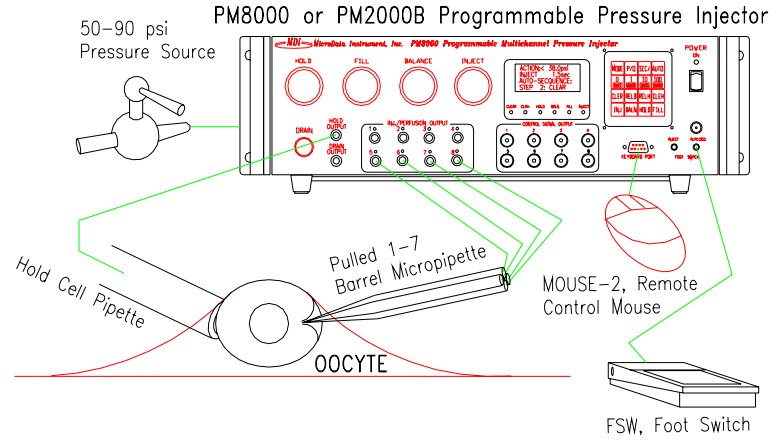
Besides programmable timers and counters, there are 16 programmable and savable injection/perfusion sequences with 32 programmable steps in each sequence. Each sequence can be repeated continually or triggered manually. The interval time between steps can be programmed for automatic sequential cycle or manual trigger.

There are two foot switch connectors for sequential step trigger and injection trigger. A digital remote port can be connected to an optional remote mouse, key pad, or be controlled by a computer. With exceptional versatility and extremely precise control, both PM6000 and PM8000 are ideal multichannel injection / perfusion engines.

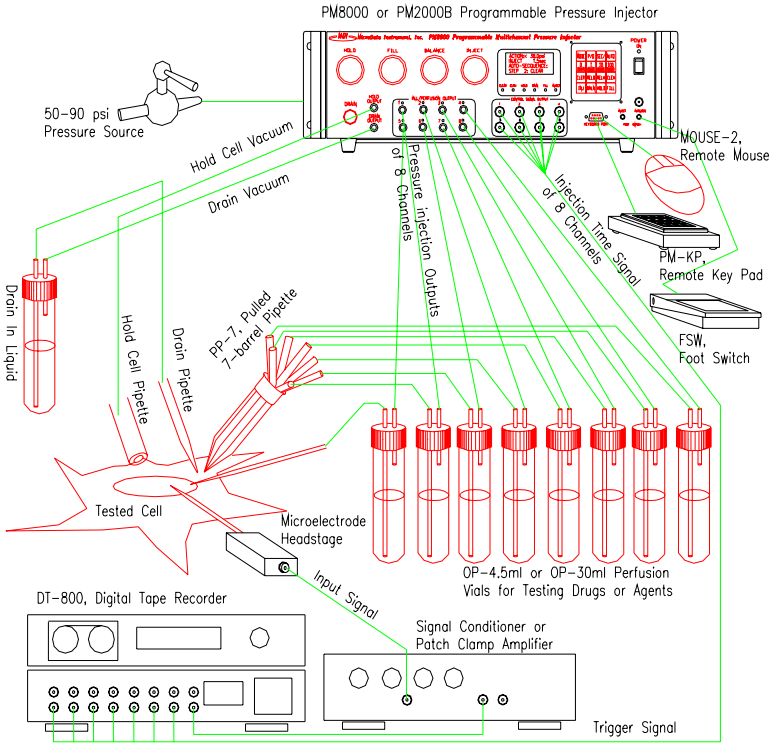
## KEY FEATURES

- **Multiple function system for microinjection and perfusion.**
- **Up to eight inject/perfusion outputs, one hold cell output and one synchronized drain out channel.**
- **Programmable and savable timers, counters and step sequences.**
- **Manual control or automatic sequential step cycle operation.**
- **Programming information and pressure real time display.**

## Connection for Intracellular Injection System :




## Connection for Extracellular Microperfusion System :




### Basic Accessories:

**IP-1** Input tubing/connector. 6 for PM6000, 10 for PM8000.
**OP-2** output tubing/connector. 4 for PM6000, 8 for PM8000.
**OV-1.5** perfusion vial (1.5ml):4 for PM6000, 8 for PM8000.
**HOLD-4(7)** 4(7)-barrel pipette holder.
**PP-4(7)** pulled 4-barrel pipettefor PM6000, 7-barrel for PM8000.
**FSW** foot switch. Power cord. User's manual.

### Optional Accessories:

**OP-4.5**ml, **OP-10**ml, **OP-30**ml perfusion/ drain vial.
**STB-1.5** magnetic stand and 1.5ml vial bracket.
**HOLD-1** single pipette holder..
**PP-4, PP-7** pulled multibarrel pipette.
**MOUSE-2** special remote mouse.
**PM-KP** remote key pad.
**RK-2** rack mounted kit with handle.

## SPECIFICATIONS

| | |
|---|---|
| **Output Channels** | 4 (PM6000) or 8 (PM8000) injection / perfusion outputs, one synchronized drain out and one cell hold channel. |
| **Input Gas Pressure** | 30 - 100 psi |
| **Clearing Pressure** | Same as input pressure |
| **Clear Hold Pressure** | 0-3 psi (regulated) |
| **Injection Pressure** | 0.05 - 60 psi ( regulated ) |
| **Balance Pressure** | 0.05 - 10 psi ( regulated ) |
| **Fill Vacuum** | 0" - 24" Hg ( regulated ) |
| **Hold Vacuum** | 0" - 30" of water (regulated ) |
| **Drain Vacuum** | 0" - 30" of water ( regulated ) |
| **Repeatability** | +/- 0.05 psi |
| **Display Accuracy** | +/- 0.1 |
| **Timer Setting Range** | 10 msec - 327.67 sec. (10 msec. Resolution for whole range). |
| **Counter Setting Range** | 1 - 255 |
| **Savable Sequences** | 16 sequences |
| **Programmable Steps** | 32 steps for each sequence. |
| **Remote Control Ports** | DB9 connector for remote key pad, foot switch jack or BNC for negative TTL trigger, a jack connector for injection foot switch. |
| **Signal Output Ports** | 4 (PM6000) or 8 (PM8000) BNCs for injection signals. |
| **Power Consumption** | 100, 120 or 220 VAC, 35 Watts |

# PMFP Programmable Multichannel Microfluidic Pump

New !


## *KEY FEATURES:*

- **Multichannel pressure outputs with versatile capabilities and compact size for microfluidic solution driving.**
- **Up to eight independent pressure output channels plus one adjustable vacuum suction output channel.**
- **Programmable and savable timers and automatic multistep sequences. Adjustable nine output pressures, one suction vacuum and savable readings.**
- **Nine independent synchronize signal outputs, trigger and interrupt signal input and trigger/interrupt foot switch.**
- **Convenient full function control key pad and remote port for remote key pad and computer interface.**

The PMFP Programmable Multichannel Microfluidic Pump is designed to drive solution for variers microfluidic devices, microfluidic logics, flow cells and microfluidic chips applications.

Up to eight pressure outputs and one suction vacuum output can be controlled separately or with different channels combination together to perform actions such as output different pressures and suction, different timing and different automatic sequences.

There are up to nine individual regulators for adjustments of eight channel output pressure and one suction vacuum. An LCD provides full information display such as pressure, vacuum, time, sequence steps and actions. During pressure mode, all pressure readings are savable for next time repeat operation. The previous pressure reading can be recalled on the LCD for new pressure setup comparison.

The PMFP provides programmable timers for every independent output control. The PMFP also provide different sequence step time to deliver accurate timing and duration for each step channels action. The PMFP allows the user to operate manually or automatically multistep sequences running which are designed by user. There are 15 savable sequences with 20 programmable steps in each sequence. They can be used to perform and repeat different sequential pressure outputs precisely and automatically. Also, the sequential step cycles can be automatically performed or triggered each step manually. All preset timers, pressure reading memory and sequential steps are saved even turn off the power. The PMFP is capable to perform repeatable experiments at anytime.

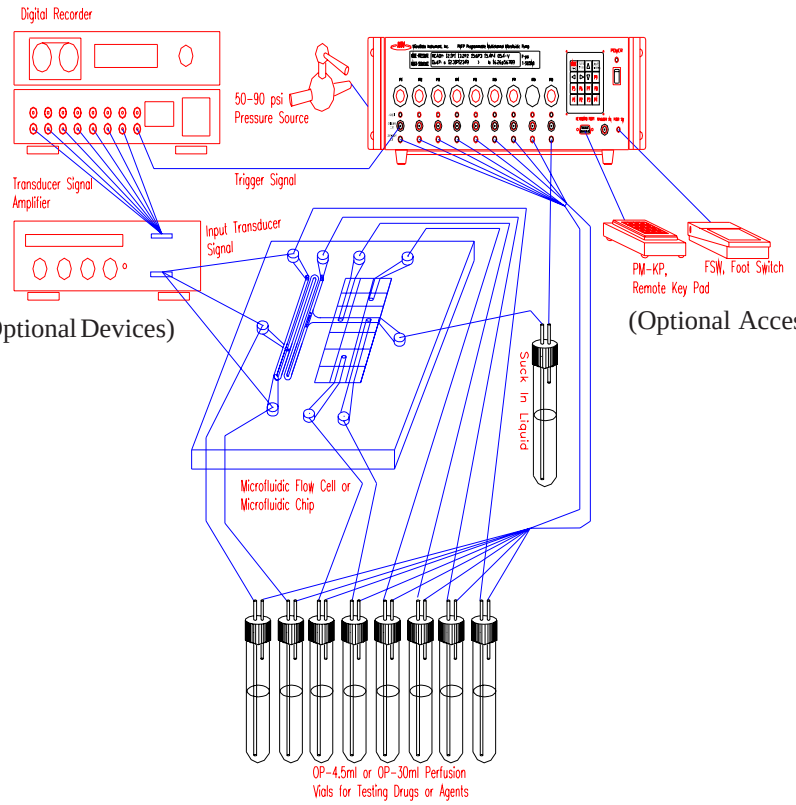
An attached foot switch can trigger preset sequence steps or be used as an interrupt trigger during output actions. An optional remote keyboard give the user another convenient tool to control the whole operation. The remote key board port can be interfaced with a computer control. The exceptional versatility and precise multi-output pressure control are the hallmark of the PMFP.

## SPECIFICATIONS:

| | |
|---|---|
| **OUTPUT CHANNEL** | Eight adjustable pressure output channels. One adjustable vacuum suction channel. |
| **LINE VOLTAGE** | 100, 120 or 240 VAC |
| **POWER CONSUMPTION** | 40 Watts |
| **INPUT AIR PRESSURE** | 30 - 93 psi |
| **PRESSURE OUTPUT** | 0.2 - 90 psi (regulated) |
| **VACUUM OUTPUT** | 0-13 -psi (0"-25" Hg regulated) |
| **REPEATABILITY** | +/- 0.1 psi |
| **DISPLAY RESOLUTION** | +/- 0.1 psi for pressure |
| **TIMER SETTING RANGE** | 0.01sec. to 327.66 sec. (0.01sec. resolution for whole range ) to EXTEND or 0-MANU control. |
| **SAVABLE SEQUENCES** | 15 Programmable sequences. |
| **STEPS PER SEQUENCE** | 20 Programmable steps |
| **REMOTE CONTROL PORTS** | Remote DB9 connector, foot switch jack and Trigger BNC for negative TTL input. |
| **OUTPUT SYNCHRO** | Eight BNCs for pressure output port P1-P8 with positive TTL (0-5V) signals output. |
| **SIGNAL PORTS** | One BNC for vacuum suction output port P9 with negative TTL signal (5V-0) output. |
| **WORKING TEMPERATURE** | 4C - 43C (39F - 105F) |
| **COMPUTER INTERFACE** | DB9 connector with technical code reference (optional) |

## MICROFLUIDIC SYSTEM SETUP DIAGRAM :

### PMFP Programmable Multichannel Microfluidic Pump




(Optional Devices)

(Optional Accessory)

(Optional Accessory)

# PMP-107 Programmable Multipipette Puller


PMP-107 Programmable Multipipette Puller


PMP-107Lr Programmable Super Length Multipipette Puller

- Automatic Single to 7-Barrel Pipette Puller.
- Exclusive Optical-Digital Ruler Measurement.
- Computerize Real-Time Feedback Heater Control.
- Programmable and Savable Sequences for Creation and Reproduction.
- Manufacture Preset Programs for Single, 3, 4 and 7-Barrel Micropipette Pulling.
- Pneumatic Pulling Force and Compact Size.
- Super Length Multipipette and Electrode Pulling Model.

### Automatic Single to 7-Barrel Pipette Puller

With just pressing one key, a multi-barrel pipette can be successfully pulled by the PMP-107 Programmable Multipipette puller. Equipped with a microcomputer, pneumatic pulling arm, precise automatic rotator, optical-digital ruler and a new designed clamp, the PMP-107 can automatically heat, twist and pull one to seven barrel pipette. There is no need for any manual rotation or any inconsistent timing interrupt control. The whole pulling processing is programmable and under control of a preset sequence. The PMP-107 is a new upgrade model from the PMP-100 multipipette puller. Many new features have been added to the PMP-107: The rotation (twist) angle is adjustable. Sequences are easy to copy and modify. Rotation and pulling can act simultaneously while pulling distance is adjustable, which can twist a multipipette with adjustable spirality.

### Exclusive Optical-Digital Ruler Measurement

There is an exclusive optical-digital ruler in the PMP-107 to perform precise taper length setting, real-time measurement and tip sensing. With this feature, a user can easily handle taper and tip pulling.

### Computerize Real-Time Feedback Heater Control

In the PMP-107, there is an advanced microcontroller to perform real-time heater monitoring and controlling. If a heating level is selected and preset, the microcontroller will measure the actual heating power during heating power on. The measurement will be real-time displayed and feedback to the control unit to match the set point dynamically. As a result, the PMP-107 always provides precise heating power, despite of many times of pipette pulling or thermal/electrical characteristic changing. Under a microcomputer controlling, the heater is smart and reliable.

### Programmable and Savable Sequences for Creation and Reproduction

There are 99 user programmable and savable pulling sequences with maximum 18 steps in each sequence. Users can easily program different taper length, tip shape for single to 7-barrel pipettes. Time number, heat level, heat control and action parameters can be individually set in each step. After a special sequence setting up, a multibarrel micropipette will be automatically produced by just pressing the Start button.

### Manufacture Preset Programs for Single, 3, 4 and 7-Barrel Micropipette Pulling

Every PMP-107 will be well tested and installed sample pulling programs for single, 3, 4 and 7-barrel multipipettes. A new user will easily select the right program or just change a few step parameters to fit their special need. The preset programs are convenient and important, not only because they can pull different multibarrel pipettes but also as convenient copy templets to make other programs with only minor parameter change for other applications. The PMP-107 has an easy copy program function.

### Pneumatic Pulling Force and Compact Size

Comparing with other pipette puller using gravity or magnetic field as pulling force, the PMP-107 applies precise controlled pneumatic pressure as the pulling force, which gives more controllable, even and consistent dragging characteristics. Within a very compact size, the PMP-107 can precisely and automatically perform twisting and multiparameter multi-pulling without inconsistent manual interrupt. A precision micro-linear ball bearing rail and advanced pneumatic components are used to

provide no fault pulling movement. A simple 4x4 keypad and full information display LCD let users control easily and read all pulling parameters directly, which include sequences, steps, time, timing, heat level, heater control, tip length and actions. With an intelligent PMP-107, pulling a multipipette is no longer an uncertainty of hand skill, but a reproducible automatic processing.

### Super Length Multipipette and Electrode Pulling

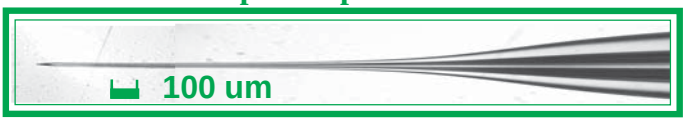
In the PMP-107 series, there are optional models of PMP107L-r and PMP107L-e. The PMP107L-r not only has the same function as the PMP-107 but also can pull extra length taper and tip up to 120 mm. The application includes deep microperfusion and deep multichannel testing. The PMP107L-r features same rotation clamp on one side and flexible clamp head on the other side as the PMP-107 has. While the PMP107L-e is specially designed to pull extra long taper and tip for single to multipipette without twisting (no rotation) which can be inserted a long carbon or metal fiber inside the pipette for making a long electrode. Since both pipette clamps on the PMP107L-e are open ends, an extra long fiber can be left out of both ends of pipette for pulling an extra long electrode. Therefore, the PMP107L-e is straight pulling super length puller and excellent for long electrode fiber inside pipette pulling. The PMP107-r can do rotating and straight pulling and is excellent for making long tip microperfusion and drug deep testing multipittes.

Unpulled 7, 4-barrel Pipettes
Pulled 7, 4-barrel Pipettes

## Specifications

| | |
|---|---|
| **Multi-barrel pipette** | Single to 7- barrel |
| **Each barrel pipette O.D.** | 1 mm (2 mm for single barrel) |
| **Pulling force** | Pneumatic |
| **Heater** | Nichrome coil or foil |
| **Heater control** | Microcontrollor |
| **Heating** | 74 general heat levels (24-99), 64 automatic heat levels (45-98). |
| **Number of sequences** | 99 |
| **Steps of each sequence** | 18 |
| **Taper length setting** | Optical ruler 0.5 - 30 mm (0.5-120 mm for PMP-107L) |
| **Pressure 1** | Adjustable 0.1 - 10 psi |
| **Pressure 2** | Adjustable 0.1 - 60 psi |
| **Cooling Pressure** | Adjustable 1 - 30 psi |
| **Rotation Control** | Turning angle 90, 135, 180 and 225 degree adjustable. |
| **Gas input pressure** | 30-60 psi |
| **Actions** | Pull 1, Pull 2, Pull 2/Cool, Rotation, Rotation/pull, Cool Air and Return. |
| **Display** | 20x4 LCD |
| **Power input** | 110 / 240 VAC |
| **Power consumption** | Maximum 150 watts |
| **Dimension** | 14L x 11W x 7H inch. |
| **Weight** | About 18 lbs. |

**Pulled 4-barrel Pipette Tip**




**Pulled 7-barrel Pipette Tip**


**Pulled 7-barrel Pipette With 100 mm Long Tip**

### Basic Accessories:

Spare heat coil. Tweezers. 12 preset sequences and samples. Input tubing and connector. Power cord. User's manual.

### Optional Accessories:

**MFG-5 Microforge-Grinding Center** for single pipette to multipipette tip modification.

Air Compressor Pump for PMP-107 air source.

### Optional Model:

**PMP107L-r :** Extra length pull up to 120 mm for the taper and tip. Selected fix pipette clamp for both sides or one side clamp rotatable another side flexible.

**PMP107L-e :** Extra length pull up to 120 mm for the taper and tip. Fix and open end pipette clamp for both sides.

# PMP-102 Programmable Micropipette Puller


PMP-102 Programmable Micropipette Puller


PMP107L-e (PMP102L) Super Length Programmable Micropipette Puller

- **Press only one key to produce two identical single pipettes with different preset and programmable sequences.**
- **Pull different patch clamping, intracellular electrodes, injection micropipettes and microneedles with 99 programmable sequences.**
- **Microprocessor real-time controlled system performs programmable multipulling steps, optical-digital measurement and precise digital feedback heating control to achieve exceptional flexibility and repeatability.**
- **Consistent pulling force by utilizing pneumatic pressure instead of gravity or magnetic field.**
- **22 manufacture preset sequences and samples for different application pipettes. Optional microforge heater power supply, air jet output and foot switch connectors.**

The PMP102 is a state of the art microprocessor controlled pipette puller. The PMP102 is designed to pull a pipette horizontally to produce two identical pulled micropipettes. Different kinds of pipettes can be pulled repeatedly by the preset program sequences. There are varied micropipettes can be produced, such as patch clamp electrodes, intracellular electrodes, injection micropipette and microneedles, by manufactory preset sequences. To achieve these versatility and the higher degree of reproducibility, many advanced technologies are applied on the PMP102:

## Exclusive Optical-Digital Taper Measurement

Instead of mechanical tip length setting from other pipette puller, there is an exclusive optical-digital ruler in the PMP102 to perform precise taper length setting, real-time measurement and controlling. With this feature, a user can handle taper pulling very precisely and easily. Equipped with a powerful computerize tip sensing function, the puller can automatically finish the tip pulling. It gives the user a quick reference to pull an ideal tip.

## Computerize Real-Time Feedback Heater Control

Inside the PMP102, there is an advanced microcontroller to perform real-time heater monitoring and controlling. If a heating level is selected and preset, the microcontroller will measure the actual heating power during heating power on. The measurement is real-time displayed and feedback to the control unit to match the set point dynamically. As a result, the puller always provides precise heating power, despite of many times of pipette pulling or thermal/electrical characteristic changing.

If the heating level is set to AUTO, the heater will automatically search the melting point for different glass pipettes. Under a microcomputer controlling, the heater is smart and reliable.

## Programmable and Savable Sequences for Creation and Reproduction

There are 99 manufacture/user programmable and savable pulling sequences with 18 steps in each sequence. Users can easily program different pipette tip size, tip length and tip shape in different sequence for different application. Time and length count, heat level, heat control and action parameters can be individually set in each step. After a special sequence setting up, a double identical micropipettes can be automatically produced by just pressing the START button on the PMP102.

## Pneumatic Pulling Force and Very Compact Size

Comparing with other pipette puller using gravity or magnetic field as pulling force, the PMP102 apply precise controlled pneumatic pressure as the pulling force, which gives more controllable, even and consistent dragging characteristics. With a double horizontal pulling, the PMP102 can pull two identical ideal injection tips or microelectrode tips at the same time. Within a very compact size, the PMP102 can precisely and automatically perform multistep pulling without manual interrupt. A precision micro-linear ball bearing rail and advanced pneumatic components are used to provide no fault pulling movement. A simple 4x4 keypad and full information display LCD let users control easily and read all pulling parameters directly, which include sequences, steps, time, timing, heat

## Pulling Samples from Preset Sequences:


level, heater control, tip length and actions. The heater power control and acting time count up or count down are real-time displayed. With versatility of the intelligent PMP102, pulling an ideal micropipette is no longer an uncertainty of hand skill, but a reproducible automatic processing.

### Manufacture Preset Programs for Major Different pipette pulls

The PMP102 pipette puller is well tested and pre-installed with a number of different pipette pulling programs. A user can easily find out a right sample picture or the closest characteristic from the sequence list on the User's Manual. Select the corresponding sequence and just pressing the START key, a desired pipette will be pulled automatically. The preset programs are convenient and important not only because they can pull many different pipettes, but also they can be used as templets to produce new programs. With the copy function and just a few modifications from an exist sequence, a new customize sequence program can be configured to fit a special requirement. As many as 22 sequences are developed and preset to the PMP102 by spending a lot of test time and expertise. These preset sequences are so important that users will save their time and pipettes without numerous pulling tries.

### Optional Super Long Taper Pulling and Microforge-Grinding Center Combination

The regular PMP102 can pull up to about 20 mm setting length taper. If a longer tap or tip is needed or pulling with a metal or carbon fiber inside a pipette is needed, an optional model PMP107L-e(PMP102L) can be selected. The PMP107L-e will give you up to 120 mm long taper or tip pulling. Some special modifications, such as angle grinding, polishing and bending for a pulled tip are required by using a microforge and grinder. There is perfect combination of a PMP102 Programmable Micropipette Puller with a MFG-3A Microforge/Grinding Center to form a micropipette production work station. The two units combination will give you total capabilities and seamless ideal continuity for capillary glass micropipette making.

## Specifications:

| | | | | | |
|---|---|---|---|---|---|
| **Pipette** | Single barrel, 1mm-2.5mm O.D. borosilicate or aluminosilicate glass capillary tubing. | **Sequences** | Total 99. | **Display** | 20x4 LCD |
| **Pulling force** | Pneumatic | **Steps** | 18/per sequence | **Heater power output** | Optional |
| **Heater** | Nichrome coil | **Taper length setting** | 0.5 - 20 mm | **Light power output** | Optional |
| **Heater control** | Microcontrollor | **Pressure 1 regulator** | 0.1 - 10 psi, adjustable | **Pressure air output** | Optional |
| **Heating Level** | 76 general heat levels (24-99), 54 automatic heat levels (45-98). | **Pressure 2 regulator** | 0.1 - 60 psi, adjustable | **Foot switch connector** | Optional two (Heat Stop, Air Out) |
| | | **Cool air pressure** | 0.5 - 30 psi, adjustable | **Power input** | 110 / 240 VAC |
| | | **Pressure gas input** | 30-60 psi | **Power consumption** | Maximum 150 watts |
| | | **Actions** | Pull 1, Pull 2, Pull 2/Cool, Cool Air and Return. | **Dimension** | 18"L x 8"W x 11"H |
| | | | | **Weight** | 23lbs. |

## Accessories:

Spare heat coil, Tweezers, 22 preset sequences and samples, Input tubing and connector, Power cord, User's manual.

## Optional Model:

**MFG-5 Microforge-Grinding Center** for single pipette to multipipette tip modification.

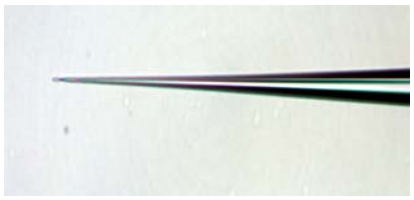
**PMP-102L (PMP-107Le)** Extra length pull up to 120 mm for the taper and tip. It can straightly pull single or multibarrel pipette from 1 mm O.D. to 5 mm O.D.

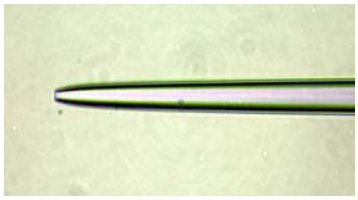
**PMP-102m** The PMP-102 model added with heater power and light power output connector, air output connector, two foot switch connectors for optional microforge M-1.

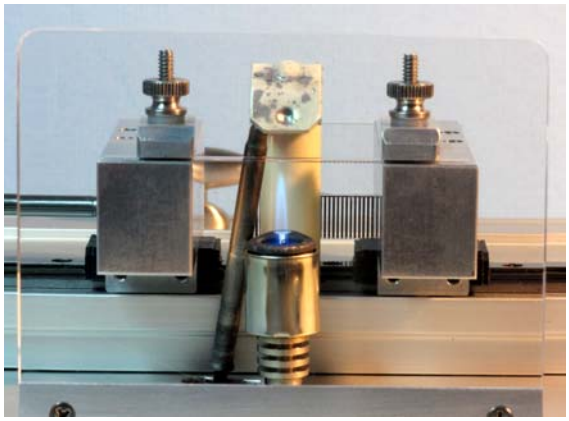
# PMP-102Q Programmable Quartz Glass Micropipette Puller

New !


- Pull fused quartz, fused silica glass micropipette with regular cooking butane gas.
- High efficient micro torch with precision flame control without focusing problem.
- Manufacture preset sequences within up to 99 Programmable sequences.
- Precise tip length setting with horizontal symmetric double pull.







www.microdatamdi.com info@microdatamdi.com Tel: 908-222-1717 Fax: 908-222-1365


**Quartz glass (fused quartz, fused silica) pipette has much lower dissipation factor and dielectric constant than that of other glass. Quartz pipette tip is much stronger than other glass too. In another word, the quartz pipette tip can be less noise in the patch clamp recording and not easy to break the tip when penetrating tough tissue. If these better electrical characteristics and better physical features of a glass pipette tip is the critical point of your application, you need pulled quartz pipettes or quartz glass pipette puller.**

**The PMP-102Q is just developed and designed to pull quartz glass pipette. With very successful technique and features designed for PMP-102 Programmable Micropipette Puller, the PMP-102Q is continually adopted the advanced microcomputer control, optical ruler measurement, heat control and precision pneumatic pulling force control for the quartz glass pipette pulling. Another bright point of the PMP-102Q is using regular cooking butane gas cartridge as heating gas source instead of using expensive and complicate laser heating source. The butane flame is optimal controlled by the PMP-102Q and well fit in a convenient and compact platform. With total savable 99 programmable sequences, the flame, pull force, pulling distance, timing can be set and programmed in up to 18 different steps in each sequence. There are very useful standard sequences which are preset by MDI experts with numerous practices and experience.**

**A regular cooking butane cartridge can be used for long time and easy to be handled as operating a butane cooking stove in a PMP-102Q. Without the focusing problem in a laser heater, the PMP-102Q can pull pipette with 0.1 mm OD to 1.5 mm OD thin wall quartz glass tubing. It can handle more pulling steps without a focusing problem. The PMP-102Q is a practical, compact, precise control and reliable new quartz glass pipette puller.**

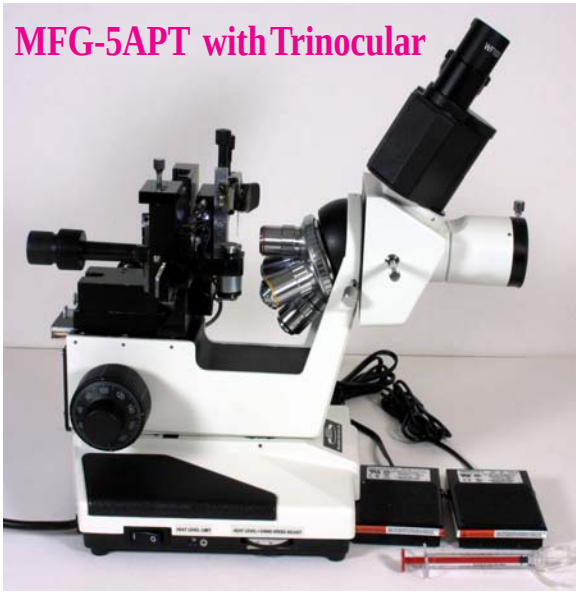
## PMP-102Q Specifications:

| | | | |
|---|---|---|---|
| Pipette | Single barrel, thin wall 0.1-1.5mm O.D., 0.7-1.1mm I.D. Fused quartz, fused silica glass capillary tubing. | Pre-pull pressure | 0.1 - 60 psi, adjustable. |
| | | Mid-pull pressure | 0.1 - 60 psi, adjustable. |
| | | End-pull pressure | 0.1 - 60 psi, adjustable. |
| | | Heat/Pull control | Microcontrollor. |
| Pulled tapper length | 0.5 - 10 mm. | Actions | Start, Pre-pull, Mid-pull, End-pull, End-pull/Stop Heat, Return and Stop. |
| Sequences | 99 programmable sequences. | | |
| Steps | 18 steps per sequence. | | |
| Heater | Micro-torch flame. | | |
| Heater gas source | UN2037 butane gas cartridge. | Display | 20x4 LCD |
| | | Power input | 110 / 240 VAC |
| Pulling force | Pneumatic force. | Power consumption | 30 watts |
| Input air source | 60-80 psi pressure air | Dimension | 18L x 12W x 11H inch. |
| Gas pressure | 0.1 - 10 psi, adjustable. | Weight | 30 lb. |

# MFG-5 Microforge-Grinding Center

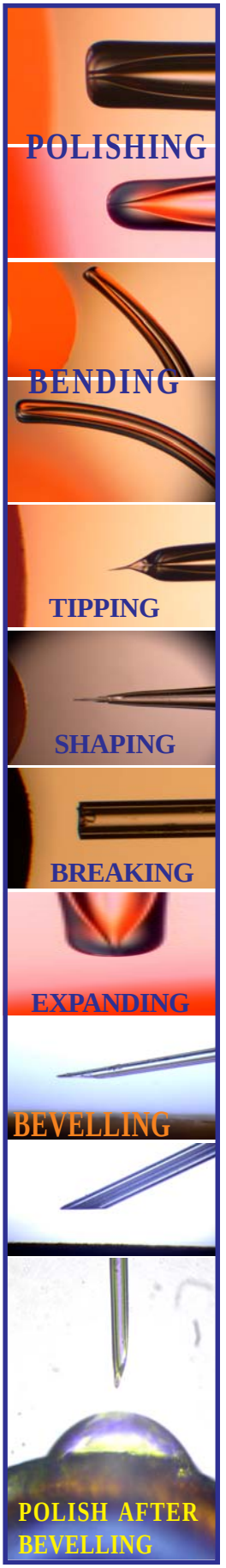
New !







- Glass micropipette tip polishing, shaping, tipping, bending, bevelling and grinding all in one compact platform.
- Combine platinum heater and precision microgrinder as convenient center tool on a horizontal binocular or monocular microscope platform.
- Precise and convenient movement controls for heater/grinder and pipette locations and optical focus. Change forge to grinder or two-step bevelling just in seconds.
- Universal pipette holder for one to seven barrel pipette and 0-180 degree bevelling.
- Up to 800 x magnification in long working distance objective and wide field eyepiece. Scale eyepiece for precision measurement.
- Adjustable precision power supply for variable grinder speed and heating level. High power background and side LED lights for better image.
- Foot switches controllable. Syringe and special tubing for wed grinding. Optional pressure air switchable for pipette tip clearing, expanding and cooling.



The MFG Microforge-Grinding Center series are a creation design for micropipette/multipipette tip total modification. It combines a precision microforge and a microgrinder in a horizontal microscope compact platform. It can be used for micropipette tip polishing, shaping, tipping, bending, breaking, bevelling and grinding. It is an ideal micropipette/multipipette tip modify center.

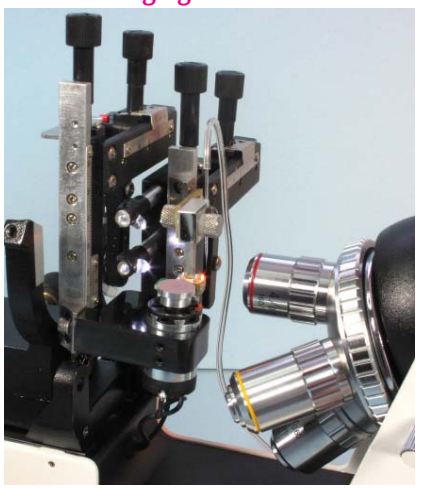
The platform of MFG-5 Microforge-Grinding Center is made from a high power horizontal binocular microscope. A precision optical focus system with 2-axial micromanipulation pipette holder can handle a single pipette or a multipipette conveniently and precisely. The pipette holders is 180 degree turnable for different angle bevelling, pipette bending or polishing. Another 2-axial micromanipulator controls combination of a platinum mini-heater and a microgrinder. They are side by side together. Turning the manipulator horizontally will select the heater or grinder in seconds, also switching their power supply automatically.

There is a foot switch and heat/speed level adjusting dial knob which control the heater or grinder operating. There are two special super bright LEDs. One is an adjustable powerful back light , another is adjustable side light for a clear contour image. The MFG Microforge-Grinding Center is designed with compact structure and precision control circuitry.

The Microforge-Grinding Center use high quality optical components which include 10x or 20x wide field eyepieces and long working distance plan achromatic 4x, 10x/0.25, 40x/0.6 objectives. The 10x wide field scale eyepiece gives user another accurate measurement tool. Besides heater/grinder control, another optional foot switch connector can be added for pressure air control. Outside pressure air can be input to the Microforge-Grinding Center and can be switched output to a tubing by stepping on the foot switch. The pressure air output can be used for clearing a pipette dust after grinding or expanding or cooling a pipette during pipette forging. A syringe and special connector tubing will come with the microgrinder for wed grinding.

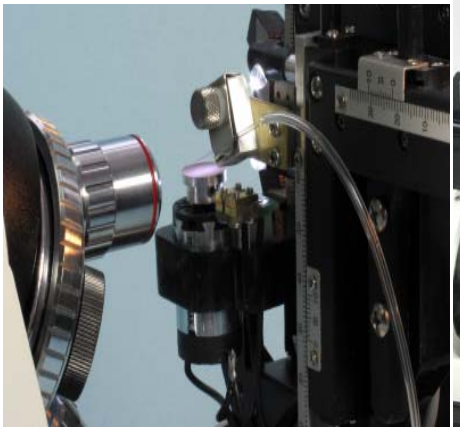
There are precision coarse and fine moving adjustments in the model **MFG-5P** compare with an adaptable tool moving adjustment in the **MFG-5**. The **M2G-5P** is a precision two-grinding motors (coarse/fine) microgrinder. It can switche between two precision grinding motors (coarse/fine) instead of between a forge heater and a grinder. The model with microforge only is **MF-5**. The model with adding pressure air valve inside and foot switch outside is **MFG-5A**. As a convenient and precision micropipette tip microforge/microgrinder, the **MFG-5** can be combined with a **PMP-102** or a **PMP-107** micropipette/multipipette puller to compose of a complete and ideal micropipette production work station. To select the correct model, please see the following tables:

**Microforging in the MFG-5**



**Precision Two-Grade Microgrinder**

**Microgrinding in the MFG-5**



**Coarse and fine grinding motors**

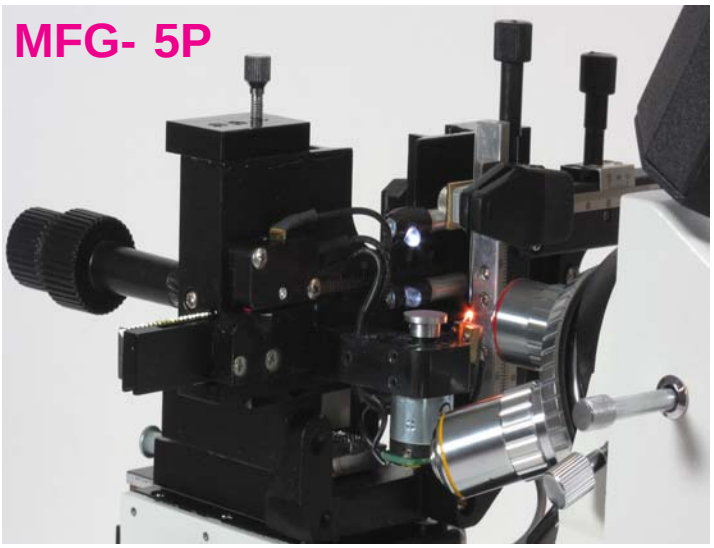
| **Model Selection:** | MF-5 | MFG-5 | MFG-5A | MFG-5AP | M2G-5AP |
|---|---|---|---|---|---|
| Micro-Heater | 1 | 1 | 1 | 1 | |
| Microgrinder | | 1 | 1 | 1 | 2 |
| Pressure Air In/output | | | 1 | 1 | 1 |
| Binocular(B) / Monocular(S) | B | B | B | B | B |
| Independent Power Supply | 1 | 1 | 1 | 1 | 1 |
| Tool Fine/Coars Movement | | | | 1 | 1 |

## Specifications:

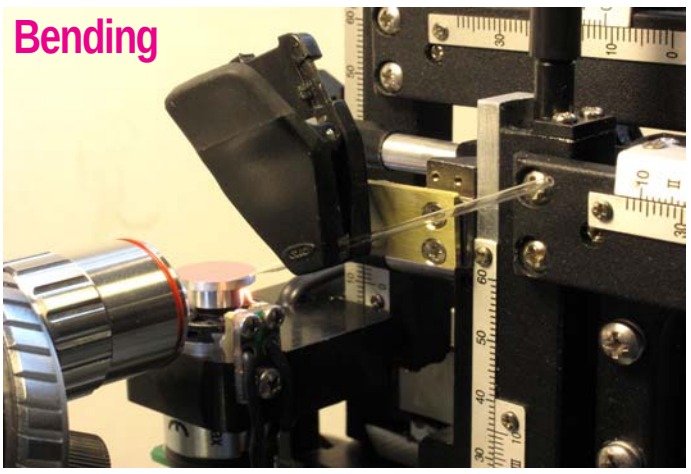
| | |
|---|---|
| **Body** | Horizontal bino/monocular microscope. |
| **Eyepiece** | 10x, 20xWF. Optional 10x Scaled. |
| **Objective lenses** | 4x, **10x/0.25,** Optional: 20x, 40x/0.6 Long Working Distance. |
| **Light** | Two super bright white LEDs with adjustable back ground light . |
| **Pipette movement** | Two-axial manipulator and coarse-fine focusing adjustment. |
| **Heater/grinder movement** | Two-axial manipulator with three-dimensional adjustment. |
| **Pipette holder** | TurnableEasy-clamp for single or multipipette holding.. |
| **Heater** | Platinum wire heater combine of: |
| **Microgrinder** | 0.1-1.0 um grinding disks with precise micromotor direct-driving. |
| **Air in/output** | Optional air jet foot switch, in/output tubing and connector. |
| **Accessory** | One foot switch. Optional one more. Syringe with special connector tubing. |
| **Power Supply** | 30W, 120/240VAC |

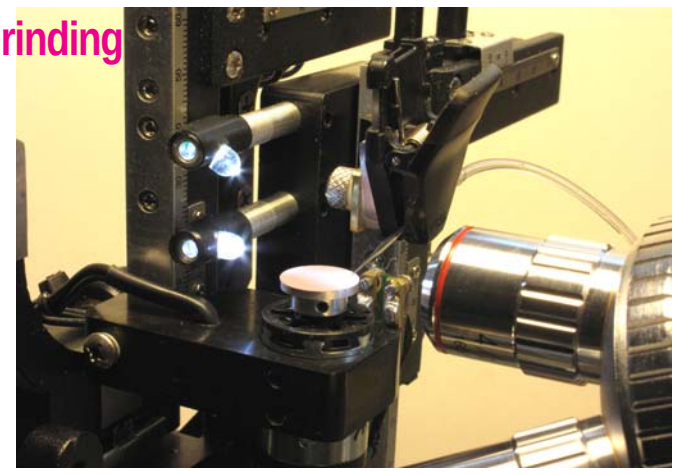
## MFG Microforge-Grinding Center Specifications:

| | MFG-5 | MFG-5A | MFG-5AP |
|---|---|---|---|
| **Body** | Horizontal Binocular microscope. | Horizontal Binocular microscope. | Horizontal Binocular microscope. |
| **Eyepiece** | 10x, 20xWF. Optional 10x Scaled. | 10x, 20xWF. Optional 10x Scaled. | 10x, 20xWF. Optional 10x Scaled. |
| **Objective lenses** | 4x, **10x/0.25,** Optional: 20x, 40x/0.6 Long Working Distance. | 4x, **10x/0.25,** Optional: 20x, 40x/0.6 Long Working Distance. | 4x, **10x/0.25,** Optional: 20x, 40x/0.6 Long Working Distance. |
| **Light** | Two super bright white LEDs with adjustable back ground light . | Two super bright white LEDs with adjustable back ground light . | Two super bright white LEDs with adjustable back ground light . |
| **Pipette movement** | Two-axial manipulator and coarse-fine focusing adjustment. | Two-axial manipulator and coarse-fine focusing adjustment. | Two-axial manipulator and coarse-fine focusing adjustment. |
| **Heater/grinder movement** | Two-axial manipulator with three-dimensional adjustment. | Precision manipulators with three-dimensional adjustment. | Precision manipulators with three-dimensional coarse/fine setting and adjustment. |
| **Pipette holder** | TurnableEasy-clamp for single or multipipette holding.. | Turnable Easy-clamp for single or multipipette holding. | Turnable Easy-clamp for single or multipipette holding. |
| **Heater** | Platinum wire heater combine of: | Precision platinum wire heater | Precision platinum wire heater combine |
| **Microgrinder** | 0.1/0.5/1 um grinding disks with precise micromotor direct-driving. | 0.1/0.5/1 um grinding disks with precise micromotor direct-driving. | with 0.1/ 0.5 / 1.0 um grinding disks with precise micromotor direct-driving. |
| **Air in/output** | N/A | Pressure valve, air jet foot switch and in/output connectors, | Pressure valve, air jet foot switch and in/output connectors, |
| **Accessory** | One foot switch. Syringe with special connector tubing. | Two foot switches. Syringe with special connector tubing. In/output air tubing. | Two foot switches. Syringe with special connector tubing. In/output air tubing |
| **Power Supply** | 30W, 120/240VAC | 30W, 120/240VAC | 30W, 120/240VAC |







# Micropipette Work Station: PMP102 and MFG-5 combination

## PMP102 Programmable Micropipette Puller


## MFG-5A Microforge-Grinding Center with Pressure Port

+

OR

## MFG-5AP Precision Microforge-Grinding Center with Pressure Port

### Model Selection:

| | MF-5S | MF-5 | MF-5A | MF-5AP | MG-5 | M2G-5AP | MFG-5 | MFG-5A | MFG-5P | MFG-5AP |
|---|---|---|---|---|---|---|---|---|---|---|
| Micro-Heater | V | V | V | V | | | V | V | V | V |
| Microgrinder | | | | | V(1) | V(2) | V | V | V | V |
| Heater/Grinder Combination | | | | | | | V | V | V | V |
| Pressure In/output | | | V | V | | V | | V | | V |
| Binocular(B), Monocular(S) | S | B | B | B | B | B | B | B | B | B |
| Two-axial manipulators | V | V | V | V | V | V | V | V | V | V |
| Coarse/Fine manipulator | | | | V | | V | | | V | V |

# IMS-02 INVERTED MICROSCOPE WORK STATION

IMS-02 INVERTED MICROSCOPE WORK STATION

IMS-02 WITH MICROMANIPULATORS AND PIPETTE HOLDER

IMS-02 WITH MICROMANIPULATORS AND PIPETTE HOLDER AND DIGITAL CAMERA

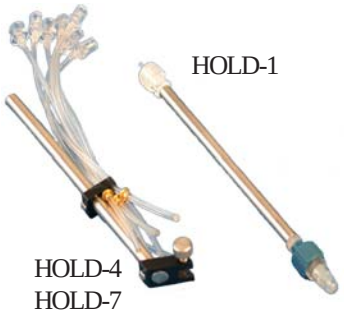
## *Inverted Microscope with Two-Side Three Dimensions Moving Stages*

**The IMS-02 Inverted Microscope Work Station is furnished with two-side three dimensions moving stages and bracket adaptors for micro-manipulators in a precision inverted microscope platform. The IMS-02 comes with long working distance plan achromatic objective, long or ultra-long working distance condenser, wide field eyepiece and phase contrast attachment and C-mounted adaptor for a video camera or a digital camera connection. Optional digital camera connecting adaptors can be selected to fit different brand digital camera. The IMS-02 is suitable for cell operating, manipulating, injecting, patch clamp, ICSI or research of cell culture, living specimen structure, microbe, liquid deposits, microperfusion and so on. It also can be used in medical treatment research, agriculture and animal husbandry research etc. Its high quality optics, simple but convenient mechanics body and very reasonable price make it becomes an ideal microbiology research working station.**

## Specifications

| | |
|---|---|
| **Magnification:** | 100x - 400x |
| **Trinocular:** | For digital photo, video camera attachment. |
| **Eyepieces:** | Wide field eyepieces:10x, F:25mm D:18mm |
| **Objectives:** | Long working distance plan achromatic objectives (cover glass thick:1.2mm):10x-NA0.25WD8.1mm, 20x-NA0.4WD4.8mm, 40x-NA0.6WD3.3mm.Long working distance plan achromatic phase contrast objective: 10x-NA0.25 WD8.1 (include 10x annular diaphragm plate). |
| **Condenser:** | Long working distance condenser: NA=0.4, working distance 28mm. |
| **Object Stage:** | Size:200x152mm.Movement range:20x60mm. |
| **Focusing Adjust:** | Coaxial coarse and fine focusing mechanism with tension adjustable and focus stop, minimum increment is 0.002mm. |
| **Illumination:** | 6V20W halogen lamp, adjustable brightness. |
| **Side Tool Stages:** | Right-hand side and left-hand side three dimansions movement stages with mounting rods (dia.10mm) and brackets for micromanipulators or other micro-tool connection. |
| **OPTIONAL ACCESSORIES** | |
| **Manipulator:** | 3-dimensional fine adjusting micromanipulator. |
| **C-mount Adaptor:** | For digital camera attachment. |
| **D-Camera Adaptor:** | For Canon or Nikon digital camera connection and convert optics. |
| **Photo Adaptor:** | 2.5x/4x change over photo attachment (include 10x viewing eyepiece), 4x focusing photo attachment for Pentex 35mm camera body. |
| **Eyepieces:** | Wide field: 16x, 20x |
| **Objective:** | Long working distance plan achromatic phase contrast objectives: 25x/0.4, 40x/0.6 (include 25x, 40x annular diaphragm plate). |
| **Condenser:** | |

# Accessories for PM Series:


HOLD-1

HOLD-4
HOLD-7


OV-1.5b

OV-1.5a

OV-1.5

OP-4.5
OP-10


OV-30

OV-10

OV-5

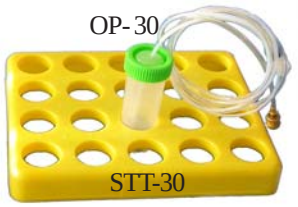

IP-1


OP-2


PP-7 (enlarged)


PP-4 (enlarged)


OP- 30


OP- 30

STT-30


MOUSE-1
MOUSE-2


RK-1
RK-2

Rolair JC10 Compressor


STB-1.5
STB-4.5
STB-10
STB-30


PM-KP


FSW

## Accessories Description:

**IP-1** Standard 6 feet 1/4" O.D. input tubing with connector to PM and 1/4" swift-fit connector for source air. Longer tubing can be selected.

**OP-2** Teflon output tubing with connector to PM and male luer connector for pipette holders or vials. There are three sizes: 1.8, 2.0, 2.2 mm O.D.. Teflon tubing can be selected.

**OP-4.5, OP-10, OP-30**
4.5 ml, 10 ml, or 30 ml vial with In/output tubing from top of vial, and connectors to fit PM series.

**OV-1.5, OV-5, OV-10, OV-30**
1.5 ml, 5 ml, 10 ml or 30 ml vial with input female luer on top and output male luer in bottom.

**STB-1.5, STB-4.5, STB-10, STB-30**
OV or OP-1.5, 4.5, 5, 10 or 30 ml vial holder. 5x or 8x vial holders can be selected.

**STT-4.5, STT-30**
OP-4.5 or OP-30 standing tray which can hold 9 of OP-4.5 or 20 of OP-30

**PP-4** Pulled 4-barrel pipette.

**PP-7** Pulled 7-barrel pipette.

**HOLD-1**
Pipette holder for single pipette (1-1.2mm O.D.).

**HOLD-4**
Pipette holder for 4-barrel pulled pipette (1 mm O.D. each barrel) with 4x 1/32 I.D. Tygon tubing & female luer connector.

**HOLD-7**
Pipette holder for 7-barrel pulled pipette (1 mm O.D. each barrel) with 4x 1/32 I.D. Tygon tubing & female luer connector.

**FSW** Foot Switch for PM series and Microforges.

**MOUSE-1**
Very convenient remote control of Injection, Hold and Fill for PM1000

**MOUSE-2**
Very convenient remote control of Injection, Auto and Fill for PM2000, PM2000B and PM8000.

**PM-KP**
Full function remote key pad for PM2000, PM2000B or PM8000.

**RK-1**
Rack mounting kits with handles (for PM1000 or PM2000)

**RK-2**
Rack mounting kits with handles (for PM2000B or PM8000).

**Optional pressure air source for PM or PMP series:**

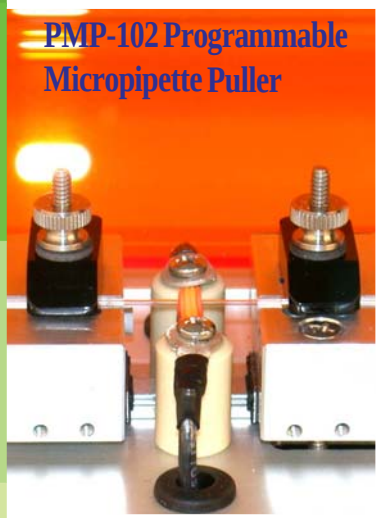
### Rolair JC10 Compressor

Noise level: 60 db (very quiet). Horsepower: 1 HP, 115 VAC. CFM Displaced @ 90 PSI: 5.3 CFM. CFM Delivered @ 90 PSI: 2.3 CFM. Pump/Motor RPM: 1,725 RPM's. Overload Protection: Yes (Automatic). Lubrication Type: Oil-Less. Reed Valve System: Yes (Standard). Number of Cylinders: 2. Tank Capacity: 2.5 Gallons. Length: 17 Inches, Width: 16 Inches, Height: 15 Inches, Shipping Weight: 39 Pounds.

PMP-107 Programmable Multipipette Puller

PMP107L-r Programmable Super Length Multipipette Puller

PMP-102 Programmable Micropipette Puller

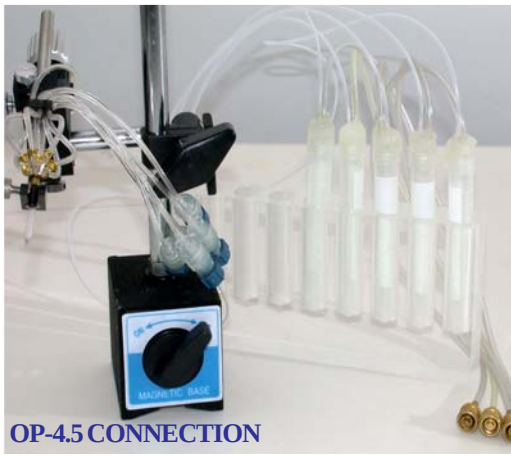


PMP107L-e Programmable Super Length Multipipette Puller

MFG-5 Microfor Grinding Center

OV-1.5 CONNECTION

PP-4,7 CONNECTION



OP-4.5 CONNECTION

MDI
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