



Micromanipulators

ASI offers Marzhauser's line of micromanipulators and piezo devices. The micromanipulators are built to demanding specifications and are a standard within the scientific community. The piezo devices are used for piercing cell walls quickly and precisely. We offer both manual and motorized micromanipulators with a wide range of features and configurations.

Manual Micromanipulators

MM33

The popular MM33 Micromanipulator is a small and compact unit for manual manipulation in all three axes. The scales on the slides allow readings of the coarse adjustment with an accuracy of 0.1 mm. The additional x-axis fine control is achieved with a micrometer screw with a resolution of 10 microns. The range of travel is 37 mm in the x-axis, 20 mm in the y-axis, and 25 mm in the z-axis. The fine control has a travel of 10 mm. The micromanipulator is supplied with either a 10 mm or a 12 mm clamp for attachment. An 80° tilting base is offered as an option.

The MM33 is commonly used with ASI's MPPI-2 Milli-Pulse Pressure Injector for injecting a wide range of cells including oocytes, zebrafish, and other embryos.



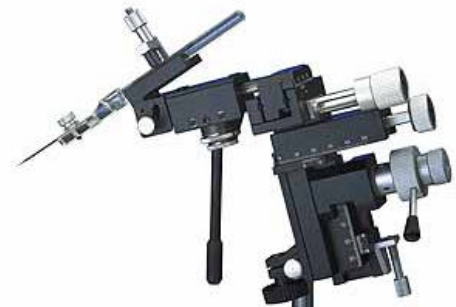
MD4

The MD4 Micromanipulator is nearly identical to the MM33, but is equipped with a second tool holder. This tool (or electrode) holder can not only be positioned in the x and y direction independent of the manipulator, but may also be tilted and swiveled by two fine adjust screws. The 80° tilting base, shown, is offered as an option.



MMJ

The MMJ Micromanipulator is equipped with coarse and fine adjustment controls for x, y and z axes, with ranges of travel the same as for the MM33, above. In addition, it has joystick-controlled motion of the x and y axes. The range of motion controlled by the joystick can be adjusted from 0.35 mm to approximately 4 mm travel over the full extension of the joystick adjustment range. The tool holder can be tilted up to 90 degrees, and is also capable of holding our piezo injector, the PM-20. The z-axis coarse and fine adjustment displacement ratio of 10:1 allows rapid motion for the tool changing assembly as well as precise positioning under high magnification. An adjustable stop allows the exact repositioning of the injection tool in the z-axis.



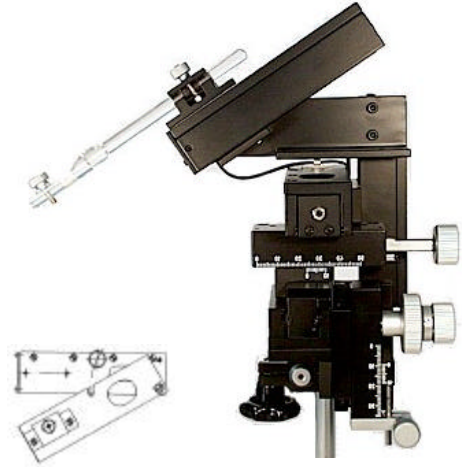
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Motorized Micromanipulators

DC-3K

The DC3-K Micromanipulator is equipped with manual as well as motorized drives in all 3 axes. Since this micromanipulator does not have to be operated by hand, but rather through the motor controls, it provides a smooth vibration-free positioning of injection tools or electrodes even under highest magnifications and when working with structures smaller than one micron. The manual adjustment capabilities of this manipulator are the same as the MM33, and can be read from scales to a resolution of 0.1 mm. The motorized motion of the 3 fine adjustment slides are driven by means of precision micrometer screws with 10 micron readout resolutions and DC motors. With the MS-314 Control Unit, below, resolution is approximately 500 nanometers.

The **DC-3KS version** has the additional capability of a swing-in / swing-out x-axis platform. This allows for the rapid and easy exchange and cleaning of tools without losing time for readjustment.



MS-314 Control Unit

The MS-314 Control Unit controls all 3 axes of the DC3-K micromanipulator in a bi-directional mode with 6 pushbuttons. Only one axis can be operated at a time. By pushing one of the buttons, the manipulator slide will move one microstep. The size of the step can be selected with the potentiometer knob on the controller panel. The maximum displacement speed is approximately 0.2mm/sec; the smallest step is approximately 0.5 micron. This controller has compensation circuitry that almost completely eliminates gear backlash. Also shown is the optional Remote Control unit.



STM-3 Control Unit

The STM-3 Control Unit for the DC-3K and DC-3KS has a built-in joystick and can drive several axes at the same time. The z-axis is activated by rotating the joystick knob.



Piezo Micromanipulators

PM10

The PM-10 Piezo Micromanipulator is specifically designed for the penetration of cell membrane in the context of electrophysiological investigations, and can be mounted on the DC-3K. Single steps of 0.5 to 10 microns are initiated by briefly pressing a button on the PM10's controller. This controller is also designed to control a DC-3K or DC-3KS motorized micromanipulator.



PM20

The PM-20 Piezo Micromanipulator was designed for the microinjection of cells, and can be mounted directly to the toolholders of the DC3-K and MMJ micromanipulators. Microinjection of cells with hard or elastic cell membranes which resist the pipette tip are difficult to penetrate with conventional micromanipulators. However, because of the very high penetration velocity and the exact actual movement of the piezo electric probe, the PM-20 is well suited for this type of work. Problems such as shifting cells are greatly reduced, and even difficult cells can be penetrated. Forward and retraction can be independently chosen (up to 100 mm/sec and 50 mm/sec, respectively), and a rapid retraction prevents a cell from sticking to the pipette tip. Step size is adjustable from 0 to 20 microns.



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