

AE.8000

micromanipulator system



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1. Introduction

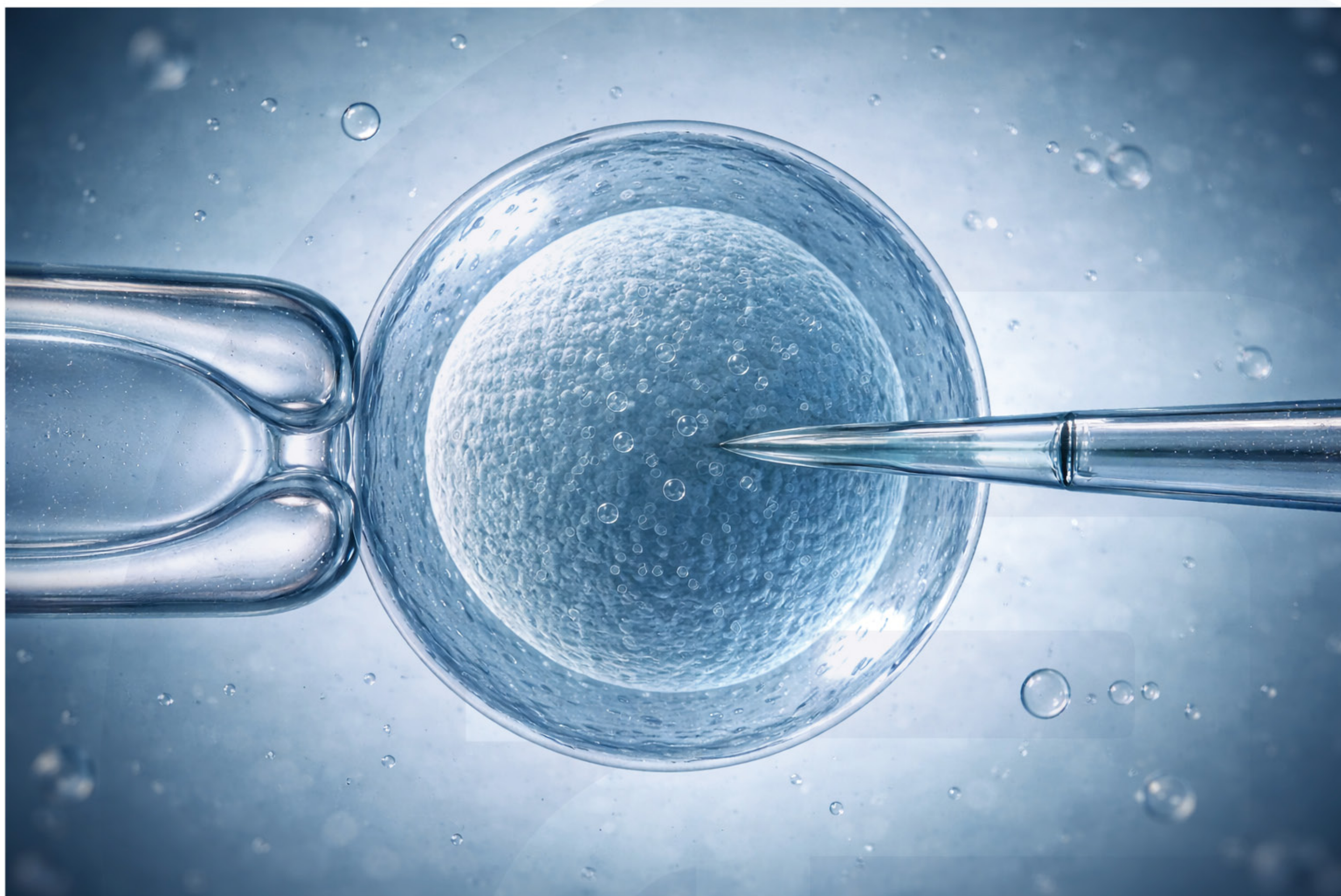
Thank you for purchasing the AE.8000 Micromanipulator System from Euromex Microscopen B.V.

This system is designed for precise micro-manipulation and injection applications in life sciences and laboratory environments. It combines high mechanical accuracy with smooth hydraulic control, allowing accurate positioning of micropipettes in three dimensions.

- Please read this manual carefully before using this product to ensure correct and safe use
- The content of this manual is subject to change without notice
- The appearance of the actual product may differ from the models described
- Not all equipment mentioned may be included in your configuration

1.1 Indended use:

This equipment is a non-medical device and is **only intended** for precise micro-manipulation and injection applications in non-human diagnostics or **non-human medical applications** in life sciences and laboratory environments, with transmitted/reflected illumination and with the cell on a e.g. petri dish.



Microscopic precision at the cellular level

2. Safety Precautions

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

2.1 Safety Precautions

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

2.2 Precautions for use

- Use the product with care. Do not drop it or hit any other equipment (microscope, table, etc.)
- Keep the product away from dusts and direct sunlight
- Do not loosen structural clampers. Do not pull tubes containing liquid
- Do not disassemble or alter the product
- The product is subject to changes in performance due to temperature variation. Please make sure to use the product in stable temperature
- Do not install the product in humid places
- Install the product on a steady surface. Ensure that the product is not installed on an unstable place subject to vibrations and impacts
- Do not bend or cut hydraulic tubes
- Please make sure you put special attention while managing moving parts

2.3 Precautions for maintenance and storage

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



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

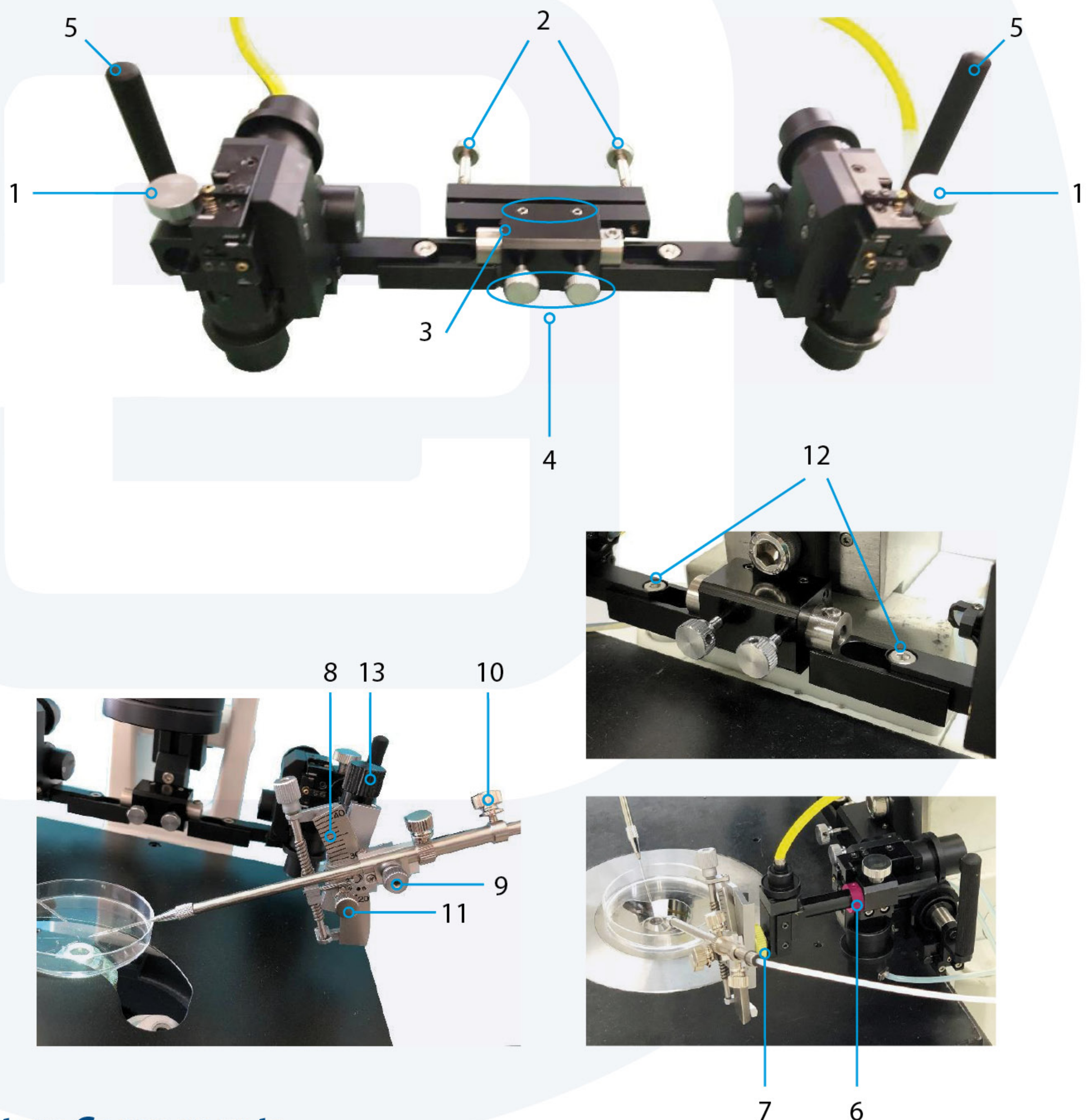
3. Accessories

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





1. Injector
2. Adaptor & manipulator (drive unit)
3. Control unit
4. Universal joint (with coarse movement remote-control type)
5. Iron plate



4. System Components

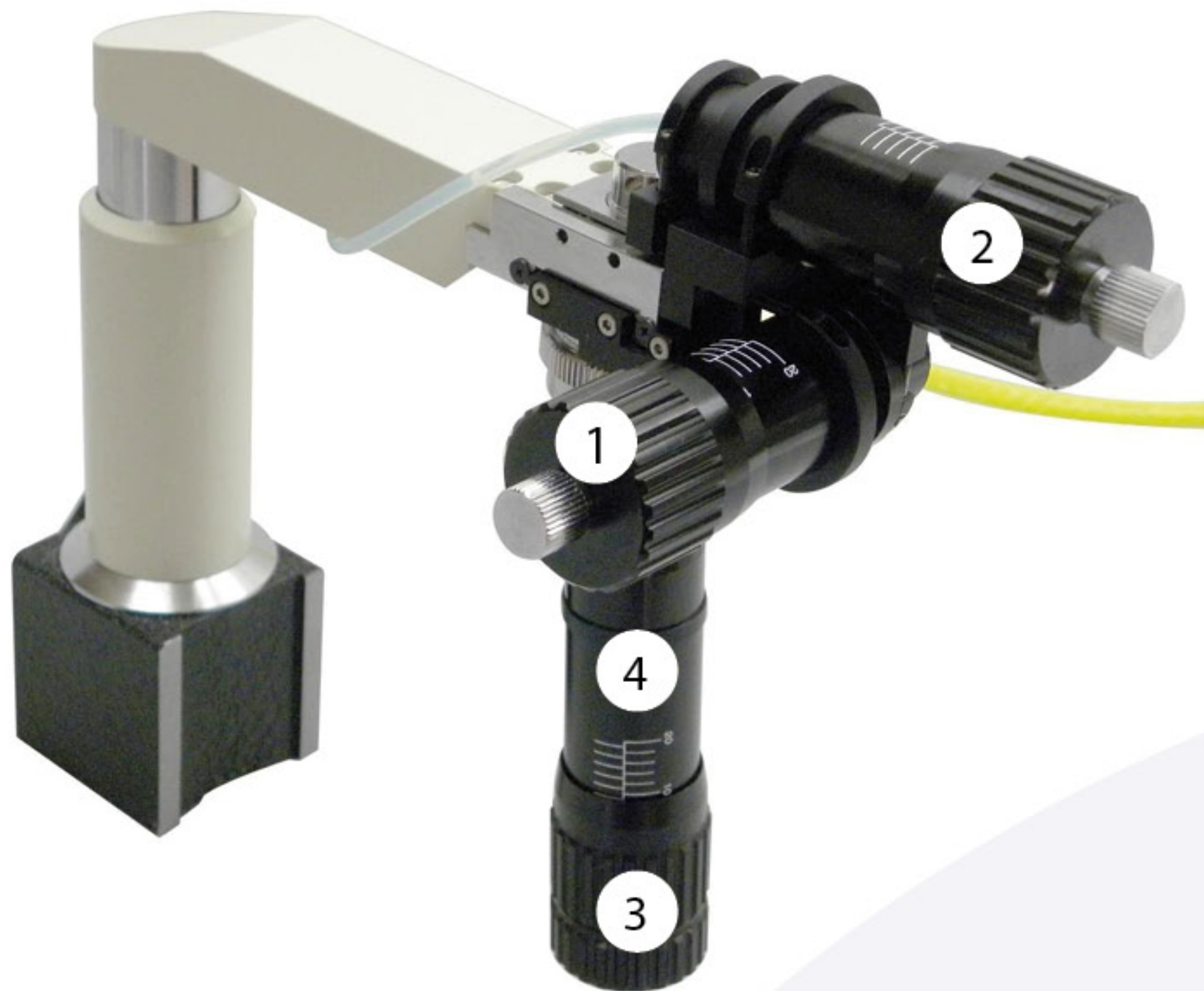
Adaptor(for Oxion) with Manipulator(AE.8000) and Universal Joint

4.1 Drive unit

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

4.2 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.

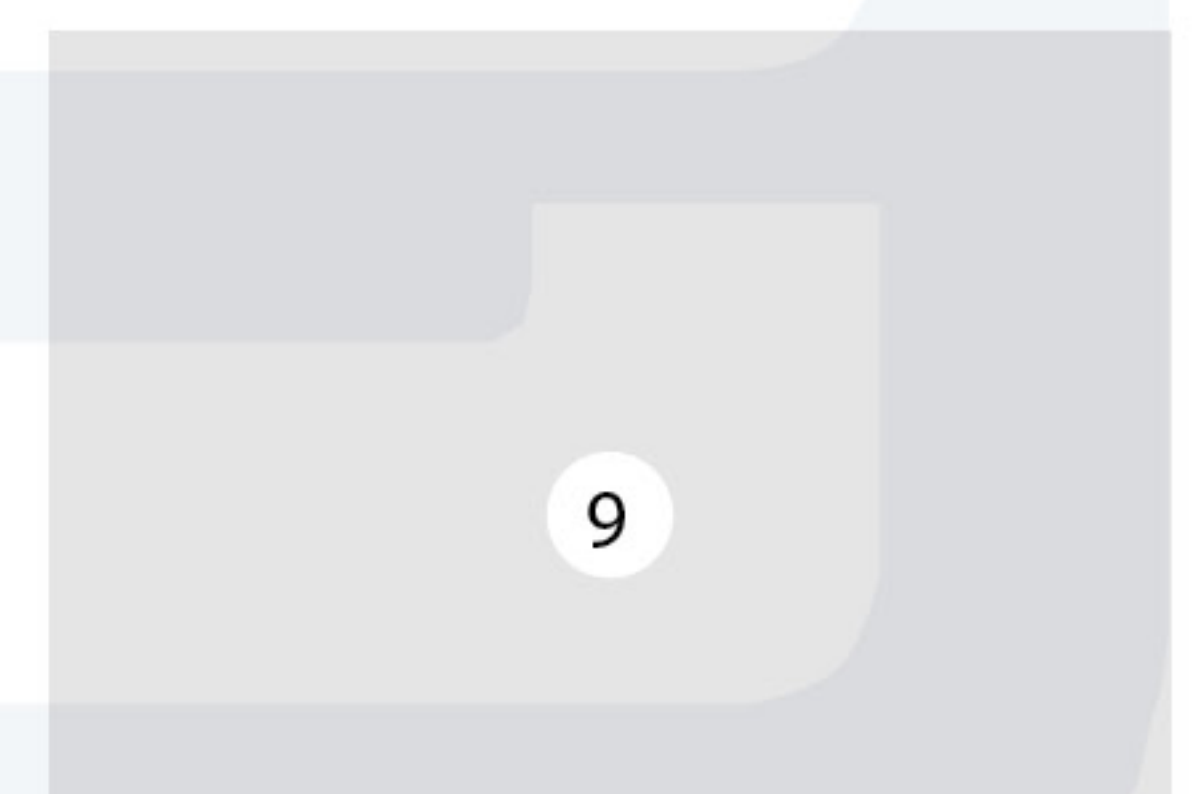
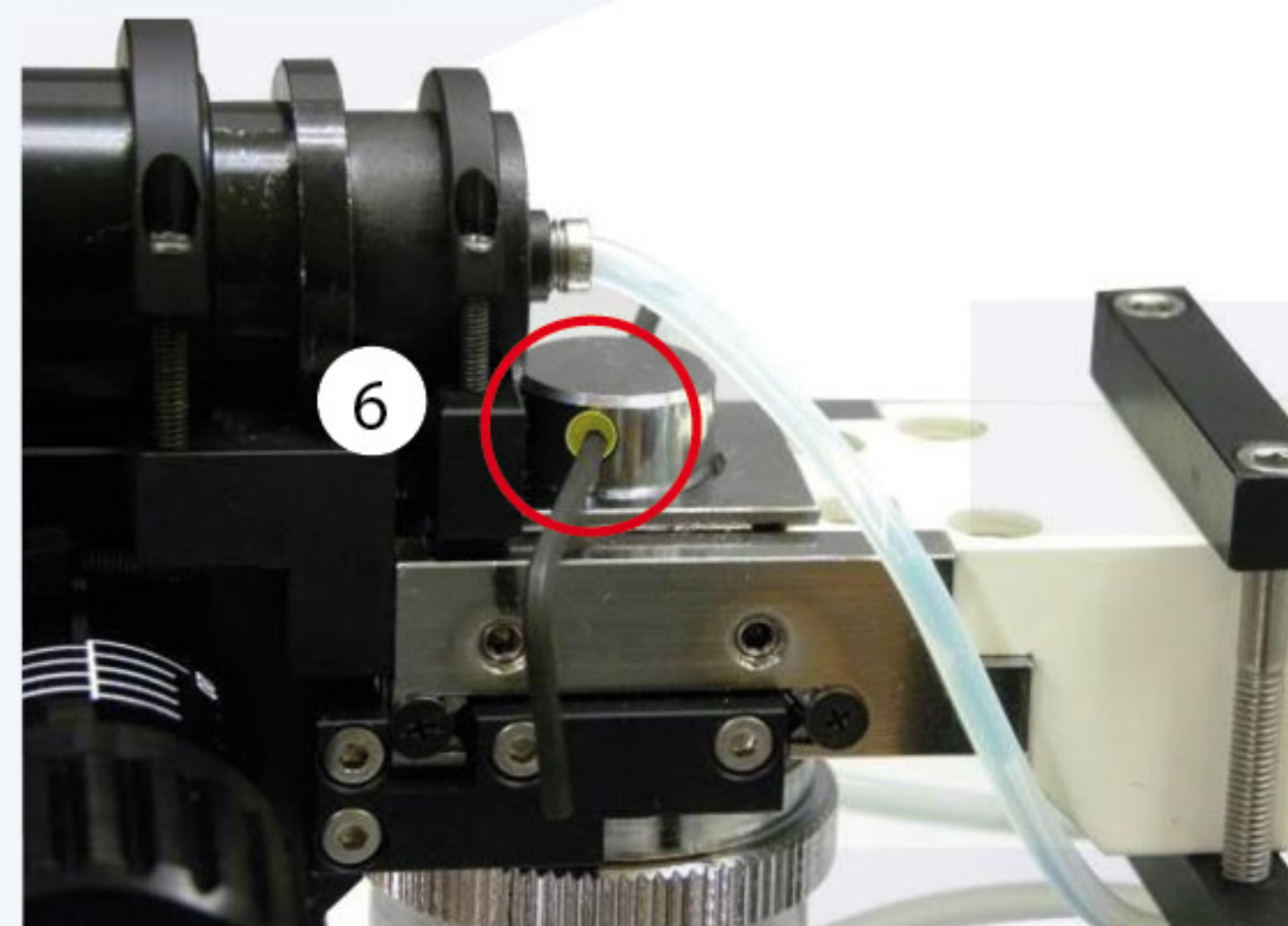
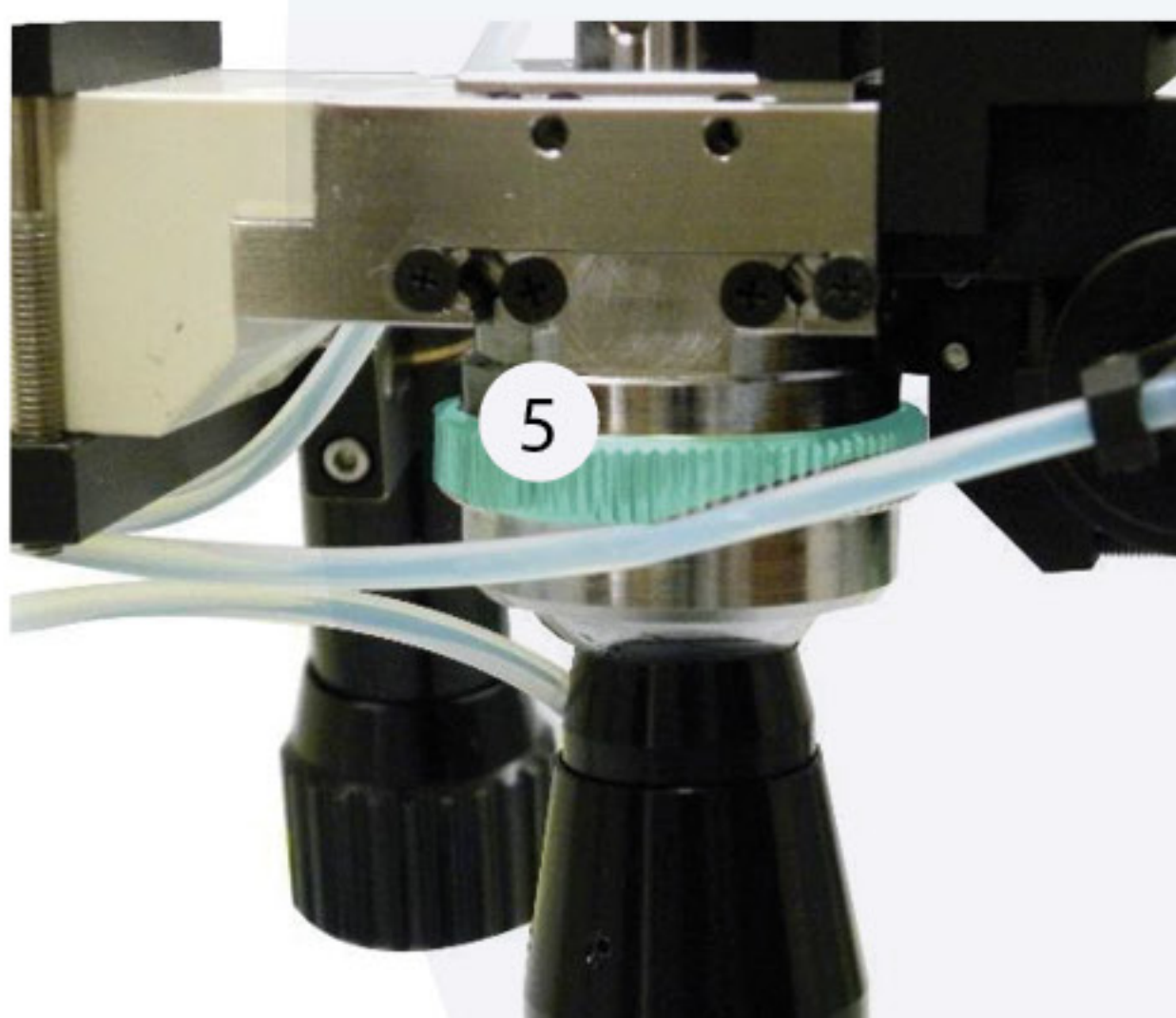


**It is left side handle*



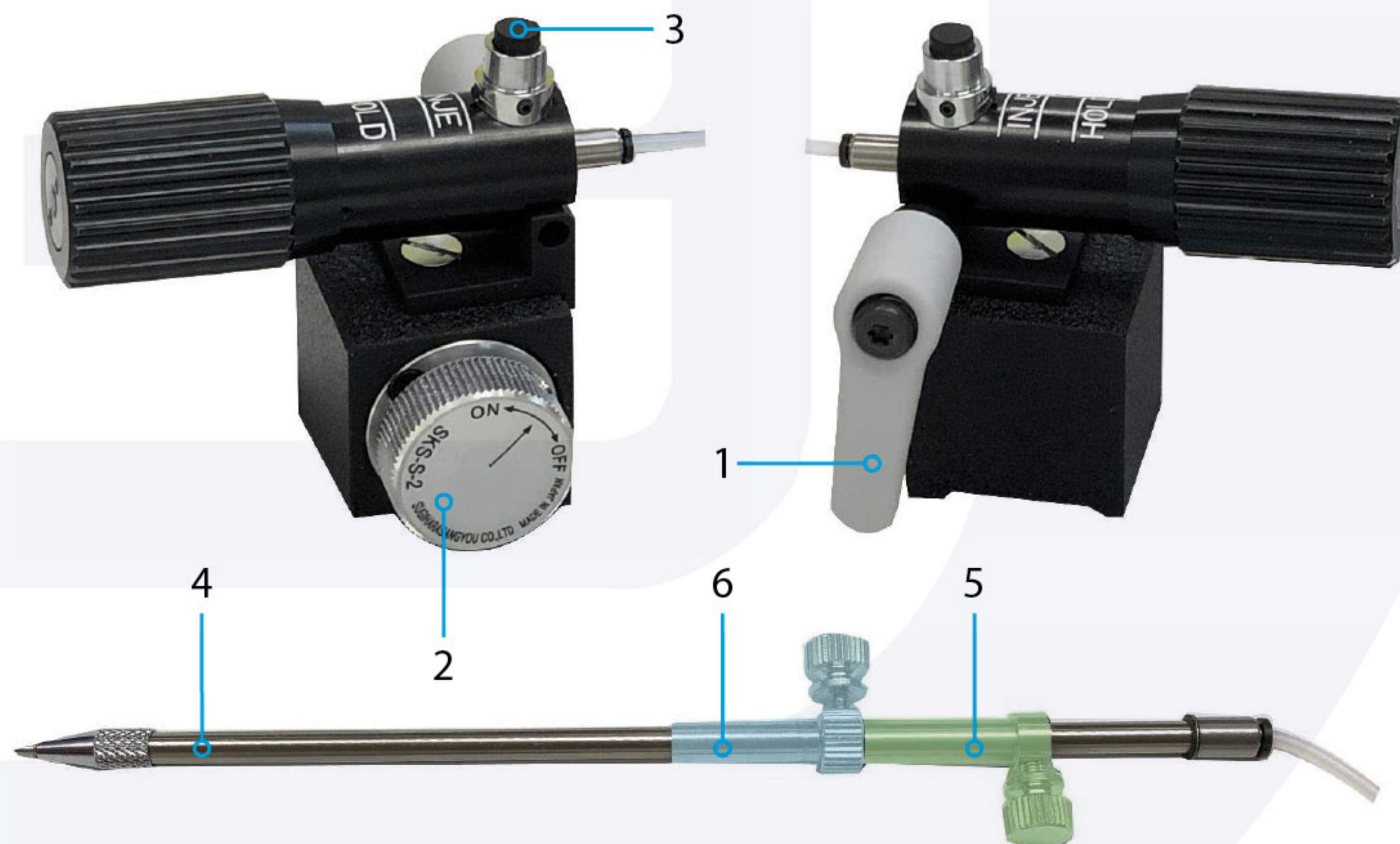
**It is right side handle*

5. Adjustment Ring for joystick lever hardness: to adjust joystick lever motion (hardness) CWR= hard motion anti-CWR= soft motion
6. 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
7. Adjustment screw for height of operating portion: to adjust operating portion to optimum height by loosening the screw with an accessory wrench
8. Magnet Switch: ON/OFF switch for magnet. (ON: Fixing/OFF: Removing)
9. Iron Plate: to fix micro manipulators



4.3 Injector

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



5. Installation

5.1 Installation to microscope, use 4mm Hex Wrench

- Install the adapter around the microscope pillar
Loosen 2 of the screws
Remove 1 screws
Mounted on the illumination column
Tighten the screws
- Set an iron plate close to microscope. Set Control unit and Injector on the iron plate and fix it by magnetic holder
- 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
- Install Injection Holder on Holder Fixation Part of the universal joint

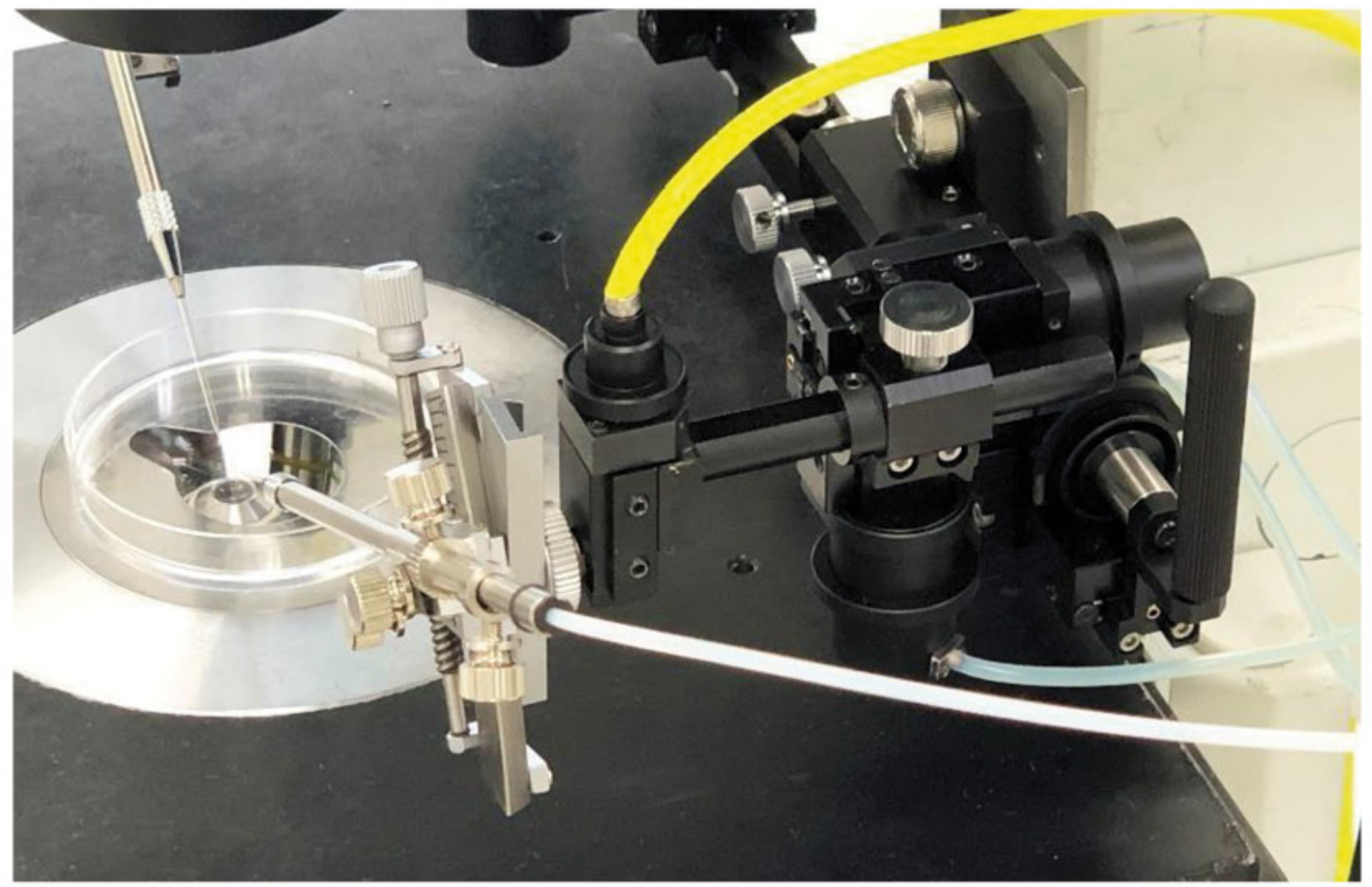


**Drive Unit of the manipulator is equipped when shipping*

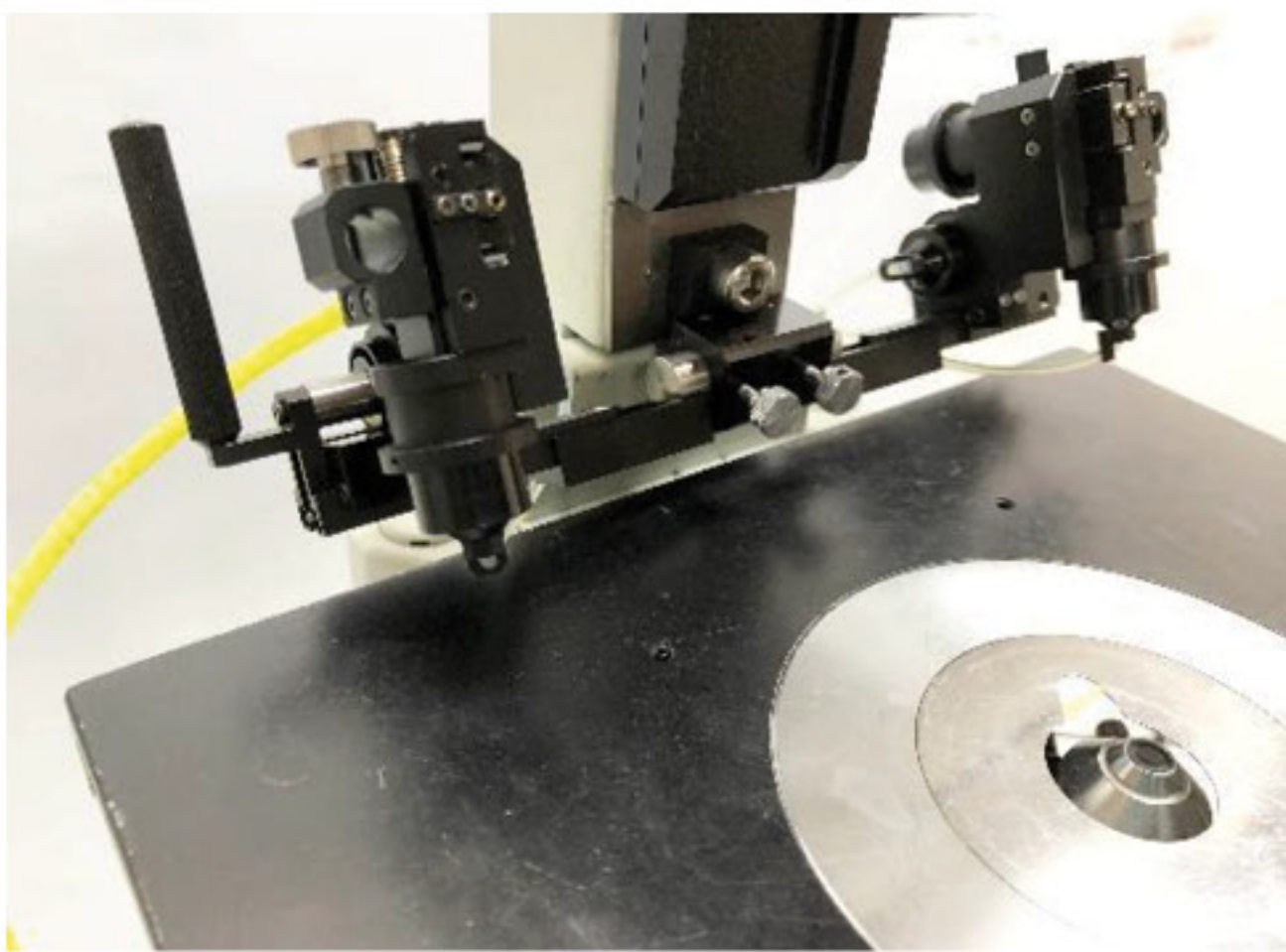
6. Function for Adaptor

6.1 Lift up lever

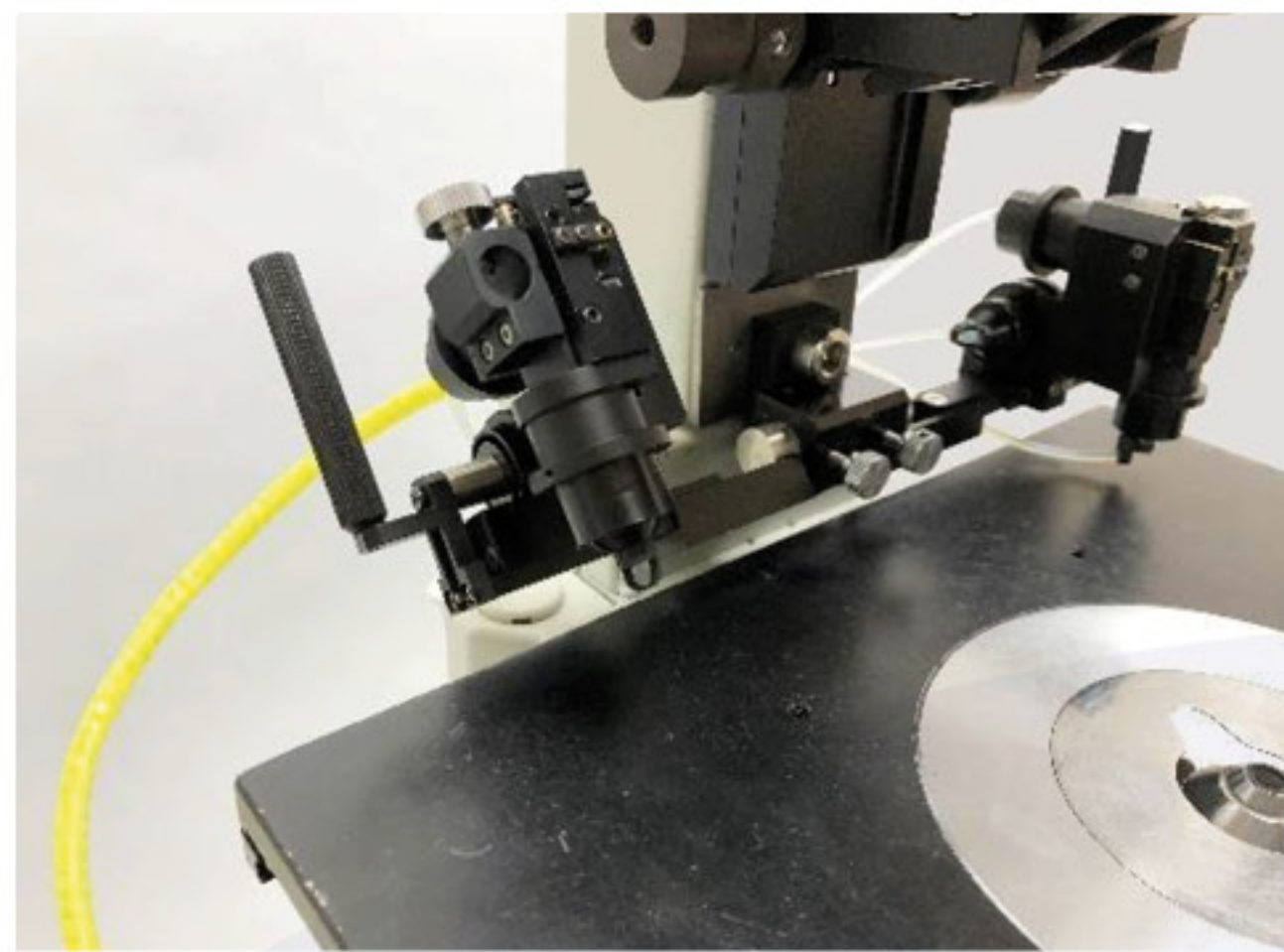
- By defeat to back the return lever, the entire manipulator drive springs up
- By returning to the original lever, so you can be made to return to the same position, you can easily be replaced in the sample



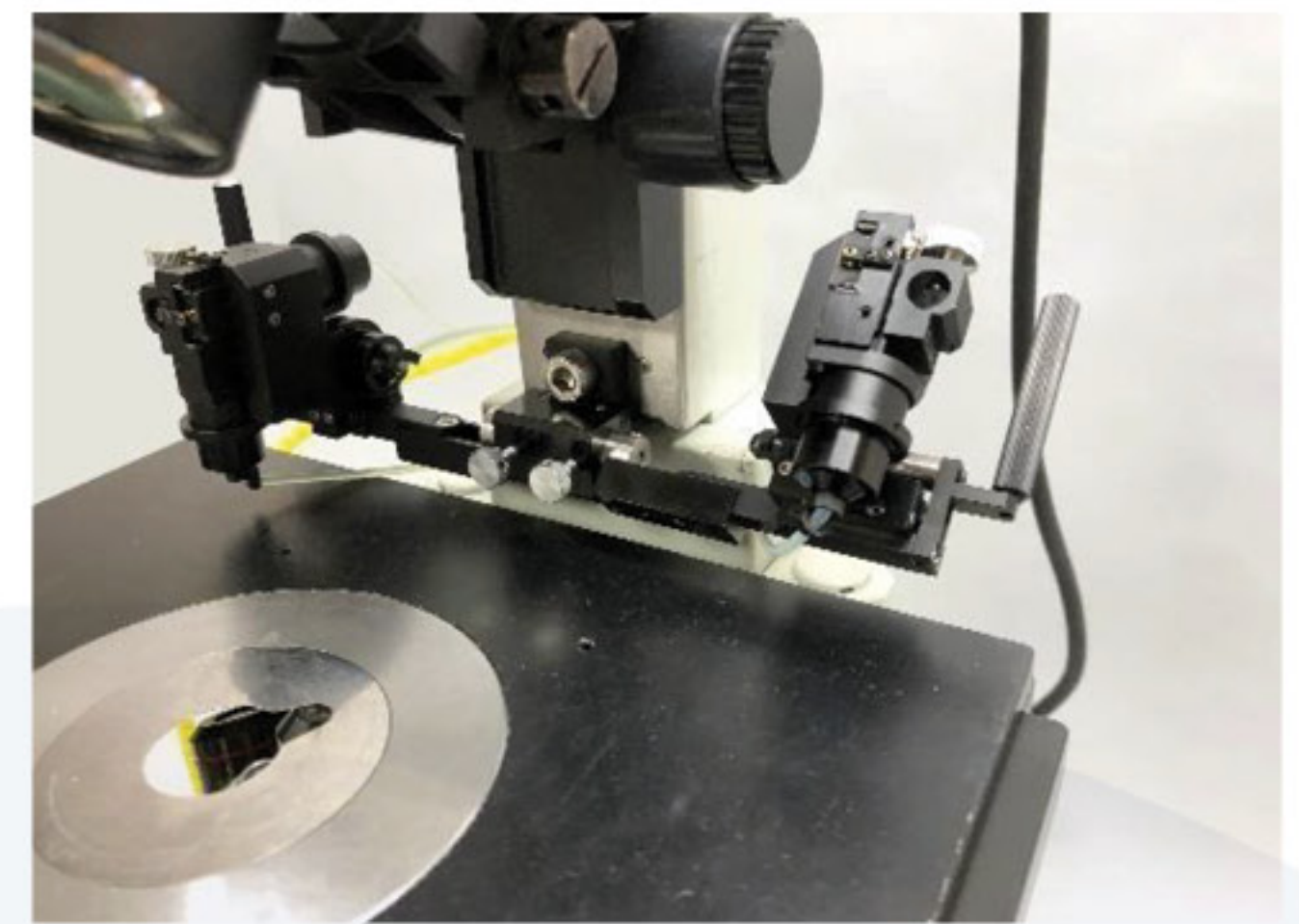
6.2 Type of Lift-up mechanism



Both sides



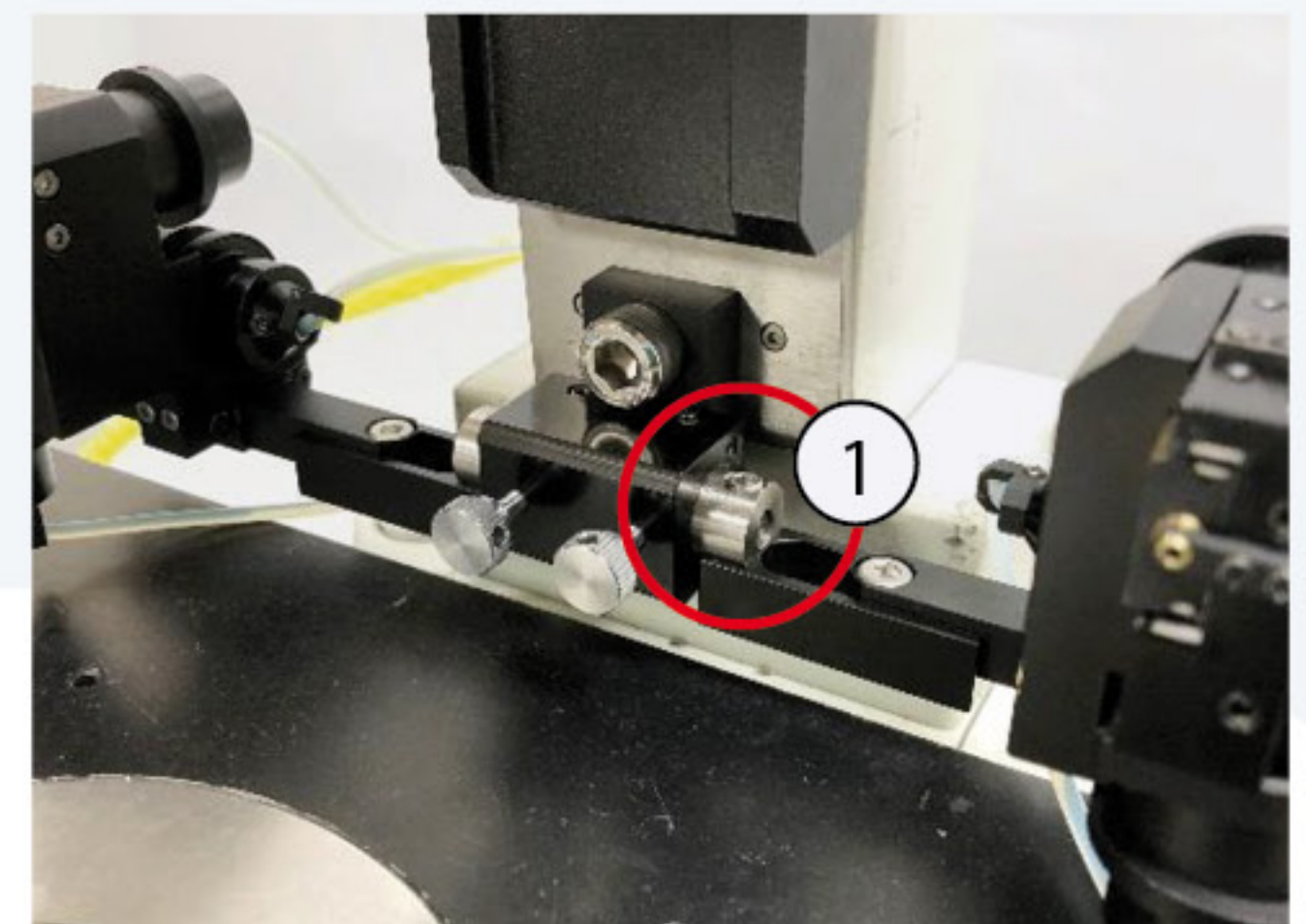
Left side only



Right side only

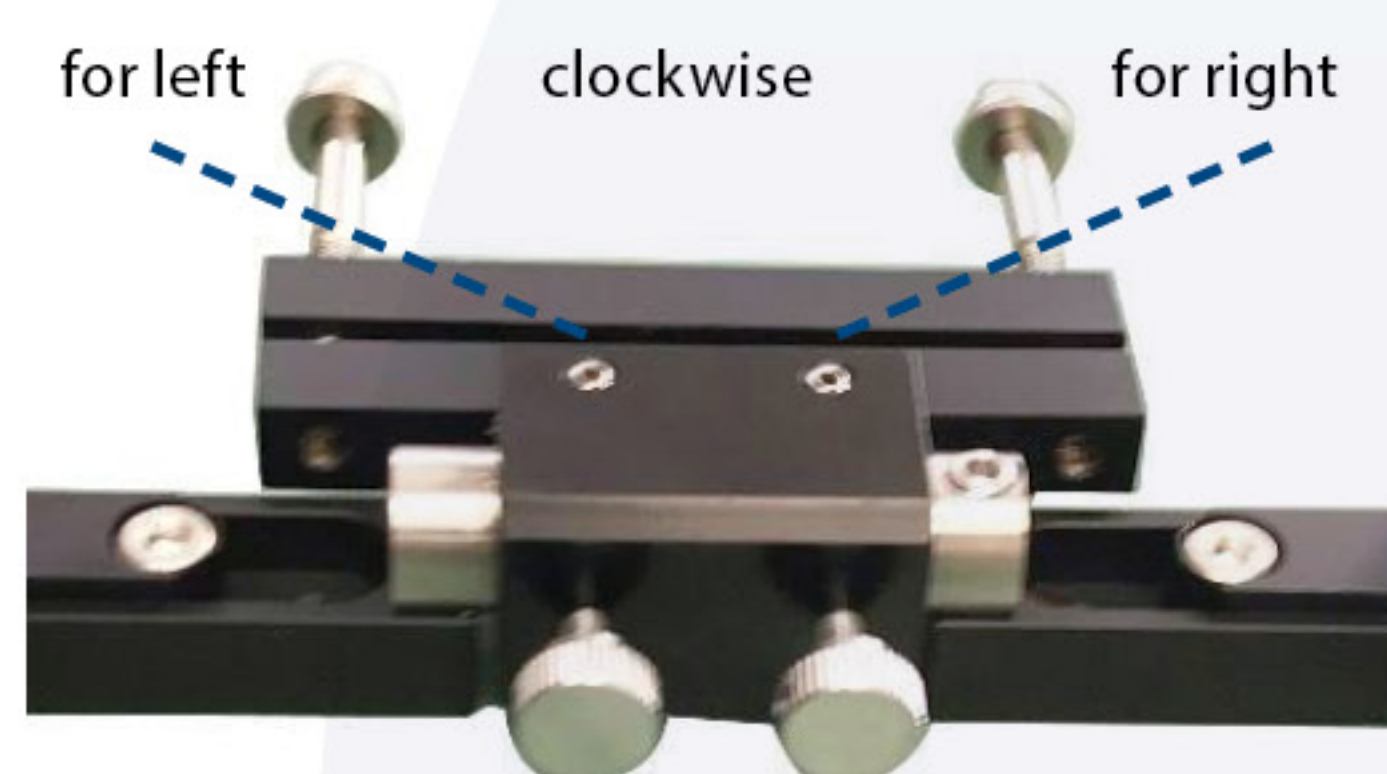
Lock screw - How to use ①

- When you loosen the screw, the both side flip-up separately
*Factory setting is lock. (Both side flip-up)

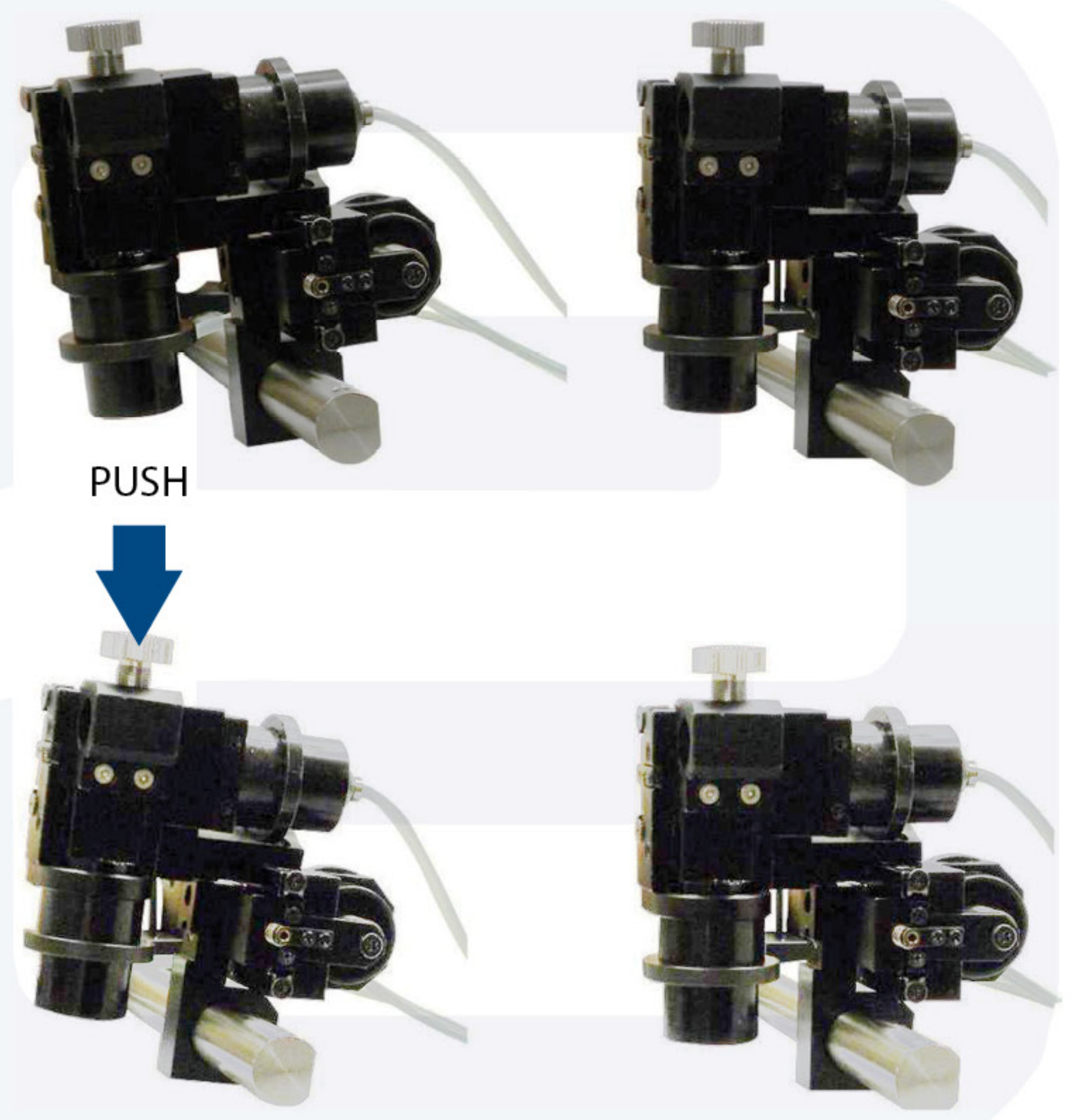
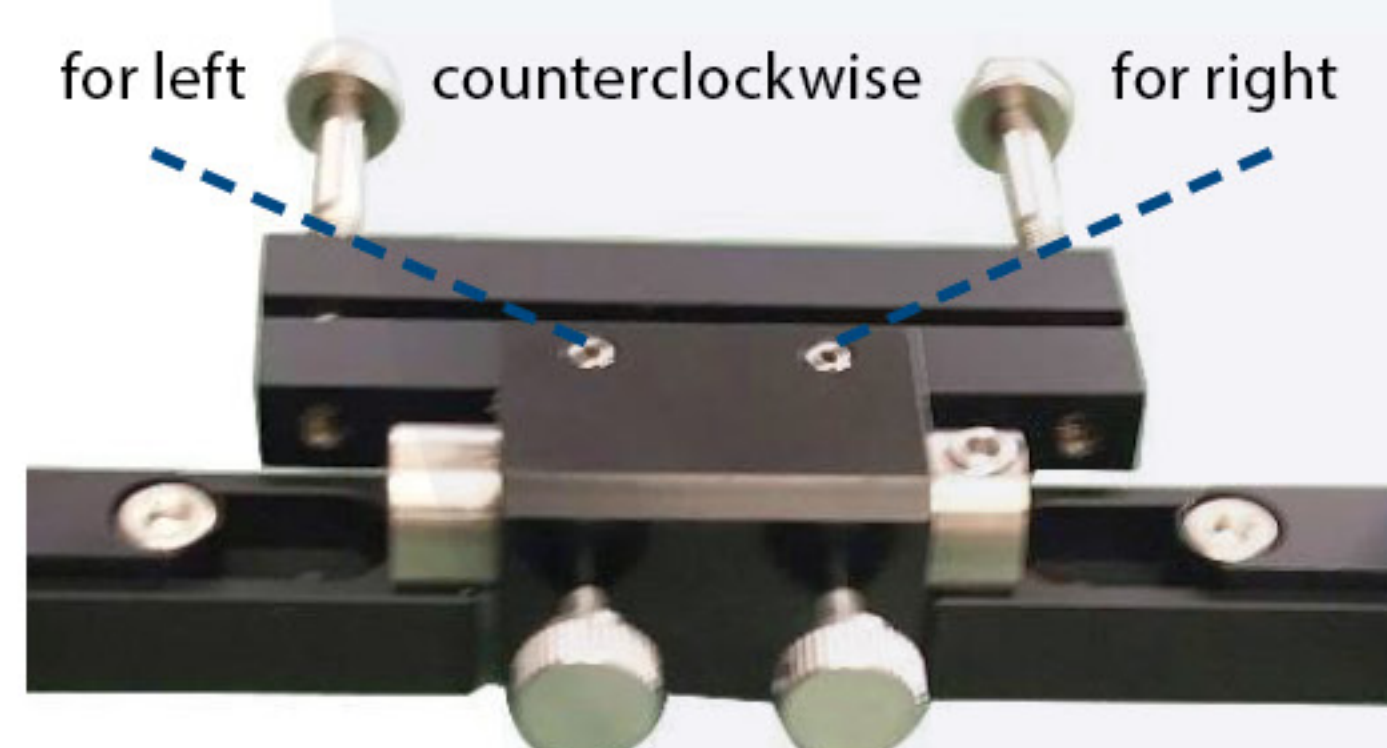


6.3 Angle adjustment Screw

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



7. Operation

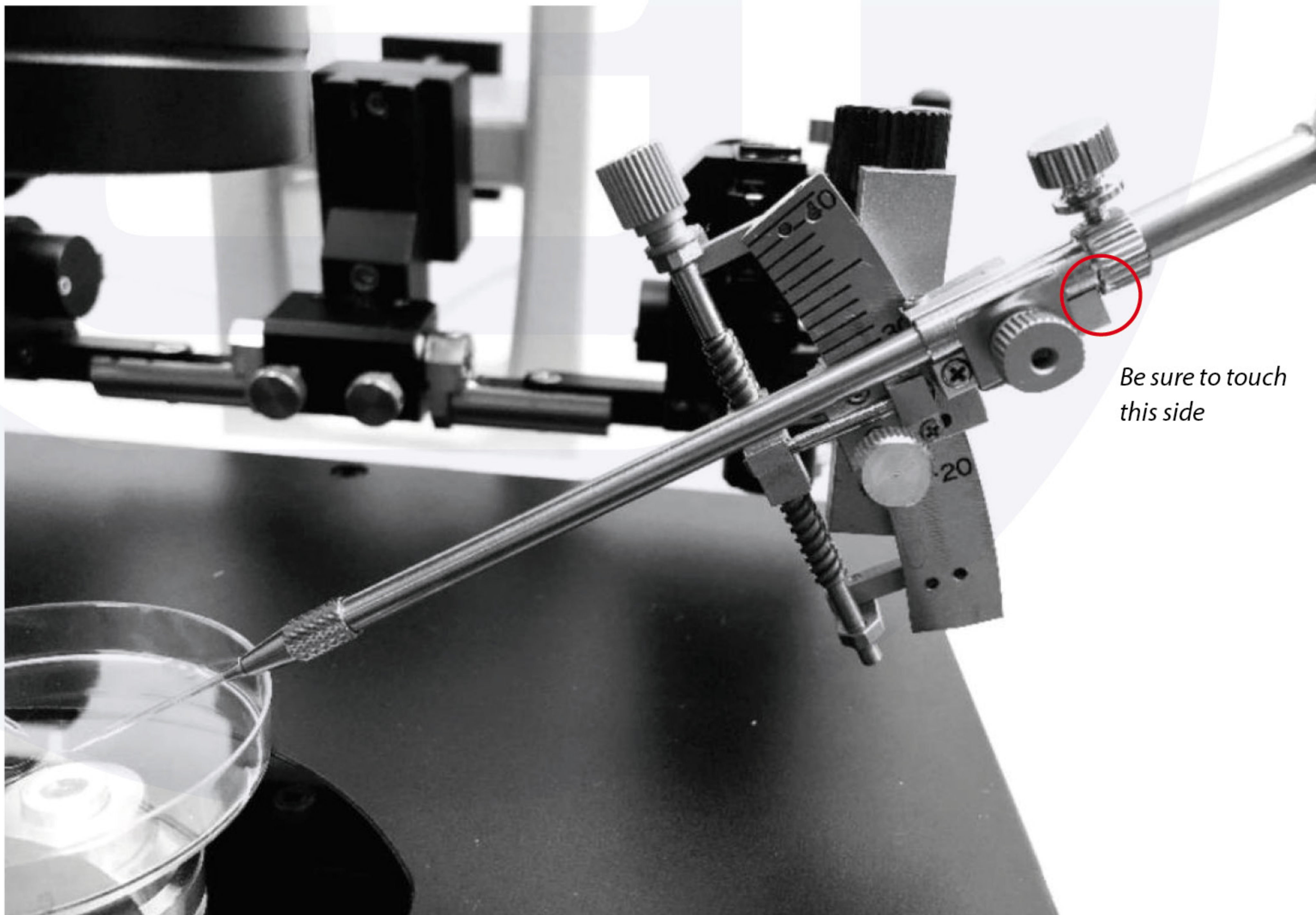
7.1 Set pipette

7.1.1 Install micropipette

- Install micropipette on micropipette Holder (part of injection system)

7.1.2 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



7.1.2

7.1.3 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

7.1.4 Fine-tuning adjustments

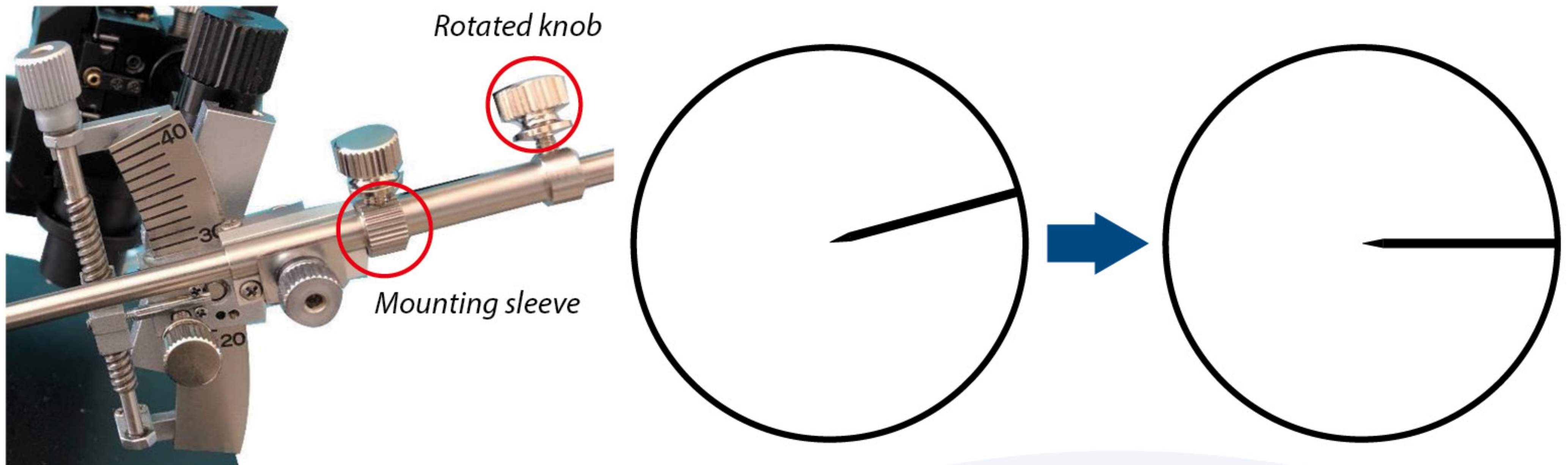
- Back and Forth fine-tuning: for universal joint position
- Right and Left fine-tuning: for position of the interfacing to adapter (block for adapter connection)
- Up and Down fine-tuning: for height of universal joint by loosening height adjustment ring of universal joint
If the height is still not an optimum height, adjust Height Adjustment Block of adapter up and down

7.2 Operation

7.2.1 Rotating Adjust the injection holder

It is used to facilitate relocation or rotation of the injection holder with a bent-tip pipette

- Loosen the screw of Mounting sleeve
- Rotate with the rotated knob and set the pipette to the appropriate position
- Fix the screw of the holder cover again

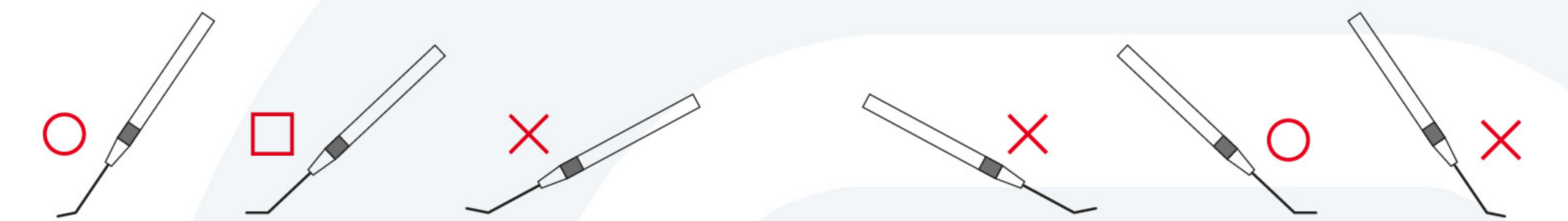


7.2.1

7.2.2 Pipette angle adjustment

Adjust the position of the pipette according to the angle of the pipette.

- Loosen the lock knob and adjust it to an arbitrary angle with the angle adjustment knob
- Fix the lock knob



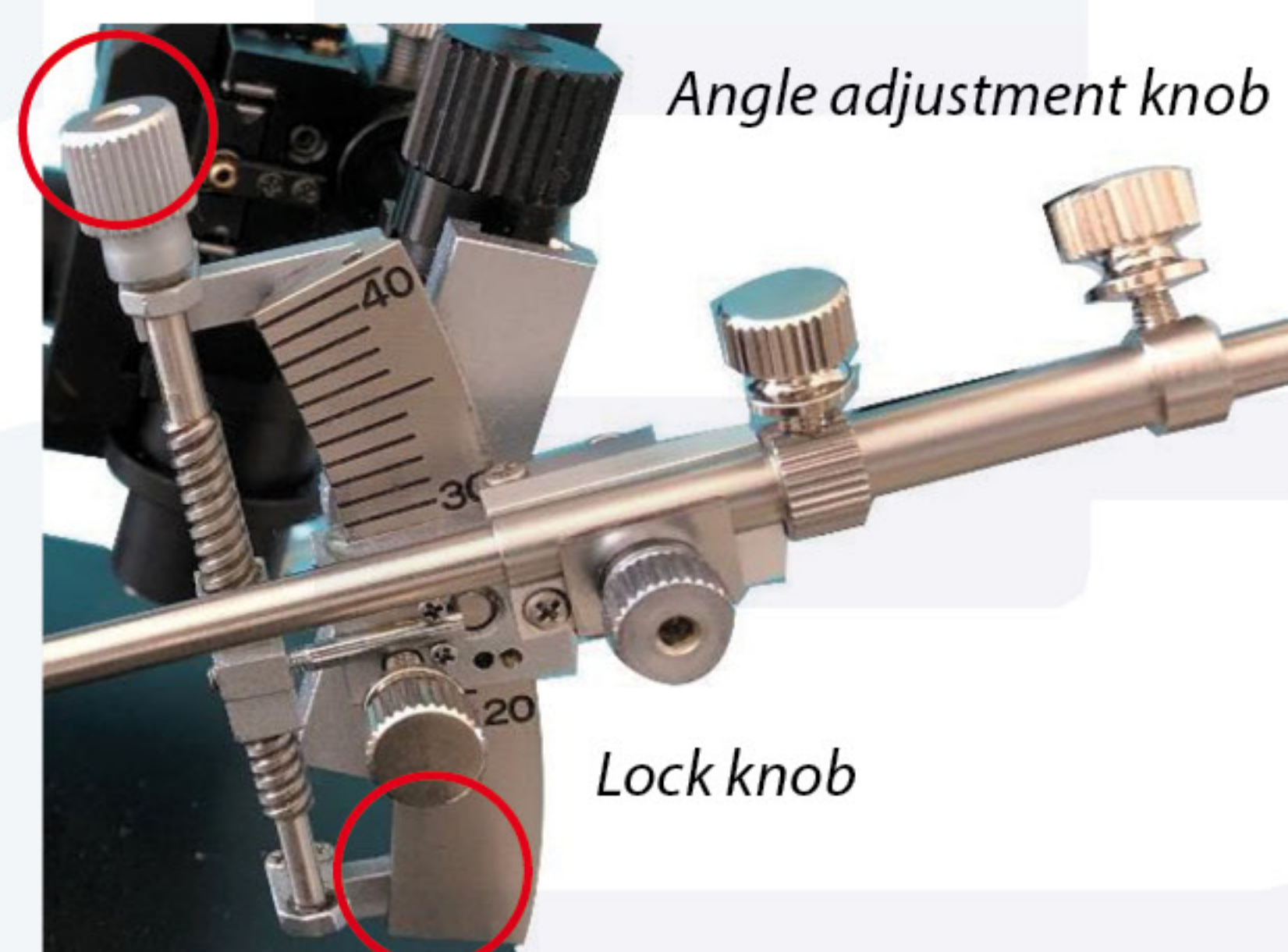
An injection pipette is set so that the tip is at a deeper angle than horizontal

A holding pipette is set so that the tip is horizontal

7.2.2

7.2.3 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



7.2.3

8. Manipulator Operation

8.1 Basic Movement

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

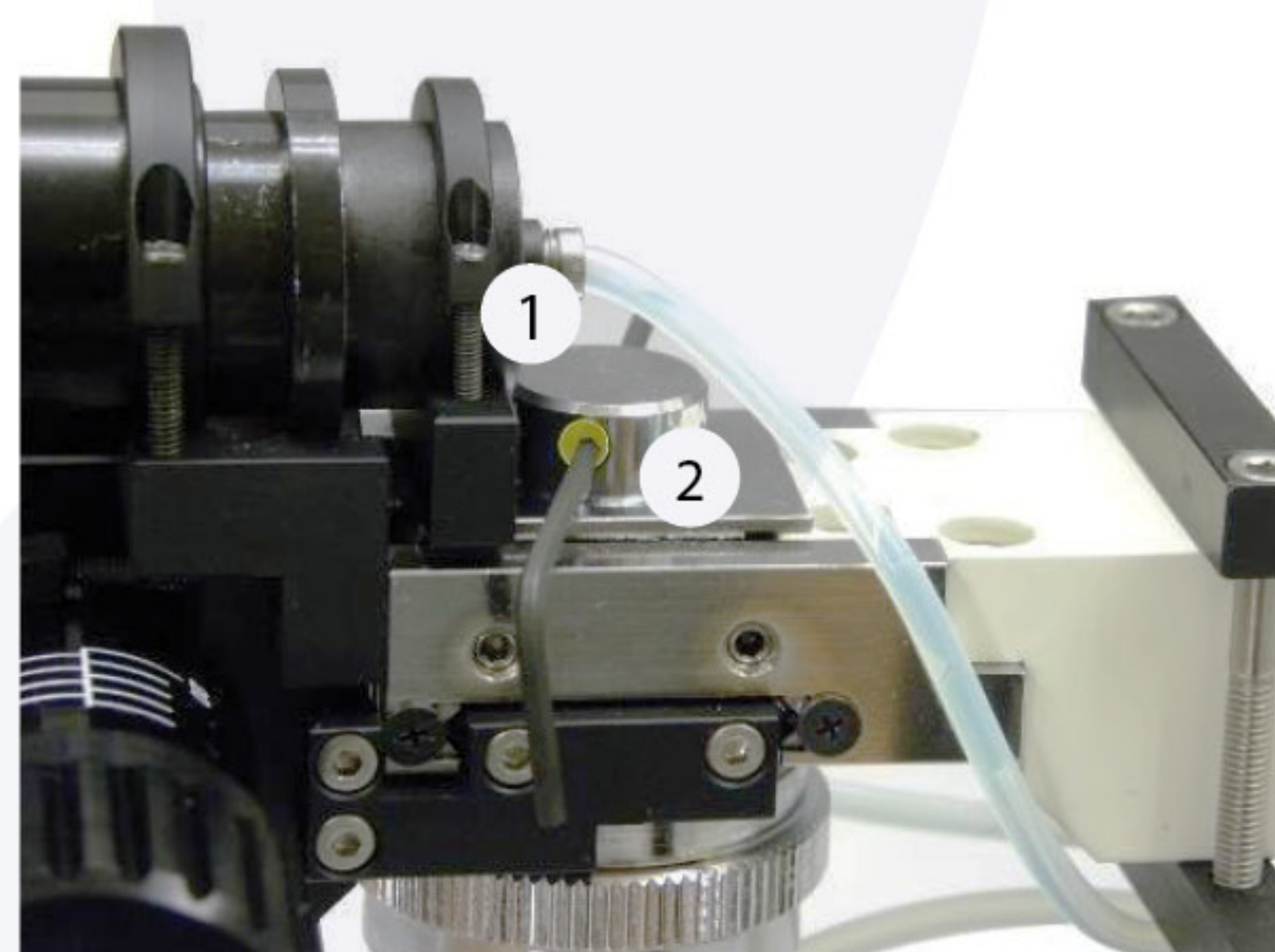
9. Joystick Functions

9.1 The joystick lever motion is adjustable by turning the adjusting knob

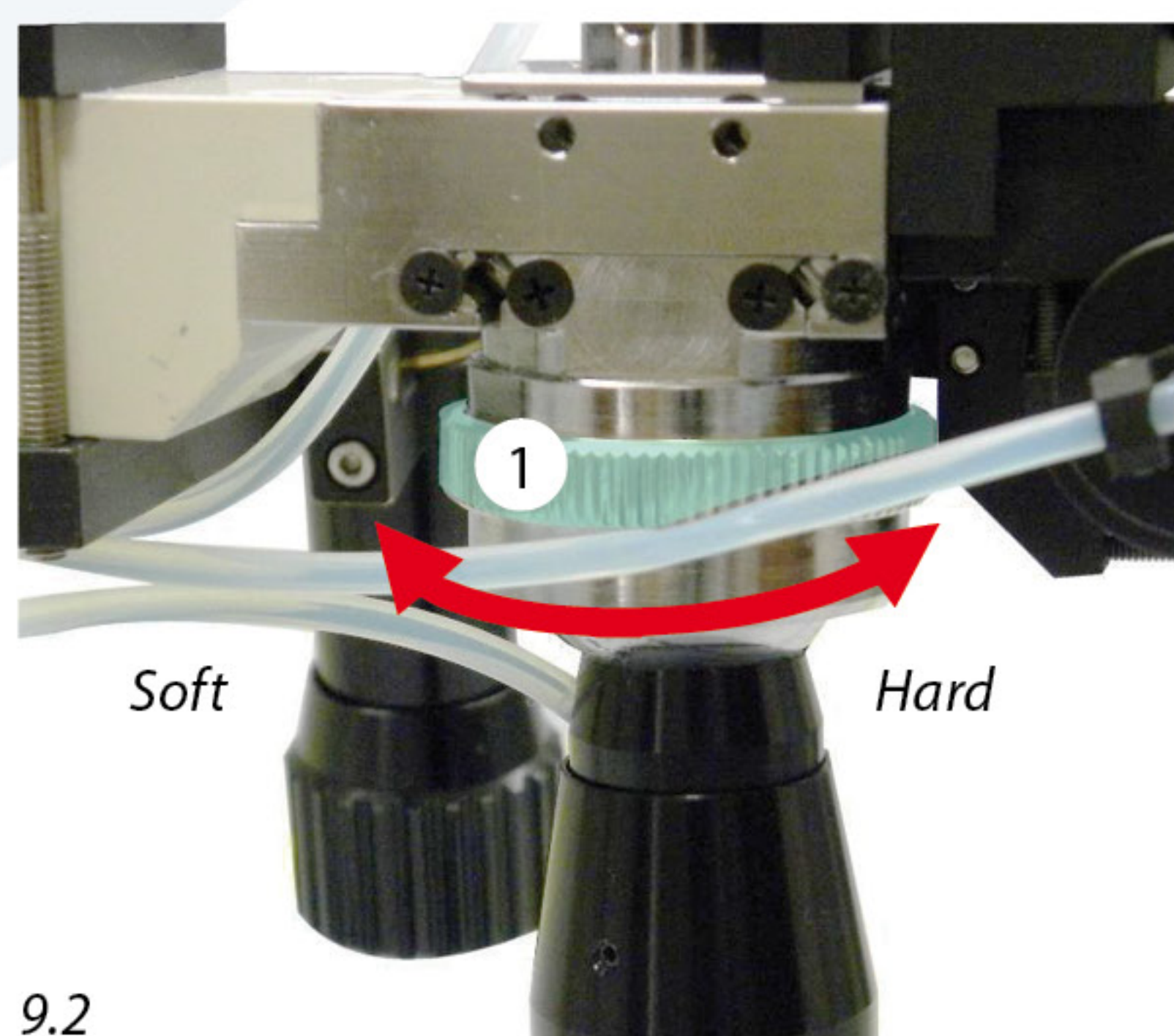
1) Insert a Hex wrench into 2) of the adjusting knob. Rotate it clockwise to make the motion of the joystick on 2D becomes shorter and anti-clockwise to make it larger. *The factory default is set to move from one end to the other within the visual field of microscope at 200X magnification

9.2 Joystick Lever Hardness Adjustment.

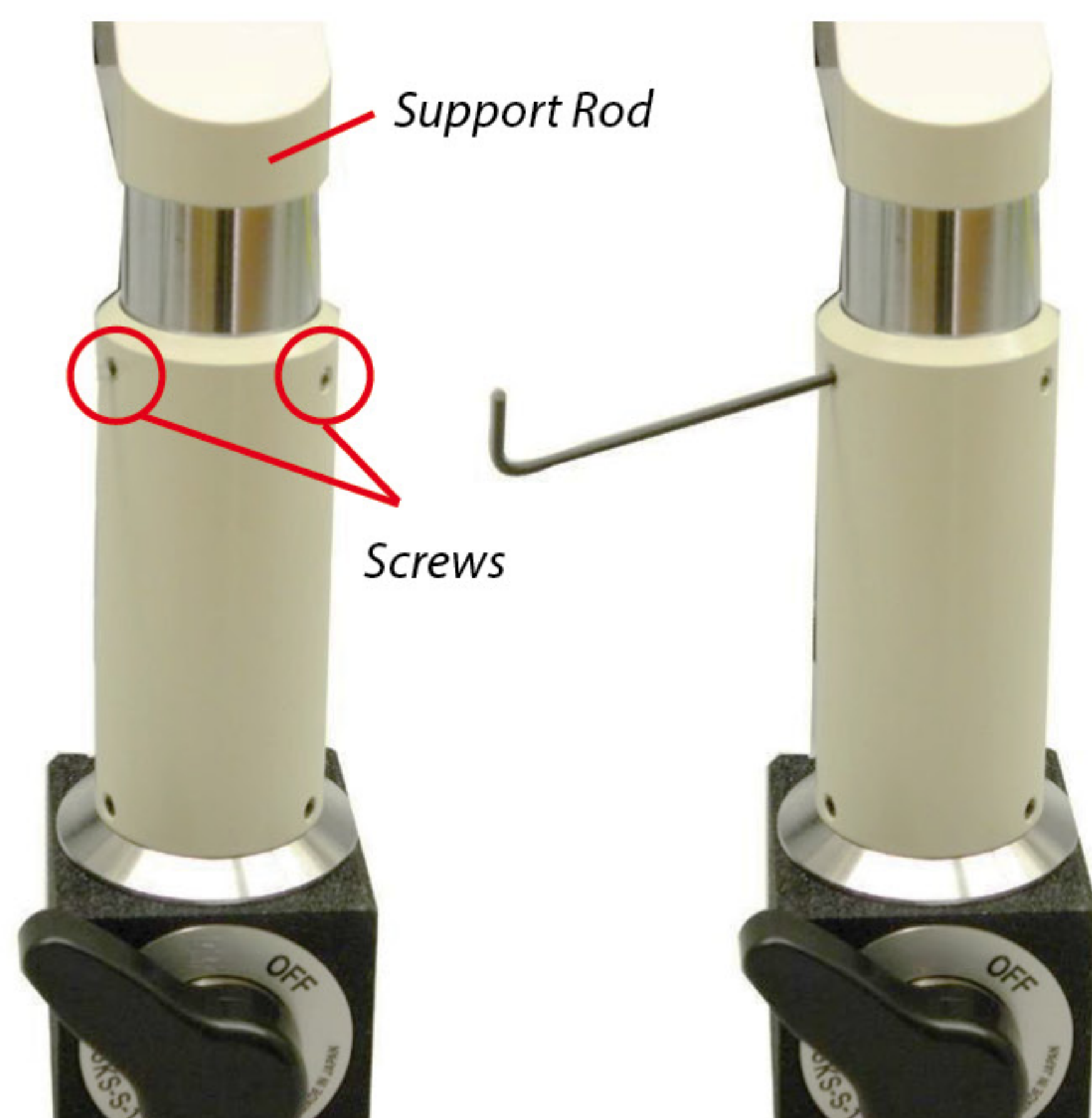
To adjust the joystick lever hardness to a convenient hardness, rotate the Adjustment Ring 1) located at the top of the handle. To make the movements harder turn the ring anti-clockwise and to make it softer clockwise



9.1



9.2



9.3

9.3 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

10. Troubleshooting for joysticks

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

11. Specifications

Description	3D Joystick Hydraulic Micro Manipulator	Description	
Driving Part size	W58xD82xH68 (mm)	Driver Part Weight	250 g
Controller size	W93xD222xH180 (mm)	Controller Weight	1,500 g
Driving Distance	X/Y/Z 20mm	Handle 1 revolution	1 mm
Iron plate size	W32xD140xH64 (mm)	Iron plate Weight	1,280 g

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

12. Safety Before Use for AE.8000



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

12.1 Precautions

12.1.1 Precautions for use

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

12.1.2 Precautions for maintenance and storage

- Do not loosen structural clampers. Do not disassemble the product. It may affect product performance
- 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
- 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

13. Operating handle and pipette handling

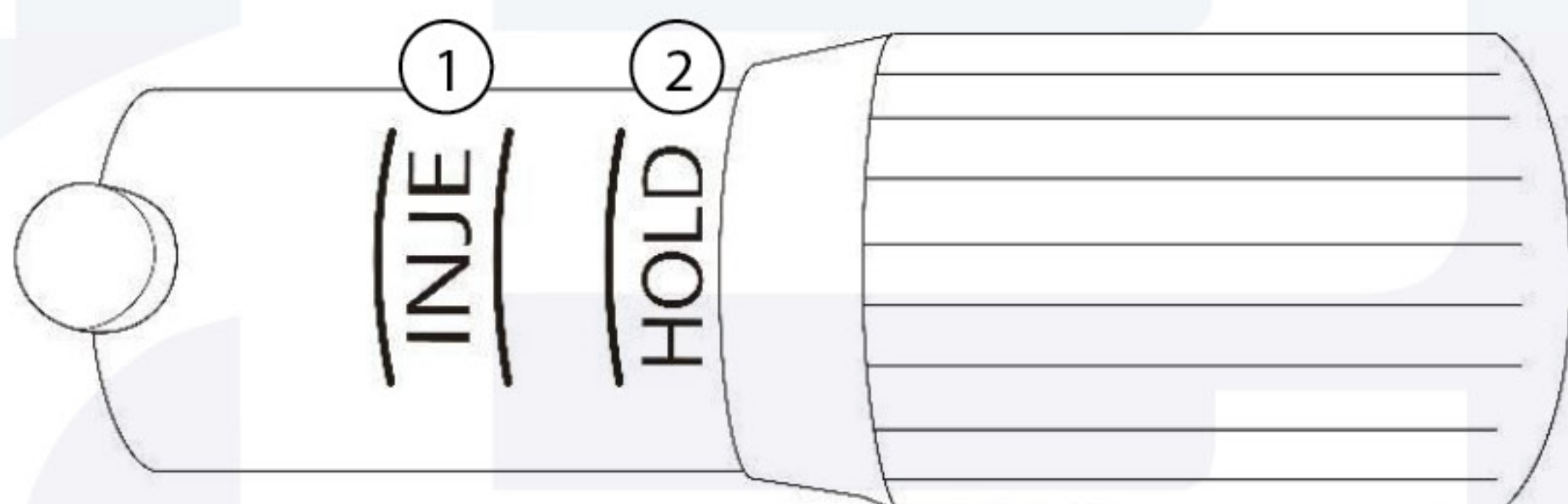
13.1 Operating handle

13.1.1 For injection side

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

13.1.2 For use at hold side

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



13.1.3 Operating

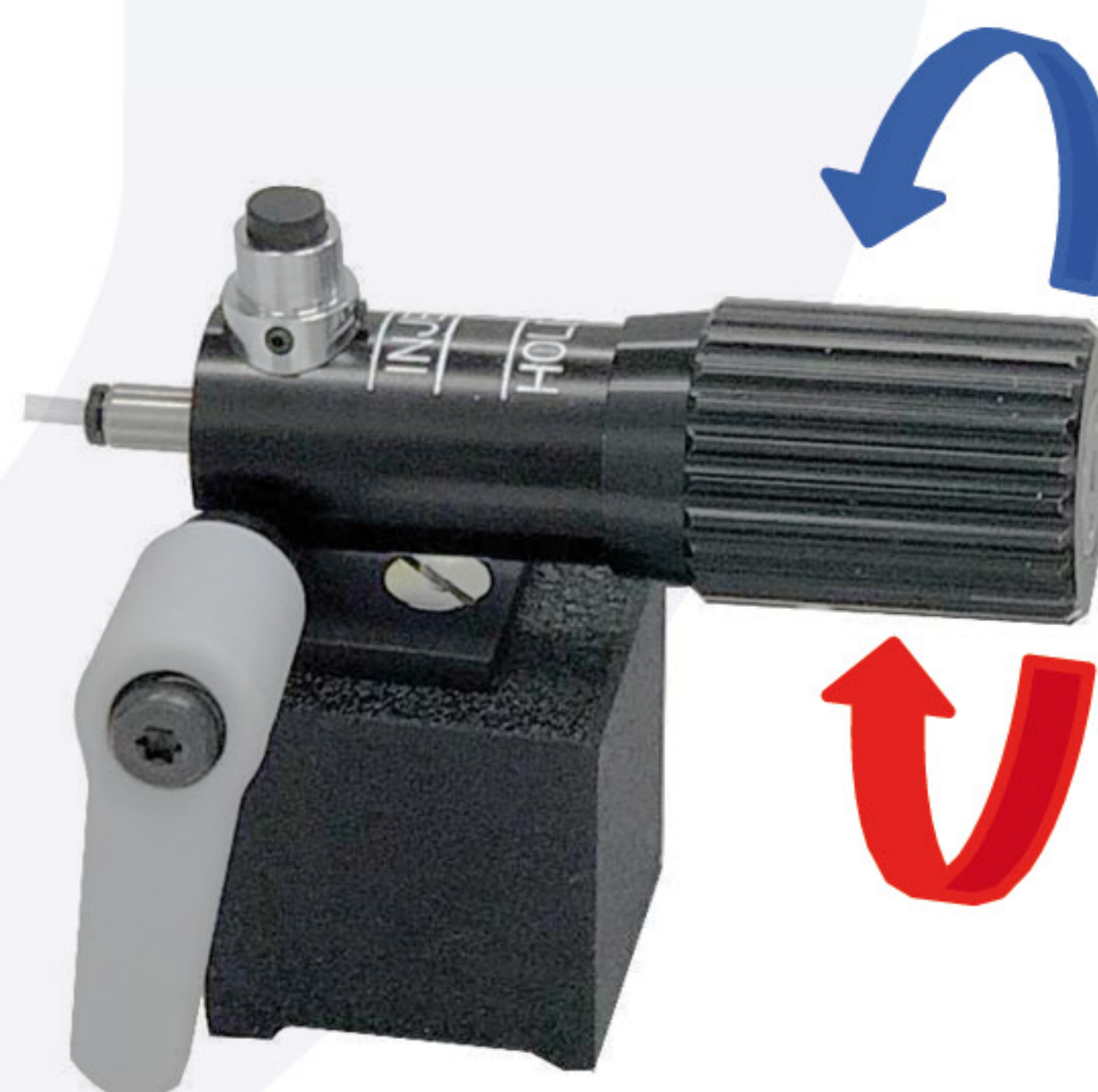
- Injection Pressure Turn anticlockwise to inject
- Aspiration Pressure Turn clockwise to aspirate



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.



13.2 Pipette Handling

13.2.1 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



Cap

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.

Silicon
Packing



Injection
holder



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

13.2.2 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

13.2.3 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



Pneumatic Release Button



**Factory setting*



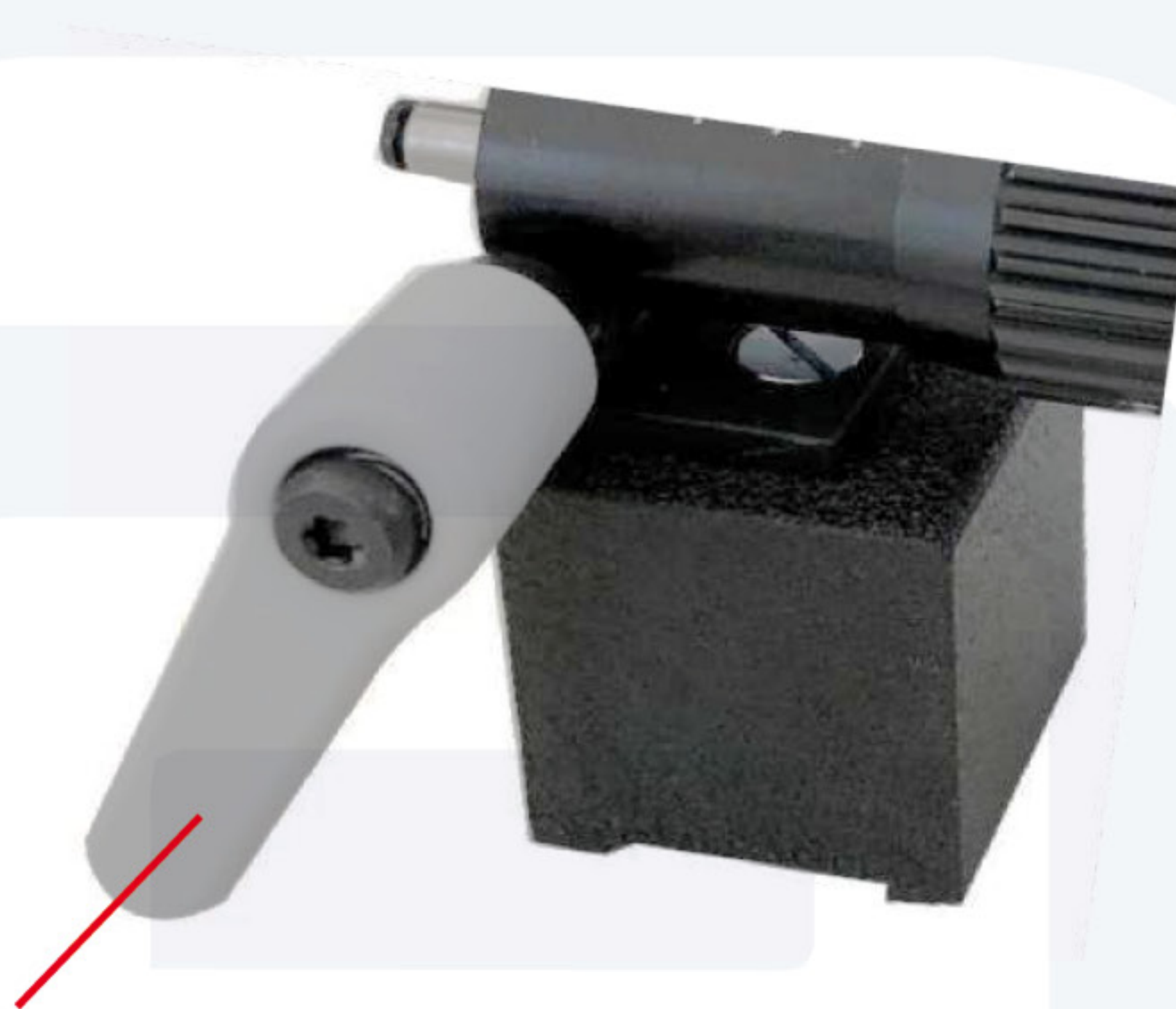
13.2.4 Useful fixing method

It can be adjusted 180 degrees and fixed in place to ensure a bigger space for handling. Recommended for the users having bigger hand

13.2.5 Easy-to screws can be tightened

After screw tightening, the lever position can be moved aside to keep it out of the way

- Rotate the lever to tighten the screw
- Pull the lever up to release the serration engagement, and then return it to its former position



Move the lever part out of the way

14. Maintenance

14.1 Silicon O-ring Replacement

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

- Remove pipette and cleaning rod, and remove Injection Holder Cap from Injection Holder
- 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
- Mount Injection Holder Cap and the procedure is complete



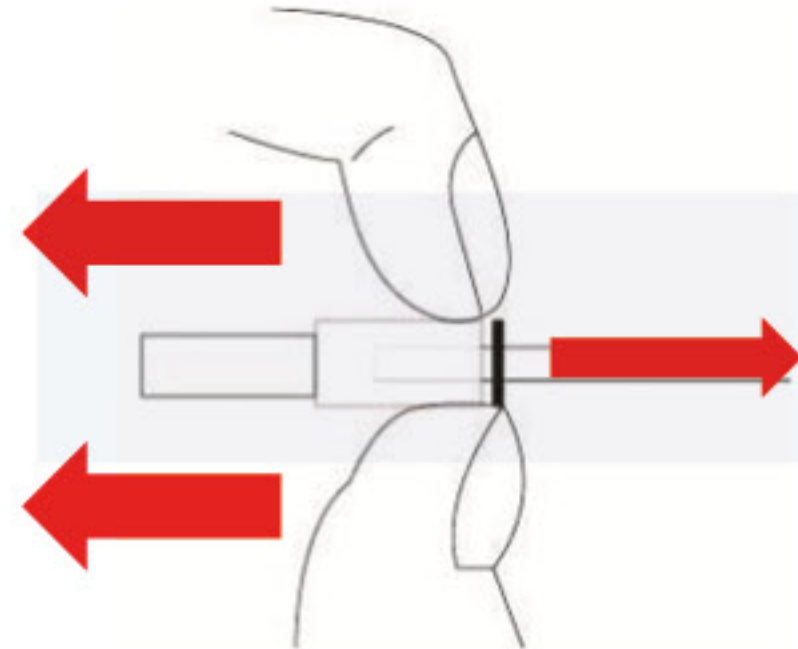
Caution! If silicon O-ring wears, pipette could protrude
Do not point injection holder with micropipette installed at yourself or people



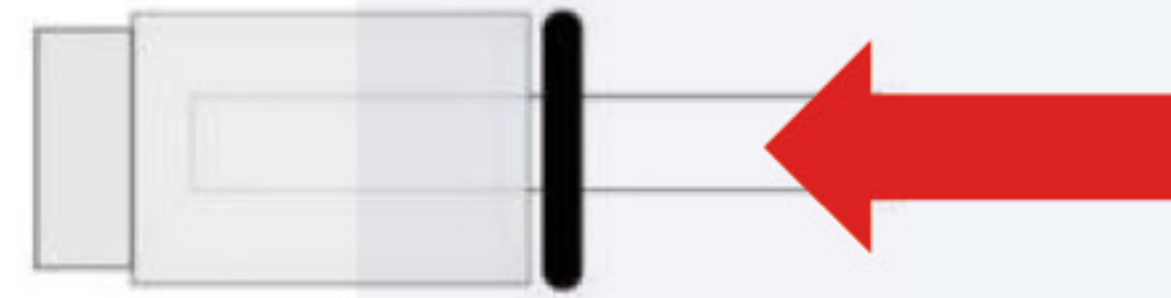
Caution! If you remove micropipette without making pressure balance "0" after operating, micropipette could protrude. Do not point injection holder with micropipette installed at yourself or people. *Please make sure to remove micropipette AFTER making pressure balance "0", AFTER loosening pneumatic release knob

13.2 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

13.3 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

15. Troubleshooting for AE.8000

If fault or malfunction persist, use the following troubleshooting table to address the issue.. If you still have trouble, please contact the your local distributor

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

16. Specifications

Description	Pneumatic Injector	Recheck tube connections. Check silicon O-ring and replace if it is damaged
Injector Size	W47xD71xH70 (mm)	290 g
Driving Distance	15mm	Replace pipette

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