

Operation Manual

PM-10 Piezomanipulator

Catalog Number 51447

8 Stoelting Co.

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620 Wheat Lane, Wood Dale, IL 60191
Phone: (630) 860-9700 ! FAX: (630) 860-9775
E-Mail: physiology@stoeltingco.com
<http://www.stoeltingco.com>

CONTROL UNIT PM10

Installation

The piezo translator of the unit PM10 has to be mounted with the enclosed holder to the motor driven micromanipulator DC3/DC3-K. Further the control unit must be connected to the manipulator and the piezotranslator with the two attached cables. The system is set to the supply voltage ~115 or ~230 volt, 50/60 Hz, as specified on the rear panel. **Before plugging in, check settings.**



Read all the operating instructions in particular the **safety instructions** at the end of the operating instructions **before installing the system.**



Basic Operation

The forward and backward movements of the three axes of the micromanipulator DC3/DC3-K are controlled by 6 keys. If a key is pressed for less than 0.3 seconds, only one step of the micromanipulator results. Stay pressing for longer than 0.3 seconds a continuous movement succeeds to the step as long as the key is pressed. During the motor is running no further step can be initiated. The first of the 6 keys, labelled '**PIEZO**', activates the piezo function in addition to the motor forward movement when used in the step mode. The step length can be set by '**STEP SIZE**' from 0.5 to 10 μm , the continuous velocity by '**CONTINUOUS SPEED**' from 0 to 150 $\mu\text{m/s}$ (reduction gear 900:1) and the step velocity of the piezo forward movement '**PIEZO SPEED**' from 1 to 100 mm/s. The settings of step length - '**STEP SIZE**'- and of the velocity of continuous movement - '**CONTINUOUS SPEED**'- are the same for all three axes. The velocity of the step movement (motor) cannot be modified externally. It is not possible to drive in more than one direction at any one time.

Piezo Mode

Pressing the key for X-forward direction briefly activates the piezo mode: The piezo translator moves forward very rapidly with the selected '**PIEZO SPEED**' and '**STEP SIZE**'. Immediately after this step the piezo drive returns slowly at constant speed to the starting position. Simultaneously the DC motor for this axis moves forward, completely and accurately compensating the movement of the piezo drive. These piezo steps can be repeated as often as needed providing they are within the range of the motor drive.

Adjustment of the Piezo Drive

The backward movement of the piezo drive and the forward movement of the motor drive are coordinated with the grey pin on the backside of the unit. The compensation may change in time for several reasons: Ageing of components, replacement of the manipulator or piezo translator or even different positions of the manipulator. For readjustment use the potentiometer on the rear (grey pin): Select a step size of 10 μm and note the position of the micrometry screw. Push the forward key '**PIEZO**' several times and compare the step size with the scale on the micrometry screw (1 mark = 10 μm). Adjust the potentiometer until one step equals one mark.



High Voltage Output



Pushing the '**PIEZO**' key the output '**HIGH VOLTAGE**' delivers a sawtooth pulse of up to 1000 volts, otherwise this output is non alive. To prevent **risk of electric shock** and damage to the unit it must only be operated with the piezo drive connected. Under no circumstances should any other devices be connected to this high voltage output or the internal pin of the outlet '**HIGH VOLTAGE**' be touched.

Backlash Compensation

This control unit has built-in electronics, to compensate the backlash of the gears. If the direction is changed, the motor receives an extra current pulse, which corresponds to the backlash. This is very valuable in the step mode, as it avoids 'missing steps' (motor turns, but no movement of the micro manipulator). On the bottom of the case there is one adjusting screw for all three axes '**BACKLASH COMPENSATION**'. Thus the backlash compensation can be adapted to the manipulator individually.

Remote Control

There is a small 7- pin jack on the backside of the case to connect a remote control. The remote control is an optional accessory and must be ordered separately.

Motor Connector

The motor cable from the micromanipulator has to be inserted to this 7-pin jack on the backside of the case.

Connection to Earth

On the left side of the backside of the case there is an uninsulated 4mm jack. It can be connected to earth, if necessary.

Trigger Input

There are two BNC-jacks on the rear panel triggering the X-forward/backward movement by positive external TTL-pulses (rear panel: left/right: forward/backward). Every pulse follows a step movement of the manipulator. A continuous movement results, if the frequency of the pulses exceeds 20 Hz. Settings see '**Basic Operation**'.

**Before opening the cover
disconnect mains.**

Special Adjustments

This unit operates on 115 V ac or 230 V ac. The voltage selector is inside the case. To change the range first **unplug the power cord** and than open the case (4 screws under the rubber pads on the bottom). Now switch the voltage selector near the transformer with a screwdriver. In no case adjust the 6 trimmers inside the case.

Note: The fuse must be changed, if the line voltage is changed (see below: '**Fuses**')

Fuses

This unit is protected by a slow blow fuse of **50 mA** (line voltage **230 V**) or by a slow blow fuse of **100 mA** (line voltage **115 V**), which is easily accessible from the backside of the case. Under the transformer is a thermal fuse (98 °C). This should only be replaced by the manufacturer.

Piezo Translator

The piezo translator is adjusted very carefully to move only axially. It must be handled with extreme care: Incautious use of force could impair the adjustment or even destroy the drive. **Lateral vibrations** are mainly caused by the repulsion of the piezo translator and depend on the mass distribution of the used basic manipulator. In order to eliminate these vibrations a second piezo translator has to be mounted in opposite direction to the back of the first translator and has to be electrically connected to this. A second piezo translator has to be ordered separately.

Holder for Micro Capillaries

For the best operation use only the specially constructed micro- capillary holders. Holders with too much or unevenly distributed mass cause vibrations and impair operation.

SPECIFICATIONS

POWER SUPPLY	~115/230 Volt 50-60 Hz
POWER CONSUMPTION	6 W
FUSES	115 Volt T 0.1A / 230Volt T 0.05A (5×20mm)
THERMAL FUSE	98°C
OPERATING TEMPERATURE	5°C to 40°C
STORAGE TEMPERATURE	-20°C to 60°C
DIMENSIONS	19×4.7×13.8 cm (7.5×1.85×5.4 in.)
WEIGHT	0.68 kg (1.6 lb)

Warranty

Stoelting warrants its products against defects in materials and workmanship according to the following schedule:

ITEM	WARRANTY PERIOD	
	Materials	Labor
ELECTRONIC CIRCUITRY (microprocessors, resistors, transistors, integrated circuits, etc.)	1 YEAR	1 YEAR
MECHANICAL AND ELECTROMECHANICAL PARTS (meters, switches, etc.)	1 YEAR	1 YEAR
ELECTRODES, CABLES AND ALL OTHER ACCESSORIES	30 DAYS	30 DAYS

Stoelting will, at its option, repair or replace defective items within the specified warranty period. Modifying or tampering with the instrument or non-factory authorized service during the warranty period will invalidate the warranty. Shipping costs both to and from the Stoelting Repair Department will be borne by the customer.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. STOELTING SHALL NOT IN ANY EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OR MISUSE OF ITS PRODUCTS.

THIS DEVICE IS MEANT FOR ANIMAL RESEARCH USE ONLY AND IT IS NOT INTENDED FOR USE WITH HUMANS. USE OF THIS DEVICE WITH HUMANS INVALIDATES WARRANTY.