SIS-4M-U / Injection System

User Manual

⚠ ATTENTION
In order for you to use the product properly, please read this instruction manual thoroughly before use and retain it for future reference. Also, when using the product, keep this manual where you can retrieve it easily.
Please note that the warranty we provide only covers the product itself. We cannot compensate for any damage and/or loss to the samples/specimen incurred by the malfunction of the product.

S CO., LTD

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Precautions

In order for you to use the product safely, please ensure that the product is used with particular attention to the following points

Safety Precautions

1) Please handle the product with care. Do not drop it.

Clean and disinfect the product using alcohol or any non-embryotoxic solution Do not sterilize the product by heat, steam or any other procedure.

1. Precautions for use

1) Use the product with care. Do not drop it or hit any other equipment (microscope, table, etc.)

2) Keep the product away from dusts and direct sunlight.

3) Do not loosen structural clampers. Do not pull tubes containing liquid.

4) Do not disassemble or alter the product.

5) The product is subject to changes in performance due to temperature variation.
Please make sure to use the product in stable temperature.

6) Do not install the product in humid places.

7) Install the product on a steady surface. Ensure that the product is not installed on an unstable place subject to vibrations and impacts.

8) Do not bend or cut hydraulic tubes.

9) Please make sure you put special attention while managing moving parts.

2. Precautions for maintenance and storage

1) Do not loosen structural clampers. Do not disassemble or alter the product.
The system may lose its functionality...

2) After use or when not in use, make sure to bring operating handles back to zero to avoid putting an extra load on hydraulic system and store the product so it is always available for use.

3) The color of oil used could change over time (from green) due to the oxidation of oil. This change does not interfere with the micromanipulator functions for a while, but overtime the oil becomes hard inside hydraulic tubes and it may interfere with the functions. Therefore it is recommended to change the oil every two years to prevent loss of functionality.

4) In case the micromanipulator loses functionality or its performance is lower than expected please contact the product distributor or our company to arrange a service. Please do not attempt to repair the system yourself.

3. Caution

Using the product other than described in this manual is not covered by the warranty. Please make sure you use the product following the instructions included in this manual.

Accessories

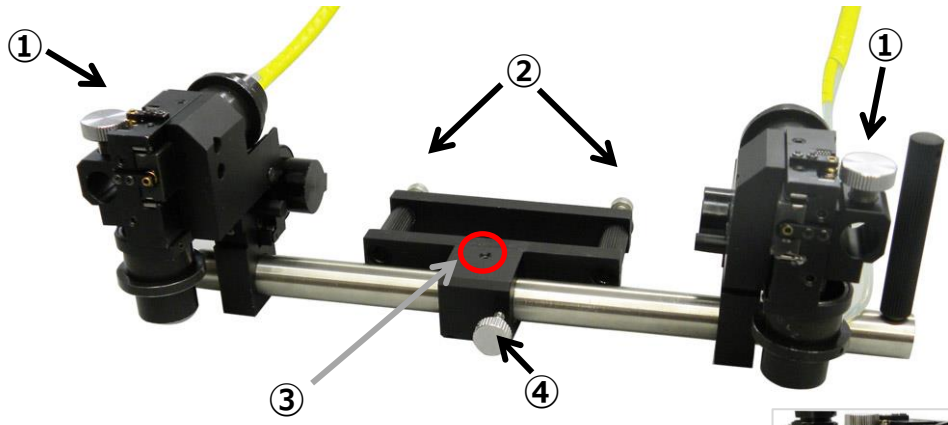
Once the box is opened, please check the contents. You should fine the following:

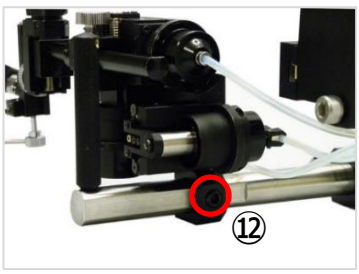
① Injector
② Adaptor & Manipulator(Drive Unit)
③ Control unit
④ Universal Joint (with Coarse movement remote-control type)
⑤ Iron plate

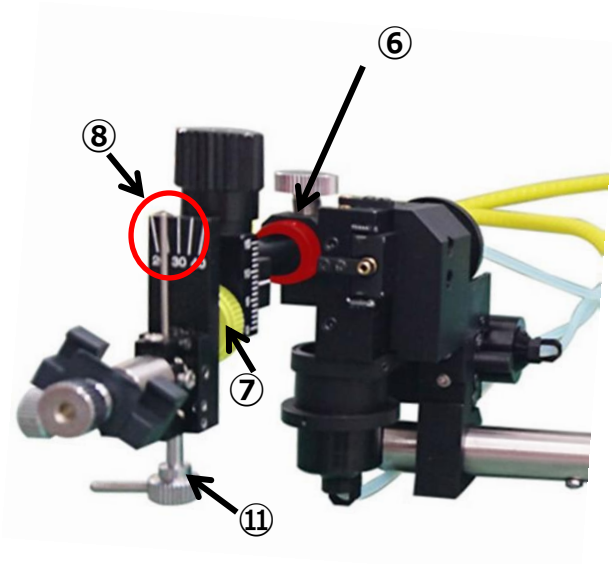
Part Names

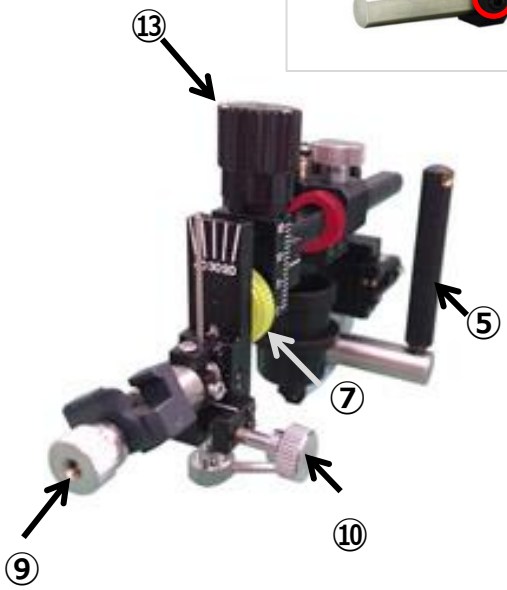
Adaptor(for Nikon) with Manipulator(MO-21) and Universal Joint(UR-2)
<Drive unit>

①Locking Knob for universal joint: to lock universal joint
②Microscope mounting screws:The screw for mounting the microscope.
③Angle adjustment screw: to angle adjustment for drive unit of manipulator
④Tension adjustment mechanism: to adjustment for swing-up of adaptor
⑤Return Lever: to replace sample or pipette easily
⑥Stopper of Y-axis location: to set the same location for Y-axis
⑦Height Adjustment Knob: to adjust the height of installed micropipette by loosening the knob
⑧Angle scale
⑨Screw for holder fixation: to fix holder
⑩Angle Adjustment knob: fine tuning of UP and Down depending on the micropipette tip shape and angle.
⑪Lock Lever: After angle adjusted, lock it. It can use with good stability.
⑫Fixing screw of drive unit : Fixed the drive part to the adapter. Also loosen when moving the position of the drive unit.
⑬Z-axis Coarse operating Knob : to drive pipette to Z-axis (up and down) / Coarse movement Travel Range; 15 mm









Part Names

MO-21　Manipulator

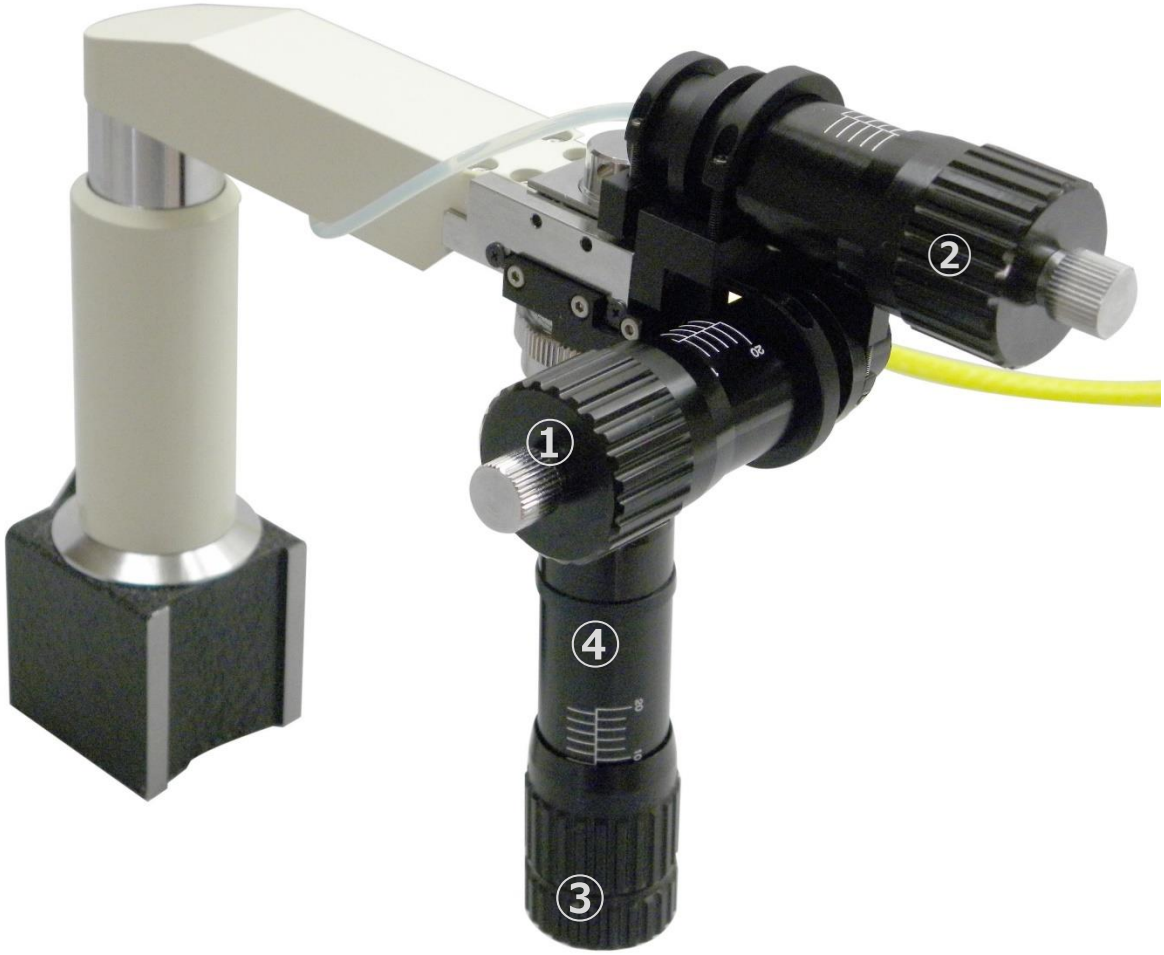
【Control unit】

① X-axis Operating Handle: to drive pipette to X-axis (right and left) by rotating handle,
Travel Range; 20 mm (0.787 in) - 1 Handle Revolution; 1 mm (0.0787 in)

② Y-axis Operating Handle: to drive pipette to Y-axis (back and forth) by rotating handle,
Travel Range; 20 mm (0.787 in) - 1 Handle Revolution; 2 mm (0.0787 in)

③ Z-axis Operating Handle: to drive pipette to Z-axis (up and down) by rotating handle,
Travel Range; 20 mm (0.787 in)　1 Handle Revolution; 2 mm (0.0787 in)

④ Joystick Lever: for 2 D (X/Y) operation. 3D operation along with using Z-axis Operating Handle on Joystick Lever is available without shifting your hand.



*It is left side handle.

*It is right side handle.

Part Names

MO-21　Manipulator

【Control unit】

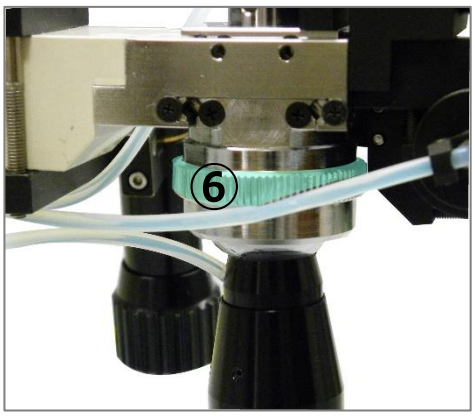
⑥ Adjustment Ring for joystick lever hardness: to adjust joystick lever motion (hardness). CWR= hard motion　anti-CWR= soft motion

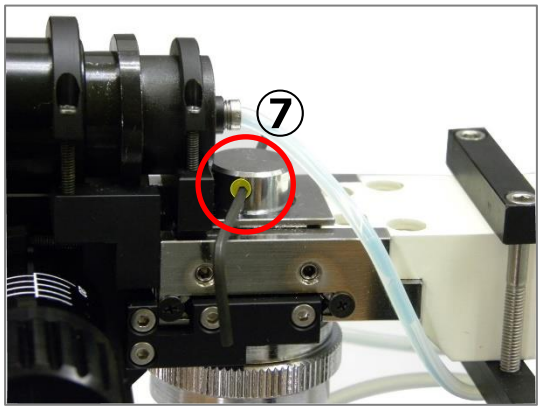
⑦ Adjustment Part for movable ratio: to adjust travel range of pipette (to X/Y-axis direction) when operating joystick lever by rotating with a coin

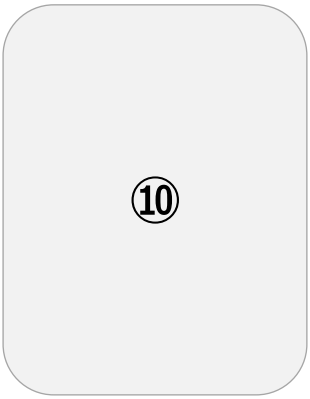
⑧ Adjustment screw for height of operating portion: to adjust operating portion to optimum height by loosening the screw with an accessory wrench

⑨ Magnet Switch: ON/OFF switch for magnet. (ON: Fixing/OFF: Removing)

⑩ Iron Plate: to fix micro manipulators



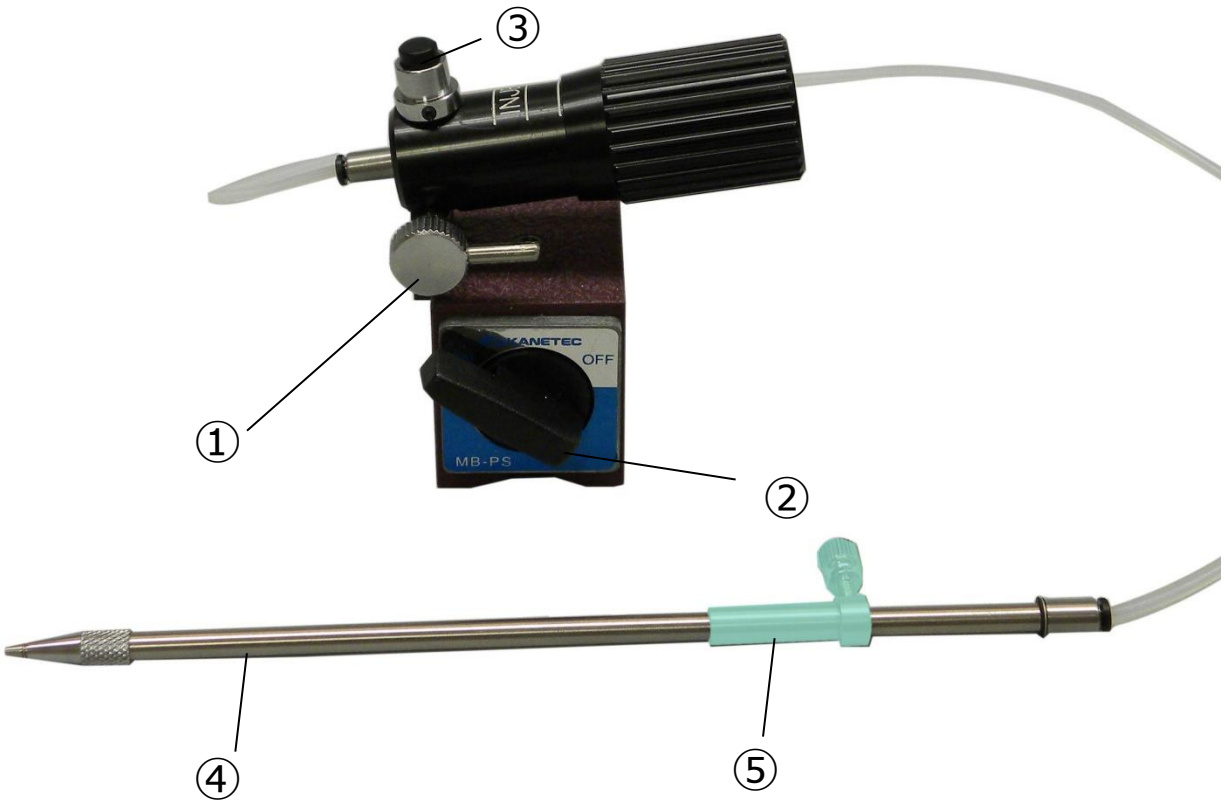




Part Names

IA-2　Injector

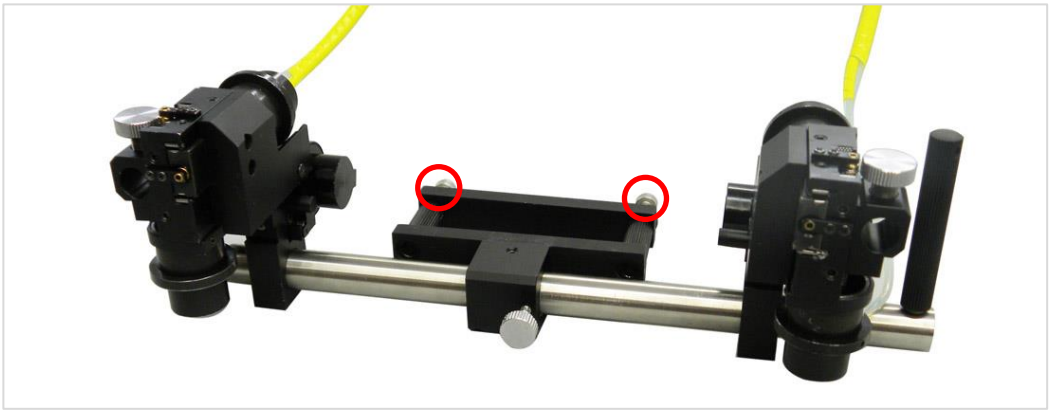
①Angle Adjustment Knob: Loosen Angle Adjustment Knob so that Injector body angle is adjusted.
②Magnetic Switch: Magnetic stand to fix pneumatic injector with an iron plate (Stainless Steel).
　ON: Fix　　OFF: Remove
③Pneumatic Release Knob: Pneumatic Release Screw so that balance pressure can be released.
④Injection Holder: For 1mm pipette
⑤Rotating Adjustable Clamp: To relocation or rotation of the injection holder with a bent-tip pipette.



Installation

▸Installation to microscope　Use 4mm Hex Wrench

1. Install the adapter around the microscope pillar.
   Loosen 2 of the screws. Remove 1 screws.
   Mounted on the illumination colum.
   Tighten the screws.



*Drive Unit of the manipulator is equipped when shipping.

2. Set an iron plate close to microscope. Set Control unit and Injector on the iron plate and fix it by magnetic holder.

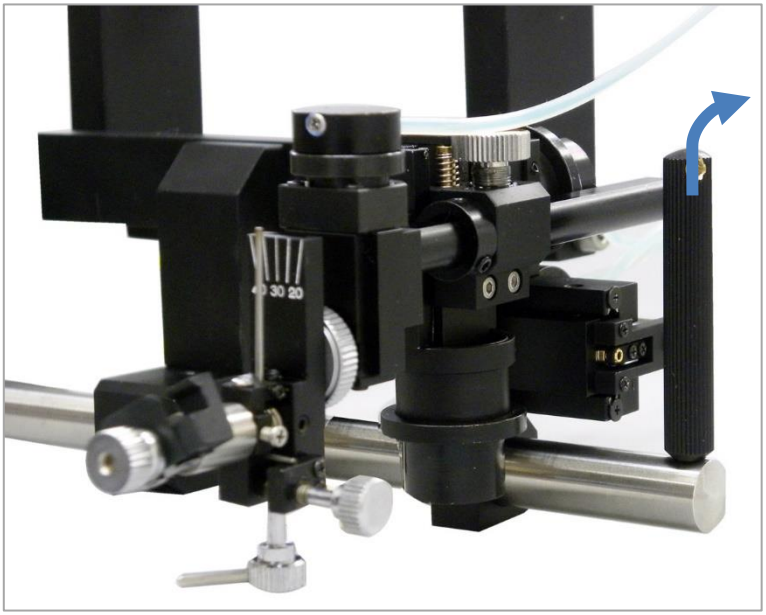
3. Loosen Locking Knob for universal joint on driver part, adjust the universal joint to an optimum position and fix it by tightening the Locking Knob

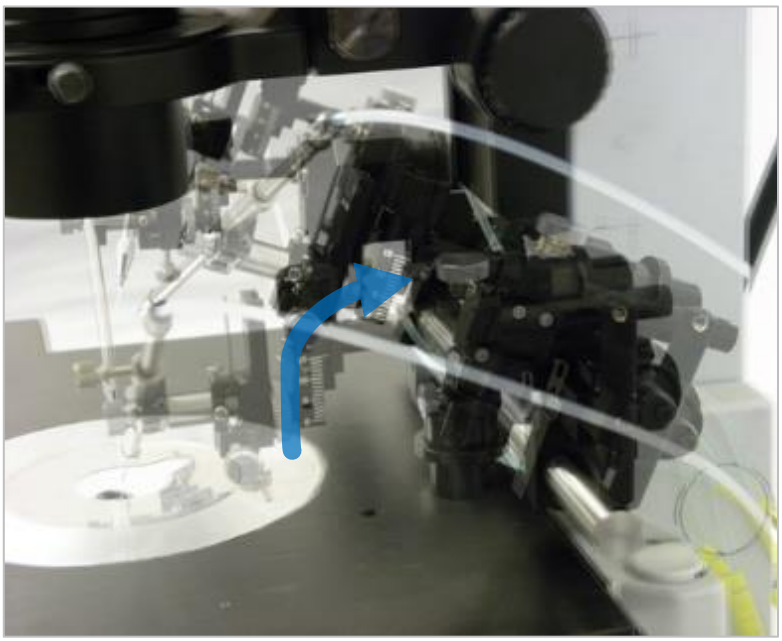
4. Install Injection Holder on Holder Fixation Part of the universal joint

Function for Adaptor

1） Return lever

By defeat to back the return lever, the entire manipulator drive springs up.
By returning to the original lever, so you can be made to return to the same position, you can easily be replaced in the sample.





Function for Adaptor

2）Angle adjustment Screw　Use 1.5mm Hex Wrench

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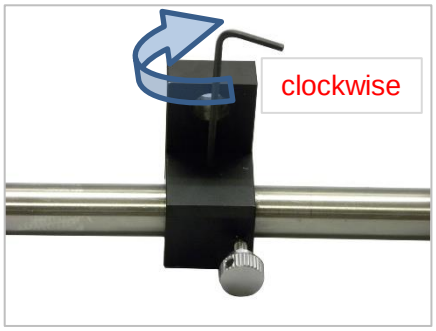
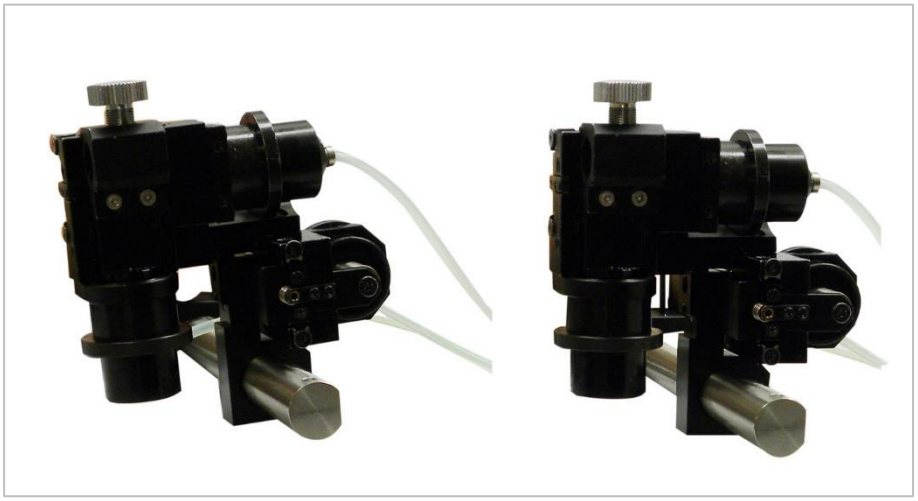
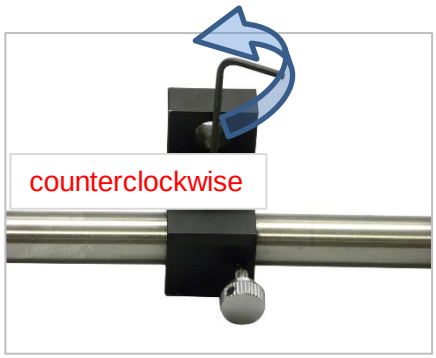


If drive unit of manipulator sway toward of front, turn the screw to the clockwise direction.





If drive unit of manipulator sway toward of back, turn the screw to the counterclockwise direction and push the drive unit of manipulator.

Operation for MO-21

1)Set pipette
Install micropipette on micropipette Holder (part of injection system)

2)Install holder on universal joint
Install each micropipette holder in the micropipette holder housing located on the universal joint. The locking screw should be loosened until final micropipette alignment is completed.

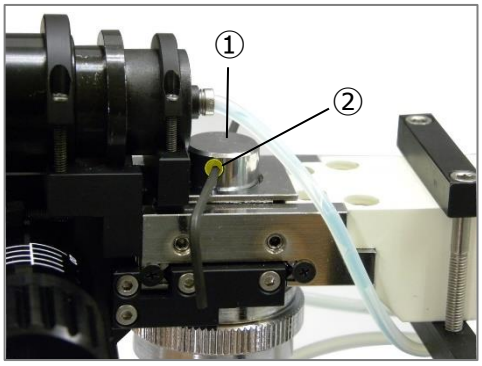
3)Set a micropipette visible on optical axis of microscope
Set the microscope to a low magnification objective (4X)
Loosen Angle Adjustment Knob of universal joint, adjust the micropipette tip to an optimum angle and adjust the position of holder to let the micropipette tip being seen on optical axis of microscope. After the adjustment, tighten Angle Adjustment Knob and Holder Locking Screw to fix holder into position.
*If unable to set the micropipette tip close to the optical axis of microscope, the following fine-tunings are required.
① Back and Forth fine-tuning: for universal joint position.
② Right and Left fine-tuning: for position of the interfacing to adapter (block for adapter connection)
③ Up and Down fine-tuning: for height of universal joint by loosening height adjustment ring of universal joint. If the height is still not an optimum height, adjust Height Adjustment Block of adapter up and down.

4)Focus micropipette within microscope field of vision
Augment the magnification from low to high (4X, 10X, 20X and 40X) and focus micropipette within microscope field of vision at magnification for actual use. Under low magnification, fine-tune the micropipette tip with adjustment knobs for back-and-forth and up-and-down until final position is set.

5)Operation practice
Operate the product to become familiar with the movements. The basic manipulation method is as follows:
- Handle of X-axis direction;
Clockwise rotation= driving to the left
Anti-clockwise rotation= driving to the right
- Handle of Y-axis direction;
Clockwise rotation= driving forward
Anti-clockwise rotation= driving backward
- Handle of Z-axis direction;
Clockwise rotation= driving to down
Anti-clockwise rotation= driving to up
In addition, by using Joystick Lever and Z-axis Operating Handle,
3D micro motion operation is available with 1 lever without shifting your hand Joystick Functions

Joystick Functions

1)Joystick Movable Ratio Adjustment

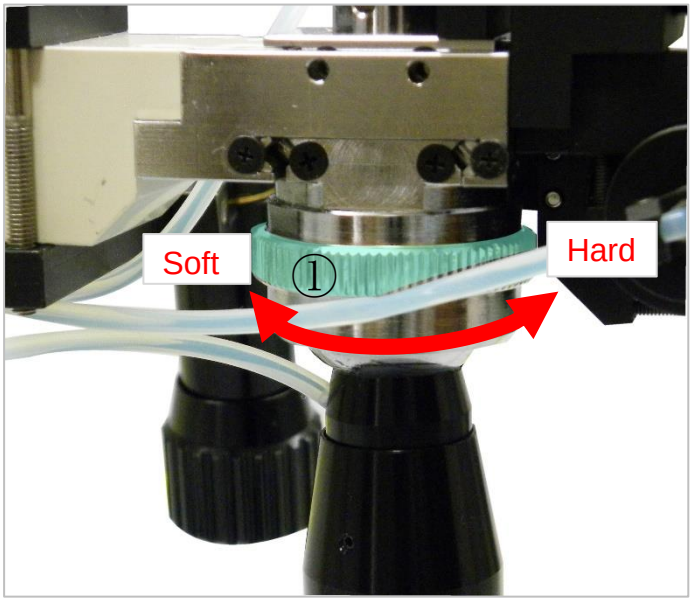


The joystick lever motion is adjustable by turning the adjusting knob ①. Insert a Hex wrench into ② of the adjusting knob. Rotate it clockwise to make the motion of the joystick on 2D becomes shorter and anti-clockwise to make it larger.

*The factory default is set to move from one end to the other within the visual field of microscope at 200X magnification.

2) Joystick Lever Hardness Adjustment

To adjust the joystick lever hardness to a convenient hardness, rotate the Adjustment Ring ① located at the top of the handle. To make the movements harder turn the ring anti-clockwise and to make it softer clockwise.

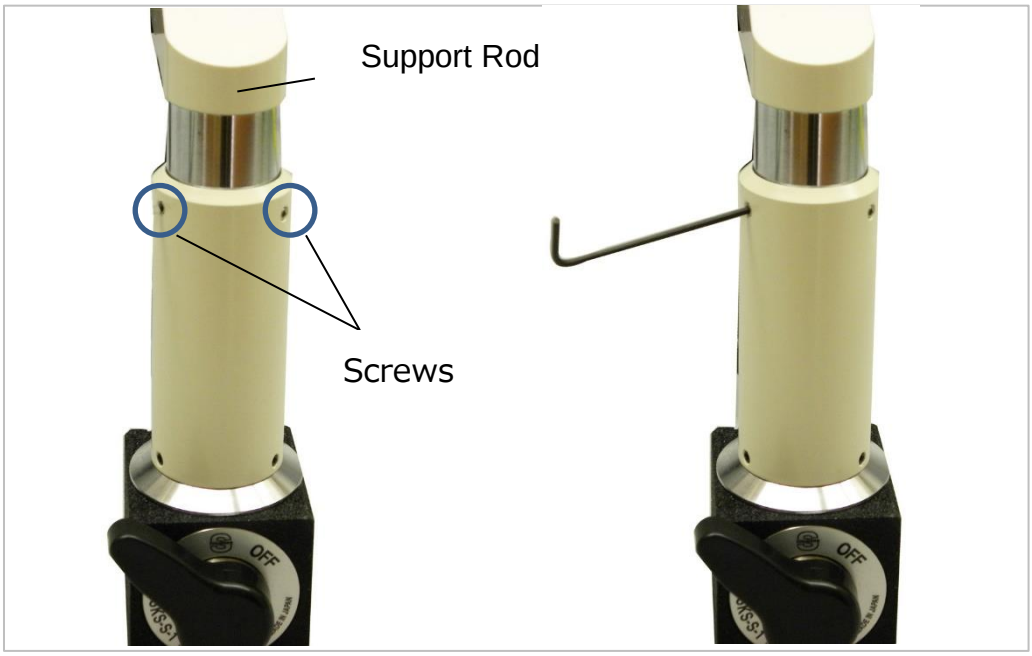


Joystick Functions

3) Height Adjustment for operating part Use 1.5mm Hex Wrench

The height of the operating part can be adjusted to a convenient height.

Loosen the screws using the wrench supplied and move the support rod up and down for your convenience.



Troubleshooting for MO-21

Troubleshooting

If the system malfunctions, use the following troubleshooting table to isolate the problem.
If you still have trouble, please contact the local distributor or our company.

Symptom	**Possible Cause**	**Remedy**
Rotating handle moves, but micropipette doesn't	Oil Leakage	Maintenance in our company is required.
	Positioned at driving limited range	Use after locating handle at midway point of the driving distance.

Specifications

Description	3D Joystick Hydraulic Micro Manipulator	**Model**	MO-21
Driving Part size	W58 x D82 x H68 (mm)	**Driver Part Weight**	250g
Controller size	W93 x D222 x H180 (mm)	**Controller Weight**	1,500g
Driving Distance	X/Y/Z 20mm	**Handle 1 revolution**	1mm
Iron plate size	W32 x D140 x H64 (mm)	**Iron plate Weight**	1,280g

Specifications and appearances are subject to change without prior notice due to continual improvements.

Before use for IA-2

Caution

Pipette could protrude being launched with force. Point the injection holder away from you and people while installing the micropipette.

When injecting, the system may build pressure inside the line and the micropipette. A clogged injection or holding micropipette will build higher pressure. Please note that pipette could protrude in the following cases:

- Removing the micropipette without making balance pressure “0” after operation.

※Please make sure to remove pipette AFTER loosening pneumatic release screw (to make balance pressure “0”).

- Rotating operating handle (knob) rapidly.
- Micropipette not securely installed in holder.
- When silicon O-ring is worn out needing replacement.

1. Precautions for use

1) Use the product with care. Do not drop it or hit any other equipment (microscope, table, etc.)
2) Keep the product away from dusts and direct sunlight.
3) Do not install the product in humid places.
4) Install on a steady surface. Please avoid vibrations.

2. Precautions for maintenance and storage

1) Do not loosen structural clampers. Do not disassemble the product. It may affect product performance.
2) Replace silicon O-ring in injection holder with the spare provided after long-term use or when the micropipette is too loose inside the holder.
3) If product is not used for long-term, make sure you turn the operating handle up and down the entire area of driving before using it. The operating handle could be hard or heavy due to solidified grease in operating handle.

Caution

Using the product other than described in this manual is not covered by the warranty and may cause trouble or failure. Please be sure to use the product following the operating instructions included in this manual.

Operating for IA-2

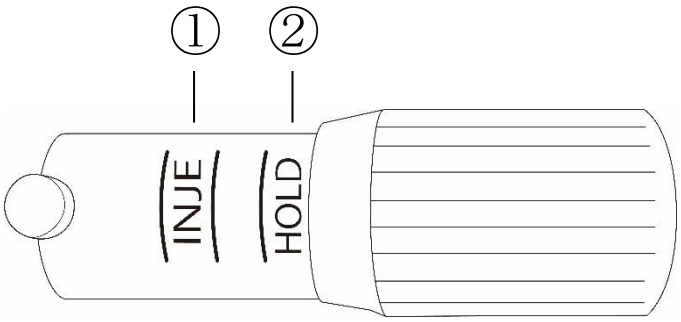
1) Operating Handle

For use at Injection side

As a guide, move handle within the range of ① on drawing below before use

For use at hold side

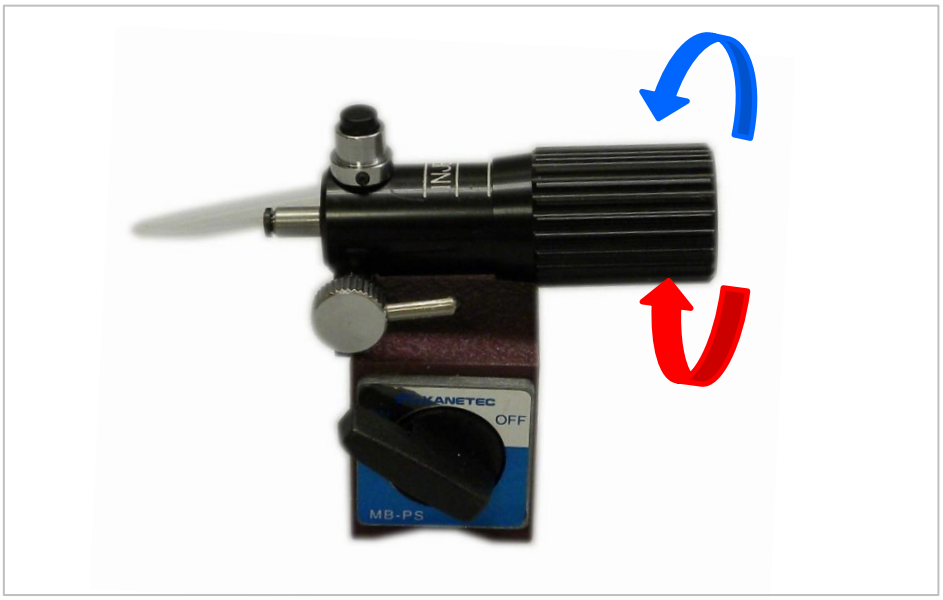
As a guide, move handle within the range of ② on drawing below before use



2) Operating

① Injection Pressure：Turn anticlockwise to inject

② Aspiration Pressure：Turn clockwise to aspirate



Attention!

Please note that Injector body could be damaged when handle is rotated over the limit.

Caution!

When handle is rotated rapidly, pipette could protrude. Do not point injection holder to yourself or to people while installing or removing a micropipette.

Operating for IA-2

1) Pipette Mounting

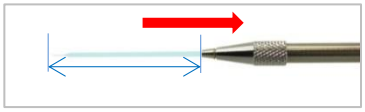
Mount Pipette after removing Cleaning Rod.

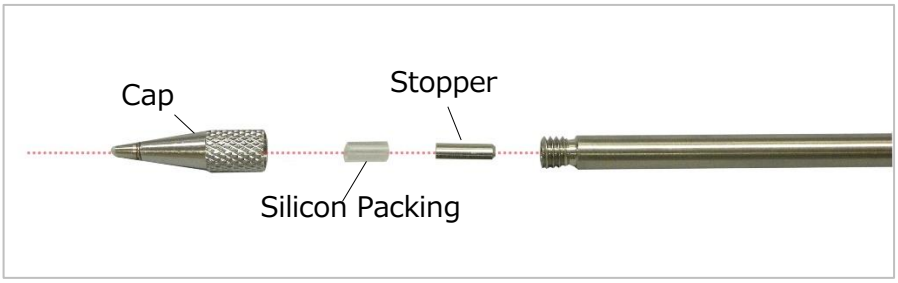
1 . Loosen ① Holder Cap

2 . Insert micropipette into the tip of ① Holder Cap from the back of the micropipette.

※Mount the micropipette to penetrate through silicon O-ring.

Insert the pipette until come to a stop.





*If the length of pipette is same, this length is same with each time.

Attention!

Please note the direction of stopper.

Operating for IA-2

Attention!

Please note that micropipette could be damaged if you clamp holder cap too much. Please make sure to insert micropipette tightly otherwise it can cause leakage of air producing instability in holding and/or injection micropipette.

Caution!

If micropipette is not tightened enough, it could protrude or launched forward. Do not point injection holder with micropipette installed at people or to yourself.

2) Mounting on Micro Manipulator

Mounting Injection Holder on manipulator.

Please make sure to set to focus the center of light axis of microscope onto micropipette tip.

3) Pressure Balance Adjustment

In order to stabilize the pressure between the inside and outside of the micropipette (Pressure Balance “0”) push the pneumatic release button located at the top of the injector.

When operating handle is rotated up to the limit of the driving distance (up or down), the operating handle position can be changed by rotating operating handle during pushing the pneumatic release button. This procedure can be done without removing the micropipette from the holder.

Maintenance for IA-2

1) Silicon O-ring Replacement

A worn silicon O-ring inside Injection Holder could cause air leakage. Silicon O-rings replacement procedure is as follows:

1. Remove pipette and cleaning rod, and remove Injection Holder Cap from Injection Holder.
2. Remove the worn silicon O-ring from Injection Holder and replace it with new one. You may need to use the Cleaning Rod to facilitate removal. The silicon O-ring is quite small, so please make sure not to lose it.
3. Mount Injection Holder Cap and the procedure is complete.

Caution!

If silicon O-ring wears, pipette could protrude.

Do not point injection holder with micropipette installed at yourself or people.

Caution!

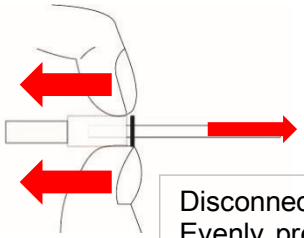
If you remove micropipette without making pressure balance “0” after operating, micropipette could protrude.

Do not point injection holder with micropipette installed at yourself or people.

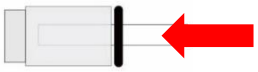
*Please make sure to remove micropipette AFTER making pressure balance “0”, AFTER loosening pneumatic release knob.

1) Tube Replacement

Contamination in tube with fluids (culture media, oil, etc.) may cause system malfunction. Please replace tube if it gets dirty or with contamination.



Disconnecting the Tubing : Evenly press in-and-hold the flange and slowly pull out the tubing.



Reconnecting the Tubing : Insert the tubing all the way into the tube fitting.

2) Cleaning Rod Usage

Contamination in micropipette holder causes operation malfunction. Glass fragments or silicon O-ring residue may clog the system. In such a case, remove the contamination inside the holder with the Cleaning Rod.

1. Remove Injection Holder Cap, Silicon O-ring and Tube from Injection Holder.
2. Insert Cleaning Rod from the back side of Injection Holder so glass particles or O-ring residue are removed.

Attention!

Please be careful not to get hurt when using Clean Rod.

Troubleshooting for IA-2

Troubleshooting

If fault or malfunction persist, use the following troubleshooting table to address the issue..
If you still have trouble, please contact the product Distributor or our company.

Symptom	Possible Cause	Remedy
Keeps on aspirating	Air leakage from connections or O-ring.	Recheck tube connections. Check silicon O-ring and replace if it is damaged.
Poor response of injection and aspiration.	Are there any silicon O-ring residue or glass particles in the holder. Is the tubing clogged?	Remove pipette tube from holder and push out dusts from micropipette inside with cleaning rod.
	Is there any residue clogged at the pipette tip?	Replace pipette
	Worn silicon O-ring inside Injection Holder?	Replace silicon O-ring with a new one
	Problems with operating handle mechanism.	Maintenance by our company is required.

Specifications

Description	Pneumatic Injector	**Model**	IA-2
Injector Size	W47 x D71 x H70 (mm)	**Body Weight**	290(g)
Driving Distance	15 (mm)		

If you have any questions or failures, please contact us at the following address.

S Co., Ltd.
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E-mail info@s-co-ltd.co.jp