Micromanipulators

Hydraulic Micromanipulators

- MMO-202ND Three-axis Hanging Joystick Oil Hydraulic Micromanipulator
- MO-202U Three-axis Joystick Oil Hydraulic Micromanipulator
- MMO-203 Three-axis Oil Hydraulic Micromanipulator
- MMO-220A One-axis Oil Hydraulic Micromanipulator
- MHW-3 Three-axis Water Hydraulic Micromanipulator
- MHW-4 One-axis Water Hydraulic Micromanipulator
- MHW-A Tilting Adaptor
- NR-35 Rotating Adjustable Clamp
- UST-1 Solid Universal Joint
- WR-6 Three-axis Water Hydraulic Micromanipulator
- MO-10 One-axis Oil Hydraulic Micromanipulator
- MHW-103 Three-axis Water Hydraulic Micromanipulator

Coarse Manipulators

- MM-89 Motor-drive Manipulator
- MN-4 Coarse Manipulator
- MMN-1 Coarse Manipulator

Manipulators for Stereo Microscopes

- MWS-1A Micromanipulator (One-axis Water Hydraulic System)
- MWS-1 Manipulator
- MWS-31 Micromanipulator (One-axis Water Hydraulic, Bar-mount)
- MWS-32 Micromanipulator (One-axis Water Hydraulic, Magnet-mount)
- MWS-1A Micromanipulator (One-axis Water Hydraulic System)
- MWS-1B Micromanipulator (One-axis Water Hydraulic System)

Mechanical Micromanipulators

- MN-151 Joystick Micromanipulator
- M-152 Manipulator
- MN-153 Micromanipulator
- NMN-21 Micromanipulator
- NMN-A Tilting Stand
- NR-12 Rotating Adjustable Clump
- UST-2 Solid Universal Joint
- UST-3 Solid Universal Joint
- NMN-25 Micromanipulator
- MX-2 Micromanipulator
- MX-4 Micromanipulator
- MM-3 Micromanipulator
- M-3333 Micromanipulator
- MP-2 Micromanipulator

Motor-drive Micromanipulator

- EMM-3NV Three-axis Motorized Micromanipulator
- UST-3A Joint Attachment
- MM-80 Three-axis Motorized Micromanipulator

MMO-202ND

Three-axis Hanging Joystick Oil Hydraulic Micromanipulator

3-D joystick operations while maintaining an easy posture.

The MMO-202ND micromanipulator features an oil hydraulic joystick enabling smooth three-dimensional movement with a single lever. Since the joystick is the hanging type, it can be manipulated with the user's arms and hands placed comfortably on the table. Operation is therefore done in a natural posture, and can be maintained for longer periods. Among other features promoting ease of use are the movable ratio adjustment section located on top of the control unit, and the unit's familiar rounded design instead of the more angular shape seen on conventional equipment. As one of our most popular micromanipulators, the MMO-202ND is highly recommended.

* For attachment to the microscope, a coarse manipulator and suitable mounting adaptor are required (sold separately).

* Select TypeB adaptor for mounting this manipulator in combination with MMN-1 coarse manipulator.

* Changing the universal joint included with the micromanipulator to the double pipette holder HD-21 (sold separately) enables performance of embryo biopsy.

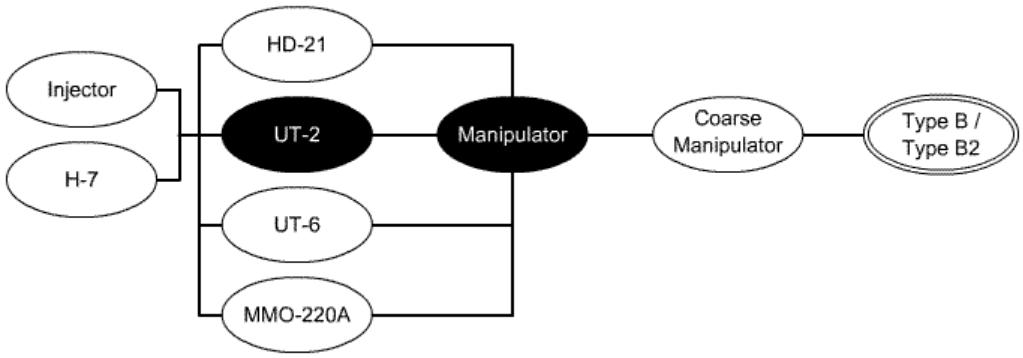
* Changing the universal joint included with the micromanipulator to MMO-220A one-axis oil hydraulic micromanipulator (sold separately) enables four-dimensional remote controlled movement.

Specification

Accessories included		IP Iron Plate UT-2 Universal Joint Allen wrench
Movement range	**Fine**	X10mm, Y10mm, Z10mm Full rotation of knob 250µm Minimum graduation 2µm
Movement range		Joystick (for maximum movement in X-Y plane) 2mm
Dimensions/Weight	**Control unit**	W165 × D80 × H175mm, 1.85kg
	Drive unit	W40 × D46 × H87mm, 0.18kg

* Please contact your local Narishige representative for the model with full rotation of knob 500µm.

System Diagram



refers to the model itself with standard attachments
refers to attachable main accessories
refers to types of mounting adaptors

MO-202U

Three-axis Joystick Oil Hydraulic Micromanipulator

Return of an acclaimed design with outstanding ease of use.

This oil hydraulic joystick micromanipulator won considerable attention as an innovative model as soon as it went on sale, principally because of its smooth three-dimensional operation using a single lever. Since that time, it has been widely used by many customers, whose requests for restoration of its former shape and other discontinued features are met in this latest model. Those features include the tall upright joystick control section with plastic hand-rest and full, 500µm rotation movement. In addition, a slimmer driving unit and attachment of the UT-2 as an accessory make this model easier than ever to use.

* For attachment to the microscope, a coarse manipulator and suitable mounting adaptor are required (sold separately).

* Select TypeB adaptor for mounting this manipulator in combination with MMN-1 coarse manipulator.

* Changing the universal joint included with the micromanipulator to the double pipette holder HD-21 (sold separately) enables performance of embryo biopsy.

* Changing the universal joint included with the micromanipulator to MMO-220A one-axis oil hydraulic micromanipulator (sold separately) enables four-dimensional remote controlled movement.

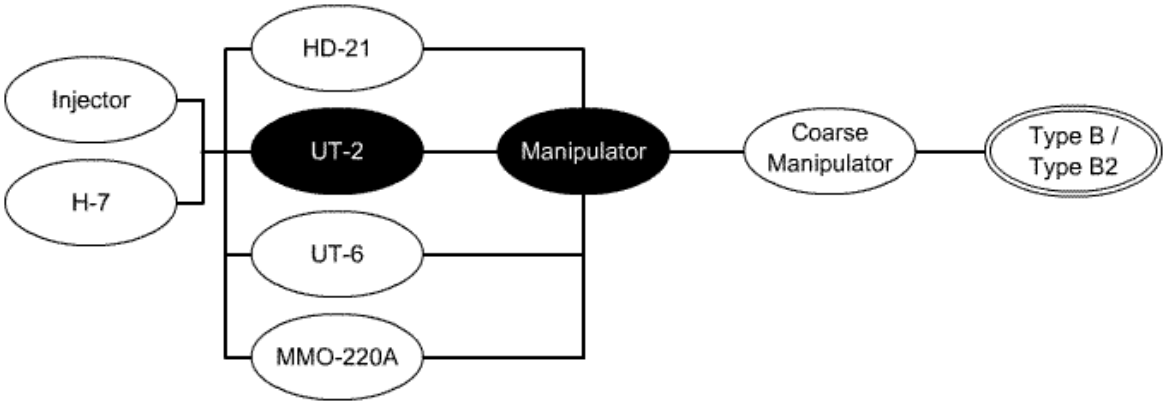
Hydraulic Micromanipulators

Specification

Accessories included		UT-2 Universal Joint Allen Wrench
Movement range	**Fine**	X10mm, Y10mm, Z10mm Full rotation of knob 500µm Minimum graduation 4µm
Movement range		Joystick (for maximum movement in X-Y plane) 2mm
Dimensions/Weight	**Control unit**	W130 × D130 × H220mm, 1.86kg
	Drive unit	W40 × D51 × H87mm, 0.18kg

* Please contact your local Narishige representative for the model with full rotation of knob 250µm.

System Diagram



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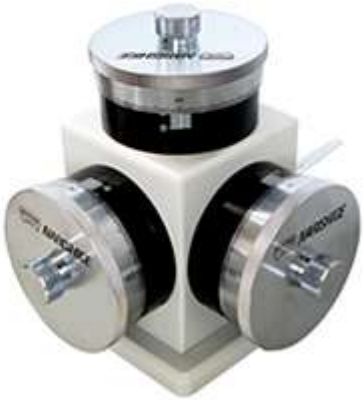
MMO-203

Three-axis Oil Hydraulic Micromanipulator

Original hydraulic model with large handle offering excellent linearity.

This micromanipulator's hydraulic drive system can be remote controlled, and provides smooth, vibration-free movements. As successor to the vernier type, it features a big cylinder control unit which enables very fine operation. Another key feature is high reproduction of the linear position. Compared with the currently popular joystick method, this control unit has a long record of use among discerning customers because of its simple design and outstanding cost-efficiency. For microinjection systems, this model is recommended for use on the cell holding side, in combination with a joystick type manipulator.



* For attachment to the microscope, a coarse manipulator and suitable mounting adaptor are required (sold separately).

* Select TypeB adaptor for mounting this manipulator in combination with MMN-1 coarse manipulator.

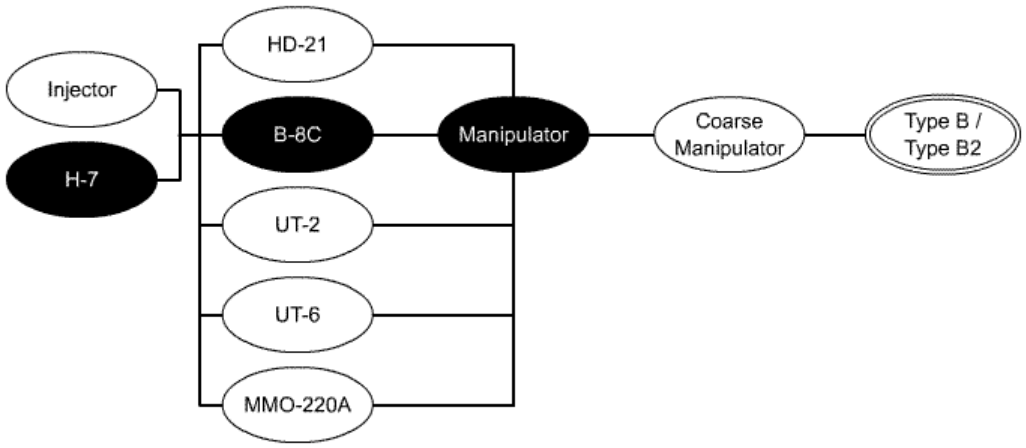
* Changing the ball joint included with the micromanipulator to the double pipette holder HD-21 (sold separately) enables performance of embryo biopsy.

* Changing the ball joint included with the micromanipulator to MMO-220A one-axis oil hydraulic micromanipulator (sold separately) enables four-dimensional remote controlled movement.

Specification

Accessories included		B-8C Ball Joint H-7 Pipette Holder
Movement range	**Fine**	X10mm, Y10mm, Z10mm Full rotation of knob 250µm Minimum graduation 1µm
Dimensions/Weight	**Control unit**	W115 × D115 × H132mm, 1.6kg
	Drive unit	W40 × D51 × H87mm, 0.18kg

System Diagram



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MMO-220A

One-axis Oil Hydraulic Micromanipulator

Permits the enhancement of a three-dimensional manipulator with added movement capability in the same direction as the pipette.

When using this unit to insert a pipette into the cell, operators can make further movement in the same direction, which minimizes the chance of damaging the cell. This one-axis oil hydraulic manipulator meets that requirement and can also be used as an add-on manipulator. A compact drive unit is installed on the tip of the ball joint, giving this model the same high accuracy as a general oil hydraulic micromanipulator.

* H-7 sold separately.

Setting Example

	
MMO-202ND + MMO-220A + IM-H1 setting example	M-152 + MMO-220A + IM-H1 setting example

Hydraulic Micromanipulators

Specification

Movement range	**Fine**	10mm Full rotation of knob 250µm Minimum graduation 1µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W52 × D20 × H35mm, 38g

MHW-3

Three-axis Water Hydraulic Micromanipulator

Acclaimed water hydraulic manipulator for patch clamping.

This was Narishige's first water hydraulic micromanipulator specially designed for patch clamping. Its water hydraulic system has a lower coefficient of expansion than an oil hydraulic system, and allows precise movement. A 1:5 cartridge is incorporated to minimize drifting. The large, rigid driving unit enables fine movements and coarse manipulations and a sturdy ball joint is also used. Installation is made more rigid by securing attachments with a double adaptor or an isolation table, eliminating direct attachments to the bar. The drum type control unit has a large handle for precise operation and high linear repeatability. Overall, design considerations are focused on precision movement and stability over long periods of time.

* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

* The micromanipulator can be mounted directly on the isolation table.

* This model can be firmly fixed to any part of the isolation table with GJ-12 thin-type magnetic stand (sold separately).

* AP-12/AP-13-2 patch clamp headstage holders can be attached on the B-9 ball joint, incorporated in the manipulator.

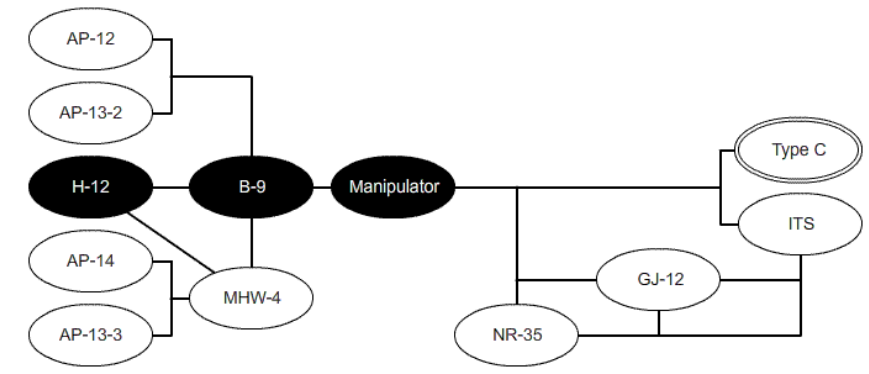
Hydraulic Micromanipulators

* Combining the B-9 ball joint included with the micromanipulator with MHW-4 one-axis water hydraulic micromanipulator (sold separately) enables four-dimensional remote controlled movement.

Specification

Accessories included		B-9 Ball Joint H-12 Electrode Holder Allen Wrench
Movement range	**Coarse**	X30mm, Y30mm, Z30mm Full rotation of knob approx. 4mm
	Fine	X2mm, Y2mm, Z2mm Full rotation of knob 50µm Minimum graduation 0.2µm
Dimensions/Weight	**Control unit**	W115 × D115 × H132mm, 1.6kg
	Drive unit	W155 × D155 × H100mm, 900g

System Diagram



refers to the model itself with standard attachments
refers to attachable main accessories
refers to types of mounting adaptors

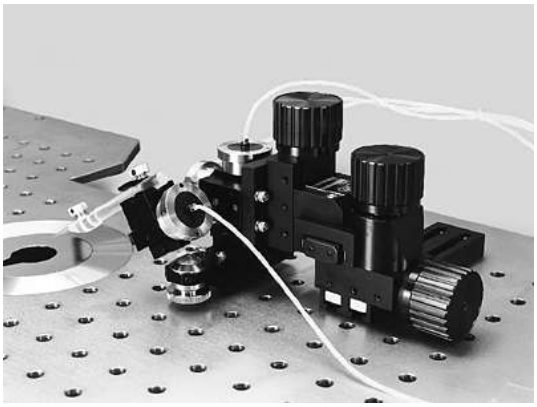
MHW-4

One-axis Water Hydraulic Micromanipulator

This model is an add-on type one-axis water hydraulic micromanipulator, attachable to ball joint B-9. Made for use with the MHW-3 in patch clamping applications, it offers excellent stability with minimal drifting.

* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

Setting Example



MHW-3 + MHW-4 setting example

Specification

Movement range	**Fine**	2mm Full rotation of knob 50 µm Minimum graduation 0.2 µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W42 × D28 × H41mm, 60g

MHW-A

Tilting Adaptor

This adaptor is used to tilt the fine movement unit. Fixed between coarse and fine manipulators of the MHW-3, it enables operation with the same directional drive as the microelectrode.

Setting Example

MHW-3 + MHW-A setting example

Specification

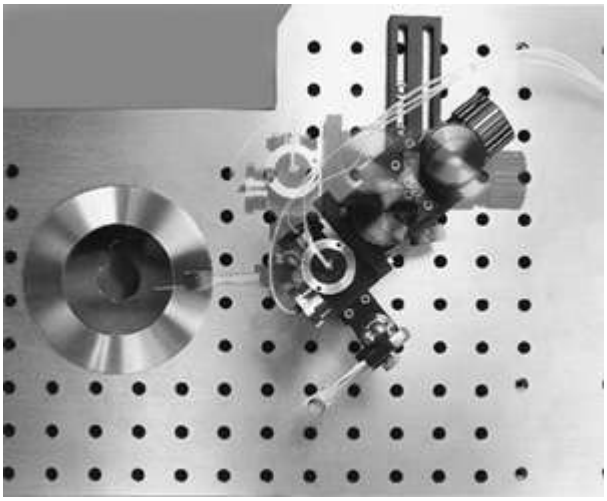
Accessory included	Allen Wrench
Dimensions/Weight	W43 × D12 × H52mm, 50g

NR-35

Rotating Adjustable Clamp

Fixed to coarse drive unit of the MHW-3, this clamp allows whole manipulators to be rotated, and makes it easy to attach/detach microelectrodes and exchange specimens.

Setting Example



NR-35 + MHW-3 setting example

Specification

Accessory included	Allen Wrench
Dimensions/Weight	W56 × D45 × H16mm, 200g

UST-1

Solid Universal Joint

Joint-type accessories give a stronger, more solid fix than ball joints, and also allow angles to be set freely. For the MHW-3, the UST-1 is used instead of the B-9 to enhance stability.

* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

Specification

Accessory included	Allen Wrench
Dimensions/Weight	W105 × D30 × H55mm, 130g

WR-6

Three-axis Water Hydraulic Micromanipulator

Highly recommended for patch clamping from the microscope stage side.

Employing the water hydraulic system, which has a lower coefficient of expansion due to temperature changes, this model offers precise movement while minimizing drift by incorporating a 1:5 cartridge. In addition, it integrates both coarse and fine manipulation capabilities by featuring a manual coarse manipulator for each axis. The drum type control unit has a large handle for precise operation and high linear repeatability. Overall, design considerations are focused on precision movement and stability over long periods of time. The WR-6 is outstandingly versatile: when setting up, it is attached using the bar, but independent setup using a magnetic stand is also possible, as is attachment to the side of the microscope stage with an adaptor.

* For attachment to the microscope, P-1A height adjustment plate included and a suitable mounting adaptor is required (sold separately).

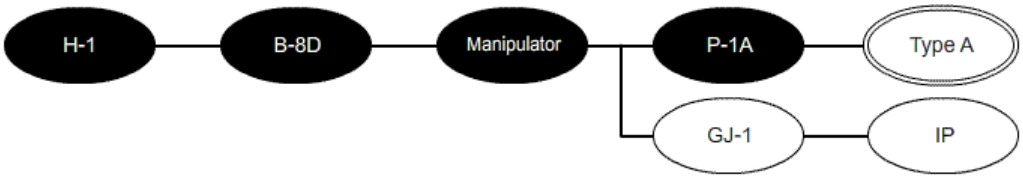
* Can be attached directly to the GJ-1 magnetic stand (sold separately).

Hydraulic Micromanipulators

Specification

Accessories included		B-8D Ball Joint H-1 Electrode Holder P-1A Height Adjustment Plate Allen Wrench
Movement range	**Coarse**	X18mm, Y18mm, Z18mm
	Fine	X2mm, Y2mm, Z2mm Full rotation of knob 50µm Minimum graduation 0.2µm
Dimensions/Weight	**Control unit**	W115 × D115 × H132mm, 1.6kg
	Drive unit	W110 × D60 × H140mm, 0.4kg

System Diagram



refers to the model itself with standard attachments
refers to attachable main accessories
refers to types of mounting adaptors

MO-10

One-axis Oil Hydraulic Micromanipulator

Pencil type manipulator, easily combined with three-dimensional manual manipulator.

This is a pencil type oil hydraulic micromanipulator designed for use with a three-dimensional manipulator. The drum type control unit is employed for space saving as well as for precise operation.

* A long holder is also available when the electrode is not long enough to reach the sample, or when the operator wants to make the setting closer to the sample. Please contact your local Narishige representative for the details.

Specification

Accessory included		Dedicated Electrode Holder
Length of hydraulic tubing		1.5m
Movement range	**Fine**	10mm Full rotation of knob 500µm Minimum graduation 2µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W30 × D20 × H125mm, 50g

MHW-103

Three-axis Water Hydraulic Micromanipulator

A wide driving range while keeping drift to a minimum.

Liquid hydraulic micromanipulators developed for patch clamping generally use the 1:5 cartridge system to solve the problem of drifting. Since this can limit their driving range to as little as 2mm, customers who want a wide driving range are recommended to choose this product, which uses a 1:1 cartridge. The drum type control unit has a large handle for precise operation and high linear repeatability. The water hydraulic system is less prone to drift caused by changes in temperature than an oil hydraulic system, and is thus more suitable for patch clamping. A coarse manipulator is not mounted, so must be purchased separately.

* For attachment to the microscope, a coarse manipulator and suitable mounting adaptor are required (sold separately).

* Select TypeB adaptor for mounting this manipulator in combination with MMN-1 coarse manipulator.

Hydraulic Micromanipulators

Specification

Accessories included		B-8C Ball Joint H-7 Pipette Holder Allen Wrench
Movement range	**Fine**	X10mm, Y10mm, Z10mm Full rotation of knob 250µm Minimum graduation 1µm
Dimensions/Weight	**Control unit**	W115 × D115 × H132mm, 1.6kg
	Drive unit	W40 × D51 × H87mm, 0.18kg

System Diagram

refers to the model itself with standard attachments
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refers to types of mounting adaptors

Coarse Manipulators

MM-89

Motor-drive Manipulator

Coarse manipulator with most popular motor-drive system.

This motor-driven coarse manipulator enables remote controlled movement of a pipette into the microscope field of view. The bigger the microscope, the more difficult manual control becomes; remote control is the mainstream alternative. Control is easy, with the joystick right at the operator's hand, and a return mechanism facilitates specimen exchange.

* Separately sold NR-89 is available when attaching a rotating adjustable clamp to this model.

Coarse Manipulators

Specification

Accessories included		AC Power Cord Allen Wrench
Movement range	**Coarse**	X22mm, Y22mm, Z22mm
Driving speed		When Coarse switch is used 1.4mm/s Speed adjusting switch (at maximum) 0.7mm/s Speed adjusting switch (at minimum) 0.1mm/s
Power source		AC100V (±5%), 50/60Hz AC120V(±5%), 50/60Hz AC220V(±5%), 50/60Hz AC240V(±5%), 50/60Hz
Power consumption		Approx. 15W
Dimensions/Weight	**Control unit**	W70 × D100 × H120mm, 0.53kg
	Drive unit	W80 × D116 × H142mm, 0.6kg
	Power supply	W125 × D105 × H85mm, 1.5kg

MN-4

Coarse Manipulator

Manual coarse manipulator with many convenient functions.

This manual coarse manipulator is used in combination with a hydraulic micromanipulator to transfer the pipette into the microscope field of view. Since its operation is manual, this model offers excellent response at affordable price. Compared with the MMN-1, setup and installation are straightforward. Return and rotating mechanisms are included for easy specimen or pipette exchange.

Specification

Accessory included		Allen Wrench
Movement range	**Coarse**	X30mm, Y30mm, Z30mm
Dimensions/Weight		W125 × D110 × H135mm, 0.6kg

MMN-1

Coarse Manipulator

Manual coarse manipulator suitable for a wide range of applications.

This manual coarse manipulator features a classical, performance-proven design. Different component combinations enable a variety of installations, ensuring wide applicability for installation of hydraulic micromanipulators. Responsive manual operation and affordable price have made the MMN-1 a long-term success with pioneering researchers.

Specification

Accessories included		Screw Allen Wrench
Movement range	**Coarse**	X30mm, Y30mm, Z30mm
Dimensions/Weight		W130 × D130 × H118mm, 0.53kg

MWS-1A

Micromanipulator (One-axis Water Hydraulic System)

Excellent microinjection performance under low magnifications.

Intended for performing microinjections under low magnifications using a stereo microscope, this unit features a one-axis water hydraulic micromanipulator mounted on the MWS-1. Employment of the 1:1 cartridge system produces a movement range as wide as 10mm, so that the MWS-1A can be used for a wide variety of applications other than microinjection.

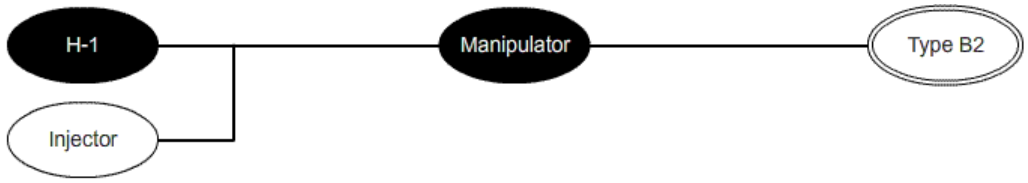
* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

Specification

Accessories included		H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X15mm, Y15mm, Z15mm
	Fine	10mm Full rotation of knob 250µm Minimum graduation 1µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W105 × D115 × H110mm, 370g

Manipulators for Stereo Microscope

System Diagram



refers to the model itself with standard attachments
refers to attachable main accessories
refers to types of mounting adaptors

MWS-1

Manipulator

Manipulator for experiments using stereo microscopes.

This is a manual manipulator developed for experimental tasks under low magnifications using a stereo microscope. An adaptor attachment is employed, according to the size of the stand with which the illumination equipment is integrated. The compact size makes it possible to place the unit closer to the specimen. A pipette rotation and return mechanism is included to simplify specimen or pipette exchange.

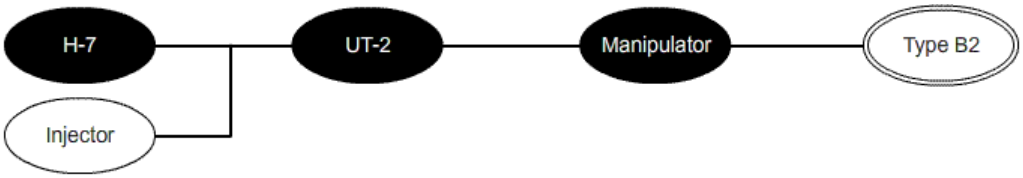
* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

Specification

Accessories included		UT-2 Universal Joint H-7 Pipette Holder Allen Wrench
Movement range	**Coarse**	X15mm, Y15mm, Z15mm
Dimensions/Weight		W105 × D115 × H110mm, 300g

Manipulators for Stereo Microscope

System Diagram



refers to the model itself with standard attachments
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refers to types of mounting adaptors

MWS-31

Micromanipulator (One-axis Water Hydraulic, Bar-mount)

Ideal for experiments under low magnification.

This one-axis water hydraulic micromanipulator is combined with a three-dimensional manual coarse manipulator for patch clamping applications under low magnifications, such as when using a stereo microscope. Even at low magnifications, vibration is a critical problem, so a large and rigid manual manipulator is used to prevent it. The rotation mechanism makes exchanging pipettes easier, and the water hydraulic 1:5 cartridge system enables more stable and precise operation. An angle adjustment mechanism is equipped on the fine movement section so that an angle can be added for the fine movement section only, while coarse section retains its vertical position. This allows the manipulator angle to be changed between horizontal and vertical while the manipulator itself remains firmly fixed in position.

* When used with a stereo microscope, GJD-1 Magnetic "Bridge" Stand and P-1C Height Adjustment Plate are required (both sold separately).

* Can be attached directly to the GJ-2 magnetic stand (sold separately).

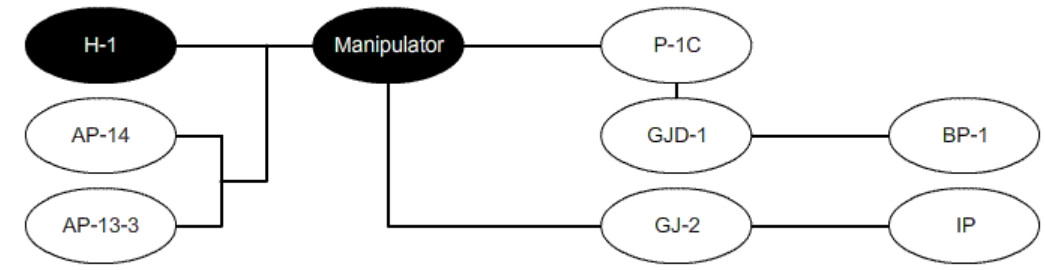
* AP-13-3/AP-14 patch clamp headstage holder (sold separately) can be attached.

Manipulators for Stereo Microscope

Specification

Accessories included		H-1 Electrode Holder Clamp Rod Allen Wrench
Movement range	**Coarse**	X38mm, Y25mm, Z28mm With tension adjustment mechanism
	Fine	2mm Full rotation of knob 50µm Minimum graduation 0.2µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W190 × D145 × H200mm, 1.15kg

System Diagram



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refers to types of mounting adaptors

MWS-32

Micromanipulator (One-axis Water Hydraulic, Magnet-mount)

Independently usable micromanipulator for stereo microscopes.

This model combines a magnetic stand with the MWS-31, so that it can be used independently. Direct attachment to the magnetic stand provides the enhanced stability required for applications with stereo microscopes. The main features of the MWS-31 come standard with the MWS-32, including a water hydraulic 1:5 cartridge system, angle adjustment mechanism for firm fixing and rigid manual coarse manipulator. In addition, fixing the manipulator directly to the original, a rigid magnetic stand makes vertical adjustments more stable. Integration of the magnetic stand allows independent use in a variety of applications other than with a stereo microscope.

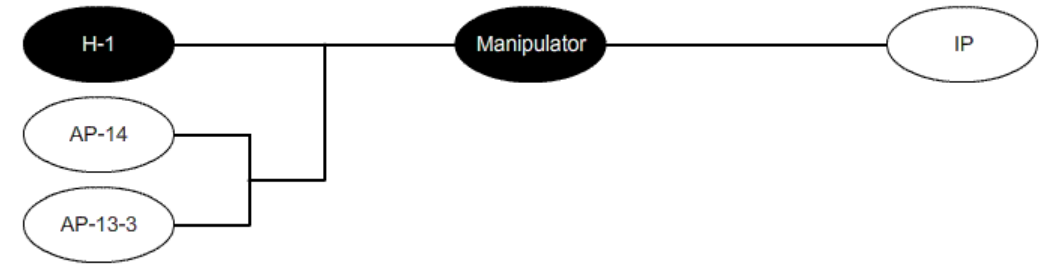
* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

Manipulators for Stereo Microscope

Specification

Accessories included		H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X38mm, Y25mm, Z28mm With tension adjustment mechanism
	Fine	2mm Full rotation of knob 50µm Minimum graduation 0.2µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W200 × D100 × H240mm, 2.45kg

System Diagram



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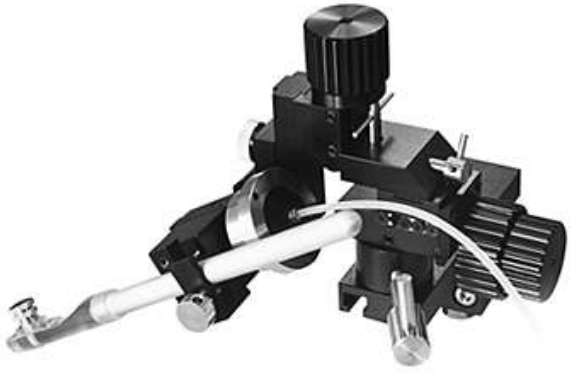
Manipulators for Stereo Microscope

MWS-1B

Micromanipulator (One-axis Water Hydraulic System)

Ideal for patch clamping/blind patching using stereo microscopes.

Designed for patch clamping and blind patching with a stereo microscope at low magnification, this one-axis water hydraulic micromanipulator features a coarse manipulator with a 1:5 cartridge system. This micromanipulator continues to offer precise movement to allow you to accurately determine the target location and good stability with minimal drift.



* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

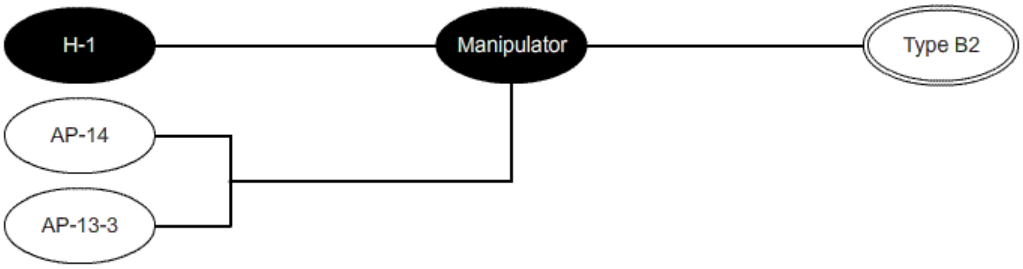
* AP-13-3/AP-14 patch clamp headstage holders can be attached (sold separately).

Specification

Accessories included		H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X15mm, Y15mm, Z15mm
	Fine	2mm Full rotation of knob: 50µm Minimum graduation: 0.2µm
Dimensions/Weight	**Control unit**	W70 × D115 × H100mm, 1.15kg
	Drive unit	W105 × D115 × H110mm, 400g

Manipulators for Stereo Microscope

System Diagram



refers to the model itself with standard attachments
refers to attachable main accessories
refers to types of mounting adaptors

MN-151

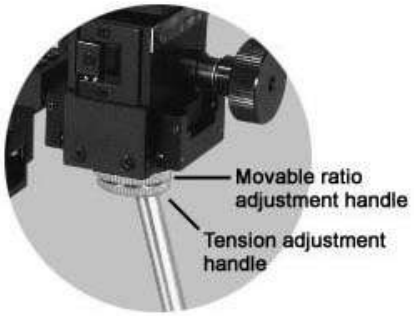
Joystick Micromanipulator

Light, compact, easy-to-operate manual manipulator with joystick.

Designed to be light and compact for diverse applications, this manual micromanipulator features joystick control for excellent operability. The joystick enables the micropipette to be freely controlled on the X and Y planes, and coarse movement is provided on the X, Y and Z axes. The Z-axis offers fine movement as well, making vertical adjustment both easy and accurate: used with the joystick, it also enables three-dimensional fine movement. A ball joint is attached so that approach angles can be set without interfering with the joystick operation. The model's versatility also extends to installation, with a bar mount system which allows attachment by either a magnetic stand or mounting adaptor.

* For attachment to the microscope, P-1A height adjustment plate included and a suitable mounting adaptor (sold separately) are required.

* The ball joint included with the micromanipulator can be replaced by MMO-220A one-axis oil hydraulic micromanipulator (sold separately).

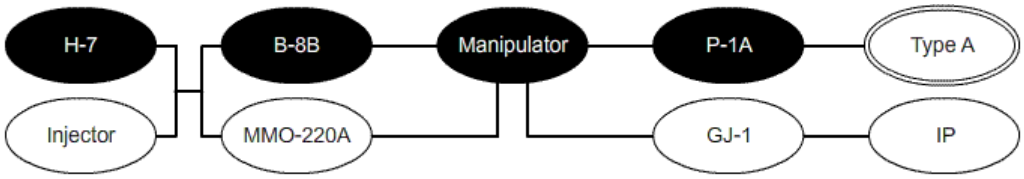


Mechanical Micromanipulators

Specification

Accessories included		B-8B Ball Joint P-1A Height Adjustment Plate H-7 Pipette Holder Allen Wrench
Movement range	**Coarse**	X25mm, Y20mm, Z25mm
	Fine	Z8mm Full rotation of fine knob 250µm Minimum graduation 5µm
	Joystick control	1:150 - 1:15 (X-Y plane movement ratio)
Dimensions/Weight		W115 × D42 × H165mm, 470g

System Diagram



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M-152

Manipulator

Three-dimensional coarse manual manipulator with simple design.

This compact, lightweight model offers coarse manipulation only and is very simple to use. A bar mount is provided to enable installation by either a mounting adaptor or magnetic stand. When used in conjunction with a micromanipulator such as the MMO-220A, quick three-dimensional operation is possible in low magnification experiments using a stereo microscope.

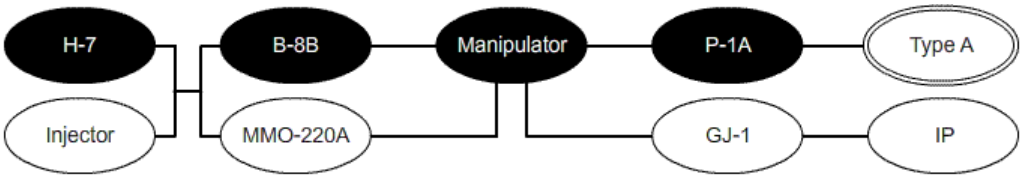
* For attachment to the microscope, P-1A height adjustment plate included and a suitable mounting adaptor (sold separately) are required.

* The ball joint included with the micromanipulator can be replaced by MMO-220A one-axis oil hydraulic micromanipulator (sold separately).

Specification

Accessories included		B-8B Ball Joint P-1A Height Adjustment Plate H-7 Pipette Holder Allen Wrench
Movement range	**Coarse**	X25mm, Y20mm, Z25mm
Dimensions/Weight		W95 × D36 × H135mm, 320g

System Diagram



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MN-153

Micromanipulator

With added one-axis fine movement in the same direction as the pipette.

Based on the M-152, this version adds the capability of fine movement on the X-axis, enabling accurate linear approach to the cell with no danger of causing it any serious damage. Employment of the bar mount system provides complete installation flexibility and greatly broadens the range of possible applications.

* For attachment to the microscope, P-1A height adjustment plate included and a suitable mounting adaptor (sold separately) are required.

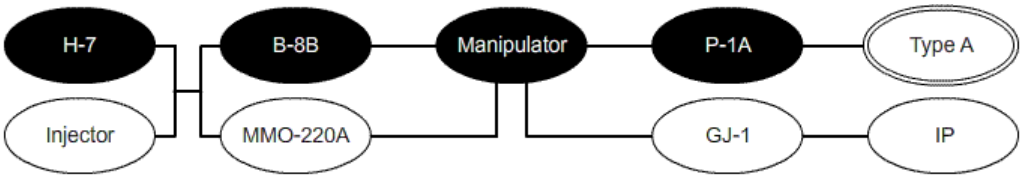
* The ball joint included with the micromanipulator can be replaced by MMO-220A one-axis oil hydraulic micromanipulator (sold separately).

Mechanical Micromanipulators

Specification

Accessories included		B-8B Ball Joint P-1A Height Adjustment Plate H-7 Pipette Holder Allen Wrench
Movement range	**Coarse**	X25mm, Y20mm, Z25mm
	Fine	X8mm Full rotation of knob 250µm Minimum graduation 5µm
Dimensions/Weight		W105 × D36 × H145mm, 330g

System Diagram



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NMN-21

Micromanipulator

Manual operation minimizes jitter for simplicity and high performance.

Drift and electromagnetic disturbance are critical problems in patch clamping work. This mechanical micromanipulator was developed specifically for patch clamping: it does not employ a liquid hydraulic system (which is prone to drift caused by temperature changes), has no spring (a common cause of mechanical drifting), nor a motor (which is a source of noise). Its body is designed to absorb vibrations, so that even at high magnifications, problems of jittering are virtually non-existent. Based on a drum type design, which is highly reputed as a liquid hydraulic method, and with a very stable center of gravity, this model provides exceptionally steady and stable performance. The overall design is compact, so installation requires a minimum of space. With coarse and fine manipulators integrated in the compact body, this model handles a full range of required movements, from moving a microelectrode into the microscope view field to making contact with the cell.

* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

* The micromanipulator can be mounted directly on the isolation table.

* This model can be firmly fixed to any part of the isolation table with GJ-12 magnetic stand (sold separately).

* AP-13-3/AP-14 patch clamp headstage holders can be attached on the UST-2 solid universal joint, incorporated in the manipulator.

Mechanical Micromanipulators

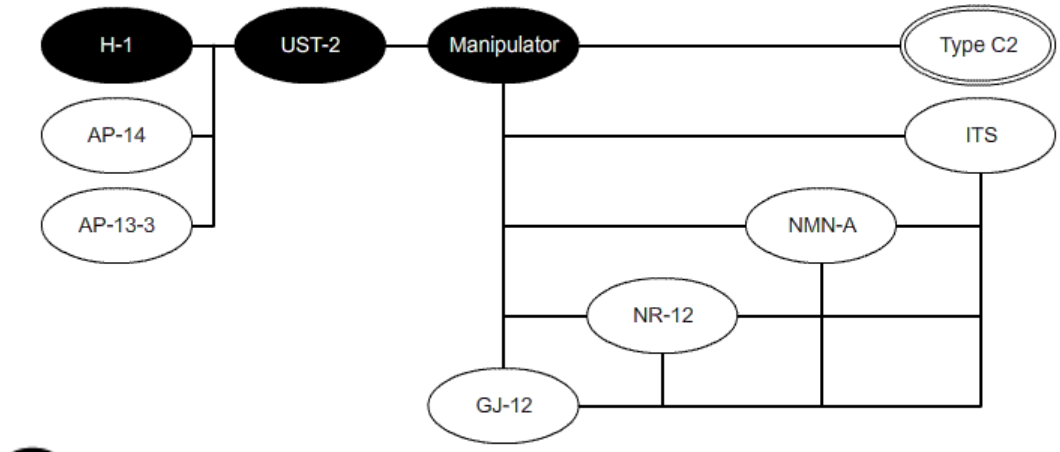
Achieving low vibration operation

The slider, which is one of the main mechanisms of a micromanipulator, actually consists of two independent sliders - one used inside, the other outside. When the operator touches the control knob, which is connected to one slider, vibrations are caused. To overcome this problem, the control knob is fixed independently, separate from the slider.

Specification

Accessories included		UST-2 Solid Universal Joint Fixing Plate H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X15mm, Y15mm, Z15mm Full rotation of knob approx. 4mm
	Fine	X6mm, Y6mm, Z6mm Full rotation of knob: 250µm Minimum graduation: 1µm
Dimensions/Weight		W110 × D170 × H105mm, 930g

System Diagram



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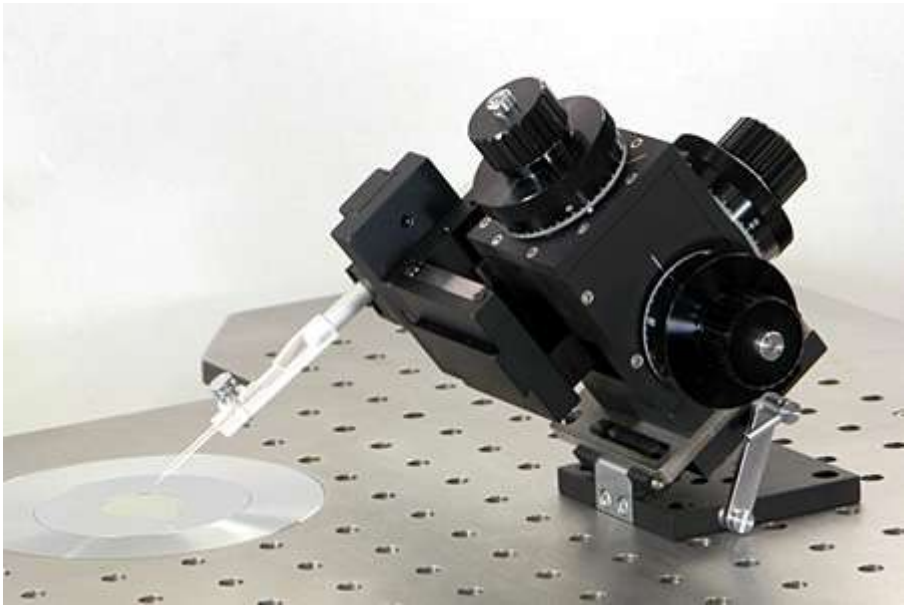
NMN-A

Tilting Stand

Attached with the NMN-21, this tilting stand makes it possible to incline a manipulator at any angle up to 45 degrees, and drive it in the same direction as the electrodes.



ITS + NMN-A + NMN-21 setting example

Specification

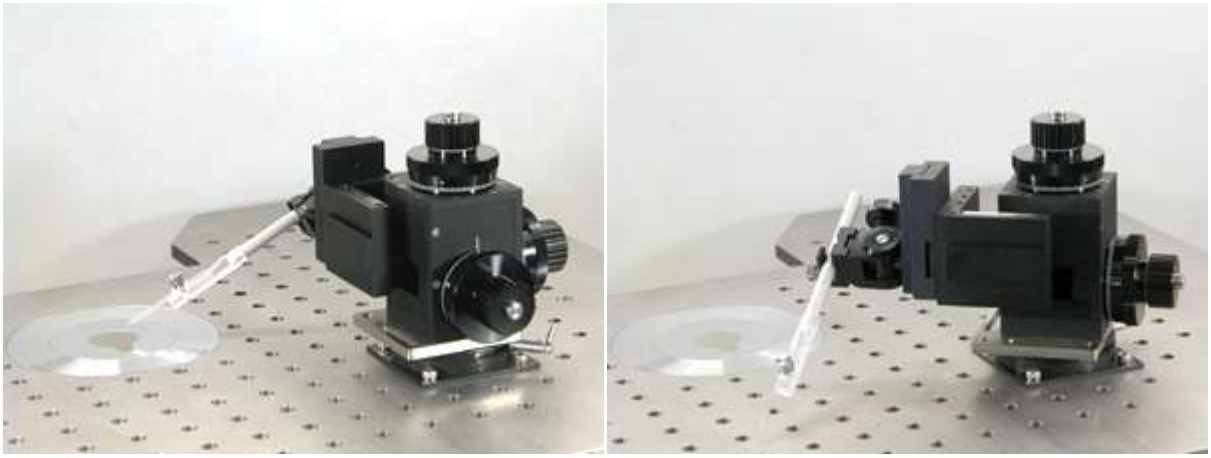
Accessory included	Allen Wrench
Dimensions/Weight	W65 × D95 × H20 - 80mm, 200g

NR-12

Rotating Adjustable Clump

Using the clamp with the NMN-21 / NMN-25 micromanipulator allows the entire micromanipulator to rotate. This allows easy and quick microelectrode and specimen exchange.

Setting Example



ITS + NR-12 + NMN-21 setting example

Specifications

Accessories included	Allen Wrench
Dimensions/Weight	W71 × D71 × H15mm, 300g

UST-2

Solid Universal Joint

This universal joint is attached to the NMN-21 and ensures strong, stable fixing. Horizontal and vertical rotations are controlled with a single knob, making it easy to set many different microelectrodes at any selected angle.

* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

Specification

Accessory included	Allen Wrench
Dimensions/Weight	W70 × D35 × H60mm, 220g

UST-3

Solid Universal Joint

This universal joint is also used with the NMN-21 / EMM-3NV and provides very dependable fixing. The use of scales for reading the tilting angles allows very accurate angle setting, limited to the vertical plane.

* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

Setting example

NMN-21 + UST-3 Setting example

Specification

Accessory included	Allen Wrench
Dimensions/Weight	W52 × D52 × H55mm, 120g

NMN-25

Micromanipulator

Thin body design for multi-channel recording.

The NMN-25 features a thin driving unit for multi-channel recording. In addition, the placement of handles in one direction instead of three, and the adoption of a simpler holder fixing section, enables several manipulators to be installed and operated close together without interfering with each other. Use of an isolation table makes it easy to install multiple manipulators. Like the NMN-21, which was developed for patch clamping, this manual manipulator integrates coarse and fine movements, and employs a body design which absorbs vibrations. As a result, operation is precise and stable, free from concerns about drifting and electromagnetic disturbance.

* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

* The micromanipulator can be mounted directly on the isolation table.

* AP-13-3/AP-14 Patch Clamp Headstage Holder (sold separately) can be attached to the dedicated universal joint included with the micromanipulator.

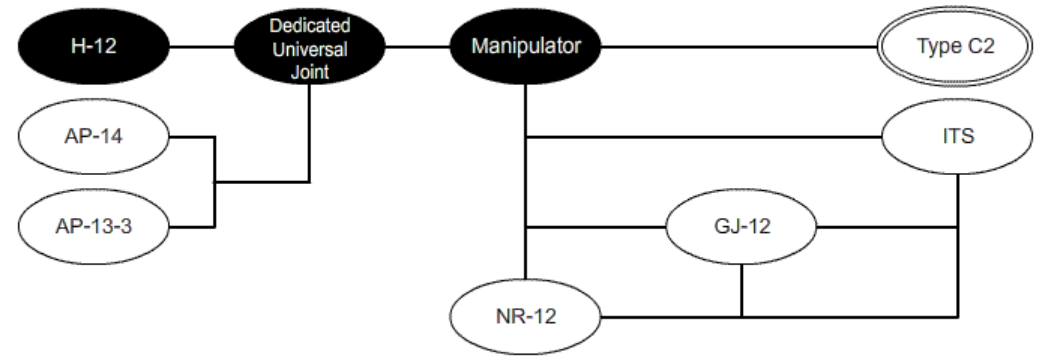
ITS + NMN-25 setting example

Mechanical Micromanipulators

Specification

Accessories included		Dedicated Universal Joint Fixing Plate H-12 Electrode Holder Allen Wrench
Movement range	**X**	Coarse 15mm Fine 6mm Full rotation of fine knob 250µm
	Y	Coarse and fine total 15mm Full rotation of fine knob approx. 250µm
	Z	Coarse 15mm Fine 6mm Full rotation of fine knob 250µm
Dimensions/Weight		W155 × D60 × H100mm, 600g

System Diagram



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MX-2

Micromanipulator

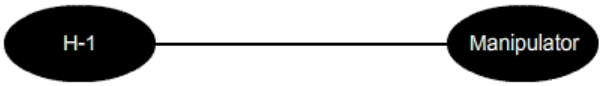
Manipulator + tilting stand for more convenient patch clamping.

This model is the MX-1, with tilting stand TM-1 attached, for easier and more convenient patch clamping. Its unique structure prevents hand jitters passing to the tip of the microelectrode, and obviates concerns about drifting caused by changes of temperature. The tilting stand offers outstanding performance stability, allowing the manipulator to be set at any angle for easier approach to the specimen, and enabling the manipulator to move horizontally as well as vertically in line with the microelectrode. The stand has a magnetic base, so (as long as an iron plate is used) installation is possible even when no screw holes are provided. A rotating mechanism is also included, making the exchange of microelectrodes easy.

Specification

Accessories included		H-1 Electrode Holder Spanner Allen Wrench Tension Adjustment Pin
Movement range	**Coarse**	X35mm, Y30mm
	Fine	X4mm, Y4mm Full rotation of knob: 100µm Minimum graduation: 1µm
	Z-axis coaxial handle	Coarse/fine movement range: 24mm Full rotation of coarse handle: 18mm Full rotation of fine handle: 200µm
Dimensions/Weight		W210 × D180 × H265mm, 6.7kg

System Diagram



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MX-4

Micromanipulator

Another small MX for installation on the stage side of a microscope.

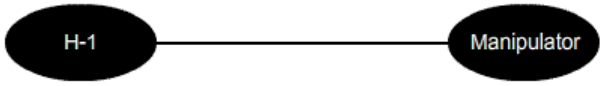
This model includes the MX's special patch clamping features, but in another more compact, space-saving version. The tilting stand has a magnetic base for unrestricted installation, and allows the whole body to be set at different angles, which makes it easy to approach the microelectrodes. A rotation mechanism is also included to facilitate attachment/detachment of microelectrodes.

Specification

Accessories included		H-1 Electrode Holder Spanner Allen Wrench Tension Adjustment Pin
Movement range	**Coarse**	X25mm, Y23mm
	Fine	X3mm, Y3mm Full rotation of knob: 100µm Minimum graduation: 1µm
	Z-axis coaxial handle	Coarse/fine movement range: 26mm Full rotation of coarse handle: 18mm Full rotation of fine handle: 200µm
Dimensions/Weight		W143 × D106 × H265mm, 2.85kg

Mechanical Micromanipulators

System Diagram



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MM-3

Micromanipulator

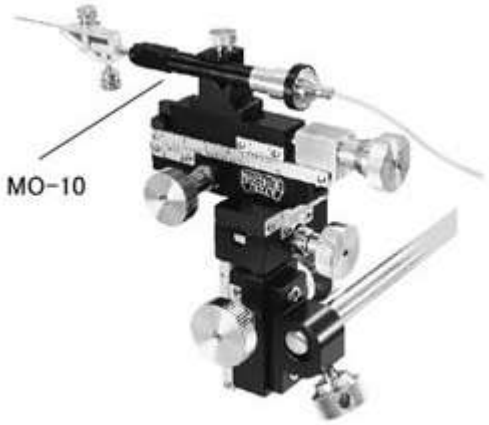
Smooth drive and stable controls developed through outstanding technologies.

Long cherished by many pioneering users, this manual micromanipulator features a smooth drive and stable controls which are derived from advanced and successful technologies. One-axis fine movement in the same direction as the microelectrode makes it possible to approach a specimen with care and caution. The three-dimensional coarse movement handle operates via a rack & pinion mechanism, enabling the microelectrode to be placed near the specimen quickly. Handles on both sides in the X- and Z-axis make this equipment suitable for both left- and right-handed operators, and tension adjustment is also available to prevent the handle from dropping under its own weight. If used properly, this model's smoothness and stability will remain unchanged even over several decades of use.

* Use GJ-8 Magnetic Stand (sold separately) or equivalent equipment to attach this model.

* Changing the H-1 included with the manipulator to separately sold oil hydraulic micromanipulator such as MO-10 enables remote controlled X-axis fine movement.

Mechanical Micromanipulators

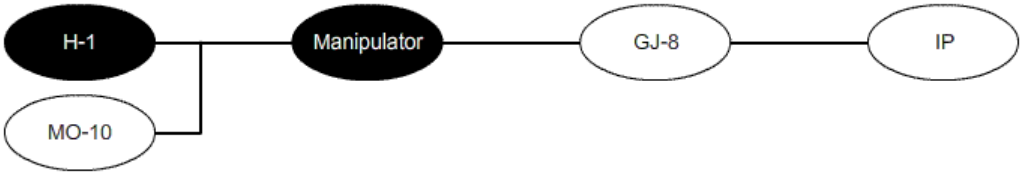


MM-3 + MO-10 mounting example

Specification

Accessories included		H-1 Electrode Holder Clamp Rod Allen Wrench
Movement range	**Coarse**	X30mm, Y20mm, Z35mm
	Fine	X7mm Full rotation of knob: 250µm Minimum graduation: 10µm
Dimensions/Weight		W105 × D70 × H145mm, 790g

System Diagram



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M-3333

Micromanipulator

Ultra-thin manipulator body enables multiple recording.

To enable recording from multiple microelectrodes, the body of this model is made as thin as possible, with all the handles positioned in a single direction. Use of the X-4 Rotating X-Blocks (sold separately), makes it possible to place many microelectrodes close together without taking up too much space. It is of course possible to mount a one-axis fine movement unit on the X-axis for a more careful approach to the specimen.

* Use X-4 X-Block and GJ-8 Magnetic Stand (both sold separately) or equivalent equipment to attach this model.

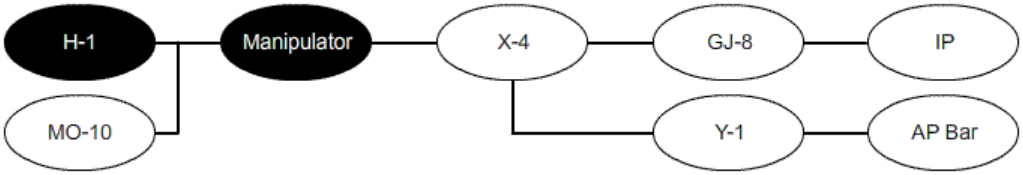
* Changing the H-1 included with the manipulator to separately sold oil hydraulic micromanipulator such as MO-10 enables remote controlled X-axis fine movement.

Mechanical Micromanipulators

Specification

Accessories included		H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X40mm, Y12mm, Z30mm
	Fine	X7mm Full rotation of knob: 250µm Minimum graduation: 10µm
Dimensions/Weight		W126 × D43 × H145mm, 340g

System Diagram



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MP-2

Micromanipulator

Incorporating a sub-stage for fine manipulations in the Y-axis.

This model combines sub-stage M-1, which allows fine movement manipulations in the Y-axis, with the MP-1 micromanipulator, which is only for manipulation with X and Z movement. This allows three-dimensional movement in addition to this versatile model's numerous other functions, which include an easy-to-use tilting stand and pivot/tilt mechanisms.

* GJ-10 magnetic stand (sold separately) can be attached to the tilting stand.

Options

MP-2 + BP-1

This iron plate is designed for use with the MP-1/MP-2. For increased stability, it is designed to make contact with the table at all four corners and the top surface of the iron plate is machined to flat finish.

MP-2

Micromanipulator

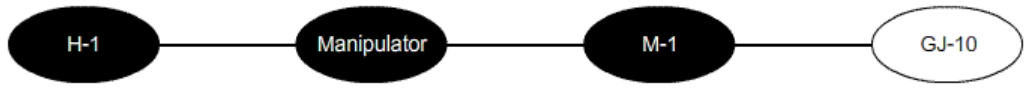
MP-2 + GJ-10

GJ-10 magnetic stand (sold separately) can be attached to the tilting stand.

Specification

Accessories included		H-1 Electrode Holder Allen Wrench
Movement range	**Coarse**	X60mm, Z50mm
	Fine	X4mm, Z4mm Full rotation of knob: 250µm Minimum graduation: 10µm
		Y40mm Full rotation of knob: 500µm Minimum graduation: 10µm
		Pivot and tilt mechanism
Dimensions/Weight		W150 × D130 × H210mm, 4.8kg

System Diagram



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Motor Drive Micromanipulators

EMM-3NV

Three-axis Motorized Micromanipulator

Advanced motorized micromanipulator with smooth, hydraulic-type movement. 40mm movement range provides superb workability.

While a hydraulic system permits smoothly operable fine movement, some users voice their concerns about drift occurrence caused by temperature changes. This motorized micromanipulator, designed for use not only by professionals but also by novice users, ensures stability and is resistant to drift occurrence.

* AP-13-3/AP-14 patch clamp headstage holders can be attached on the UST-3 solid universal joint, incorporated in the manipulator.

Motor Drive Micromanipulators

	**40mm movement range provides superb workability** The wide 40mm movement range in all three (X, Y, Z) axes (coarse and fine combined), enabling work over a wider area. This is about 60% more than the conventional 25mm (1 inch) working area.
	**Smooth movement with excellent operability** Narishige's familiar vernier control knobs are employed. The control knobs are equivalent in size to those of a hydraulic unit, allowing the same operating feel as a hydraulic control unit. Easy to make the switch to the motorized control box.
	**Retract & Return/ Positional Memory (up to 5 positions) & Return/ T-axis drive** Useful functions available with this motorized control box include: • Allows the electrode to retract from and return to the object. • Permits the electrode to return to the position stored in memory (up to 5 positions). • Permits T-axis drive (the same direction as the electrode) without having to tilt the X-axis and Z-axis. • The compact control box permits placement in a desired position.
	**Defines electrode position more clearly and accurately** A fluorescent digital display provides increased visibility. The rack-mountable power supply unit is space-saving. Position readings in each X-, Y-, and Z-axis are calibrated in "µm" for easy and precise reading.

Motor Drive Micromanipulators

Specifications

Accessories included		Power Supply-Control Box Connecting Cable (3m) Power Supply-Drive Unit Connecting Cable (3m) AC Power Cord UST-3 Solid Universal Joint Positioning Plate Rack-mount Bracket H-1 Electrode Holder Allen Wrench
Working Distance		X40mm, Y40mm, Z40mm
Drive System		Five-phase Stepping Motor
	Minimum Controllable Step	0.02 / 0.06 / 0.1µm
	Maximum Speed	3.6mm/s
	Input Voltage	AC100 - 240V (±5%), 50Hz/60Hz
Dimensions/Weight	**Control unit**	W115 × D115 × H132mm, 1.57kg
	Drive unit	W133 × D167 × H177mm, 1.25kg
	Control Box	W125 × D103 × H51mm, 0.22kg
	Power Supply	W430 × D370 × H89mm, 5.80kg

* Non-compliant with CE Marking

UST-3A

Joint Attachment

Securely fixed yet easy to use.

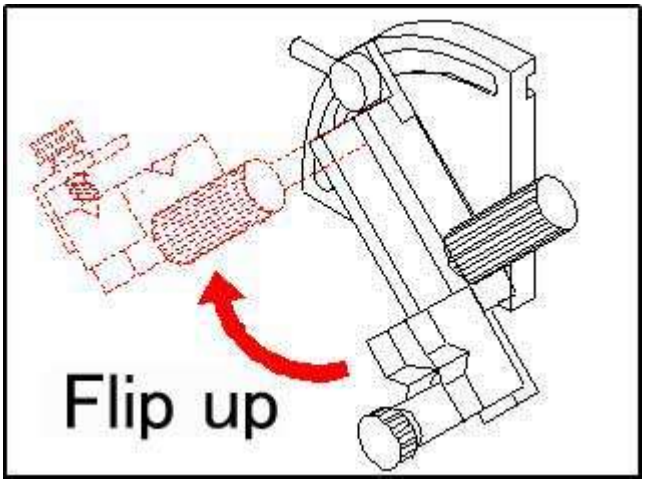
In electrophysiology, it is of primary importance that the electrode (holder) is fixed securely onto the manipulator, while on the other hand you may find it inconvenient to replace electrodes. We worked out a method of facilitating replacement of electrodes. With the holder mount conveniently situated toward the front, it is now much easier to replace electrodes.

* UST-3A can not be used by itself.

* UST-3A can be attached to EMM-3NV Motorized Micromanipulator.

Motor Drive Micromanipulators

UST-3A allows the tilted electrode holder to flip up with the tilt angle unchanged, as illustrated. Not just opens parallel to the microscope stage, it is not likely to hit the edge of the petri dish, and thus replacement of electrodes is facilitated without having to operate the manipulator.



UST-3A serves a useful function when attached to a highly stable solid universal joint UST-3 designed for patch clamp recording.

* Separately sold AP-13-3/AP-14 Patch Clamp Headstage Holders mountable.

MM-80

Three-axis Motorized Micromanipulator

Developed for patch clamp recording, this motor-driven micromanipulator is designed to provide as fine movement as possible.

The MM-80 has been developed to satisfy competing goals of "stability" and "compactness" that are essential for research work in electrophysiology. Generally, the higher the stability, the less compact it becomes. While maintaining stability, the MM-80 is designed to reduce the drive unit size to a minimum and deliver the performance to satisfy the requirements of researchers. The compact space-saving drive unit provides long working distance (20mm for fine travel and 30mm for coarse travel). In addition, the MM-80 incorporates "electrode holder fixing with angle gauge" that enables you to read the angle of a patch clamp headstage, which helps reduce stress during an experiment. "Rotation mechanism" has been also incorporated, allowing the motorized fine drive unit to rotate toward you to facilitate replacing the microelectrode or specimen.

* For attachment to the microscope, a suitable mounting adaptor is required (sold separately).

* The micromanipulator can be mounted directly on the isolation table.

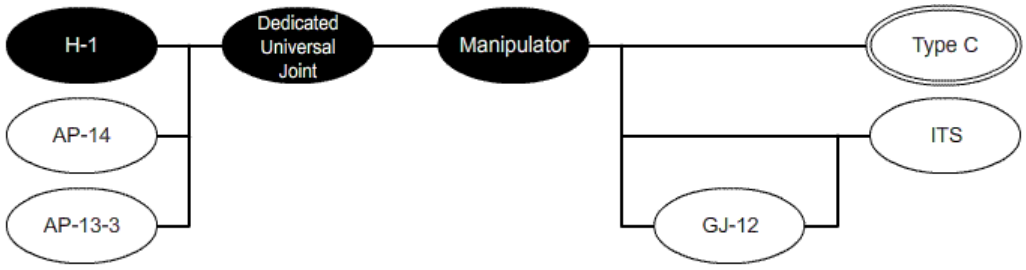
* AP-14/AP-13-3 patch clamp headstage holders can be attached to the dedicated universal joint.

Motor Drive Micromanipulators

Specifications

Accessories included		H-1 Electrode Holder AC Power Cord Allen Wrench
Movement range	**Coarse**	X30mm, Y30mm, Z30mm
	Fine	X20mm, Y20mm, Z20mm
Speed	**Minimun**	Approx. 10µm/s (with DC motor drive, theoretical value)
	Maximum	Approx. 150µm/s (with DC motor drive, theoretical value)
Power source		AC100V (±5%), 50/60Hz AC120V (±5%), 50/60Hz AC220V (±5%), 50/60Hz AC240V (±5%), 50/60Hz
Power consumption		Approx. 15W
Dimensions/Weight	**Control unit**	W100 × D75 × H50mm, 0.25kg
	Drive unit	W145 × D140 × H135mm, 1.1kg
	Power supply	W125 × D105 × H85mm, 1.5kg

System Diagram



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