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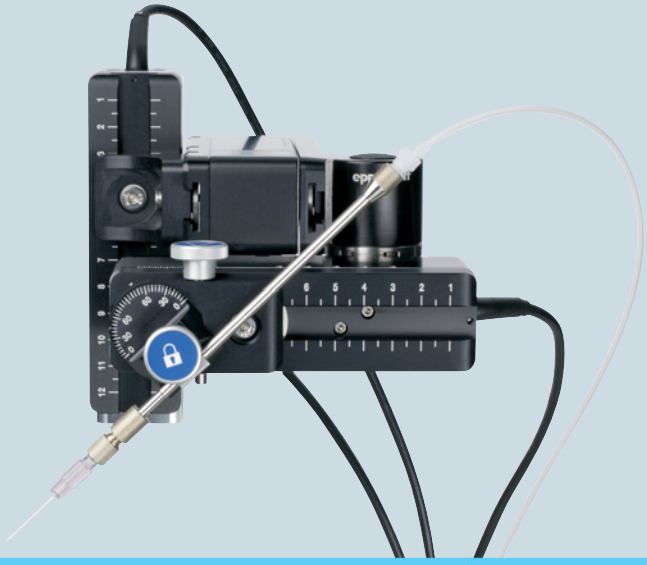


InjectMan® 4

Operating Manual

5192 900 010-05/052022

Table of contents

1 Operating instructions

1.1 Using this manual

- Read this operating manual completely before using the device for the first time. Observe the instructions for use of the accessories where applicable.
- This operating manual is part of the product. Please keep it in a place that is easily accessible.
- Enclose this operating manual when transferring the device to third parties.
- The current version of the operating manual for all available languages can be found on our webpage www.eppendorf.com/manuals.

1.2 Danger symbols and danger levels

1.2.1 Danger symbols

The safety instructions in this manual have the following danger symbols and danger levels:

 **Cuts**	 **Electric shock**
 **Hazard point**	 **Material damage**

1.2.2 Danger levels

DANGER	Will lead to severe injuries or death.
WARNING	May lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display or software texts
	Additional information

2 Safety

2.1 Intended use

The InjectMan 4 has been designed and manufactured for use in biological, chemical and physical research. It is used for the precise positioning of microcapillaries and similar tools as well as for the transfer of very small sample volumes.

The InjectMan 4 has been designed and manufactured for research use only.

The InjectMan 4 is intended exclusively for indoor use and for operation by qualified staff.

2.2 Warnings for intended use

WARNING! Risk of injury due to flying capillaries and glass splinters.
If exposed to high pressures, capillaries may detach themselves from the grip heads and become projectiles.
Capillaries can crack as a result of incorrect handling.

- Wear protective goggles.
- Never aim capillaries at people.
- Use capillaries with an outer diameter that matches the grip head specifications.
- Always mount / dismount capillaries when they are depressurized.
- Mount the capillary correctly in the grip head.
- Do not touch the capillary with the Petri dish or other objects.

CAUTION! Risk of cuts from broken capillaries.
Capillaries are made of glass. They are very sharp and fragile.

- Wear your personal protective equipment (PPE).
- Always mount capillaries depressurized.
- Never aim capillaries at people.
- Handle the capillaries very carefully.

NOTICE! Mechanical damage to the motor modules.
Excessive load leads to increment errors or destruction of the drive.

- Do not drive the modules against mechanical obstructions.
- Do not hold any objects near the modules.
- Load the motor module with a maximum of 200 g.

NOTICE! Device malfunction
Do not use mobile phones or other mobile communication equipment during operation.

- Keep at least a distance of 2 meters.

WARNING! Damage to health due to infectious liquids and pathogenic germs.

- When handling infectious liquids and pathogenic germs, observe the national regulations, the biosafety level of your laboratory, and the manufacturers' Safety Data Sheets and application notes.
- Wear your personal protective equipment.
- For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, the current edition).

CAUTION! Poor safety due to incorrect accessories and spare parts.
The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, functioning and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of accessories and spare parts other than those recommended or from improper use.

- Only use accessories and original spare parts recommended by Eppendorf.

2.3 Warning symbols on the device

Warning symbol	Meaning
	Warns of the risk of injury caused by capillary tips
	Warns of the risk of crushing on the motor module
	Warns of magnetic fields
	Read the instructions for use

2.4 User profile

The device and accessories may only be operated by trained and skilled personnel.

Before using the device, read the operating manual and the instructions for use of the accessories carefully and familiarize yourself with the device's mode of operation.

2.5 Information on product liability

In the following cases, the designated protection of the device may be affected. The liability for any resulting damage or personal injury is then transferred to the owner:

- The device is not used in accordance with the operating manual.
- The device is used outside of its intended use.
- The device is used with accessories or consumables which are not recommended by Eppendorf SE.
- The device is maintained or repaired by persons who were not authorized by Eppendorf SE.
- The user makes unauthorized changes to the device.

3 Product description

3.1 Delivery package

Quantity	Description
1	X-module
1	Y-module
1	Z-module
1	YZ connector
1	Swivel joint
1	Angle head
1	Control board
1	Power cable
1	Cable sheathing
1	Operating manual
1	Short instructions
1	Unpacking instructions

3.1.1 Tools

Quantity	Description
7	Allen key, 1.5 mm, 2 mm, 2.5 mm, 3 mm, 4 mm, 5 mm, 6 mm
1	Allen torque screwdriver, 3 mm
1	Allen screwdriver, 1.3 mm
1	Tool bag

3.1.2 Accessories

Quantity	Description
1	Connecting cable for FemtoJet 4i/FemtoJet 4x
2	Positioning aid for capillary holder
1	Spare parts kit
1	Label

3.2 Features

The InjectMan 4 micromanipulator has been especially developed for work processes that require intuitive movement of the capillary.

The InjectMan 4 combines the classic benefits of a mechanical system with the benefits of an accurate electrically driven system.

The capillary is controlled by a joystick. A greater movement of the joystick results in an acceleration of the capillary movement. The movement ranges enable moving to any position in the working range of the micromanipulator.

The dynamic movement of the joystick is especially suitable for serial injections and working techniques that require fast injection movement.

The software control provides predefined applications, freely programmable softkey functions, a freely programmable application and the storage of different positions in all spatial coordinates.

3.2.1 Suitable accessories

The following accessories from Eppendorf are suitable for use with the InjectMan 4:

- FemtoJet 4i
- FemtoJet 4x
- CellTram 4r Air
- CellTram 4r Oil
- PiezoXpert
- Capillaries
- Capillary holder 4
- Microscope adapter
- Universal stand

3.3 Product overview

The motor module is mounted on a special microscope adapter or on a free-standing tripod (magnetic). The control board is mechanically separated from the motor module.

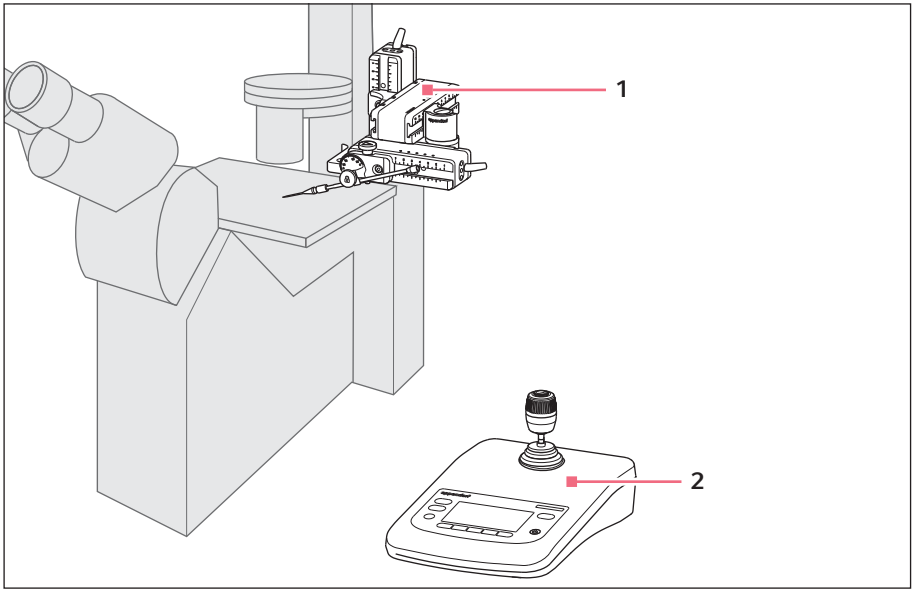


Fig. 3-1: InjectMan 4 – right-hand side mounting

1 Motor module **2 Control board**

3.3.1 Motor module

The motor module is made up of three modules. The capillary can be moved in all three spatial axes due to the layout of the modules. The X-module with the capillary can be swung out of the working range using the swivel joint. The injection angle of the capillary can be set to any angle on the angle head.

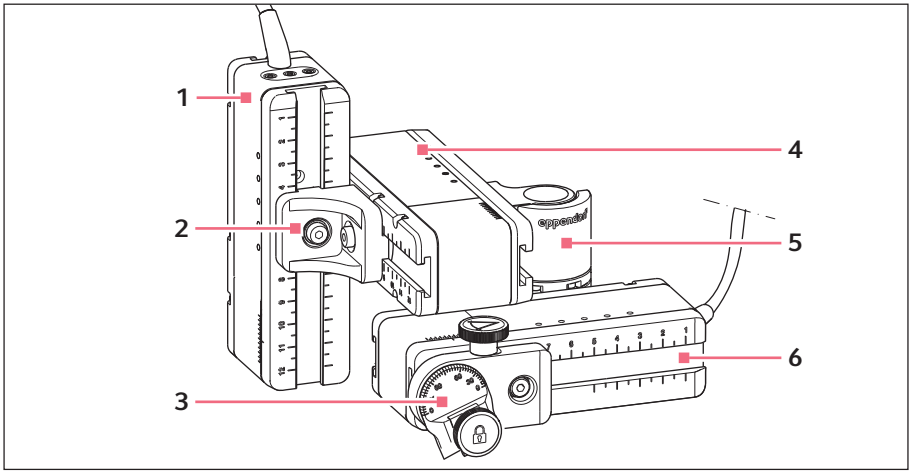


Fig. 3-2: Motor module – right-hand side mounting

1 Z-module
2 YZ connector
3 Angle head
4 Y-module
5 Swivel joint
6 X-module

3.3.2 Microscope adapter

The motor module is mounted at an adapter for microscope. There is a special adapter for each type of microscope. The adapters for microscope are either mounted horizontally or vertically.

The adapter for microscope is not included in the delivery package.

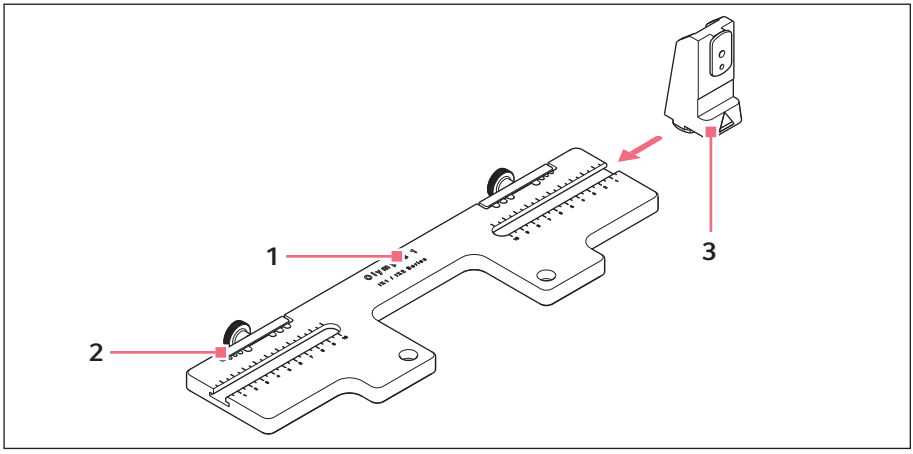


Fig. 3-3: Adapter for microscope for horizontal mounting – example Olympus 1

1 Designation including the type of microscope

2 Cable conduit

3 Z-module holder
For horizontally mounted adapters for microscope

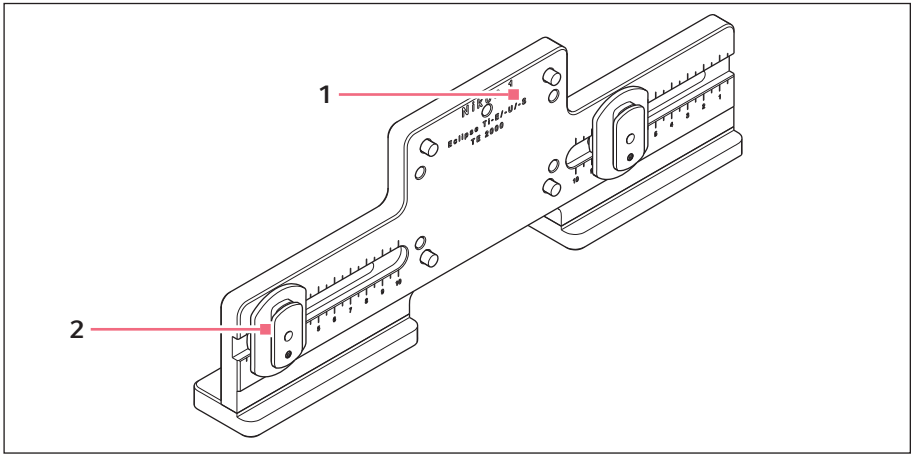


Fig. 3-4: Adapter for microscope for vertical mounting – example Nikon 1

1 Designation including the type of microscope

2 Z slide shoe
For vertically mounted adapters for microscope

3.3.3 Control board

The control board contains the key pad, the display and the joystick, and, to the side, the selection dial. The direction of movement and the speed of the joystick are transferred to the capillary. The responsitivity of the movement and the size of the working range are predefined in the software setting. On the control panel, the working range can be selected and modified via the selection dial.

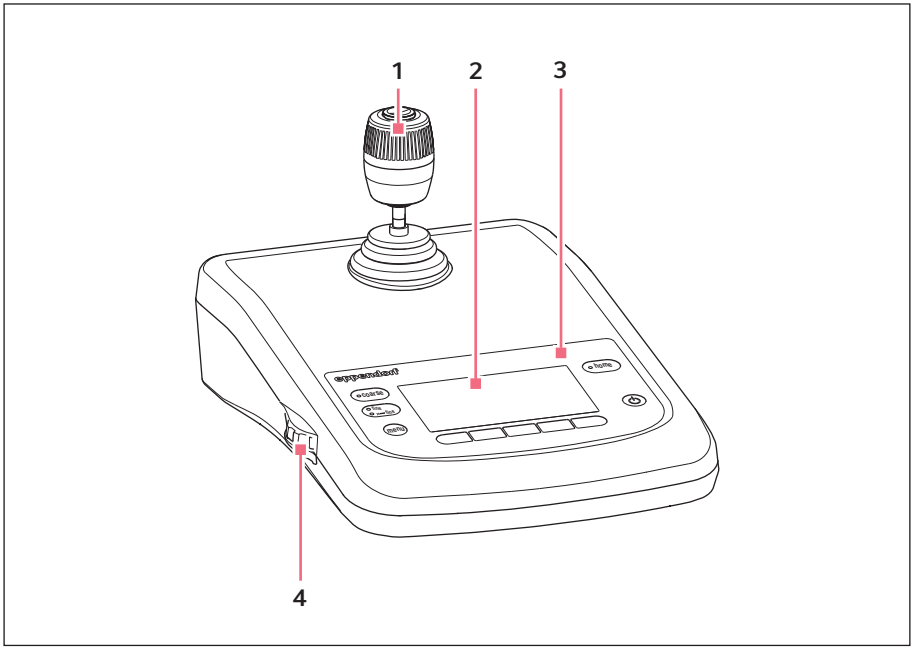


Fig. 3-5: Control board - front

1 Joystick
Dynamic movement

2 Display

3 Control panel

4 Selection dial
For increasing or reducing the speed

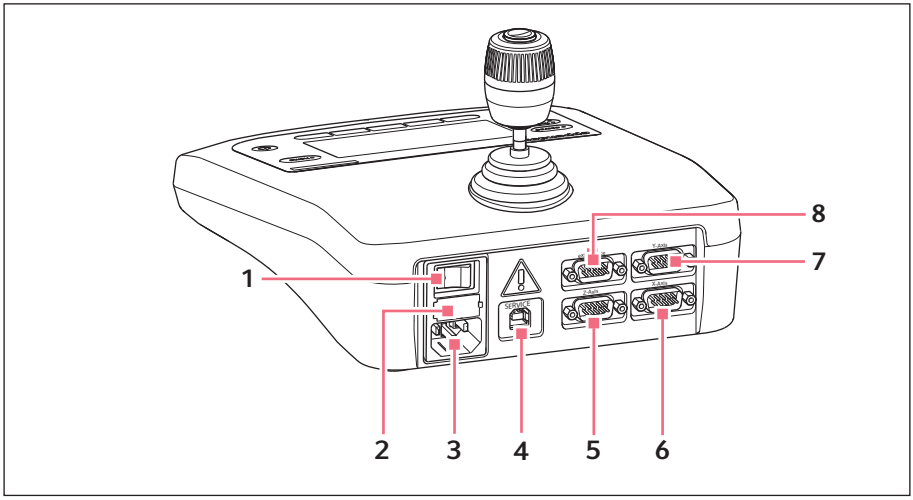


Fig. 3-6: Control board - rear

1 **Mains/power switch On/Off**

2 **Micro fuse**

3 **Mains/power connection**

4 **Service connection**

5 **Connection for a Z-module**

6 **Connection for an X-module**

7 **Connection for a Y-module**

8 **Connection for an external device**
Foot control, FemtoJet, FemtoJet express, PiezoXpert or PC

3.3.4 Tool

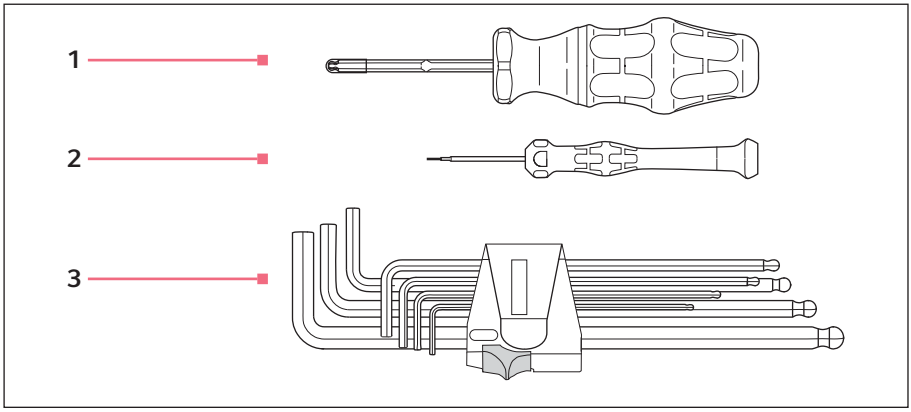


Fig. 3-7: Tool

1 Allen torque screwdriver
3 mm

2 Allen screwdriver
1.3 mm

3 Allen key
1.5 mm, 2 mm, 2.5 mm, 3 mm, 4 mm, 5 mm, 6 mm

3.4 Control panel

With the keys on the control panel you can switch on the control board and select the size of the working range. The softkeys are used to open applications, execute functions, navigate the menu and set parameters.

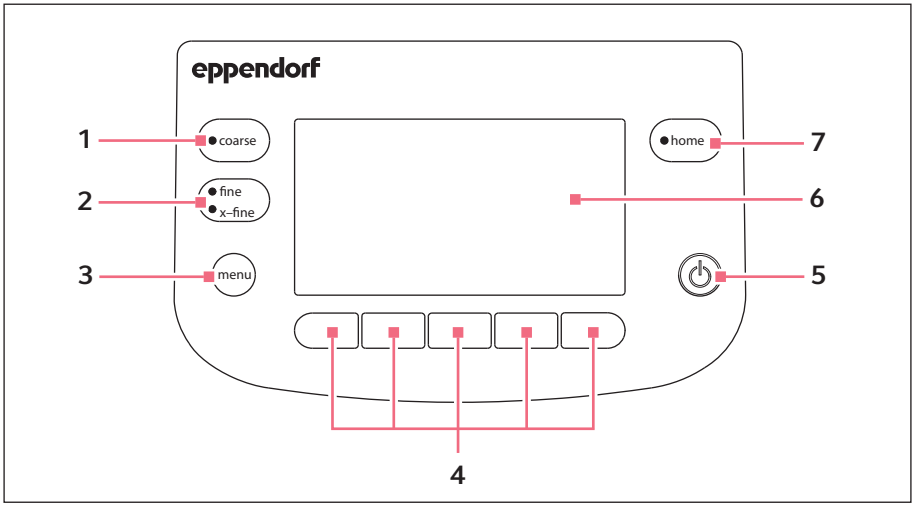


Fig. 3-8: Control panel

1 ***coarse*** **key**
Sets the large working range

2 ***fine/x-fine*** **key**
Sets the medium or small working range

3 ***menu*** **key**
Opens the menu

4 **Softkeys 1 – 5**
Select the application, trigger the function, navigate or set parameter values

5 ***standby*** **key**
Switches the control board on or off or cancels automatic movements

6 **Display**
Displays the software

7 ***home*** **key**
Moves the capillary out of the working range to a defined position

3.5 Joystick

The joystick controls the capillary in all three spatial axes. The movement of the capillary is accelerated the further the joystick is moved forwards or backwards.

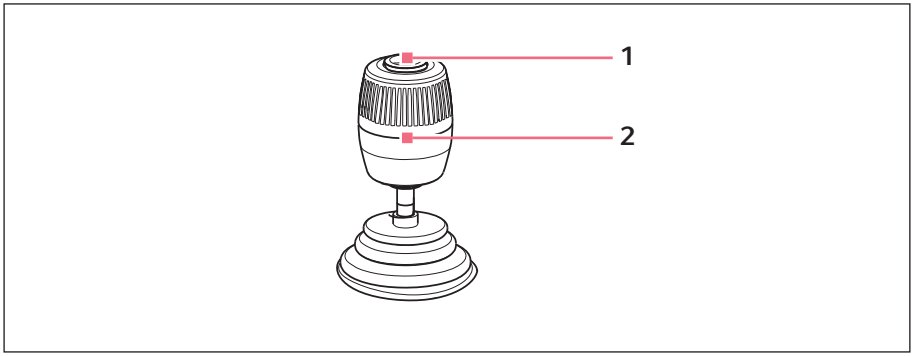


Fig. 3-9: Joystick

1 Joystick key

2 Joystick
Controls movements in the X, Y and Z-axis

3.5.1 Dynamic range

The size of the dynamic range is limited by the movement range of the modules (X, Y and Z).

When the joystick is moved, the capillary starts moving into the direction of the joystick movement. The movement of the capillary is accelerated the further the joystick is moved. The movement stops when the joystick is released.

3.5.2 Direction of movement of the joystick

The joystick can be moved along the horizontal plane. This controls the motors of the X-module and the Y-module. The joystick can be moved in one axis at a time or in a combination of axes. Rotating the joystick moves the motor module on the vertical axes.

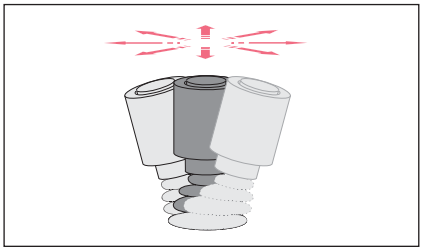


Fig. 3-10: Movement in the X and Y-axis

- Move the capillary in the horizontal direction (X and Y-axis).

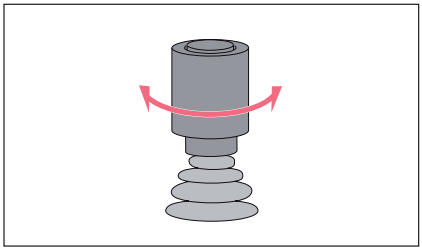


Fig. 3-11: Movement in the Z-axis

- Move the capillary in the vertical direction (Z-axis).

3.5.3 Joystick key functions

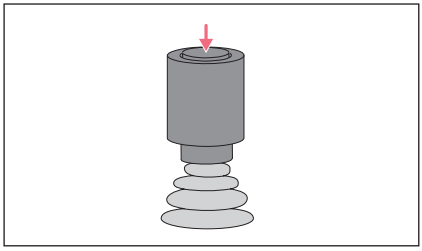


Fig. 3-12: Function

- Trigger function (e.g., trigger injection).

3.6 Speed ranges

There are three speed ranges in the movement range of the joystick. The speed can be set using the selection dial on the control board and in the *Speed* menu.

Speed ranges:

- *coarse* – for a large working range
- *fine* – for a medium working range
- *x-fine* – for a small working range

4 Installation

4.1 Preparing installation

NOTICE! Damage to the control board as a result of incorrect handling.

- Grasp the control board on the housing.
- Do not lift the control board using the joystick.
- Never place the control board on the joystick.

Keep the packaging and the transport securing devices for later transport or storage.

Do not operate the device if there is visible damage to the device itself and/or to its packaging.

1. Check the packaging for damage.
2. Carefully remove the motor module and the control board from the packaging.
3. Check that everything is included in the delivery.
4. Check the modules, the control board and the accessories for damage.

4.1.1 If there is any damage, make a claim

- Contact customer service.

4.1.2 Delivery incomplete

- Contact customer service.

4.1.3 Microscope adapter assembly

The microscope adapter is not included in the scope of delivery and must be ordered separately.

- Assemble the microscope adapter in accordance with the assembly instructions for the microscope adapter.

4.2 Selecting the location

Select the location for the device according to the following criteria:

- Mains/power connection in accordance with the name plate.
  The mains/power supply must be equipped with a residual current circuit breaker.
- A bench with a horizontal and even work surface which is designed to support the weight of the devices.
- A mat or bench that is cushioned against vibrations.
- A mat or bench that is cushioned against vibrations.

The mains/power switch and the disconnecting device for the mains/power line must be easily accessible during operation (e.g., a residual current circuit breaker).

4.3 Mounting overview

4.3.1 Mounting with horizontal microscope adapter

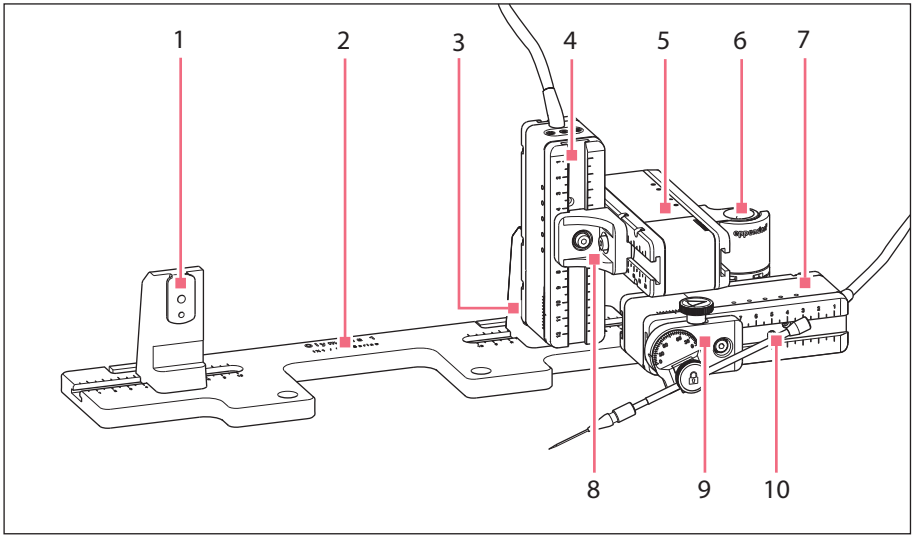


Fig. 4-1: Overview for right side mounting

1 Z-module holder
Position for left side mounting

2 Designation of the microscope adapter

3 Z-module holder
Position for right side mounting

4 Z-module

5 Y-module

6 Swivel joint

7 X-module

8 YZ connector

9 Angle head

10 Capillary holder 4
(not included in the delivery package)

4.3.2 Mounting with vertical microscope adapter

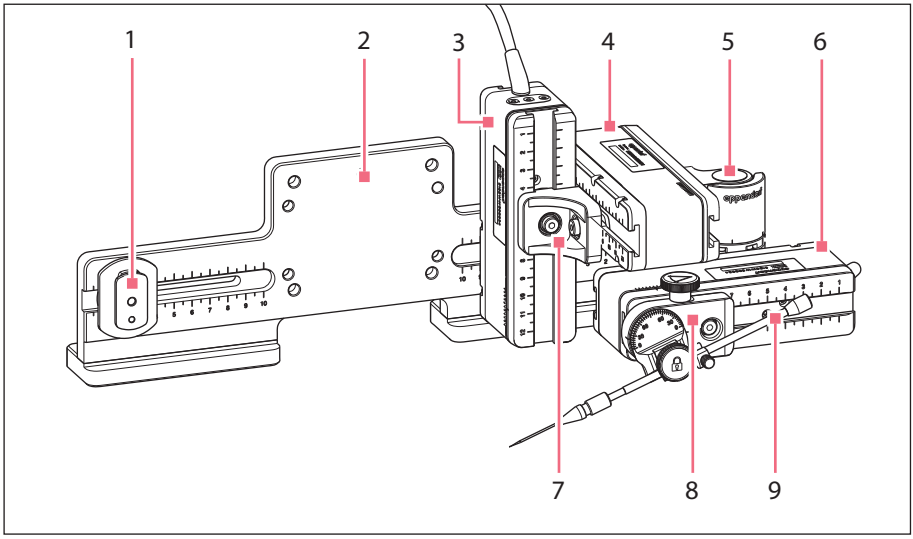


Fig. 4-2: Overview for right side mounting

1 Z-slider

2 Designation of the microscope adapter

3 Z-module

4 Y-module

5 Swivel joint

6 X-module

7 YZ connector

8 Angle head

9 Capillary holder 4
(not included in the delivery package)

4.3.3 Module (X, Y, Z)

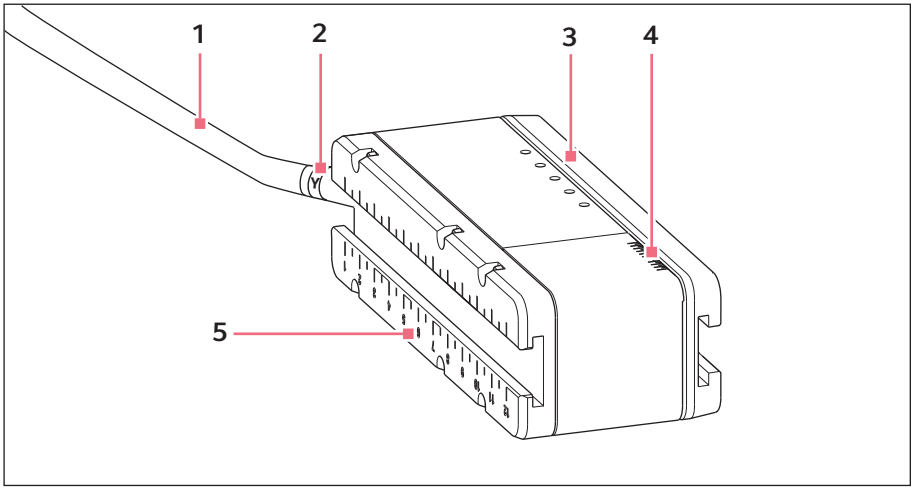


Fig. 4-3: Y-module (example)

1 Cable

2 Module identification

3 Movable rail

4 Scale
Movement range of the rail

5 Fixed rail

4.3.4 Z-module holder – horizontal microscope adapter

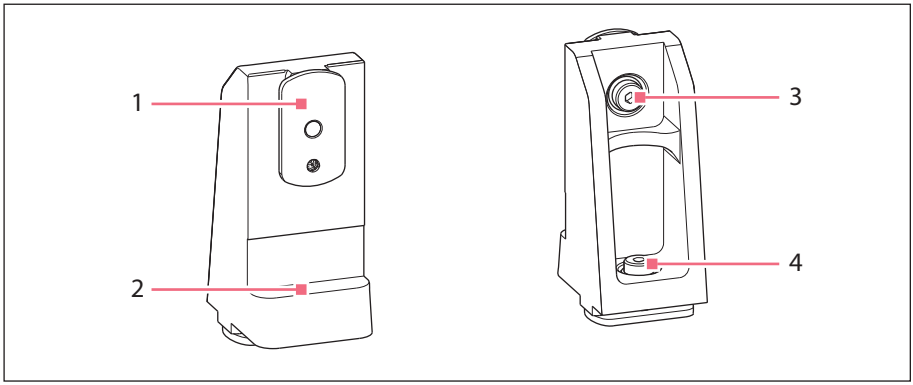


Fig. 4-4: Z-module holder, front and back

1 Slider

2 Stop angle

3 Screw
Attach Z-module

4 Screw
Attach Z-module holder to the adapter

4.3.5 Slider

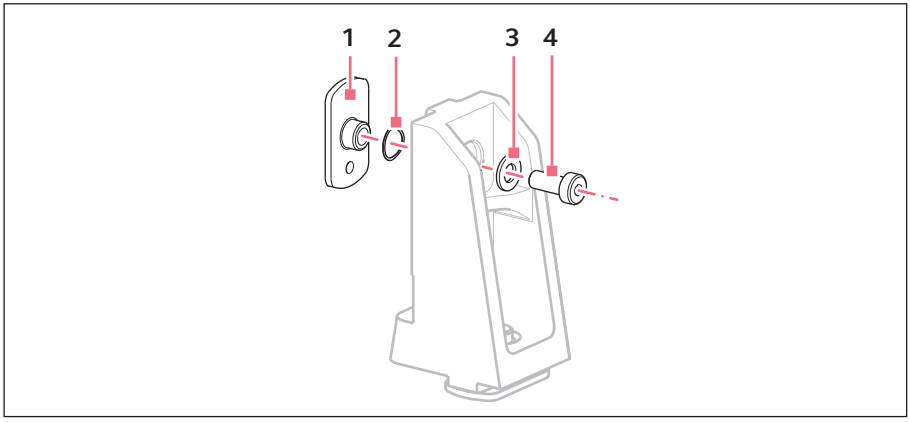


Fig. 4-5: Slider – position of the washers on the Z-module holder as an example

1 Slider

2 Lock washer

3 Flat washer

4 Screw

4.3.6 Z-slider – vertical microscope adapter

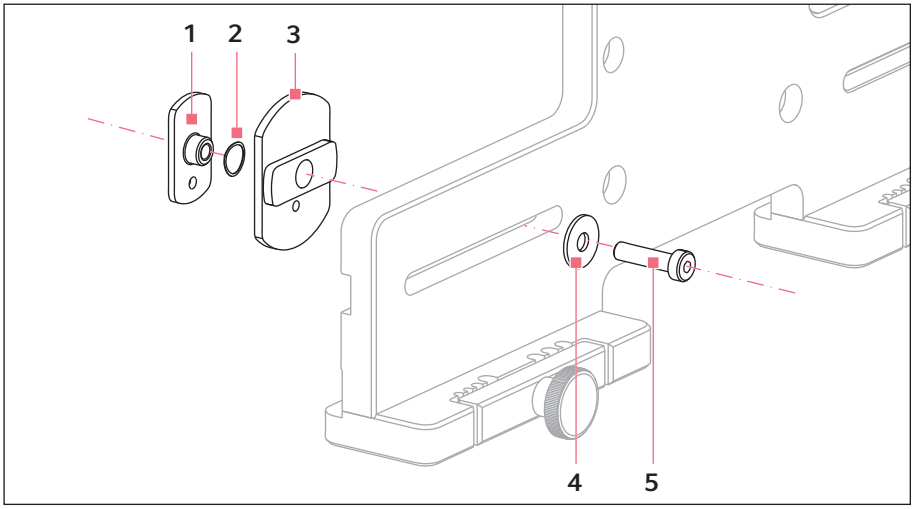


Fig. 4-6: Z-slider – position of the washers on the vertical adapter as an example

1 Slider

2 Lock washer

3 Z-slider

4 Flat washer

5 Screw

4.3.7 Angle head

The angle head is supplied ready for right side mounting. For left side mounting, the position of the fixing screw has to be changed and the holder for the capillary holder has to be turned accordingly.

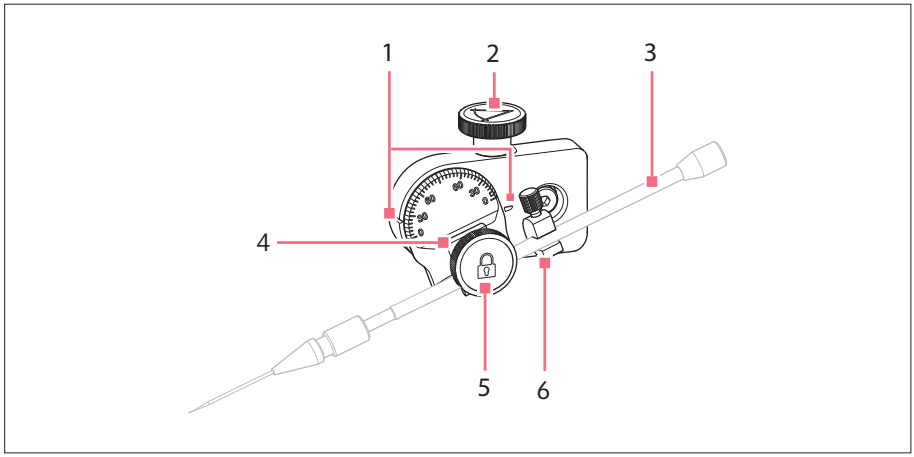


Fig. 4-7: Angle head with inserted capillary holder 4

1 Identification
For setting the angle

2 Knurled screw
For setting the injection angle

3 Capillary holder 4
(not included in the delivery package)

4 Holder for capillary holder

5 Fixing screw
For securing the capillary holder

6 Positioning aid

4.3.8 Swivel joint

The swivel is supplied ready for right side mounting. For mounting on the left-hand side, the swivel joint must be modified.

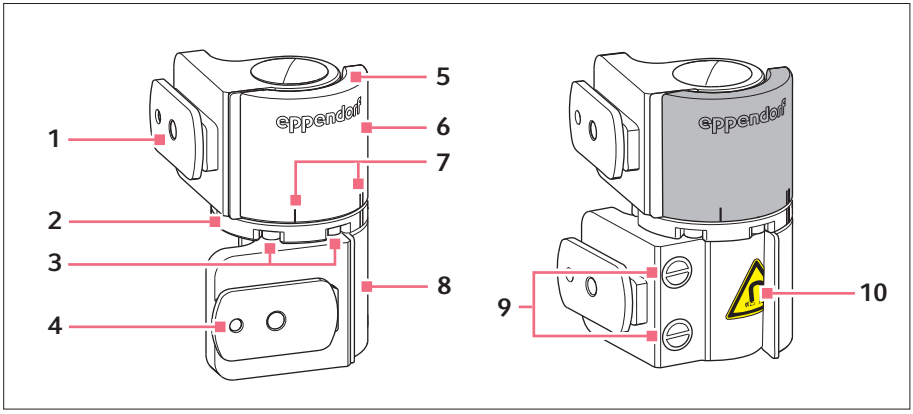


Fig. 4-8: Swivel joint for right side mounting of the motor module

1 **Slider**
Y-module

2 **Turntable**

3 **Allen screws**

4 **Slider**
X-module

5 **Stop plate**

6 **Upper joint**

7 **Mounting mark**
| stands for left side mounting
|| stands for right side mounting

8 **Lower joint**

9 **Industrial magnets**

10 **Warning symbol**
Strong magnetic field

4.4 Mounting the motor module

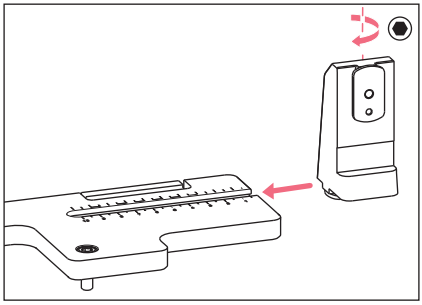
The motor module can be mounted on the right-hand or left-hand side of the microscope adapter. The following describes mounting on the right-hand side. For mounting on the left-hand side, the swivel joint and the angle head must be modified.

The motor module is mounted as standard on an inverse microscope. It can also be mounted on a universal stand. Mounting on a universal stand is described in the corresponding manual.

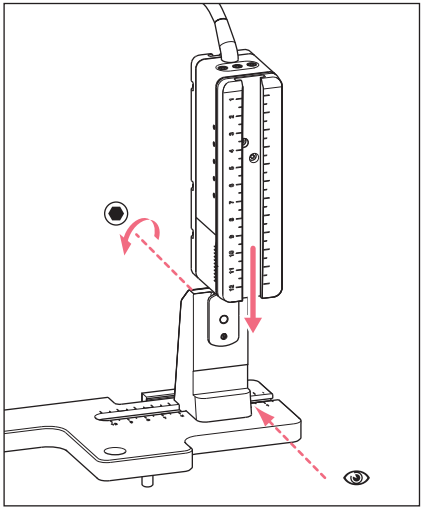
4.4.1 Mounting the Z-module – horizontal microscope adapter

Prerequisites

- Horizontally mounted microscope adapter
- Installation manual for the microscope adapter
- Allen torque screwdriver, 3 mm



1. Slide the Z-module holder onto the microscope adapter.

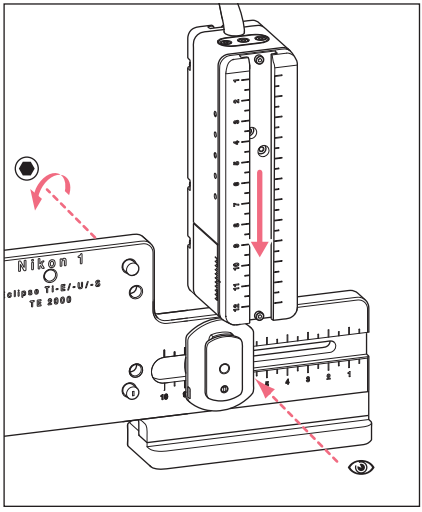


2. Push the fixed rail onto the Z-module holder until it reaches the stop angle and tighten the screw.
   The connecting cable must point to the rear.
3. Take the setting position for the Z-module holder from table column **1** (installation manual for the microscope adapter).
4. Slide the Z-module holder with the Z-module into its setting position and tighten the screw.

4.4.2 Mounting the Z-module – vertical microscope adapter

Prerequisites

- Vertically mounted microscope adapter
- Installation manual for the microscope adapter
- Allen torque screwdriver, 3 mm

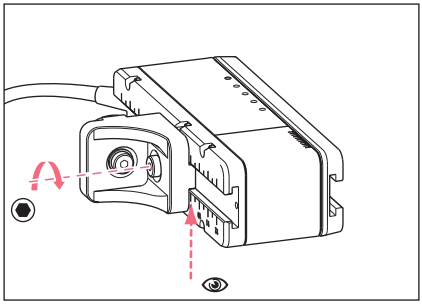


1. Slide the Z-module onto the Z-slider and tighten the screw slightly.
2. Take the setting position for the Z-module from table column **1** (installation manual for the microscope adapter).
3. Slide the Z-module into its setting position and tighten the screw.

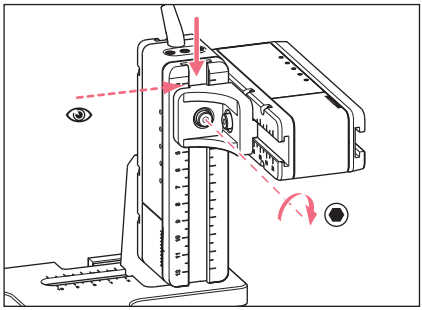
4.4.3 Mounting the Y-module

Prerequisites

- Installation manual for the microscope adapter
- Allen torque screwdriver, 3 mm



1. Undo the screw on the YZ connector.
2. Take the setting position from table column **3** (installation manual for the microscope adapter).
3. Set the position on the front edge of the YZ connector.
4. Tighten the screw on the YZ connector.



5. Take the setting position from table column **4** (installation manual for the microscope adapter).
6. Push the YZ connector with the Y-module onto the Z-module and hold it in position.
7. Set the position on the upper edge of the YZ connector.
8. Tighten the screw on the YZ connector.

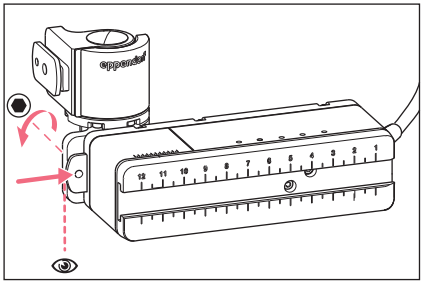
4.4.4 Mounting the X-module

Prerequisites

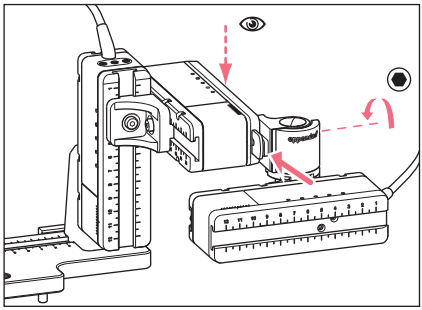
- Installation manual for the microscope adapter
- Allen torque screwdriver, 3 mm

WARNING! Danger due to strong magnetic field
Magnetic fields may affect pacemakers and defibrillators. Pacemakers may be reset.

- Keep a distance of at least 10 cm from the magnet.
- In particular, be sure to keep the safety distance during installation.



1. Push the swivel joint onto the fixed rail of the X-module.
   The **eppendorf** labeling must be readable.
2. Take the setting position from table column **6** (installation manual for the microscope adapter).
3. Set the position on the left edge of the swivel joint.
4. Tighten the screw on the swivel joint.

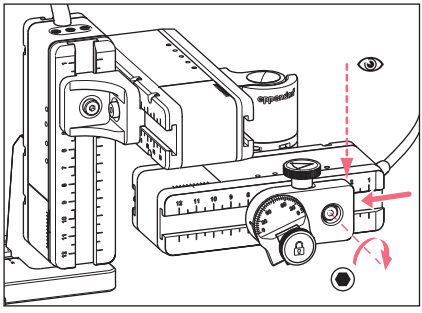


5. Take the setting position from table column **5** (installation manual for the microscope adapter).
6. Push the swivel joint with the X-module onto the Y-module.
7. Set the position on the rear edge of the swivel joint.
8. Tighten the screw on the swivel joint.

4.4.5 Mounting the angle head

Prerequisites

- Installation manual for the microscope adapter
- Allen torque screwdriver, 3 mm



1. Push the angle head onto the X-module.
2. Take the setting position from table column **7** (installation manual for the microscope adapter).
3. Set the position on the right edge of the angle head.
4. Tighten the screw on the angle head.

4.5 Inserting o-rings in the grip head

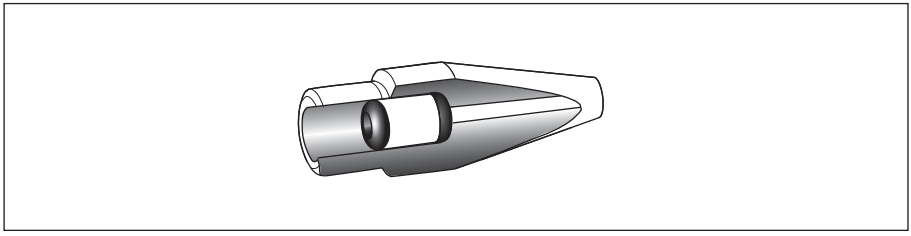
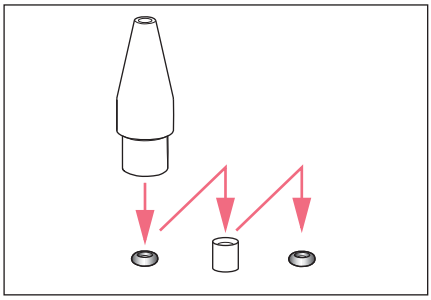


Fig. 4-9: Cross-section of the grip head with correctly inserted o-rings and distancing sleeve

Prerequisites

- The o-rings and the distancing sleeve are clean and free of damage.
- The grip head is clean and free of damage.
- A flat and clean surface is available.

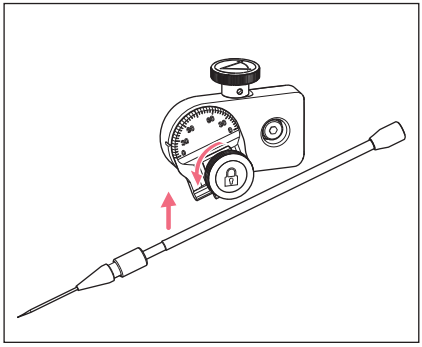


1. Place the o-rings and the distancing sleeve on a flat surface.
2. Press the grip head vertically onto the first o-ring and push it into the grip head with the capillary holder.
3. Press the grip head vertically onto the distancing sleeve and push it into the grip head with the capillary holder.
4. Press the grip head vertically onto the second o-ring and push it into the grip head with the capillary holder.

4.6 Inserting the capillary holder into the angle head

Prerequisites

- Capillary holder 4 from Eppendorf is prepared.
- Capillary holder (diameter: 4 mm) from another manufacturer is prepared.
- The O-rings are inserted in the grip head.



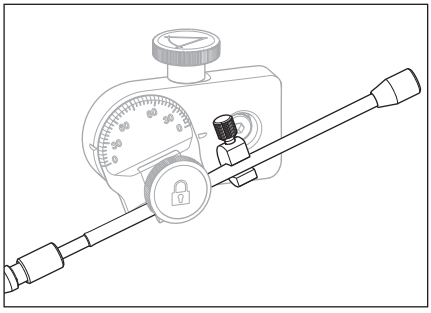
1. Loosen the knurled screw on the angle head.
2. Insert the capillary holder into the clamp.
3. Align the capillary holder in such a way that the capillary tip is located approx. 20 mm above and approx. 20 mm from the outside of the operating point.

4.6.1 Attaching the positioning aid

Prerequisites

- The positioning aid is prepared.
- The capillary holder is inserted in the angle head.

The positioning aid can be attached to the capillary holder to quickly clamp it in the same position.



1. Place the positioning aid on the capillary holder and tighten.
2. Tighten the knurled screw.

4.7 Inserting the capillary

WARNING! Risk of injury due to flying capillaries and glass splinters.
If exposed to high pressures, capillaries may detach themselves from the grip heads and become projectiles.
Capillaries can crack as a result of incorrect handling.

- Wear protective goggles.
- Never aim capillaries at people.
- Use capillaries with an outer diameter that matches the grip head specifications.
- Always mount / dismount capillaries when they are depressurized.
- Mount the capillary correctly in the grip head.
- Do not touch the capillary with the Petri dish or other objects.

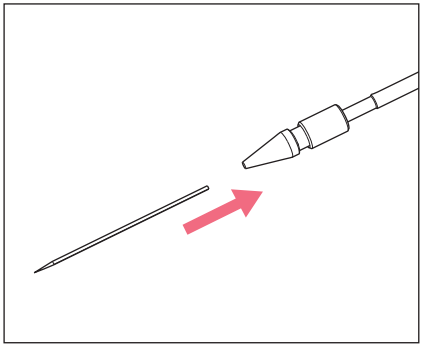
NOTICE! Mechanical damage to the motor modules.
Excessive load leads to increment errors or destruction of the drive.

- Do not drive the modules against mechanical obstructions.
- Do not hold any objects near the modules.
- Load the motor module with a maximum of 200 g.

Standard capillary: Only use the grip head 4, size 0, with capillaries with an outer diameter of 1.0 mm to 1.1 mm. If you would like to use other capillaries, order the matching gear head.

Prerequisites

- The O-rings are inserted in the grip head.



1. Push the capillary into the grip head until it reaches the stop and tighten the grip head.

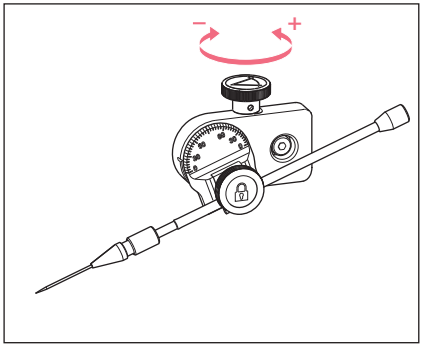
4.8 Inserting Femtotips

Prerequisites

- Capillary holder 4 is prepared.
- Adapter for Femtotips is prepared.

1. Remove the grip head.
2. Screw the adapter for Femtotips into the capillary holder.
3. Screw the Femtotip into the adapter and tighten.

4.9 Setting the injection angle



1. Turn the knurled screw to set the injection angle.
   The injection angle normally corresponds to the angle of the capillary.

4.10 Aligning the motor module

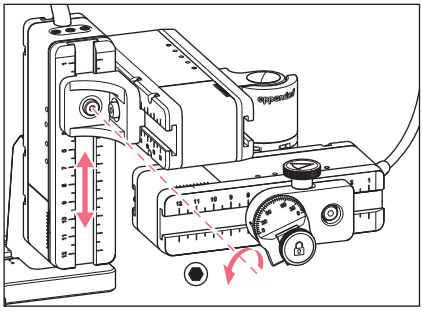
To be able to use the full movement range of the modules, the modules should be aligned centrally.

The exact position values (vary depending on the angle adjustment) to adjust the modules to the microscope can be found in the installation instructions of the respective microscope adapter.

Position holder	Angle	1 [cm]	2 [cm]	3 [cm]	4 [cm]	5 [cm]	6 [cm]	7 [cm]
Down	10°	6.5	7.0	4.2	9.2	6.0	6.8	9.0
Top	25°	6.5	7.0	5.2	9.2	6.0	6.8	9.0
Top	35°	6.5	7.0	4.1	9.2	6.0	6.3	9.0
Top	45°	6.5	7.0	2.4	9.2	6.0	5.5	9.0

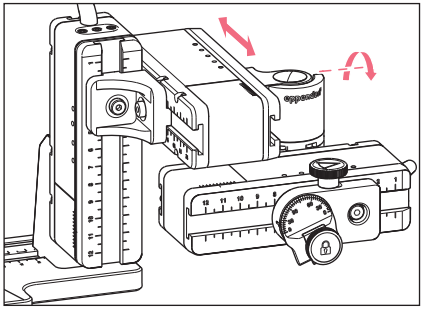
Fig. 4-10: Sample table from the installation manual for the Olympus 1 microscope adapter

4.10.1 Aligning the height



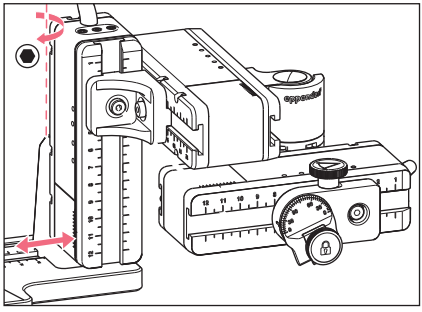
1. Undo the screw on the YZ connector.
2. Align the Y-module on the scale of the Z-module.
3. Tighten the screw to the set torque.

4.10.2 Aligning the depth



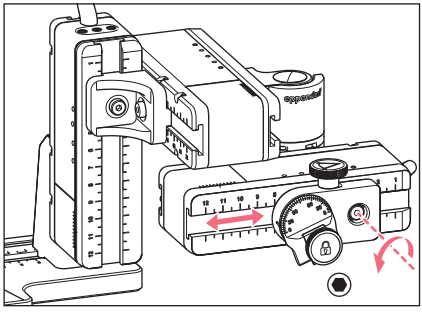
1. Undo the screw on the swivel joint.
2. Align the X-module on the scale of the Y-module.
3. Tighten the screw to the set torque.

4.10.3 Aligning the width



1. Undo the screw on the Z-module holder.
2. Align the Z-module on the scale of the microscope adapter.
3. Tighten the screw to the set torque.

4.10.4 Aligning the angle head



1. Undo the screw on the angle head.
2. Align the angle head on the scale of the X-module.
3. Tighten the screw to the set torque.

4.11 Entering mounting parameters

To facilitate easy remounting, the mounting parameters can be recorded.

- Enter the mounting parameters in the tables.

4.11.1 Microscope and adapter

Name	Type
Microscope	
Adapter	
Attachment side of the motor module	

4.11.2 Motor module – horizontal microscope adapter

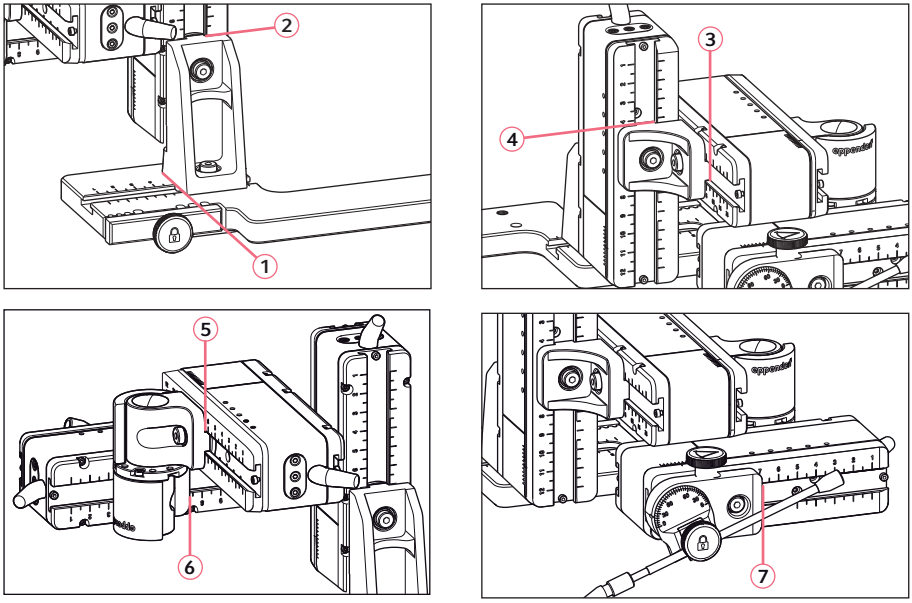


Fig. 4-11: Reading positions of the mounting parameters

4.11.3 Motor module – vertical microscope adapter

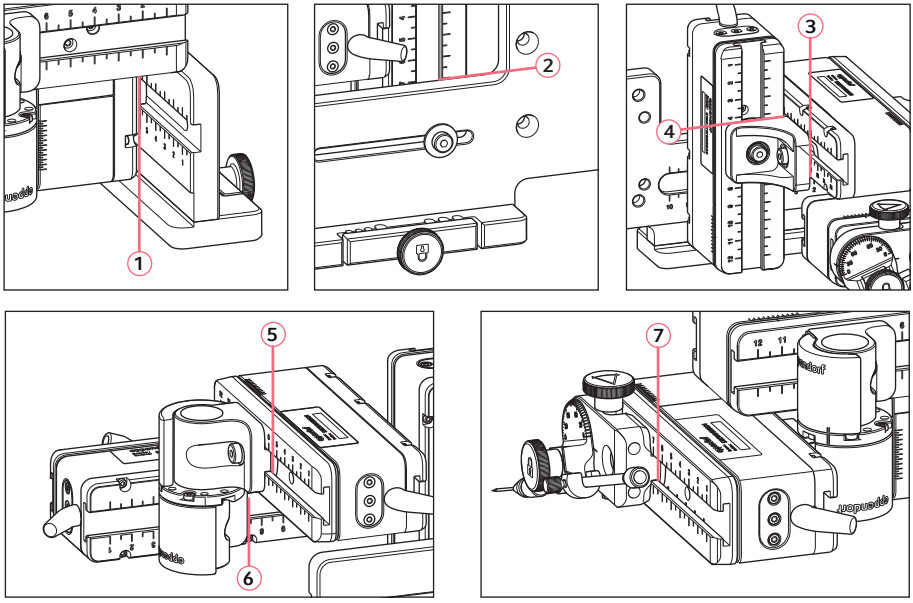


Fig. 4-12: Reading positions of the mounting parameters

Reading position	Position [cm]
1	
2	
3	
4	
5	
6	
7	

4.11.4 Angle head

Name	Position [cm]	Degrees
Capillary holder		
Injection angle		

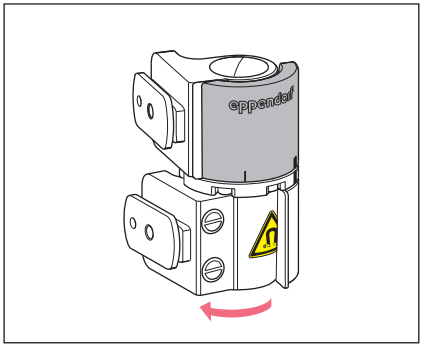
4.12 Converting the swivel joint for left side mounting

Prerequisites

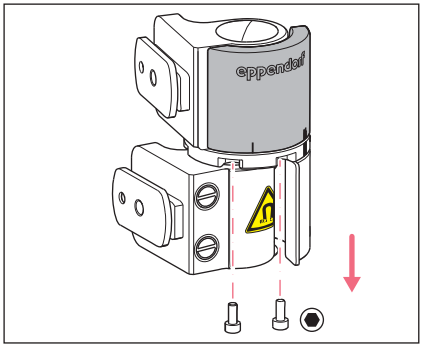
- 2 mm Allen key
- Right side mounting marks (||) are aligned above each other

WARNING! Danger due to strong magnetic field
Magnetic fields may affect pacemakers and defibrillators. Pacemakers may be reset.

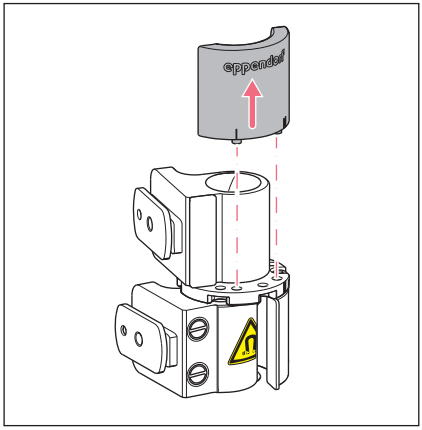
- Keep a distance of at least 10 cm from the magnet.
- In particular, be sure to keep the safety distance during installation.



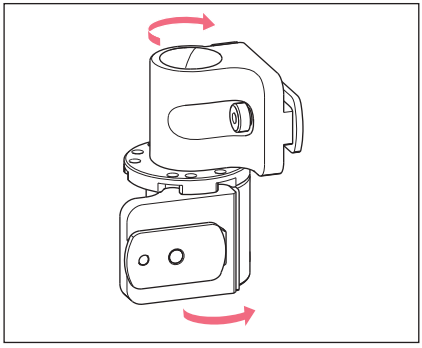
1. Rotate the lower joint until both Allen screws are accessible.



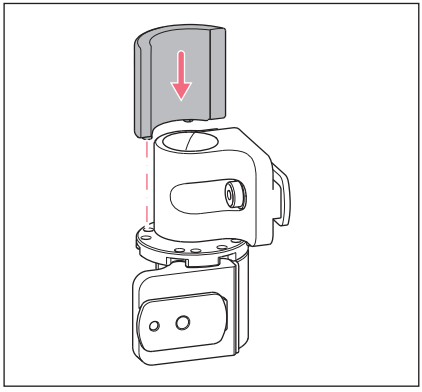
2. Unscrew the Allen screws.



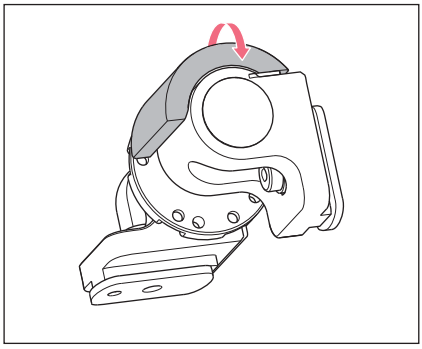
3. Open the upper joint a little bit.
   The magnets are not in contact with the stop plate.
   The stop plate can be removed more easily.
4. Remove the stop plate.



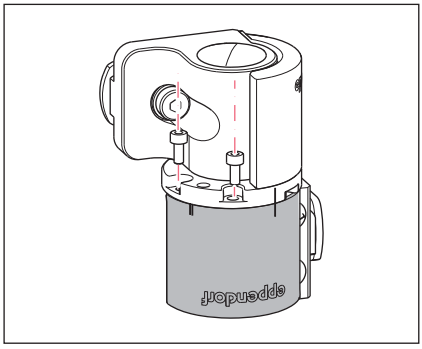
5. Rotate the lower joint back.
6. Rotate the upper joint by 180°.
   The sliders must be at a 90° angle to each other.



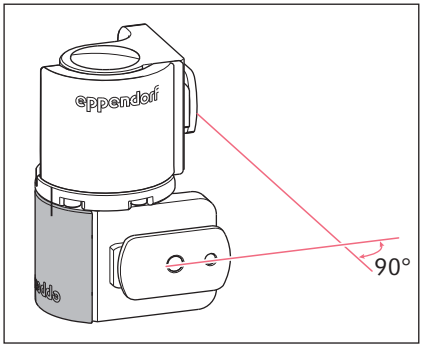
7. Align the left side mounting marks (I).
8. Fit the stop plate in such a way that the pins sit in the holes of the turntable.



9. Rotate the swivel joint by 180°.



10. Insert the Allen screws and tighten the stop plate.
Left side mounting marks (I) are aligned above each other.

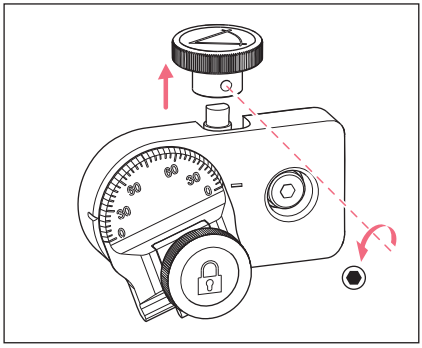


11. Check the position of the joints.
The sliders must be at a 90° angle to each other.
The eppendorf labeling must be readable.

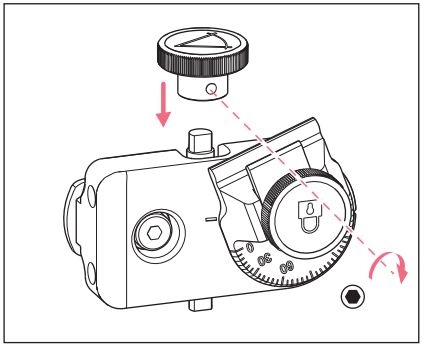
4.13 Converting the angle head for left side mounting

Prerequisites

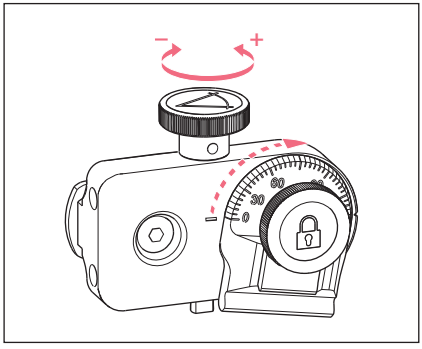
- 1.3 mm Allen key.



1. Undo the set screw and pull the knurled screw off the spindle.



2. Rotate the angle head by 180°.
3. Push the knurled screw onto the spindle end and fasten it with the set screw.



4. Turn the knurled screw until the desired angle is set.

4.14 Connect the motor module to the control board

WARNING! Risk from incorrect voltage supply.

- Only connect the device to voltage sources which correspond with the electrical requirements on the name plate.
- Only use earth/grounded sockets with a protective earth (PE) conductor.
- Only use the mains/power cord supplied.

NOTICE! Damage to the control board as a result of incorrect handling.

- Grasp the control board on the housing.
- Do not lift the control board using the joystick.
- Never place the control board on the joystick.

NOTICE! Material damage from incorrect connections.

- Only make electrical connections to devices that are described in the operating manual.
- Other connections are only permitted the consent of Eppendorf SE.
- Only connect devices that meet the safety requirements defined in IEC 62368-1 .

NOTICE! Short circuit caused by incorrect installation.

- Failure to observe the order of steps may result in a short circuit.

Prerequisites

- InjectMan 4 is switched off.
- The power cable is disconnected.

1. Connect the module (X,Y,Z) plug with the ports on the control board.
2. Tighten the fixing screws on the plug manually.
3. Connect the mains/power cord.
4. Switch on the mains switch.
5. Set the installation parameters. You can use the software wizard *First set-up* or the *Installation* menu to set the *Side* and *Angle* parameters.

4.15 Setting installation parameters

Installation parameters must be set:

- for the initial installation
- after a reset

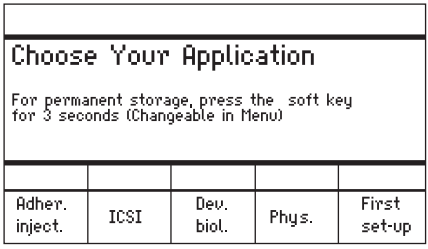
The following settings are defined:

- Mounting side of the motor module
- Operating angle for the capillary
- Center motors
- Adjust motors
- Set date

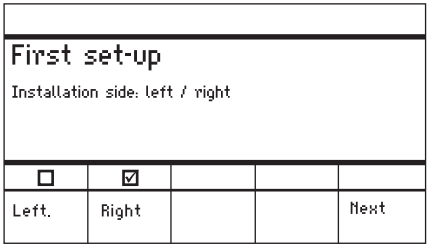
4.15.1 *First set-up* wizard

Prerequisites

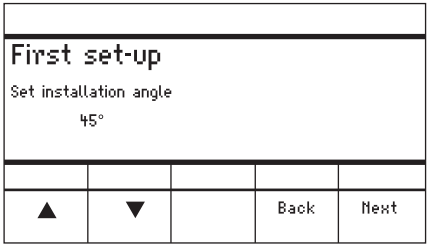
- The micromanipulator is switched on.
- The capillary holder is **not** installed.



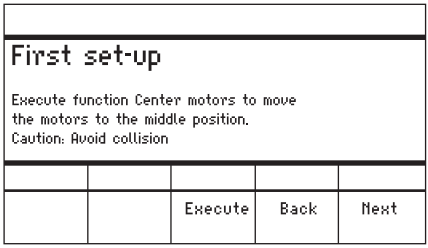
1. Select the *First set-up* application.



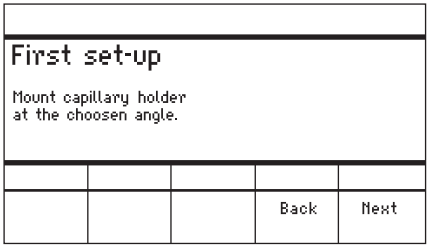
2. Select the mounting side.
3. Select *Next*.



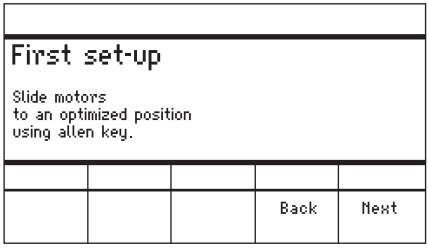
4. Set the angle for the axial motor movement.
5. Select *Next*.



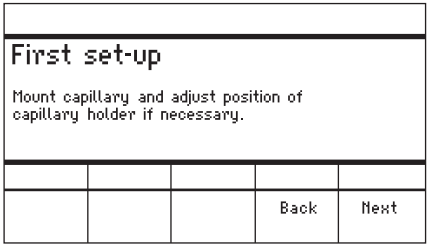
6. Select *Execute*.
   The X-motor and Y-motor are moved to the middle position.
   The Z-motor is moved to a position at a ratio of 20/80.
7. Select *Next*.



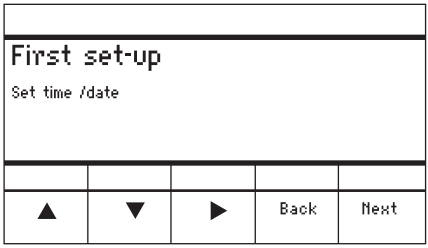
8. Insert the capillary holder into the angle head.
   The capillary tip should be in the focus of the microscope.
9. Select *Next*.



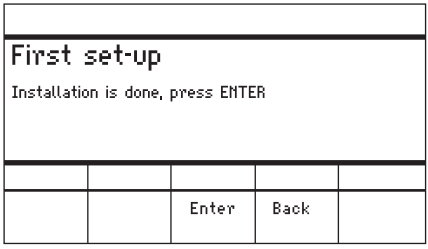
10. Manually align the module using an Allen key.
    Align the capillary tip such that it is in the focus of the microscope.
11. Select *Next*.



12. Remove the capillary holder.
13. Insert the capillary into the capillary holder.
14. Insert the capillary holder with the capillary into the angle head.
15. Finely adjust the position of the capillary holder and the modules.
16. Select *Next*.



17. Set the time and the date.
18. Select *Next*.



19. Select *Enter*.
    The installation is complete and the modules are adjusted.
    The application screen shows *My application*.
    An application can be selected or specified as start screen.

4.16 Connecting an external device

The following devices can be connected to the control board:

- Eppendorf FemtoJet 4i
- Eppendorf PiezoXpert
- Computer

4.16.1 Connecting the FemtoJet 4i

Prerequisites

- Devices are switched off.

The operation is described in the manual for the FemtoJet 4i.

1. Connect the FemtoJet 4i to the port for external devices.
2. Switch on the FemtoJet 4i.
   The initialization phase starts.
3. Switch on the control board.
   After completion of the initialization phase, the status message *Injector ready* appears on the application screen.

4.16.2 Connecting the PiezoXpert

Prerequisites

- Devices are switched off.

The operation is described in the manual for the PiezoXpert.

1. Connect the PiezoXpert to the port for external devices.
2. Switch on the PiezoXpert.
   The initialization phase starts.
3. Switch on the control board.
   After completion of the initialization phase, the status message *PiezoXpert ready* appears on the application screen.

4.16.3 Connecting the Computer

Prerequisites

- A data cable is available.
- Devices are switched off.

Control with a computer is described in the **Cell Technology · PC Control** manual.

1. Connect the data cable to the port for external devices.
2. Connect the computer to the data cable.
3. Switch on the control board.

4.16.4 Connecting two devices

Prerequisites

- Y-connector is available.
- Devices are switched off.

Two devices can be connected with a Y-connector.

The following combinations are possible:

- Computer and FemtoJet 4i
- FemtoJet 4i and PiezoXpert

1. Connect the Y-connector to the port for external devices.
2. Connect the device combination.
3. Connect the devices.
   After initialization, status messages appear on the application screen.

5 Software

5.1 Display

The display shows current settings, for example, the selected working range, the position of the motors and defined limits.

5.1.1 Application display

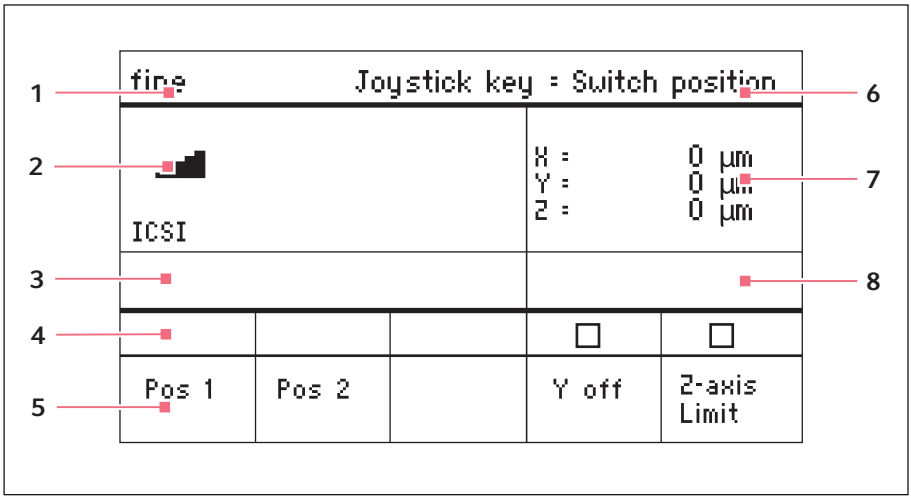


Fig. 5-1: Display layout - ICSI application as an example

1 **Status line with working range**
2 **Active application with speed bars**
3 **Connected device**
4 **Status fields of the softkeys**
5 **Softkeys**
6 **Function of the joystick key**
7 **Display of coordinates**
8 **Display of the defined limits**

5.1.2 Display of coordinates

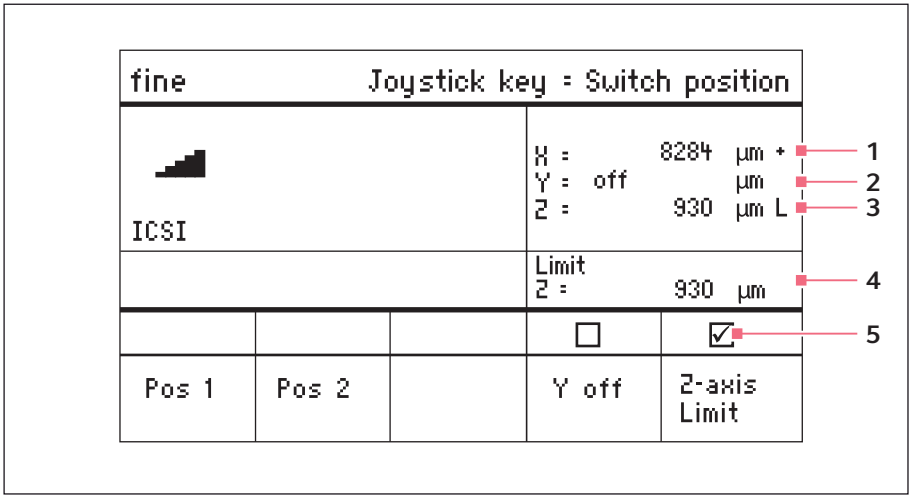


Fig. 5-2: Display of coordinates

1 Motor limit stop
+ = positive, - = negative

2 Axis is deactivated

3 Lower limit (*Z-axis Limit*) reached

4 Display of the lower limit

5 Lower limit activated

5.1.3 Menu display

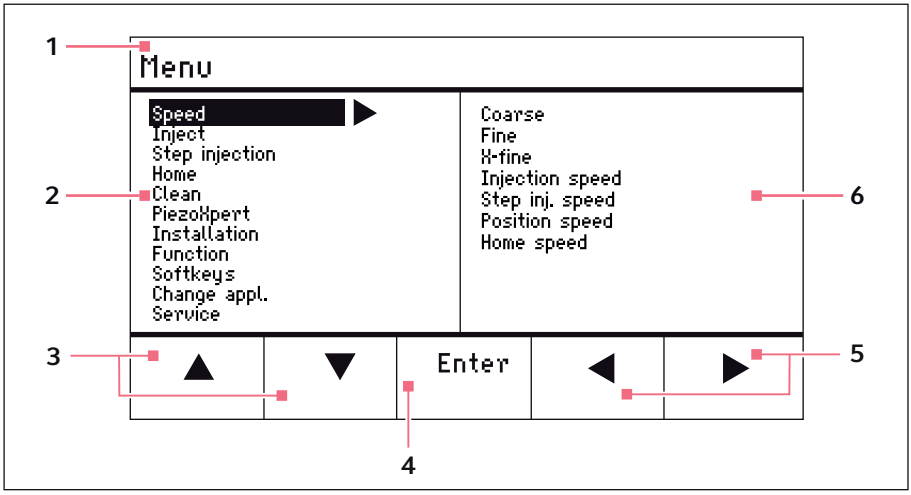


Fig. 5-3: Menu and parameter display

1 Navigation path

2 Menu

3 Arrow up/down softkey
For navigation and changing parameters.

4 *Enter* softkey
For confirming input, executing the function, saving parameters

5 Arrow left/right softkey
Navigation

6 Parameter

5.2 Applications

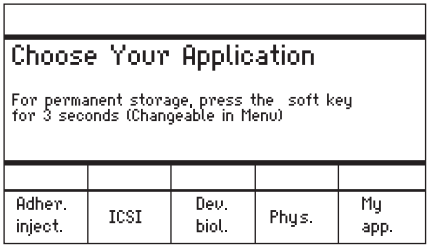


Fig. 5-4: Application screen

Application selection

- Select the application
- Store the main application

5.2.1 Application parameters

Pre-defined functions of the different applications.

Application parameter	Description
Pos 1	Save the X, Y and Z values of the capillary position. Switch the position using the joystick key.
Pos 2	Save the X, Y and Z values of the capillary position. Switch the position using the joystick key.
Step inject	Activate or deactivate the function.
Y off	Switch off the movement of the capillary in the Y-axis. Prevents moving sideways during injection.
Z-axis Limit	Save the lower limit for the vertical capillary movement.
Axial	Switch on the capillary movement along the assembly bracket. Suitable for straight capillaries.
Limit	Reduce or increase the value for the limit.
Clean	Execute the function.

5.2.2 Application – *Adherent cell injection*

This application is suitable for injection into adherent cells.

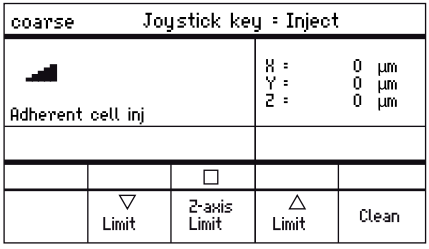


Fig. 5-5: Application 1 *Adherent cell injection*

Parameter selection

- Joystick key – Inject
- Freely program the softkey
- Reduce the value for *Z-axis Limit*
- Set the lower limit (*Z-axis Limit*)
- Increase the value for *Z-axis Limit*
- Execute the *Clean* function

5.2.3 Application – *ICSI*

This application is suitable for intracytoplasmic sperm injection.

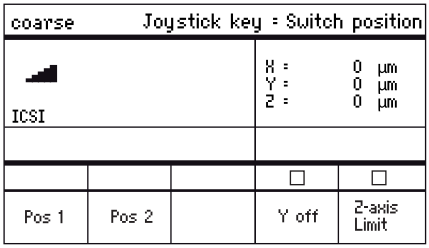


Fig. 5-6: Application 2 *ICSI*

Parameter selection

- Joystick key – Switch position
- Save positions 1 and 2
- Freely program the softkey
- Deactivate the control of the axis of movement (Y-axis)
- Set the lower limit (*Z-axis Limit*)

5.2.4 Application – *Developmental biology*

This application is suitable for developmental biology.

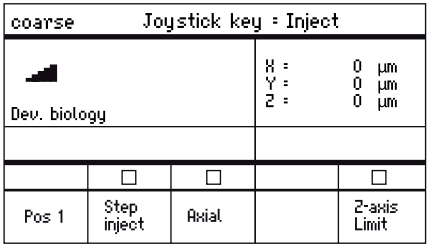


Fig. 5-7: Application 3 *Developmental biology*

Parameter selection

- Joystick key – Inject
- Save position 1
- Activate the *Step inject* function
- Switch on the axial movement of the Z-axis
- Freely program the softkey
- Set the lower limit (*Z-axis Limit*)

5.2.5 Application – *Physiology*

This application is suitable for physiology.

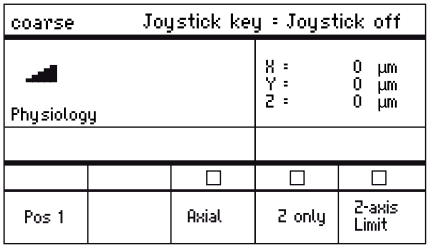


Fig. 5-8: Application 4 *Physiology*

Parameter selection

- Joystick key – Joystick off
- Save position 1
- Freely program the softkey
- Switch on the axial movement of the Z-axis
- Deactivate the control of the axes of movement (X and Y-axis)
- Set the lower limit (*Z-axis Limit*)

5.2.6 Application – *My application*

No softkeys are preprogrammed for this application. This application can be individually programmed.

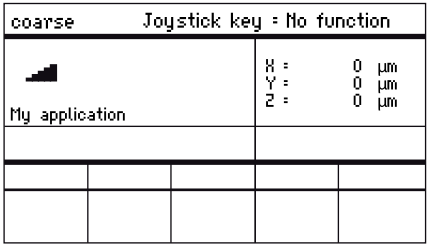


Fig. 5-9: Application 5 *My application*

Parameter selection

- Freely program the joystick key
- Freely program all softkeys

5.3 Main menu

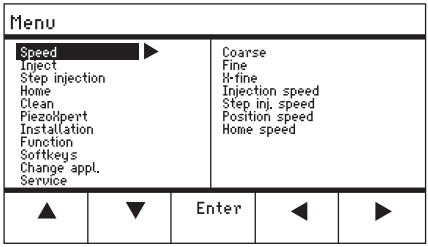


Fig. 5-10: Main menu

Menu	Parameter
Speed	Set the speed parameters
Inject	Set the injection parameters
Step injection	Set the injection parameters
Home	Set the parameters for the Home movement
Clean	Set the parameters for the Clean movement
PiezoXpert	Set the parameters for an optional device
Installation	Set the device parameters
Function	Execute the device function
Softkeys	Program softkeys
Change appl	Change the selected application or activate the application screen
Service	Execute the service function on a user basis

5.4 Navigating the menu

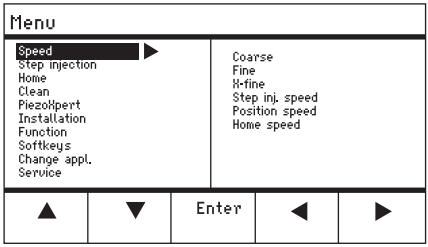


Fig. 5-11: Software navigation

Navigate the menu using the arrow keys. Pressing *Enter* will confirm the selection. You can switch between menus and submenus with the arrow keys to the left and to the right.

5.4.1 Entering or changing parameters

Parameters can be changed in the menu using the arrow keys, the selection dial or the rotating wheel on the joystick.

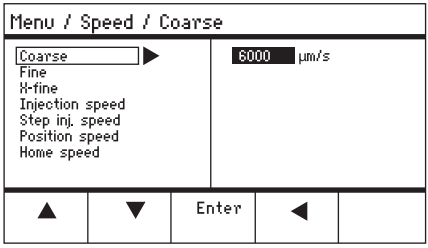


Fig. 5-12: Changing the parameters

- Change values with the upwards or downwards arrow keys.
- Change values using the selection dial.
- Change values using the upper part of the joystick.
- Save with *Enter*.

6 Operation

WARNING! Electric shock due to damage to the device or mains/power cord.

- Only switch on the device if the device and the mains/power cord are undamaged.
- Only operate devices that have been properly installed or repaired.
- In case of danger, disconnect the device from the mains/power supply voltage. Disconnect the mains/power plug from the device or the earth/ grounded socket. Use the isolating device intended for this purpose (e.g., the emergency switch in the laboratory).

Do not move the joystick immediately after power-on. Wait until the initialization is completed. The completion of initialization is indicated by the display switching to the operating state.

6.1 Switching the device on or off

6.1.1 Switching the device on

1. Switch on the device at the mains/power switch.
   The motor module and the control board are switched on.
   The device runs through an initialization phase.
   The application screen appears.

6.1.2 Switching off the device

1. Switch off the device at the mains/power switch.
   The motor module and the control board are deenergized.

6.2 Activating or deactivating the control board

6.2.1 Activating the control board

Prerequisites

- The display shows *STANDBY*.

1. Press the *standby* key.
   The keys, joystick, selection dial, and softkeys are activated.
   The display shows the application screen.

6.2.2 Deactivating the control board

The step motors slowly move to the next parking position. This prevents the motors falling back to the parking position and the capillary jumping.

1. Press the *standby* key.
   The keys, joystick, and selection dial are deactivated.
   The display shows *STANDBY*.
   Current movements are stopped.
   The motor module remains switched on so that the step motors keep their current position.

6.3 Defining the start screen

An application can be selected as the default application. The micromanipulator then starts with the defined application. The application screen with all the applications can be redefined in the *Start display* menu.

6.3.1 Defining the application

1. Press and hold the softkey of the desired application for 3 seconds.
   The micromanipulator always starts with the defined application.

6.3.2 Defining the selected application

1. In the *Change appl* menu, select the *Start display* submenu.
2. Select *Execute*.
3. Confirm with *Enter*.
   The micromanipulator starts with the selected application.

6.4 Replacing the capillary

Prerequisites

- The capillary is depressurized.

WARNING! Risk of injury due to flying capillaries and glass splinters.
If exposed to high pressures, capillaries may detach themselves from the grip heads and become projectiles.
Capillaries can crack as a result of incorrect handling.

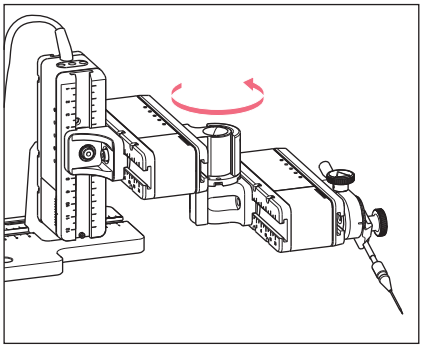
- Wear protective goggles.
- Never aim capillaries at people.
- Use capillaries with an outer diameter that matches the grip head specifications.
- Always mount / dismount capillaries when they are depressurized.
- Mount the capillary correctly in the grip head.
- Do not touch the capillary with the Petri dish or other objects.

CAUTION! Risk of injury from capillaries
Capillaries can easily penetrate your skin.

- After changing a capillary, swivel it immediately back to the working range.

CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

- Do not reach into the movement range of the modules.



1. Move the capillary out of the working range using the *home* key.
2. Swing the X-module forwards.
3. Undo the grip head on the capillary holder.
4. Carefully pull the capillary out of the grip head.
5. Push the new capillary into the grip head until it reaches the stop and tighten the grip head.
6. Swing the X-module back.

6.4.1 Manually positioning the capillary

Suitable when using capillaries of different lengths (e.g., self-pulled capillary).

1. Press the *Back manual* key.
2. Manually position the capillary in the working range.

6.4.2 Automatically positioning the capillary

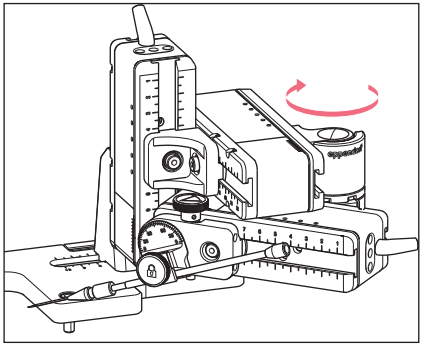
Suitable for industrial capillaries of exactly the same length.

1. Press the *home* key.
   The capillary automatically moves back into the working range.

6.5 Replacing the sample on the microscope table

CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

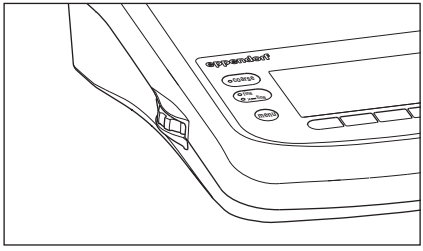
- Do not reach into the movement range of the modules.



1. Press the *home* key to move the capillary out of the working range.
2. Swing the X-module backwards.
3. Replace the sample.
4. Swing the X-module back.
5. Press the *home* key to move the capillary back into the working range.

6.6 Changing the speed range

6.6.1 Changing parameters using the selection dial

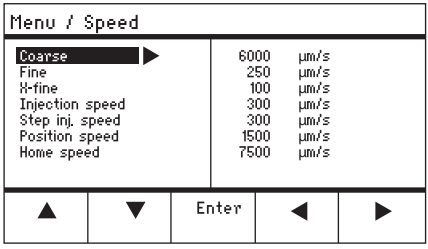


1. Press the key for the desired speed range on the control panel.
2. Turn the selection dial to change the speed.

6.6.2 Changing parameters in the menu

Prerequisites

- An application has been selected.



1. Press the *menu* key.
2. Select the*Speed* menu.
3. Select the desired parameter.
4. Change the value.

6.7 Capillary positions

To secure the capillary when moving a slide and to move it back to the same work position, you can save the coordinates. Strictly speaking, the system does not save the position of the capillary tip, but the coordinates of the motor module. The standard function saves the coordinates for the duration of the working session. When the micromanipulator is switched off, the saved data, positions and coordinates will be deleted. If the saved data is to be kept beyond the duration of the working session, the extended storage function can be used.

Storage functions:

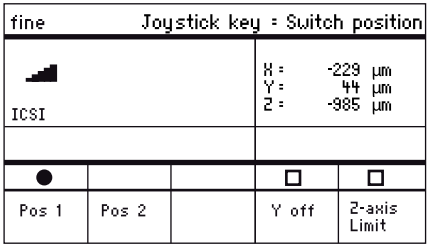
- Standard storage function – The coordinates are deleted when the device is switched off.
- Extended storage function – The coordinates are kept when the device is switched off.

6.7.1 Saving a position

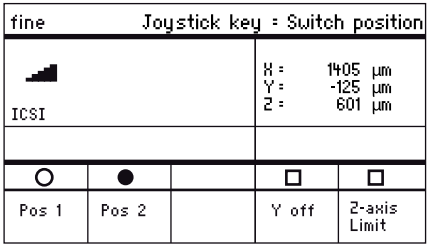
Prerequisites

- An application has been selected.

Depending on the application, a maximum of five positions can be stored.



1. Move the capillary to the desired position.
2. Hold the *Pos 1* softkey for approx. one second to store the working position of the capillary.
   An acoustic signal sounds.
   Pos 1 is marked.
   The coordinates are displayed.
   The stored position is displayed in the status field.



3. Move the capillary to the desired position (e.g., parking position).
4. Touch and hold the *Pos 2* softkey for approx. one second to store the parking position of the capillary.
   An acoustic signal sounds.
   Pos 2 is marked.
   The stored position is displayed in the status field.

As soon as the capillary leaves a stored position, the filled circle is displayed as an empty circle, to show that this position is now stored. If no positions are stored, the status field will be empty.

6.7.2 Moving to the position using the softkey

Prerequisites

- At least one position is stored.

1. Press a softkey with a stored position.
   You will move to the selected position.
   The joystick is deactivated until the position has been reached.
   The LEDs flash.
   In the softkey status field a filled circle is displayed.

If a stored position is lower than the lower limit (*Z-axis Limit*), the position on the Z-axis will only be approached up to the defined limit.

6.7.3 Moving to the position using the joystick key

Prerequisites

- At least one position is stored.
- The *Joystick key* parameter must be set to the *Switch position* value.

▸ Press the joystick key.
  You will move to the first position.

▸ Press the joystick key.
  You will move to the next position.

6.7.4 Overwriting a stored position

Prerequisites

- A position is stored.

1. Press the softkey for a different position.
   You will move to the position.
2. When the position has been reached, press and hold the softkey for the position to be overwritten.
   The old position is overwritten with the current coordinates.
3. Press the softkey.
   An acoustic signal sounds.
   In the softkey status field a filled circle is displayed.
   The stored position is displayed in the coordinate field.

6.7.5 Deleting a stored position

Prerequisites

- A position is stored.

1. When the position has been reached, hold the softkey.
   An acoustic signal sounds.
   The position has been deleted.
   The status field is empty.

6.8 Using the advanced storage function

The following data is stored:

- the current coordinates of the motor module.
- the data of the *Pos 1* to *Pos 5* softkeys.
- the defined vertical (*Z-axis Limit* and *Upper limit*) or horizontal (*X-axis Limit*) limits.

Prerequisites

- An application has been defined as the default application.
- At least one position or limit has been defined.

1. Press the *standby* key.
   The specified data of the work session will be stored.
   The current coordinates of the motor module will be stored.
   For technical reasons, the motors will still move a few micrometers after this to get into a defined end position.
   The micromanipulator can be switched off at the mains/power switch.
   The data will be available when the micromanipulator is started the next time.

6.9 Vertical limits

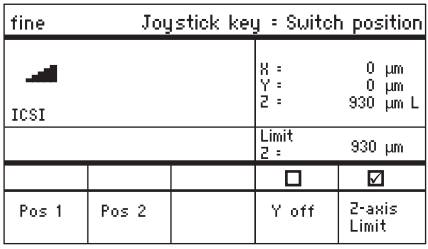
For the Z-axis, a lower and upper limit can be defined. This prevents the capillary coming into contact with the bottom of the Petri dish or moving against the condenser of the microscope adapter.

- Lower limit – *Z-axis Limit*
- Upper limit – *Upper limit*

6.9.1 Defining the lower limit

Prerequisites

- An application has been selected.

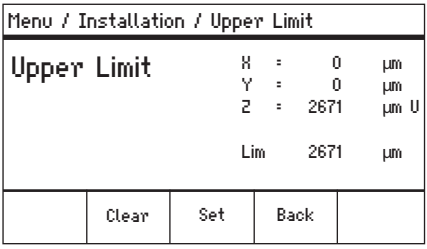


1. Position the capillary a little way above the slide.
2. Press *Z-axis Limit*.
   The Z-coordinate is marked with *L*.
   The value for the limit (*Limit Z*) is displayed.
   Z-axis Limit is selected.
   The capillary cannot be moved any lower.

6.9.2 Deleting the lower limit

1. Press *Z-axis Limit*.
   The limit is deleted.

6.9.3 Defining the upper limit



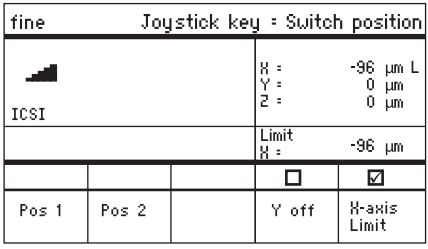
1. In the *Installation* menu, select the *Upper limit* submenu.
   The *Upper Limit* window appears.
2. Move the capillary to the top position.
3. Save the position with *Set*.
   The Z-coordinate is marked with *U*.
   The value for the limit (*Lim*) is displayed.
   The capillary cannot be moved any higher.

6.9.4 Deleting the upper limit

1. In the *Installation* menu, select the *Upper limit* submenu.
   The *Upper Limit* window appears.
2. Save the position with *Clear*.
   The limit is deleted.

6.10 Horizontal limit

For the X-axis, a limit can be defined for a horizontal injection. This prevents the capillary from moving through the sample.



6.10.1 Defining the horizontal limit

1. In the *Installation* menu, select the *Angle* submenu.
2. Set the injection angle to 0° and save with *Enter*.
3. Close the menu.
   The application screen now displays *X-axis Limit*.
4. Move the capillary to the desired final position for the X-axis.
5. Save the lateral limit with *X-axis Limit*.
   The X-coordinate is marked with *L*.
   The value for the limit (*Limit X*) is displayed.
   X-axis Limit is selected.
   The capillary cannot be moved any further to the side.

6.10.2 Deleting the horizontal limit

1. Press *X-axis Limit*.
   The limit is deactivated.
2. In the *Installation* menu, select the *Angle* submenu.
3. Reset the injection angle to the operating angle and save with *Enter*.
   The lateral limit is deleted.
   The application screen displays *Back* again.

6.11 *Speed* function

In the *Speed* menu you can set the speed of the working range and the speed at which certain positions are approached or movements executed.

6.11.1 *Speed* menu and parameters

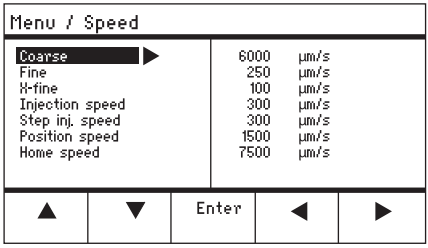


Fig. 6-1: Menu – *Speed*

Parameter	Value	Range of values	Increment	Standard
Coarse	Set the speed in µm per second	5 – 10000	5	7500
Fine	Set the speed in µm per second	5 – 1000	5	1000
X-fine	Set the speed in µm per second	0 – 100	1	100
Injection speed	Set the speed in µm per second	5 – 10000	5	300
Step inj. speed	Set the speed in µm per second	5 – 10000	5	300
Position speed	Set the speed in µm per second	5 – 10000	5	1500
Home speed	Set the speed in µm per second	5 – 10000	5	7500

6.11.2 Setting the parameters for *Speed*

If a value of 0 is set for the *X-fine* parameter, then the change between the *Fine* and *X-fine* working ranges is deactivated.

1. Select the desired parameter.
2. Set the value for the parameter.
3. Close the menu.

6.12 *Inject* function

This function performs an automatic injection movement. You can set the injection speed, the injection time, the injection movement and fix the distance between the capillary and the lower limit.

6.12.1 *Inject* menu and parameters

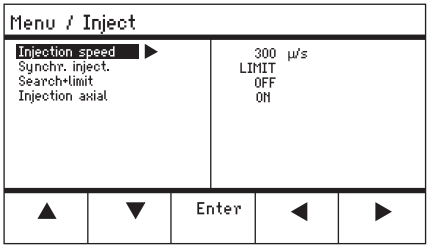


Fig. 6-2: Menu – *Inject*

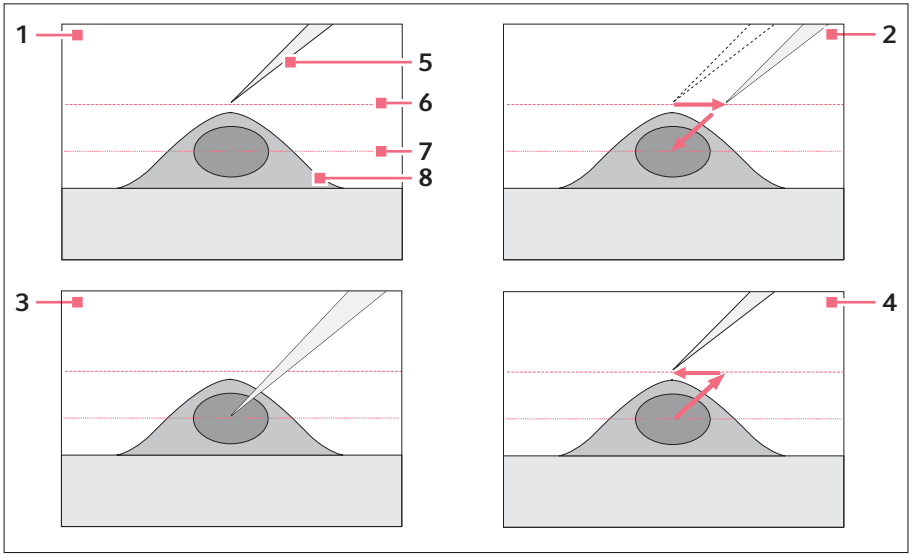
Parameter	Value	Range of values	Increment	Standard
Injection speed	Set the injection speed in µm per second	5 – 10000	5	300
Synchr. inject	Set the synchronized time of injection	*MOVE* *IMMEDIATE* *LIMIT* *PRESSURE*	–	*LIMIT*
Search+limit	Change the lower limit and the position of the capillary. The distance between the capillary and the limit remains constant	OFF/ON	–	OFF
Injection axial	Switch the axial movement of the function on or off	OFF/ON	–	On

Parameter	Range of values	Function
Synchr. inject	*MOVE*	Injection movement without injection pressure (when using non-connected injectors)
	IMMEDIATE	Injection pressure starts with the injection movement
	LIMIT	Injection pressure at the end of the injection distance (*Z-axis Limit*)
	PRESSURE	Injection pressure without injection movement

6.12.2 Executing the *Inject* function

Prerequisites

- A FemtoJet 4i is connected.
- A lower limit (*Z-axis Limit*) has been defined.



1	**Position the capillary**	**5**	**Capillary**
2	**Trigger an automatic injection**	**6**	**Search level**
3	**Injection**	**7**	***Z-axis Limit***
4	**Automatic movement to the starting position**	**8**	**Cell**

If the *Search+limit* parameter is activated you can inject cells with different heights using the same injection parameters.

1. Press the joystick key.
   The capillary is moved to the side and to the lower limit at the injection angle.
   The injection is carried out automatically.
   The capillary is moved back to the starting position.

6.13 *Step injection* function

With this function you can execute a straight injection over a defined distance.

Step injection can be triggered with:

- the joystick key
- the foot control
- or a connected microinjector (e.g., FemtoJet 4i)

6.13.1 *Step injection* menu and parameters

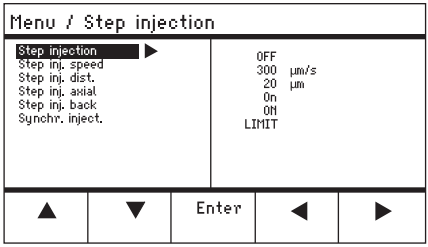


Fig. 6-3: Menu – *Step injection*

Parameter	Value	Range of values	Increment	Standard
Step injection	Switch the function on or off	OFF/ON	–	OFF
Step inj. speed	Set the injection speed in µm per second	5 – 10000	5	300
Step inj. dist	Set the injection path in µm	1 – 2000	1	20
Step inj. axial	Switch the axial movement of the capillary on or off	OFF/ON	–	On
Step inj. back	Switch the backward movement of the capillary on or off	OFF/ON	–	On
Synchr. inject	Set the time of injection	*MOVE IMMEDIATE LIMIT PRESSURE*	–	*LIMIT*

Parameter	Range of values	Function
Synchr. inject	*MOVE*	Injection movement without injection pressure
	IMMEDIATE	Injection pressure starts with the injection movement
	LIMIT	Injection pressure at the end of the injection distance (*Step inj. dist*)
	PRESSURE	Injection pressure without injection movement

6.13.2 Executing the *Step injection* function

Prerequisites

- A FemtoJet 4i is connected.
- *Step injection* is assigned to a free softkey.

1. Activate *Step injection*.
2. Set all parameters.
3. Set the injection time on the FemtoJet 4i.
4. Close the menu.
   The application screen displays *Step injection*.
5. Trigger the injection with the joystick key.
   The function is executed.

6.14 *Home* function

The *Home* function quickly moves the capillary out of the work area and is suitable for a quick change of capillary.

6.14.1 *Home* menu and parameters

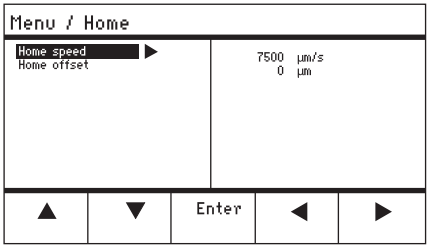


Fig. 6-4: Menu – *Home*

Parameter	Value	Range of values	Increment	Standard
Home speed	Set the speed of the Home function in µm/s	5 – 10000	5	7500
Home offset	Set vertical offset in µm	5 – 20000	5	0

6.14.2 Setting the parameter for *Home*

1. Set the speed.
2. Set the offset.
3. Close the menu.

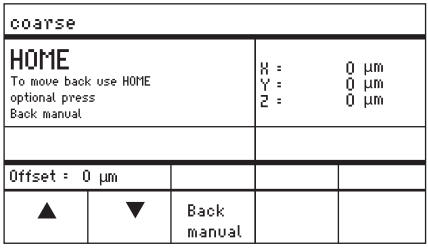
6.14.3 Move the capillary out with the *home* key

Prerequisites

- The parameters in the *Home* menu have been defined.

CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

▶ Do not reach into the movement range of the modules.



1. Press the *home* key.
   The *home* key flashes.
   The capillary is moved out of the work area.
   The *home* key lights up.

6.14.4 Move the capillary back with the *home* key

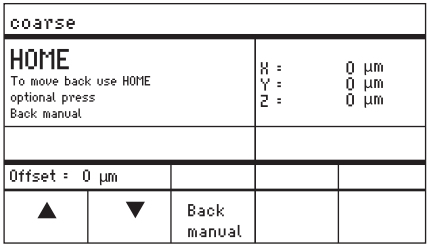
CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

- Do not reach into the movement range of the modules.

1. Press the *home* key.
   The *home* function is terminated.
   The capillary is moved back into the work area.

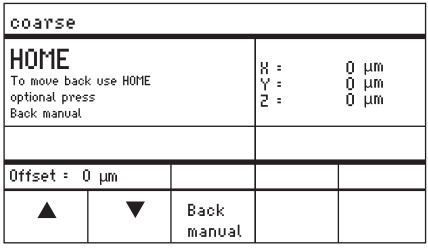
6.14.5 Setting the offset.

For capillaries of different lengths, an offset can be set. This defines a limit for the *home* function.



1. Change the offset using the arrow keys.
   The value for the offset is displayed in the status field.

6.14.6 Terminate the *home* function.



1. Press *Back manual*.
   The *home* function is terminated.
2. Move the capillary manually using the joystick.

6.15 *Clean* function

With this function you can move the capillary over a defined distance out of the medium. In the process, outside contamination is removed from the capillary at the medium boundary.

6.15.1 *Clean* menu and parameters

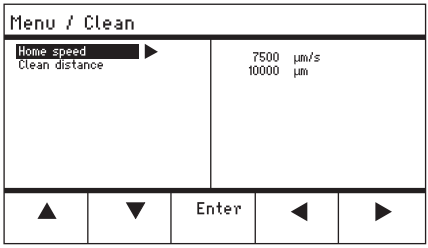


Fig. 6-5: Menu – *Clean*

Parameter	Value	Range of values	Increment	Standard
Home speed	Set the speed of the Clean function in µm/s	5 – 10000	5	7500
Clean distance	Set distance in µm	0 – 20000	5	10000

6.15.2 Setting the parameter for *Clean*

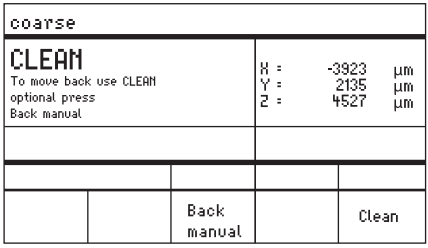
Set the *Clean distance* above the medium boundary

1. Set *Home speed*.
2. Set *Clean distance*.
3. Close the menu.

6.15.3 Execute the *Clean* function

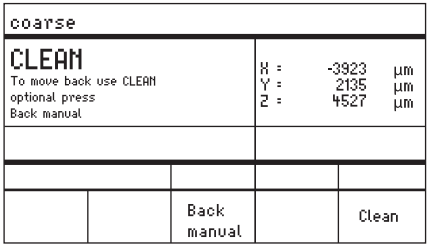
Prerequisites

- Parameters are set for *Clean*.
- *Clean* is assigned to a softkey.



1. Press *Clean*.
   The screen for *Clean* appears.
2. Execute the function with *Clean*.
   The capillary is moved out of the medium with the set parameters.

6.15.4 Terminate the *Clean* function.



1. Press *Back manual*.
   The function is terminated.
   The application screen appears.

6.16 *PiezoXpert* function

6.16.1 *PiezoXpert* menu and parameters

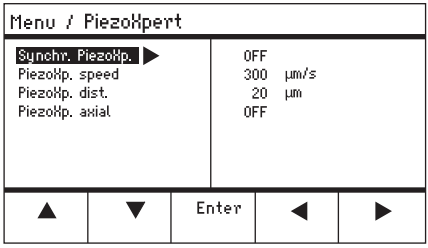


Fig. 6-6: Menu – *PiezoXpert*

Parameter	Value	Range of values	Increment	Standard
Synchr. PiezoXp	Switch synchronization between InjectMan 4 and PiezoXpert on or off	OFF/ON	–	–
PiezoXp. speed	Set the advance rate of the manipulator in µm/s while the PiezoXpert triggers a pulse.	5 – 10000	5	300
PiezoXp. dist	Set the length of the movement step of the manipulator in µm while the PiezoXpert triggers a pulse.	1 – 2000	1	20
PiezoXp. axial	Axial movement on or off (corresponds to the set injection angle) On = movement in the X and Y-axis. Off = movement in the X-axis	ON/OFF	–	OFF

6.16.2 Execute the *PiezoXpert* function

Prerequisites

- A PiezoXpert is connected.

1. Activate *Synchr. PiezoXp*.
2. *PiezoXp. speed*arrow keys.
3. Set *PiezoXp. dist*.
4. Select *PiezoXp. axial*.
5. Close the menu.
6. Trigger the function with *Channel A* on the PiezoXpert.
   The function is executed.

6.17 *Installation* function

This function provides settings for finely adjusting the motor module and the control board. Parameters in the *Installation* menu disable identical softkey functions.

6.17.1 *Installation* menu and parameters

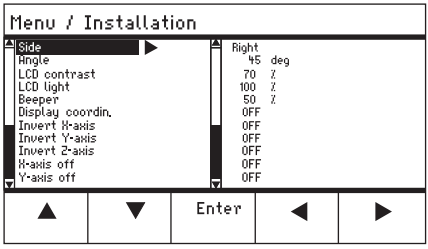


Fig. 6-7: Menu – *Installation*

6.17.2 Installation parameters

Parameter	Value	Range of values	Increment	Standard
Side	Set the mounting side	LEFT/ RIGHT	–	RIGHT
Angle	Set the capillary angle in degrees	0° – 90°	1	–

6.17.3 Control board parameters

Parameter	Value	Range of values	Increment	Standard
LCD contrast	Set the display contrast	65 % – 75 %	1	70 %
LCD light	Set the brightness level of the display	0 % - 100%	1	100 %
Beeper	Set the volume	0 – 100 %	1	50 %
Display coordin	Set the coordinate display	OFF/ON	–	On

6.17.4 Module parameters

Parameter	Value	Range of values	Increment	Standard
Invert X-axis	Reverse the direction of movement of the motor	OFF/ON	–	OFF
Invert Y-axis	Reverse the direction of movement of the motor	OFF/ON	–	OFF
Invert Z-axis	Reverse the direction of movement of the motor	OFF/ON	–	OFF
X-axis off	Switch the motor of the movement axis on or off	OFF/ON	–	OFF
Y-axis off	Switch the motor of the movement axis on or off	OFF/ON	–	OFF
Z-axis off	Switch the motor of the movement axis on or off	OFF/ON	–	OFF
Upper limit	Define the upper limit	EXECUTE	–	–

6.18 *Function* function

Function allows you to reset the parameters and coordinates and to move the modules to the middle position.

6.18.1 *Function* menu and parameters

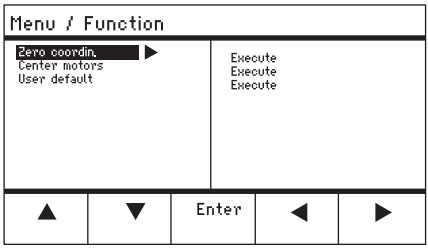


Fig. 6-8: Menu – *Function*

Parameter	Value	Range of values
Zero coordin	Reset all coordinates to zero	Execute
Center motors	Move step motors of the motor module to the middle position	Execute
User default	Reset the settings to the delivery status	Execute

6.18.2 Executing *Zero coordin*

1. Select the parameters and confirm with *Enter*.
2. Confirm *Execute* with *Enter*.
   All coordinates are reset to zero.
   Saved positions are deleted.
   Set limits are deleted.

6.18.3 Executing *Center motors*

Prerequisites

- No capillary holder is clamped.

CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

▸ Do not reach into the movement range of the modules.

1. Select the parameters and confirm with *Enter*.
2. Confirm *Execute* with *Enter*.
   X-motor and Y-motor are moved to the middle position.
   Z-motor is moved to a 20/80 position.
   All coordinates are reset to zero.
   Saved positions are deleted.
   Set limits are deleted.

6.18.4 Executing *User default*

1. Select the parameters and confirm with *Enter*.
2. Confirm *Execute* with *Enter*.
   All parameters are reset to the factory settings.
   The application screen appears.

6.19 *Softkeys* function

With this function you can assign programs to free softkeys. Assigned softkeys are indicated with a lock symbol.

6.19.1 *Softkeys* menu and parameters

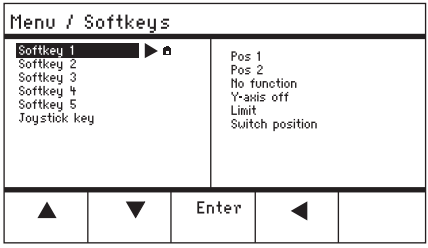


Fig. 6-9: Menu – *Softkeys*

Parameter	Value	Range of values
Softkey 1	Set the function	
Softkey 2	Set the function	
Softkey 3	Set the function	
Softkey 4	Set the function	
Softkey 5	Set the function	
Joystick key	Set the function for the joystick key	*No function* *Switch position* *Switch fine* *Joystick off* *Inject*

Parameter	Function
No function	Softkey has no function
Pos 1	Save, overwrite or delete a position
Pos 2	Save, overwrite or delete a position
Pos 3	Save, overwrite or delete a position
Pos 4	Save, overwrite or delete a position
Pos 5	Save, overwrite or delete a position
Y-axis off	Switch the control of the movement axis on or off
Axial	Change vertical movement to axial movement
Limit	Activate or deactivate the vertical or horizontal (X-axis) limit
Step injection	Activate the *Step injection* function
Limit up	Change the value for *Z-axis Limit* upwards
Limit down	Change the value for *Z-axis Limit* downwards
Clean	Axial movement out of the working range
Z-axis only	Only control of movements in the Z-axis. The control of movements in the X and Y-axis is disabled
LCD light	Set the brightness level of the display
Beeper	Set the volume
Joystick off	Deactivates all joystick movements
X-axis off	Switch the control of the movement axis on or off
Z-axis off	Switch the control of the movement axis on or off
X-axis only	Only control of movements in the X-axis. The control of movements in the Y and Z-axis is disabled
Y-axis only	Only control of movements in the Y-axis. The control of movements in the X and Z-axis is disabled

Parameter	Range of values	Function
Joystick key	*No function*	Deactivate the function of the joystick key
	Switch position	Click once to go to the next saved position
	Switch fine	Click once to go to the *fine* or *x-fine* working range
	Joystick off	Click once to switch the joystick on or off
	Inject	Click once to activate the function

6.19.2 Executing *Softkeys*

1. Select the free softkey and confirm with *Enter*.
2. Select the desired parameter and confirm with *Enter*.
3. Close the menu.
   The selected parameter is assigned to the free softkey.
   The parameter appears on the application screen.

6.19.3 Executing *Joystick key*

Prerequisites

The *My application* application has been selected.

1. Select *Joystick key* and confirm with *Enter*.
2. Select the desired function and confirm with *Enter*.
3. Close the menu.
   The function is assigned to the joystick key.
   The selected function appears on the application screen.

6.20 *Change appl* function

With this function you can define each application as the start screen or reactivate the default screen.

6.20.1 *Change appl* menu and parameters

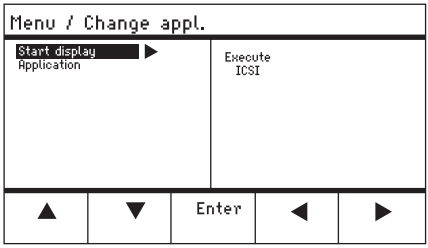


Fig. 6-10: Menu – *Change appl*

Parameter	Value	Range of values
Start display	Reactivate start screen to select an application	Execute
Application	Define the selected application as the start screen	*Adherent cell inj* *ICSI* *Dev. biology* *Physiology* *My application*

6.20.2 Defining the application selection as the start screen

1. Select *Start display*.
2. Confirm with *Execute*.
3. Close the menu.
   The micromanipulator starts with the selected application.

6.20.3 Defining an application as the start screen

1. Select an application.
2. Confirm with *Enter*.
3. Close the menu.
   The micromanipulator always starts with the defined application.

6.21 *Service* function

6.21.1 *Service* menu and parameters

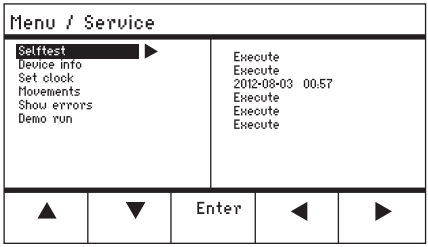


Fig. 6-11: *Service* menu

Parameter	Value	Range of values
Selftest	Move the motor module in all three axes and output error message	EXECUTE
Device info	Display the software version	EXECUTE
Set clock	Set date and time	YYYY-MM-DD 00:00
Movements	Show movement routes of the modules (X, Y, Z)	EXECUTE
Show errors	Display the last 10 error messages	EXECUTE
Demo run	Save the position and move to it	EXECUTE

6.21.2 Executing the *Selftest* function

CAUTION! Risk of crushing between the modules
The modules automatically move in all spatial axes.

- Do not reach into the movement range of the modules.

1. Select *Selftest* and confirm with *Enter*.
2. Confirm *Execute* with *Enter*.
   The screen for the *Selftest* function appears.
3. Execute *Selftest* with *Start*.
   The motors move up to the limit stops.
4. Terminate *Selftest* with *Stop*.

6.22 Resetting parameters to the factory settings

6.22.1 Perform reset

Reset all parameters to the factory settings.

1. Keep the *home* key pressed.
2. Switch on the device at the mains power switch.
   The screen for *GENERAL RESET* appears.
3. Execute the function with *Yes*.
   All parameters are now reset to the factory settings.

6.22.2 Carrying out a reset in the menu

Prerequisites

- An application has been selected.

1. Press the *menu* key.
2. Select the *Function* menu.
3. Press *Enter*.
4. Select *User default* and confirm with *Execute*.
   All parameters are now reset to the factory settings.

6.23 Remote computer control of the InjectMan 4

You can control the InjectMan 4 by means of a terminal program remotely via computer. Computer control by means of a terminal program is only recommended for certain applications and is not described in this operating manual. A special operating manual for this functionality is available at the following Internet address: www.eppendorf.com.

Eppendorf does not provide any support for controlling the InjectMan 4 by means of a terminal program.

7 Troubleshooting

7.1 General errors

7.1.1 Motor module

Problem	Cause	Solution
Motor axes move in the wrong direction or do not match joystick movement.	• Motor module mounted incorrectly. • Incorrect installation parameters entered. • Direction of movement of axis inverted.	▸ Compare the installation parameters with the structure of the motor module. ▸ Check the orientation and structure of the modules. ▸ Check the connections of the modules at the control board. ▸ Cancel the inversion of the axis.

7.1.2 Capillary

Problem	Cause	Solution
Capillary moves too fast or too slow.	• Radius of working range incorrectly set.	▸ Set the radius with the selection dial or in the *Speed* menu.
	• Incorrect acceleration factor.	▸ In the *Installation* menu, set the value for the *Dyn-factor* parameter.
Capillary only moves to the side or vertically.	• Y-axis is disabled.	▸ The *Y off* function disabled.
Capillary does not move down far enough.	• The *Z-axis Limit* function is active. • Capillary is incorrectly adjusted.	▸ Deactivate the *Z-axis Limit* function. ▸ Readjust the capillary.

7.1.3 Control board and display

Problem	Cause	Solution
Device does not respond to keystroke when *Home* function is active.	• The function is active.	▸ Press the *home* key again. The capillary moves down. ▸ Press the *Back manual* softkey. ▸ Move the joystick.
The display does not show anything or the device cannot be activated although the device is connected.	• The power cable or power plug is loose. • The device is switched off.	▸ Check the power cable or the power plug. ▸ Switch on the device.
	• The fuse is defective.	▸ Replace the fuse. ▸ (see *Replacing fuses on p. 93)*

7.1.4 Joystick

Problem	Cause	Solution
Outer movement range of the joystick does not work.	• Outer movement range is deactivated.	▸ In the *Installation* menu, set the value for *Dyn-mode* to *ON*.

7.1.5 Software and parameters

Problem	Cause	Solution
Parameters are not accessible for certain operations.	–	▸ Enter parameters again. ▸ Carry out a reset and reset all parameters to the works settings. ▸ Readjust device.

7.2 Error messages

7.2.1 Warnings

Problem	Cause	Solution
WARNING 1	• FemtoJet is not connected.	▸ Disconnect the data cable to the FemtoJet and connect it again. ▸ Switch on the FemtoJet.
	• The microinjector (FemtoJet) cannot execute the injection command of the micromanipulator (InjectMan 4).	▸ Set FemtoJet to automatic injection. ▸ Set the time of the injection (*Synchr. inject*) to the value *IMMEDIATE*. ▸ Touch and hold the joystick key until the capillary has reached the set *Z-axis Limit*.
WARNING 3	• X-module is not connected.	▸ Switch off the device. ▸ Connect the plug of the X-module to the control board and tighten. ▸ Switch on the device.
WARNING 4	• Y-module is not connected.	▸ Switch off the device. ▸ Connect the plug of the Y-module to the control board and tighten. ▸ Switch on the device.
WARNING 5	• Z-module is not connected.	▸ Switch off the device. ▸ Connect the plug of the Z-module to the control board and tighten. ▸ Switch on the device.
WARNING 6	• Synchronization error with FemtoJet during an injection.	▸ Set another synchronization for *Synchr. inject*. ▸ Set the synchronization *IMMEDIATE*, *LIMIT* or *PRESSURE*.

7.2.2 Errors

Problem	Cause	Solution
ERROR 10 – ERROR 99	• Technical error.	▸ Switch the device off and back on. ▸ Reset the parameters to the factory settings. ▸ Contact Eppendorf Service.

8 Maintenance

8.1 Replacing fuses

DANGER! Electric shock.

- Switch off the device and disconnect the mains/power plug before commencing any service or cleaning operations.

The fuse holder is located between the mains connection socket and the mains power switch. The fuses may only be replaced with the same type of fuse.

1. Disconnect the mains plug.
2. Pull the fuse holder out completely.
3. Replace the defective fuse.
4. Insert the fuse holder.

8.2 Cleaning

DANGER! Electric shock due to the ingress of liquid.

- Switch off the device and disconnect it from the mains/power line before commencing any cleaning or disinfection procedures.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not spray clean or spray disinfect the housing.
- Do not reconnect the device to the mains/power line unless both the inside and outside of the device are completely dry.

NOTICE! Damage due to aggressive chemicals.

- Do not use any aggressive chemicals on the device or its accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenol.
- If the device has been contaminated by aggressive chemicals, clean it immediately using a mild cleaning agent.

Clean the device at least every 4 weeks.

1. Wipe the painted parts and the aluminum surfaces with a cloth and mild detergent.
2. Polish with a dry cloth.

8.3 Disinfection/decontamination

- ▸ Select disinfection methods that comply with the legal regulations and guidelines for your area of application.
- ▸ If you have any questions regarding cleaning, disinfection and decontamination, please contact Eppendorf SE.

Prerequisites
- All device parts are cleaned.
- A disinfectant with an alcohol base (e.g., isopropanol or ethanol) is prepared.

▸ Wipe down all devices with a cloth and the disinfectant.

8.4 Service and maintenance

The user is not required to carry out servicing or safety inspections.

Eppendorf SE recommends having a service carried out every 12 months.
- Contact Eppendorf Service for more information.

Only authorized service personnel are permitted to carry out software updates.

The services of Eppendorf SE are available for servicing and certification of your device.

Service provisions:
- Service
- Operational qualification (OQ) according to manufacturer specifications
- Software update

Information on the services offered can be found on our webpage www.eppendorf.com/epServices.

9 Technical data

Motor module	
Travel, maximum	20 mm
Step motors	X-module, Y-module, Z-module
Weight	2150 g

Module (X, Y, Z)	
Type	Step motors
Step size (calculated resolution)	< 20 nm
Speed, maximum	10000 µm/s
Width	129 mm
Depth	51 mm
Height	36 mm
Weight	570 g

Swivel joint	
Direction of rotation	-45° – +90°
Capillary change	Direction of rotation forwards
Sample change	Direction of rotation backwards

Angle head	
Operating angle	0° – 90°
Weight load, maximum	200 g

Control board	
Control	Joystick
Working range	*coarse*, *fine*, *x-fine*
Width	205 mm
Depth	288 mm
Height	152 mm
Weight	1800 g

9.1 Power supply

Voltage	AC 100 V – 240 V, ±10 %
Frequency	50 Hz – 60 Hz
Power consumption	30 W
Protection class	I
Overvoltage category	II (IEC 61010-1)
Micro fuse	250 V, 1.6 A, T

9.2 Interfaces

Module (X, Y, Z)	SubD9, female
PC/external device	Serial interface SubD9, male
Service connection	USB

9.3 Ambient conditions

Environment	For indoor use only. The surroundings must not be moist.
Ambient temperature	15 °C – 35 °C
Relative humidity	30 % – 65 %, non-condensing.
Atmospheric pressure	79,5 kPa – 106 kPa Use up to a height of 2000 m above sea level.
Pollution degree	2 (IEC 664)

10 Transport, storage and disposal

10.1 Disassembling and packing the micromanipulator

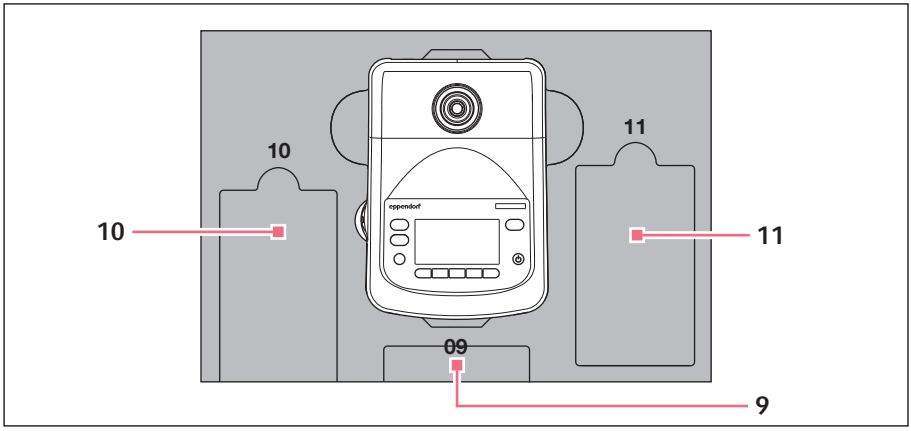


Fig. 10-1: Base padding

9 Control panel

10 Mains/power cord

11 Connecting cable

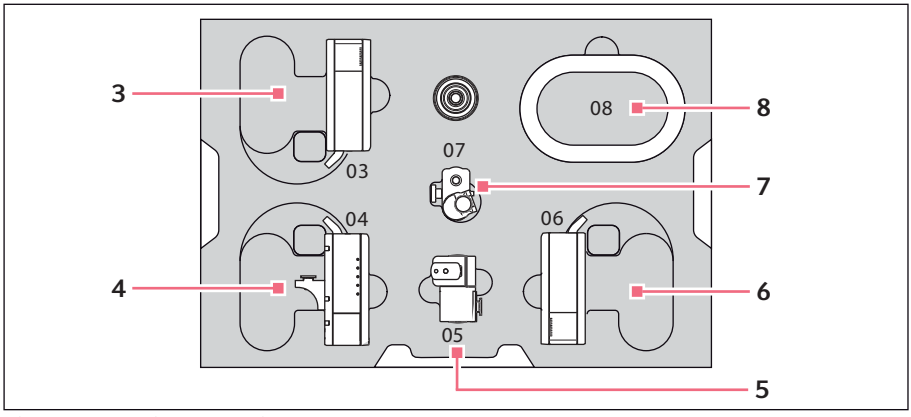


Fig. 10-2: Middle padding

3 Z-module

4 Y-module with YZ connector

5 Swivel joint

6 X-module

7 Angle head

8 Cable sheathing

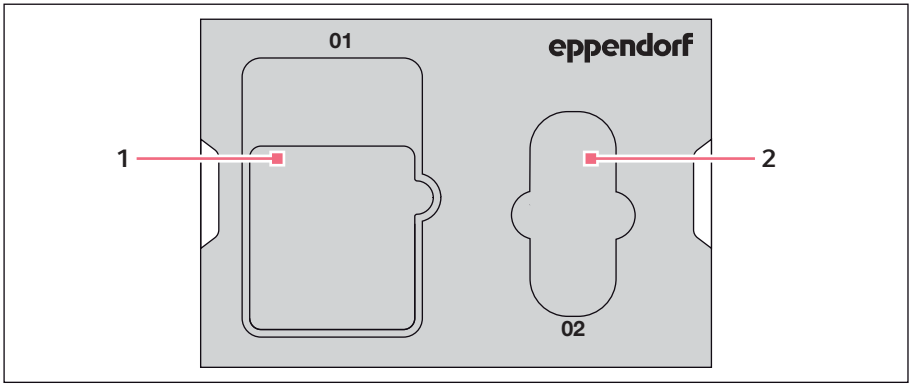


Fig. 10-3: Lid padding

1 Instructions **2 Tool bag**

Prerequisites

- The original box with foam padding is available.

1. Center the Z-module, X-module and Y-module manually with the joystick. The module housing and the movable rail must be flush.
2. Switch off the micromanipulator at the mains/power switch.
3. Pull the power cable and place it in recess **10**.
4. Unscrew the module plug connections from the control board.
5. Unscrew the connection to the external device and place it in recess **11**.
6. Place the control board in recess **09**.
7. Align the joystick so that it is straight and position the middle padding with the recess above the joystick.
8. Remove the cable sheathing and place it in recess **08**.
9. Remove the capillary holder.
10. Loosen and pull off the angle head.
11. Re-tighten the screws at the angle head and place them in recess **07**.
12. Undo the screw on the swivel joint.
13. Pull off the X-module with swivel joint.
14. Loosen the second screw at the swivel joint and pull the swivel joint from the X-module.
15. Tighten both screws at the swivel joint and place the swivel joint in recess **05**.
16. Place the X-module in recess **06**.
17. Loosen the screw connecting the YZ connector to the Z-module.

18. Pull off the YZ connector with Y-module.
    The YZ connector remains at the Y-module.
19. Tighten the screws at the YZ connector.
20. Place the Y-module with YZ connector in recess **04**.
21. Loosen the screw connecting the Z-module holder to the Z-module and pull off the Z-module.
22. Tighten the screw of the Z-module holder.
23. Place the Z-module in recess **03**.
24. Insert the lid padding.
25. Place the tool bag in recess **02**.
26. Close the box and send it to the authorized service.

10.2 Storage

	Air temperature	**Relative humidity**	**Atmospheric pressure**
In transport packing	-25 °C – 55 °C	10 % – 95 %	70 kPa – 106 kPa
Without transport packing	-5 °C – 45 °C	10 % – 95 %	70 kPa – 106 kPa

10.3 Decontamination before shipment

If you are shipping the device to the authorized Technical Service for repairs or to your authorized dealer for disposal please note the following:

WARNING! Risk to health from contaminated device.

1. Observe the information on the decontamination certificate. It is available as a PDF document on our website (www.eppendorf.com/decontamination).
2. Decontaminate all the parts to be shipped.
3. Include the fully completed decontamination certificate in the package.

10.4 Transport

NOTICE! Damage to the control board as a result of incorrect handling.

- Grasp the control board on the housing.
- Do not lift the control board using the joystick.
- Never place the control board on the joystick.

Air temperature	Relative humidity
-40 °C – 60 °C	10 % – 95 %

Carry out the following steps before transport:

1. Move the modules into the center position.
   The movable rail must not protrude over the module.
2. Disassemble the module unit before transport.
3. Only use original packaging for transport.

10.5 Disposal

Observe the relevant legal regulations when disposing of the product.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2012/19/EU pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. They are marked with the following symbol to indicate this:

As the disposal regulations may differ from one country to another within the EU, please contact your supplier for more information.

11 Ordering Information

11.1 InjectMan 4

Order no. (International)	Order no. (North America)	Description
		InjectMan 4
5192 000.019	5192000019	Mains/Power plug Europe
5192 000.027	5192000027	Mains/Power plug USA/Japan
5192 000.035	5192000035	Mains/Power plug UK/Hong Kong
5192 000.043	5192000043	Mains/Power plug Australia
5192 000.051	5192000051	Mains/Power plug China
5192 000.060	5192000060	Mains/Power plug Argentina

11.2 Accessories for InjectMan 4

Order no. (International)	Order no. (North America)	Description
5192 082.007	5192082007	**Connecting cable** TransferMan 4r/InjectMan 4 - FemtoJet 4i/4x
5181 070.015	920005845	**Data cable** Connect FemtoJet/FemtoJet express to micromanipulator
5252 070.020	5252070020	**Foot control** for FemtoJet 4i/4x
		Antivibration Pad
5181 301.009	920007945	XS, weight range 4.5 – 6.0 kg
5181 303.001	920007953	S, weight range 6.0 – 8.0 kg
5181 305.004	920007961	M, weight range 8.0 – 10.0 kg
5181 307.007	920007970	L, weight range 10.0 – 12.5 kg
5181 309.000	920007988	XL, weight range 12.5 – 16.5 kg
5192 071.005	5192071005	**Spare parts kit** 1 slider (complete), 2 machine screws M2.5×6 (swivel joint), 2 set screws (angle head), 2 compression springs (knurled screw angle head)
5192 072.001	5192072001	**Positioning aid** 2 pieces for universal capillary holder, capillary holder 4
5192 073.008	5192073008	**Headstage holder** for preamplifier
5192 081.000	5192081000	**Y-cable PX**

11.3 Tools for InjectMan 4

Order no. (International)	Order no. (North America)	Description
5192 074.004	5192074004	**Allen torque screwdriver** 3 mm
5192 075.000	5192075000	**Allen screwdriver** 1.3 mm
5192 076.007	5192076007	**Allen key** 7 pieces 1.5 mm, 2 mm, 2.5 mm, 3 mm, 4 mm, 5 mm, 6mm
5192 077.003	5192077003	**Toolbag**

11.4 Microscope adapter

Order no. (International)	Order no. (North America)	Description
5192 301.000	5192301000	**Adapter for microscope** Leica 1 DMi8, DMI3000 B, 3000 M, 4000 B, 5000 B, 5000 M, 6000 B, DM IRB E, DM IRE 2
5192 302.007	5192302007	**Adapter for microscope** Leica 2 DM IL LED, HC
5192 306.002	5192306002	**Adapter for microscope** Olympus 1 IX50, IX51, IX70, IX80, IX81
5192 307.009	5192307009	**Adapter for microscope** Olympus 2 IX53 IX3-ILL, IX73 IX3-ILL, IX83 IX3-ILL, useable also with motorized condensor IX3-MLWCDA
5192 308.005	5192308005	**Adapter for microscope** Olympus 3 IX53 IX2-ILL30
		Adapter for microscope Nikon 1

Order no. (International)	Order no. (North America)	Description
5192 316.008	5192316008	Eclipse Diaphot 200, 300, Eclipse Ti-E, Ti-U, Ti-S, TE200, TE300, TE2000
5192 317.004	5192317004	**Adapter for microscope** Nikon 2 Eclipse Ts2R
5192 318.000	5192318000	**Adapter for microscope** Nikon 3 Eclipse Ti2-U, Ti2-A, Ti2-E
5192 311.006	5192311006	**Adapter for microscope** Zeiss 1 AxioObserver 3, 5, 7, AxioObserver A1, D1, Z1, Axiovert 200
5192 312.002	5192312002	**Adapter for microscope** Zeiss 2 Axio Vert.A1

11.5 Accessories for adapters for microscope

Order no. (International)	Order no. (North America)	Description
5192 325.007	5192325007	**Universal stand** for micromanipulators TransferMan 4m/4r, InjectMan 4
5192 321.001	5192321001	**Adapter bridge** for micromanipulators TransferMan 4m/4r, InjectMan 4

11.6 Capillaries

Order no. (International)	Order no. (North America)	Description
5195 000.052	5195000052	**Biopsy Tip I** 25 pieces, sterile
5195 000.060	5195000060	**Biopsy Tip II** 25 pieces, sterile
5195 000.087	5195000087	**Piezo Drill Tip ICSI** 25 pieces, sterile
5195 000.095	5195000095	**Piezo Drill Tip ES** 25 pieces, sterile

Order no. (International)	Order no. (North America)	Description
5195 000.001	5195000001	**TransferTip F (ICSI)** 25 pieces, sterile
5195 000.010	5195000010	**TransferTip RP (ICSI)** 25 pieces, sterile
5195 000.028	5195000028	**TransferTip R (ICSI)** 25 pieces, sterile
5195 000.079	5195000079	**TransferTip ES** 25 pieces, sterile
5195 000.036	5195000036	**VacuTip I** 25 pieces, sterile
5195 000.044	5195000044	**VacuTip II** 25 pieces, sterile

11.7 Femtotips

Order no. (International)	Order no. (North America)	Description
5242 952.008	930000035	**Femtotips** 20 pieces
5242 957.000	930000043	**Femtotip II** 20 pieces
5242 956.003	930001007	**Microloader** Eppendorf Quality, 2 racks of 96 tips 0.5 - 20 µL, light gray, length: 100 mm

11.8 Capillary holder 4 and accessories

Order no. (International)	Order no. (North America)	Description
5196 081.005	5196081005	**Capillary holder 4** for mounting microcapillaries
5196 082.001	5196082001	**Grip head set 4** for capillary holder 4 and universal capillary holder Size 0, capillary diameters from 1.0 mm to 1.1 mm (O.D.)
5196 083.008	5196083008	Size 1, capillary diameters from 1.2 mm to 1.3 mm (O.D.)

Order no. (International)	Order no. (North America)	Description
5196 084.004	5196084004	Size 2, capillary diameters from 1.4 mm to 1.5 mm (O.D.)
5196 085.000	5196085000	Size 3, capillary diameters from 0.7 mm to 0.9 mm (O.D.)
5196 086.007	5196086007	**O-ring set 4** incl. 10 o-rings large, 10 o-rings small, 2 distance sleeves, o-ring removal tool for grip head set 4

11.9 CellTram 4r and accessories

Order no. (International)	Order no. (North America)	Description
5196 000.013	5196000013	**CellTram 4r Air**
5196 000.030	5196000030	**CellTram 4r Oil**
5196 061.004	5196061004	**Injection tube Air** White ring mark, I.D. 0.5 mm, length 1.3 m
5196 089.006	5196089006	**Injection tube Oil** Blue ring mark, I.D. 1.0 mm, length 1.3 m
5176 220.009	5176220009	**Tube coupling** for extending or connecting injection tubes
5196 088.000	5196088000	**Filling and Cleaning set** incl. filling tube, Luer lock adapter, 2 syringes CellTram 4

11.10 FemtoJet 4x

Order no. (International)	Order no. (North America)	Description
5253 000.017	5253000017	**FemtoJet 4x Microinjector**

11.11 FemtoJet 4i

Order no. (International)	Order no. (North America)	Description
5252 000.013	5252000013	**FemtoJet 4i microinjector**

11.12 Accessories for FemtoJet 4i/FemtoJet 4x

Order no. (International)	Order no. (North America)	Description
5252 070.011	5252070011	**Hand control** for remote-controlling for FemtoJet 4i/4x
5252 070.020	5252070020	**Foot control** for FemtoJet 4i/4x
5192 080.004	5192080004	**Y-cable FJ4**
5252 070.054	5252070054	**Injection tube** 2 m, for universal capillary holder and capillary holder 4
5248 200.008	920011993	**pressure tube** for connecting the FemtoJet express/ 4x to an external pressure supply Length 2.5 m, incl. 2 couplings G 1/ 4 inch and 1/4 inch 18 NPT
5248 202.000	920011985	**Adapter for nitrogen pressure reducer** Coupling G 1/4 inch 18 NPT

11.13 PiezoXpert

Order no. (International)	Order no. (North America)	Description
		Eppendorf PiezoXpert for piezo-assisted micromanipulation
5194 000.016	–	with mains/power plug EU
5194 000.024	5194000024	with mains/power plug USA/Japan
5194 000.032	5194000032	with mains/power plug UK/Hong Kong
5194 000.059	5194000059	with mains/power plug Australia
5194 000.067	5194000067	with mains/power plug China
5194 000.075	5194000075	with mains/power plug Argentina

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Declaration of Conformity

The product named below fulfills the requirements of directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product name:

Eppendorf InjectMan® 4

Product type:

Electric motor driven micromanipulator

Relevant directives / standards:

2014/35/EU:	EN 61010-1, EN 61010-2-081
	UL 61010-1, UL 61010-2-081
	CAN/CSA C22.2 No. 61010-1, CAN/CSA C22.2 No. 61010-2-081
2014/30/EU:	EN 61326-1, EN 55011
2011/65/EU:	EN 50581

Hamburg, November 06, 2018

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