Calibre SCIENTIFIC

CellTram® 4r Air
CellTram® 4r Oil

Service Manual

Copyright© 2024 Biozol Diagnostica Vertrieb GmbH, Germany. All rights reserved, including graphics and images. No part of this publication may be reproduced without the prior permission of the copyright owner.

CellTram® and TransferTip® are registered trademarks of Biozol Diagnostica Vertrieb GmbH, Germany.

Registered trademarks and protected trademarks are not marked in all cases with ® or ™ in this manual.

Calibre SCIENTIFIC

Your local distributor: cmi.calibrescientific.com/contact
cmi.calibrescientific.com

Manufactured by:
Biozol Diagnostica Vertriebs GmbH · Oehleckerring
11-13 · 22419 · Hamburg · Germany
www.biozol.de

Table of contents

1 Operating instructions

1.1 Using this manual

- Make sure that the service manual and the operating manual are available in the latest versions. To do so, compare the version numbers. Please visit www.calibrescientific.com to contact Calibre Scientific for the PDF document.
- Read the service manual before commencing work on the device.
- Read the chapters "Installation" and "Operation" of the operating manual.
- Observe the safety instructions in the operating manual.

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:

 **Biohazard**	 **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

1.4 Purpose and scope

1.4.1 Purpose

This document describes all prerequisites and actions necessary to perform installation, diagnosis, repair or service of the product named on the title page.

1.4.2 Scope

This document applies for all Calibre Scientific Sales and Service organizations, service providers commissoned by Biozol Diagnostica Vertrieb GmbH, and all service technicians certified by Biozol Diagnostica Vertrieb GmbH.

1.5 Version overview

Version	Issue date	Chapter	Change
00	2017-03	All	Newly created document not published
01	201703	All	First issue
02	2020-06	1, 10	Version history, purpose, scope and function test supplemented.
03	2022-05	Copyright, 1, 3, 11	Change of Biozol Diagnostica Vertrieb GmbH to Biozol Diagnostica Vertrieb GmbH. Ambient conditions supplemented.

2 Product description

2.1 Product overview

2.1.1 CellTram 4 Air

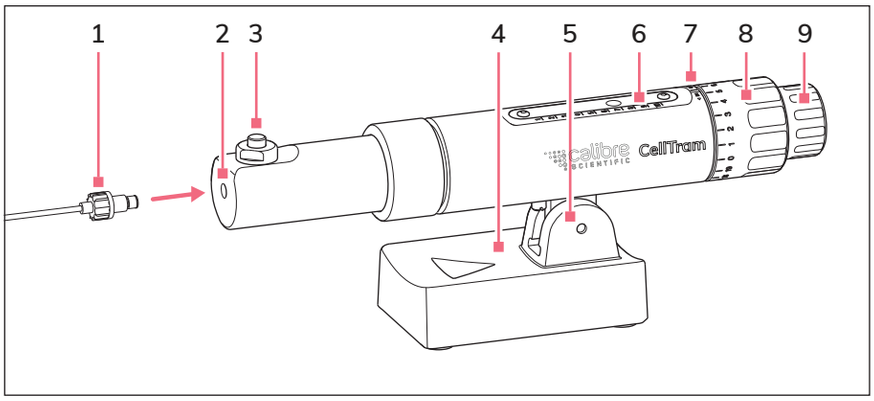


Fig. 2-1: CellTram 4 Air

1 Injection tube Air

2 Port for injection tube

3 Ventilation valve

4 Device foot

5 Joint

6 Scale for piston position

7 Rotation direction indicator
IN – aspirate
OUT – dispense

8 Coarse drive
Rotary knob with scale for coarse drive

9 Fine drive
Rotary knob for fine drive

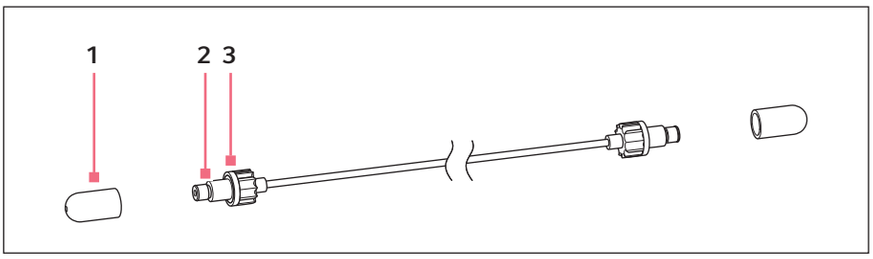


Fig. 2-2: Injection tube Air

1 Dust cap

2 Port for capillary holder 4

3 White marking ring

2.1.2 CellTram 4 Oil

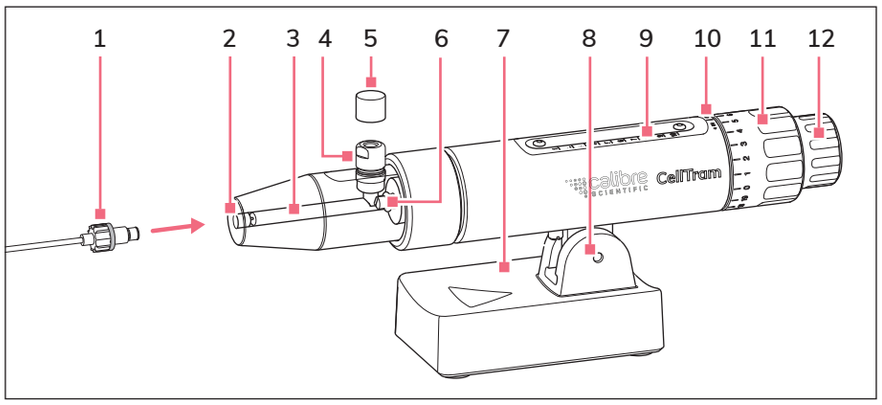


Fig. 2-3: CellTram 4 Oil

1 Injection tube Oil

2 Port for injection tube

3 Plexiglass cylinder (plexi cap)

4 Filling valve

5 Dust cap

6 Piston

7 Device foot

8 Joint

9 Scale for piston position

10 Rotation direction indicator
IN – aspirate
OUT – dispense

11 Coarse drive
Rotary knob with scale for coarse drive

12 Fine drive
Rotary knob for fine drive

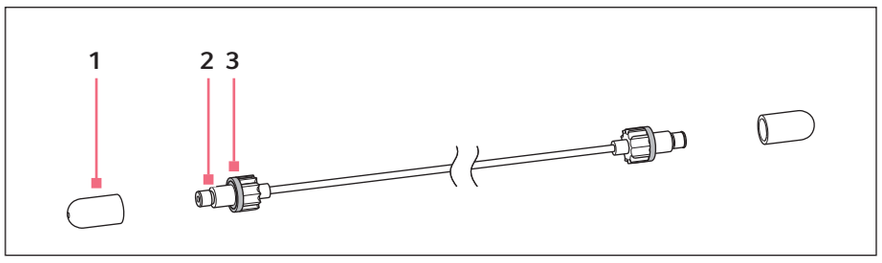


Fig. 2-4: Injection tube Oil

1 Dust cap

2 Port for capillary holder 4

3 Blue marking ring

3 Safety

3.1 User profile

The specialist entrusted with service, repair or testing must meet the following prerequisites:

- Successful participation in service training courses with certification by Biozol Diagnostica Vertrieb GmbH for the product to be maintained, repaired or tested.
- Training as a specialist with knowledge of the applicable local and international standards.
- Ability to evaluate the work delegated.
- Recognition of potential hazards and how to prevent them.

3.2 Information on liability

The Calibre Scientific service organization responsible for servicing, repair, or testing is liable for ensuring that all work is performed in a professional manner.

▸ The constructive condition of the device must not be altered as a result of repair, servicing, or testing. The safety of the original condition must be maintained.

▸ Only accessories and original spare parts recommended by Calibre Scientific as well as test and measuring equipment recommended by Calibre Scientific may be used for servicing, repair, and testing.

3.3 Personal protective equipment

Personal protective equipment protects your life and your health.

▸ Always wear protective clothing, protective gloves, and safety boots.

▸ If additional protective equipment is required, this is indicated above the respective instruction.

3.4 Warning symbols on the device

Depiction	Meaning
	**WARNING** Read the instructions for use

3.5 Danger to persons

Observe the safety regulations of the lab.

CAUTION! Risk of cuts when unpacking the capillaries
Capillaries can break as a result of incorrect unpacking.

- Do not reach into the capillary transport protection.

CAUTION! Risk of cuts from glass splinters
Capillaries break easily when they are inserted.

- Carefully push the capillary all the way to the stop.

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.

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.
- Consult the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, as amended) for comprehensive regulations on the handling of germs or biological material of risk group II or higher.

WARNING! Damage to health due to toxic, radioactive or aggressive chemicals.

- Wear your personal protective equipment.
- Observe the national regulations for handling these substances.
- Observe the manufacturers' Safety Data Sheets and application notes.

CAUTION! Poor safety due to incorrect accessories and spare parts.
The use of accessories and spare parts other than those recommended by Calibre Scientific may impair the safety, functioning and precision of the device. Calibre Scientific 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 Calibre Scientific.

3.6 Danger during repair and shipment

WARNING! Infection by contaminated material
There may be contaminated material on the device and the accessories. You may become infected by contaminated material.

- Find out more about the risk of contamination before starting work.
- Check the device decontamination certificate of the device.
- Work on decontaminated devices only.
- Wear your personal protective equipment (protective gloves, protective goggles).

NOTICE! Damage due to incorrect packing.
Biozol Diagnostica Vertrieb GmbH is not liable for any damage caused by improper packing.

- Only store and transport the device in its original packing.

4 Operation

Intentionally left blank

5 Troubleshooting

5.1 CellTram 4 Air

Problem	Cause	Solution
System not tight. Pressurization not possible.	• Capillary holder faulty or not connected.	▸ Check capillary holder and tubing for leak tightness or tighten tube connector.
	• The grip head has the wrong size or is faulty.	▸ Use correct grip head size. ▸ Exchange grip head.
	• O-rings in grip head are faulty or not inserted correctly.	▸ Replace faulty o-rings. ▸ Insert o-rings correctly.
	• Capillary broken. • Capillary has the wrong diameter.	▸ Replace faulty or wrong capillaries.
	• O-ring on piston faulty.	▸ Replace faulty o-ring.
	• O-ring on vent valve faulty.	▸ Replace faulty vent valve.
	• Vent valve faulty.	▸ Replace faulty vent valve.
Gearing problems	• Gearing faulty.	▸ Replace gearing.
	• Friction element not lubricated.	▸ Lubricate friction element.
Grinding noises in fine drive.	• No air gap between coarse and fine adjustment knob.	▸ Adjust air gap between coarse and fine adjustment knob.
Grinding noises in coarse drive.	• No air gap between housing and coarse adjustment knob.	▸ Adjust air gap between housing and coarse adjustment knob.

5.2 CellTram 4 Oil

Problem	Cause	Solution
System not tight. Pressurization not possible. Oil may leak out.	• Capillary holder faulty or not connected.	▸ Check capillary holder and tubing for leak tightness or tighten tube connector.
	• The grip head has the wrong size or is faulty.	▸ Use correct grip head size. ▸ Replace grip head.
	• O-rings in grip head are faulty or not inserted correctly.	▸ Replace faulty o-rings. ▸ Insert o-rings correctly.
	• Capillary broken. • Capillary has the wrong diameter.	▸ Replace faulty or wrong capillaries.
	• O-ring on piston faulty.	▸ Replace faulty o-ring. Or replace plexiglass cylinder (5196855205; with premounted o-ring)
	• O-ring on fill valve faulty.	▸ Replace faulty fill valve.
	• Fill valve faulty.	▸ Replace faulty fill valve.
Uneven pressure profile.	• Air in system.	▸ Remove air bubbles from system.
	• Bore for tube connection in plexi cap clogged.	▸ Clean bore for tube connection.
Abrasion from o-ring in plexi cap.	• O-ring worn.	▸ Replace o-ring. ▸ Clean plexi cap.
Gearing problems	• Gearing faulty.	▸ Replace gearing.
	• Friction element not lubricated.	▸ Lubricate friction element.
Grinding noises in fine drive.	• No air gap between coarse and fine adjustment knob.	▸ Adjust air gap between coarse and fine adjustment knob.
Grinding noises in coarse drive.	• No air gap between housing and coarse adjustment knob.	▸ Adjust air gap between housing and coarse adjustment knob.

6 Disassembly/assembly

6.1 Exchanging the gearing

Use the grease for pipettes (see ordering information).

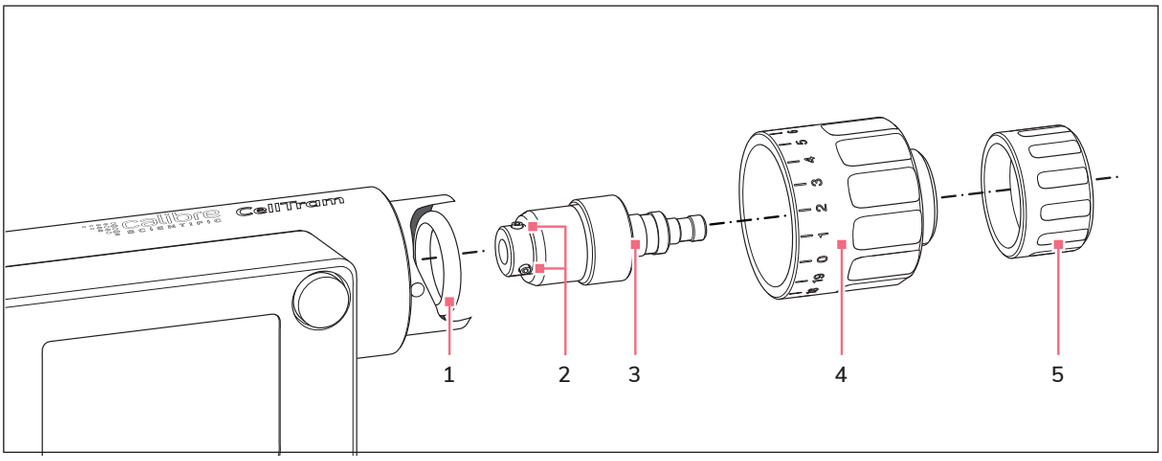


Fig. 6-1: Gearings and adjustment knobs in CellTram 4

1 O-ring

2 Set screws on the gearing

3 Gearing

4 Coarse adjustment knob

5 Fine adjustment knob

1. Loosen the set screw in the fine adjustment knob using a 1.3 mm Allen key.
2. Remove fine adjustment knob.
3. Loosen 2 opposite set screws in coarse adjustment knob using a 1.3 mm Allen key.
4. Remove coarse adjustment knob.
5. Rotate gearing until one of the set screws is positioned below the bore.
   The bore is located on the bottom of the device.
6. Loosen set screw.
7. Rotate gearing until the second set screw is positioned below the bore (120° or 240°).
8. Loosen set screw.
9. Remove gearing.
10. Clean and grease the o-ring (17 x 4 mm, NBR 70) in the housing.
11. Insert new gearing.
12. Secure set screws with Loctite 222 and tighten with 40 Ncm.
13. Fit coarse adjustment knob leaving a gap of 0.1 mm to the housing.
14. Secure set screws with Loctite 222 and tighten with 40 Ncm.
15. Fit fine adjustment knob leaving a gap of 0.1 mm to the coarse adjustment knob.
16. Secure set screws with Loctite 222 and tighten with 40 Ncm.
17. Turn piston to front stop and back to distribute the grease in the gearing.

6.2 Replacing the o-ring – CellTram 4 Air

Use the grease for pipettes (see ordering information).

1. Loosen the union nut.
2. Remove the union nut with the cap.
3. Remove the spring.
4. Remove the old o-ring.
5. Place the new o-ring (11 x 2.6 mm, NBR 70) in the piston groove.
6. Fit the spring.
7. Fit the cap and the union nut with the ventilation hole pointing upwards.
8. Screw on and tighten the union nut.

6.3 Replacing the vent valve – CellTram 4 Air

Prerequisites

The o-rings must be placed in the correct position in the valve housing and at the ram (see figure).

The o-rings are not lubricated.

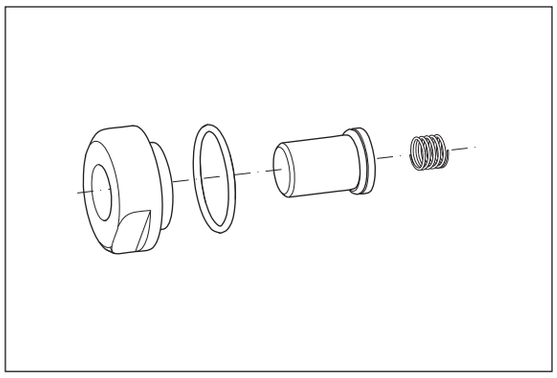


Fig. 6-2: Design of the vent valve

1. Remove vent valve with open-end wrench size SW 14.
2. Screw the vent valve into the device.
3. Operate valve several times.

6.4 Replacing the o-ring – CellTram 4 Oil

NOTICE! Device contamination due to escaping oil
If the groove of the o-ring in the plexi cap is damaged, oil escapes from the pressure cylinder.

- Do not damage the groove when replacing the o-ring.

Use the available mineral oil.

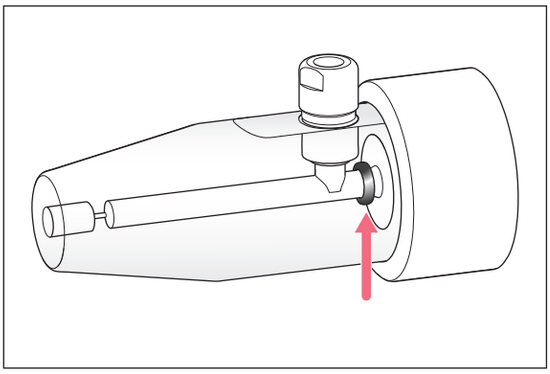


Fig. 6-3: O-ring in the plexi cap

1. Loosen the union nut.
2. Remove the union nut with the plexi cap.
3. Remove the spring.
4. Remove the old o-ring with a pointed tool.
5. Use the installation aid to spread some mineral oil in the groove.
6. Coat the new o-ring (4.5 x 2 mm, NBR 70) with mineral oil.
7. Place the o-ring into the plexi cap and squeeze it together using a pair of blunt tweezers.

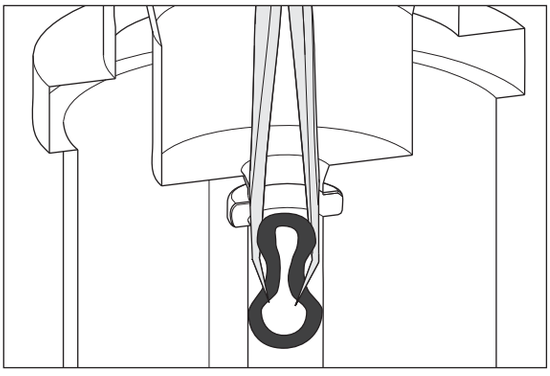


Fig. 6-4: O-ring before insertion into the groove

8. Insert the o-ring into the cylinder of the plexi cap using the tweezers.
   The o-ring must be completely in front of the groove.
9. Place the o-ring into the groove on the side of the filling opening.
10. Turn the plexi cap until the filling opening points downwards.

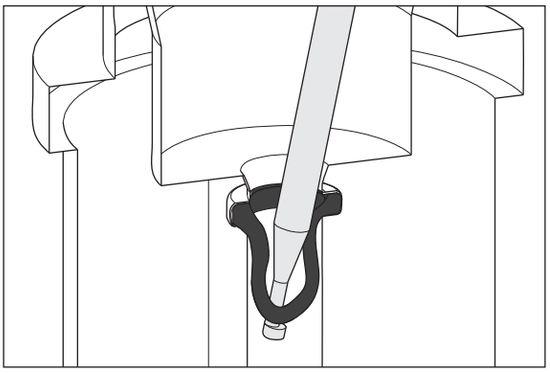


Fig. 6-5: Position of the o-ring and installation aid

11. Guide the installation aid through the o-ring.
    The hook of the installation aid points upwards.
12. Pull the o-ring on the cylinder wall into the groove.
    The o-ring must not become twisted.
13. Use the installation aid to push the o-ring into the groove and remove all tension from the o-ring.
14. Insert the installation aid with the rear side into the bore of the plexi cap.
15. To fit the o-ring evenly in the groove, turn the installation aid around its longitudinal axis.
16. Coat the piston with the available mineral oil.
17. Fit the spring.
18. Fit the plexi cap with the filling opening pointing upwards.
19. Screw on and tighten the union nut.

6.5 Exchanging the fill valve – CellTram 4 Oil

Use grease for pipettes (see order information).

1. Remove fill valve with open-end wrench size 10.
2. Remove o-ring from plexi cap.
3. Insert new o-ring in plexi cap.
4. Apply a thin layer of grease.
5. Screw new fill valve into plexi cap.
6. Use a screwdriver to actuate the valve several times.

6.6 Filling oil – CellTram 4 Oil

Observe the legal regulations for purity of the oil. The supplied oil is generally used in the ICSI area to coat drops containing embryos, egg cells or sperm. The supplied oil is not sterile. Additional instructions can be found in the manufacturer's material safety data sheet.

The entire system must be free of air bubbles. Air bubbles in the pressure system negatively affect the precise adjustment and control of pressure differences.

6.6.1 Filling the filling syringe with oil

Prerequisites

- Mineral oil is prepared.

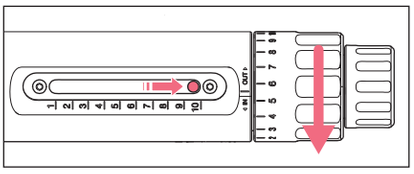
When aspirating the oil with the filling syringe, tiny air bubbles may form. Try to avoid the formation of air bubbles, as they will be transferred to the microinjector and impair or slow down the filling process. If there are air bubbles in the filling syringe, allow the syringe to rest for a longer period of time so that a large air bubble forms. Large air bubbles can be pressed out during filling.

1. Screw the luer lock adapter onto the filling tube.
2. Insert the filling syringe into the luer lock adapter.
3. Insert the filling syringe into the mineral oil and slowly aspirate at least 3 mL .
4. Hold the filling tube vertically and push out any air bubbles.

6.6.2 Connecting the filling tube

NOTICE! Material damage due to operating error
Damage to the drive due to overwinding of the piston.

- When you feel a resistance do **not** continue to wind in the same direction.
- When the piston is in piston position 1 turn the piston back in counter-clockwise direction.
- When the piston is in piston position 10 turn the piston forward in clockwise direction.

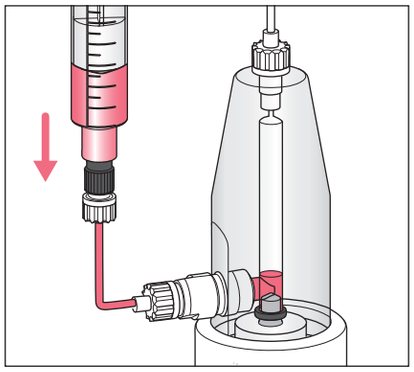


1. Move the pistons to the starting position (piston position 10).
2. Remove the dust cap from the filling valve.
3. Screw the filling tube onto the filling valve.

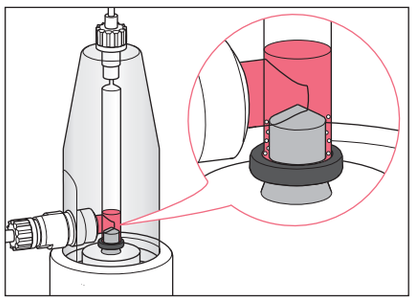
6.6.3 Filling the system with oil

Prerequisites

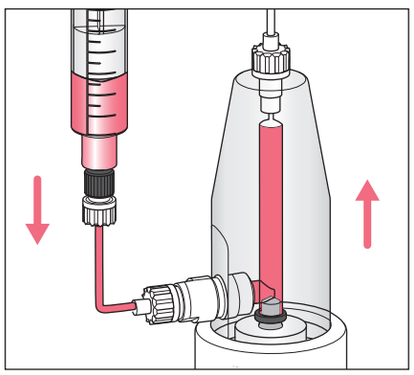
- The pistons are in the starting position (piston position 10).
- The oil in the filling syringe is free of air bubbles.



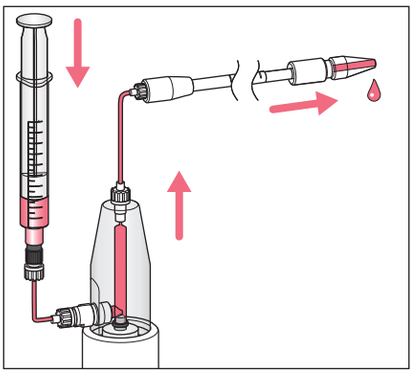
1. Hold the microinjector vertically.
2. Slowly push some oil into the piston chamber.
   When filling the system for the first time, air bubbles often form in the ring gap between the piston and the cylinder.
   The air bubbles must be removed from the ring gap.



3. Rotate the coarse drive back and forth until all air bubbles have been removed from the ring gap.



4. Slowly fill the piston chamber with oil.
5. To remove more air bubbles, gently tap the side of the piston chamber.
   Any air bubbles will collect at the transition to the injection tube.
6. Push oil through.



7. Fill the injection tube and the capillary holder with oil.
8. Check the system for air bubbles.
9. Push oil through the system until the oil passes through the grip head free of bubbles.
10. Unscrew the filling tube.
11. Place the dust cap on the filling valve.

6.7 Exchanging the o-rings in the grip head

If you notice leaks on the grip head, the o-rings must be exchanged.

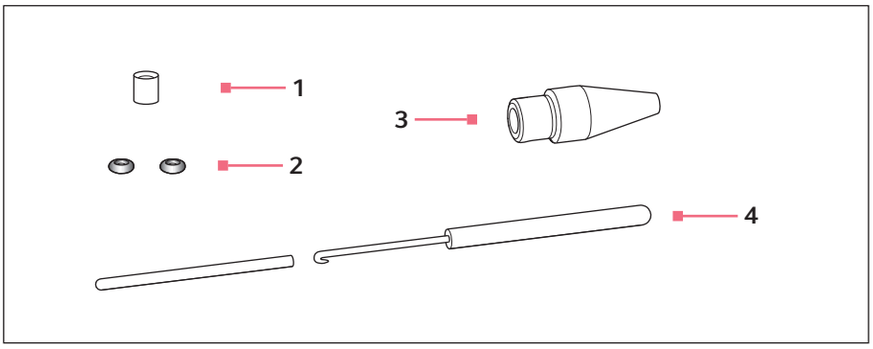


Fig. 6-6: Grip head 4 with removal tool

1 Distance sleeve

2 O-rings
Inner diameter 1.0 mm

3 Grip head 4 size 0

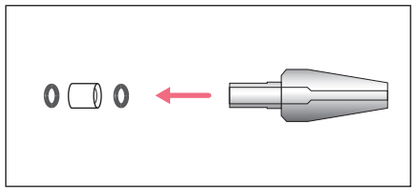
4 Removal tool
Hook with protective sleeve

6.7.1 Remove the o-rings and distancing sleeves

Prerequisites

- The grip head has been unscrewed from the capillary holder.
- The capillary has been removed from the grip head.

The hook of the removal tool is used to pull out the o-rings and the distance sleeve.



1. Pull out the first o-ring.
2. Pull out the distance sleeve.
3. Pull out the second o-ring.

6.7.2 Inserting the o-rings and the distance sleeve

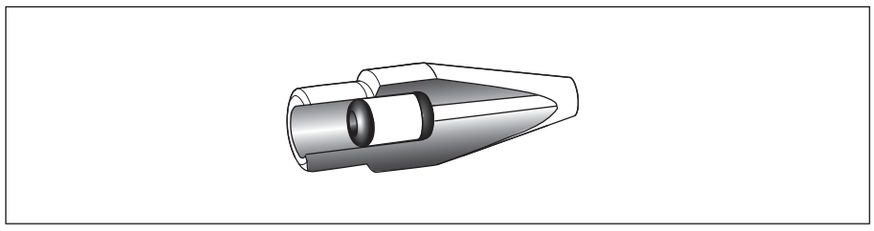
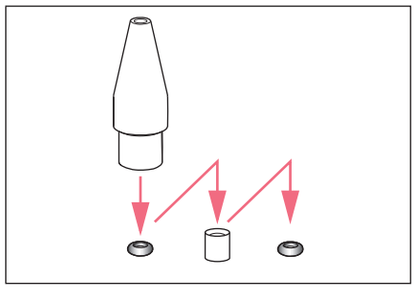


Fig. 6-7: Cross section with correctly positioned o-rings and spacing sleeve

Prerequisites

- The o-rings are clean and free of damage.
- The grip head is clean and free of damage.
- A clean and flat surface is available.
- O-rings matching the grip head size are available.



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

7 Alignment/adjustment

7.1 Pressure test

Prerequisites

The CellTram may not contain oil.

Required test tools

- Pressure measuring device for FemtoJet 4 (0055000316)
- Filling (5196088000), unused, oil free
- Stopwatch

Make sure that no oil enters the pressure sensor of the measuring device.

1. Connect pressure measuring device and filling tube.
2. Connect filling tube and CellTram 4.
3. Establish the test pressure of 50 kPa with the coarse adjustment knob of the CellTram.
4. Start the stop watch and note the pressure.
5. Wait 5 minutes.
6. Read the pressure on the measuring device.
7. Calculate the differential pressure and compare with the threshold values.

Threshold range 0

- Differential pressure ≤1.5 kPa in 5 minutes.
- Measure: None, device is OK.

Threshold range 1

- Differential pressure 1.5 kPa – 3.0 kPa in 5 minutes
- Measure: Replace seals, perform device maintenance.

Threshold range 2

- Differential pressure >3.0 kPa in 5 minutes
- Measure: Check device for damage and replace seals.

8 Software

Intentionally left blank

9 Diagrams

Intentionally left blank

10 Maintenance

10.1 Refilling oil – CellTram 4 Oil

Observe the legal regulations for purity of the oil. The supplied oil is generally used in the ICSI area to coat drops containing embryos, egg cells or sperm. The supplied oil is not sterile. Additional instructions can be found in the manufacturer's material safety data sheet.

Prerequisites

- The filling syringe is filled with oil.

Aspirating oil with the syringe may lead to the formation of tiny air bubbles. Try to avoid the formation of air bubbles, as they will be transferred to the microinjector and impair or slow down the filling process. If the syringe contains air bubbles, these should be collected via long-term storage. Large air bubbles can be pressed out during filling.

NOTICE! Material damage due to operating error
Damage to the drive due to overwinding of the piston.

- When you feel a resistance do **not** continue to wind in the same direction.
- When the piston is in piston position 1 turn the piston back in counter-clockwise direction.
- When the piston is in piston position 10 turn the piston forward in clockwise direction.

1. Remove the dust cap from the filling valve.
2. Screw the filling tube onto the filling valve.
   An air bubble is trapped between the filling tube and the filling valve.
3. Pull the trapped air bubble into the filling syringe.
4. Rotate the piston to the starting position (piston position 10).
5. Fill the system with oil.
6. Remove air from the system.

Tip: Fill the cylinder with oil while simultaneously turning back the piston. This prevents air from being aspirated.

10.1.1 Removing air bubbles from the cylinder

Prerequisites

- The filling syringe is filled with oil.
- The filling tube and the filling syringe are attached.

1. Hold the microinjector vertically.
   The air bubbles rise to the top.
2. Press oil through the system to remove the air bubbles.
3. Check the cylinder and the injection tube for air bubbles.
4. Unscrew the filling tube.
5. Place the dust cap on the filling valve.

10.2 Inspection after repair

10.2.1 Notes on the electrical safety check

Notes on the inspection procedure:

- The electrical safety check may only be carried out by an electrically skilled or instructed person.
- Check the electrical safety after repairs or carrying out work on the electrical system of the device (incl. the PE conductor system).
- Measure on a grounded, metallic point that is not insulated and can be touched from the outside (e.g., on housing screws).
- Never measure at an interface. The device's electronics may be damaged.
- Due to the electrical design of the device, the equivalent leakage current (e.g., VDE 701/702) cannot be measured correctly.

  Always measure the real leakage current (direct measurement or differential current measurement).

10.2.2 Inspections

	Micromanipulator 4	FemtoJet 4	CellTram 5176 CellTram 4	PiezoXpert	Eporator	Multiporator
Check the serial number.	X	X	X	X	X	X
Perform a test run.	X	X	X	X	X	X
Perform an electrical safety check.	X	X	X	X	X	X

Task/inspection	Procedure	Criterion/result
Check the serial number.	• Select the service function (if available). • Observe the notes provided in the service manual. • Enter the serial number, if necessary. • Check if the serial number entered matches the serial number on the name plate.	The saved serial number matches the serial number on the name plate.
Perform a test run for the micromanipulator 4.	• The three motor axes move over the entire area. The limit switches are detected. • The injector interface test was performed without errors. • The self test was performed without errors. • The module can be swung out to exchange the capillaries.	The test run was successfully performed without any error messages.
Perform a test run for the FemtoJet 4.	• Select the service function. • The FemtoJet 4 displays the correct device version when it is switched on. • The leakage test was successful. • The manipulator interface test was performed without errors. • Check the pressure using an external measuring device. • The set pressure range is displayed on the FemtoJet 4 and on the external measuring device. • The pressure deviations are within the permissible tolerances.	The test run was successfully performed without any error messages.

Task/inspection	Procedure	Criterion/result
Perform a test run for the CellTram 5176 or the CellTram 4.	• The cells can be suctioned in, held and transferred. • The system does not leak oil. (CellTram Oil/Vario) • The vent valve is working correctly. (CellTram Air) • The coarse drive and the fine drive move smoothly. (CellTram 4/Vario) • Check the pressure using an external measuring device. • The pressure drop is within the permissible tolerances.	The test run was successfully performed without any error messages.
Perform a test run for the PiezoXpert.	• Set the following values for the parameter sets A and B: – Intensity = 50 – Speed = 10 – Number of piezo impulses = infinite • The pulses are audible after pressing rotary knob A or B.	The test run was successfully performed without any error messages.
Perform a test run for the Eporator.	Perform a function test. Observe the notes provided in the service manual (chapter 5.4).	The test run was successfully performed without any error messages.
Electrical safety check	Perform an electrical safety check in accordance with the country-specific standard. Observe the notes provided in the SOP Electrical safety check checklist.	The thresholds defined in the standard are complied with.

10.3 Performance Plans

Calibre Scientific offers maintenance services for the CellTram 4 in the form of Performance

Plans. Performance Plans for the CellTram 4 are available with the following levels:

- Essential Check
- Advanced Maintenance
- Premium Service
- Operational Qualification
- Installation Qualification

Maintenance services are defined for every level of a Performance Plan. This chapter shows which maintenance services are defined and how much time needs to be scheduled in for them.

We recommend to perform servicing at least every 12 months.

Number	Service Operation	ESSENTIAL CHECK	ADVANCED MAINTENANCE/ PREMIUM SERVICE	IQ	OQ
	External Checks & Maintenance				
01	Cleaning of housing.	X	X		
	Internal Equipment & Fittings				
02	Cleaning of internal assemblies.		X		
03	Leak-tightness test (CellTram 4 Oil)	X	X		X
04	Oil exchange (CellTram 4 Oil)	X	X		
	Functional Check				
05	Check of delivery.			X	
06	Instrument set-up and initial operation.			X	
07	Instruction of user.			X	
08	System test	X	X	X	X

Average time consumption	
ESSENTIAL CHECK	Up to 45 minutes
ADVANCED MAINTENANCE/PREMIUM SERVICE	Up to 60 minutes
IQ	Up to 30 minutes
OQ	Up to 60 minutes

11 Technical data

11.1 CellTram 4 Air

11.1.1 Ambient conditions

Environment	For indoor use only. The surroundings must not be moist.
Ambient temperature	15 °C – 40 °C
Temperature change	< 2 K/h
Max. relative humidity	30 % – 65 %
Atmospheric pressure	80 kPa – 106 kPa

11.1.2 Weights/dimensions

Footprint	261 mm × 60 mm
Weight	approx. 1.7 kg
Coarse drive rotary knob diameter	40 mm
Fine drive rotary knob diameter	30 mm

11.1.3 Injection tube Air

Material	FEP
Length	1300 mm
Inner diameter	0,5 mm
Outer diameter	2 mm

11.1.4 Device parameters

Coarse/fine transmission ratio	10:1
Generation of pressure	Piston and cylinder system
Total volume	10 mL
Minimum fine drive volume	< 0.1 µL/0.5°
Coarse drive volume change (per revolution)	600 µL
Fine drive volume change (per revolution)	60 µL
Piston stroke	50 mm
Maximum pressure	3000 hPa
Auxiliary medium	Air

11.2 CellTram 4 Oil

11.2.1 Ambient conditions

Environment	For indoor use only. The surroundings must not be moist.
Ambient temperature	15 °C – 40 °C
Temperature change	< 2 K/h
Max. relative humidity	30 % – 65 %
Atmospheric pressure	80 kPa – 106 kPa

11.2.2 Weights/dimensions

Footprint	264 mm × 60 mm
Weight	approx. 1.6 kg
Coarse drive rotary knob diameter	40 mm
Fine drive rotary knob diameter	30 mm

11.2.3 Injection tube Oil

Material	FEP
Length	1300 mm
Inner diameter	1 mm
Outer diameter	2 mm

11.2.4 Device parameters

Coarse/fine transmission ratio	10:1
Generation of pressure	Piston and cylinder system
Total volume	1000 µL
Minimum fine drive volume	< 0.0015 µL/0.5°
Coarse drive volume change (per revolution)	10 µL
Fine drive volume change (per revolution)	1 µL
Piston stroke	50 mm
Maximum pressure	20000 hPa
Auxiliary medium	Mineral oil
Mineral oil filling volume (incl. injection tube and capillary holder)	approx. 2 mL

11.3 Ambient conditions

Environment	For indoor use only. The surroundings must not be moist.
Ambient temperature	15 °C – 40 °C
Relative humidity	30 % – 65 %, non-condensing.
Atmospheric pressure	80 kPa – 106 kPa Use up to a height of 2000 m above sea level.
Pollution degree	2 (IEC 664)

12 Ordering Information

12.1 Spare parts

Fig.	Item	Order no. (International)	Description
6-1	—	EPE-5196851005	**CellTram 4 Gearing**
—	—	EPE-5196852001	**CellTram 4 Maintenance set** O-ring for gearbox, O-ring for piston of the CellTram Air, O-ring for piston of the CellTram Oil, set screw M2.5
2-3	—	EPE-5196853008	**CellTram 4 Filling valve** **CellTram Oil**
2-1	—	EPE-5196854004	**CellTram 4 Vent valve** **CellTram Air**
—	—	EPE-0013019231	**Grease for o-rings**
—	—	EPE-5196855000	**Installation aid CellTram4 Oil**
2-3	—	EPE-5196855205	**Plexiglass cylinder** CellTram 4 Oil, with pre-assembled O-ring and filling valve
2-3	—	EPE-5196091000	**Dust cap** CellTram 4 Oil, for filling valve
—	—	EPE-5196088000	**Filling and cleaning set** CellTram 4
—	—	EPE-5196087003	**Transport packaging** CellTram 4

13 Technical information