



# Instruction Manual

**Flexion Microscopes** (Microscope System)

**Exepto  
Advanced  
Twin**

**Basic  
Advanced SensorUnit  
Twin lite**

**Labscope**

Basic-UDI-DI: 42518112-FLEXION-HR



Dear customer,

We are very pleased that you have chosen a device from the CJ-Optik product range. CJ-Optik products offer you the highest quality and the latest technology. In order to take full advantage of the microscope's performance and to enjoy your instrument for many years to come, please read these operating instructions carefully before using the microscope and operate it in accordance with the instructions.

**Please ensure that all persons operating the unit have read and understood the operating instructions.**

Keep the operating instructions in a safe place so that you can refer to them at any time if necessary.

If safety-related defects or problems occur, these must be reported to CJ-Optik immediately. This must be done in writing to the company address. Please inform us in advance by telephone or by e-mail.

PRRC (Person Responsible for Regulatory Compliance) in accordance with Regulation (EU) 2017/745 Article 15: In case of incidents under Regulation (EU) 2017/745 Article 87, please contact the PRRC: [vigilance@cj-optik.de](mailto:vigilance@cj-optik.de)



**Company Address:**

CJ-Optik GmbH & Co. KG  
Willeckstrasse 1  
35614 Asslar-Werdorf  
Germany

Tel.: +49 (0) 6443 / 81 81 33 0  
Fax.: +49 (0) 6443 / 81 81 33 9

[office@cj-optik.de](mailto:office@cj-optik.de)  
[www.cj-optik.de](http://www.cj-optik.de)

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**UPDATES**

Please check if adaptations are made to the content of this instruction manual. You can access the latest version via the following link:

[www.cj-optik.de/updated-manuals](http://www.cj-optik.de/updated-manuals)

Or scan the QR code:



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# 1 Introduction

## 1.1 Notes on the operating instructions

These operating instructions contain important information on how to operate the microscope safely, properly and sustainably. These operating instructions help you to avoid dangers and to reduce repair costs and downtimes. Among other things, this will increase the reliability and service life of the microscope.

It is not only intended for the training of operators, but also as a reference work. Reprints, including excerpts, are only permitted with the written consent of CJ-Optik.

**The operating instructions must always be available / kept near the microscope.**

Care and safety checks, together with proper use, ensure the operational safety and usability of the microscope and are therefore essential, in addition to regular cleaning. Repair work and safety checks may only be carried out by specialist personnel authorised by CJ-Optik. By using original spare parts, you can be sure that the operational safety, usability and value of your microscope will be maintained.



All service and repair works must be accomplished by authorised personnel only.



Before using the microscope for the first time, please read chapter 2 "Safety Instructions" to avoid possible dangerous situations.



Care and safety checks together with proper use ensure the operational safety and usability of the microscope.



The "Flexion Microscope" product bears the CE marking in accordance with the Regulation (EU) 2017/745 on medical devices, annex IV dated May 2017.

## 1.2 Intended purpose

**Product name:** Flexion Microscope

**Intended use:** The microscope is designed for illumination and magnification of the surgical area and for visualisation during procedures or examinations. The fields of application are examination for visual control of auditory canal to eardrum, oral cavity to pharynx and nasal cavities, and dental applications (endodontics etc). The microscope is not intended for ophthalmology.

**Target group:** This operating instruction is intended for use by doctors, nurses and other nursing staff who prepare, operate or maintain the device after being instructed accordingly. It is the duty of the device operator / owner to train or instruct all employees who will use the system. Installations and service work that are not described in these operating instructions may only be carried out by specialists from CJ-Optik or by personnel who have been specially trained by CJ-Optik for this purpose.

**Specification of the main functions:** Integrated, passively cooled, high-transmission, high-performance LED lighting with two LED light sources, 5-step or 3-step (Exepto) apochromatic magnification changer and selective filter system illuminate the application device for examination purposes and, if desired (optional), it can also be visualized on a monitor or tablet PC.

**Patient group:** Patients of all ages, without restrictions, who require a standard examination.

**Application organ:** Dental applications (endodontics etc.), oral cavity to the throat, ear canal to the eardrum, nasal cavity.

**Duration of use:** Application-specific, short-term duration
















**Application environment:** The application environment is clinics, surgeries and operating theatres of dental doctors, phoniatriests and ENT. The examination with the microscope may only be carried out by qualified medical personnel.

**Application restriction:** No application in ophthalmology. When used in the operation room, only work with the appropriate protective hood (drape)! The microscope is not intended for use in potentially explosive areas. Furthermore, it is not intended for diagnosis.

### 1.3 Scope of delivery


Your microscope has been subjected to a thorough functional check and carefully packed before dispatch. Nevertheless, please compare the contents of the shipment for completeness immediately upon receipt (see delivery note).


### 1.4 Explanation of symbols

	General warning sign		Follow the instructions!
	Manufacturer		Temperature
	Air humidity		Air pressure
	Serial number		This product complies with the relevant requirements of the EU guidelines
	Enumeration		No household waste
	Filter characters		Brightness adjustment
	Iris diaphragm		Aperture adjustment by rotating movement
	ON-/OFF Switch/Stand-by		

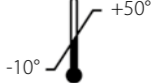
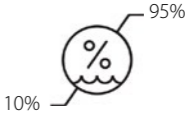
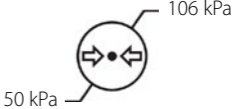
### 1.5 Transportation and storage

The microscope may only be transported in a padded shipping box that offers sufficient protection.

 Please document and report transport damage immediately.

 After transport at temperatures below freezing, the microscope must be left at room temperature for up to 48 hours before being used for the first time. If the microscope is not acclimatised, it must not be operated as the electronics may be damaged.

#### Environmental conditions for transportation and storage

Temperature	-10°C up to +50°C	
Air humidity (without condensation)	10% up to 95%	
Air pressure	50 kPa up to 106 kPa	

## 2 Safety instructions

The microscope is designed according to IEC 60601-1/EN 60601-1 and classified according to protection class I (regulation 12 92/43/EEC). To avoid the risk of electric shock, this unit must only be connected to a mains supply with a properly installed protective earth conductor.

- Every start-up and handling of the device require precise knowledge and observance of these operating instructions.
- The device is only intended for the use described.
- Do not point light at eyes or look into them. Retina damage can occur! Please always make sure that you do not shine the light into the patient's eyes or that the patient does not look directly into the light beam! Never look into the light exit yourself!
- Do not look into the sunlight with eyepieces or other optics. Retina damage can occur!
- Before commissioning, the main cable, accessories and connecting cables must be checked for damage. Damaged cables must be replaced immediately.
- The microscope may only be operated by trained specialist personnel.
- The microscope is not intended for use in potentially explosive areas (M and G). Areas at risk of explosion can arise from the use of flammable anesthetics, skin cleaning agents and skin disinfectants.
- If liquid has entered the microscope, the device must be sent in for inspection and may only be put into operation again after it has been checked by a person authorised by CJ-Optik.
- Before each start-up, the microscope suspension including all separation points must be checked for secure attachment.
- After long periods of transport at temperatures below freezing point, the microscope must be left to stand for up to 48 hours at room temperature before being used for the first time. If the microscope is not acclimatised, it must not be operated.
- Do not insert electrical plug connections (plugs, sockets) with great effort. If this is not possible, check whether the plug fits the socket. If you notice any damage to the plug connection, have our service repair the damage.
- A safety check must be carried out annually.
- Make sure that the patient does not touch the device or come into contact with the device.
- Only use monitors authorised by CJ-Optik and the corresponding connection and video cables. Failure to do so will invalidate the operating license.

- In the event of malfunctions of any kind, interrupt the operation immediately.
- Dispose of the packaging material properly or send it to CJ-Optik.
- Before connecting the microscope, it must be checked whether the mains voltage and mains frequency indicated on the microscope match the values of the supply network.
- Use only proper and undamaged power connections and extension cables.
- To disconnect the microscope from the main power supply, always pull the plug out of the wall socket first. Only then disconnect the connecting cable from the microscope. Never touch the plug or cable with wet hands.
- The environmental conditions specified in the technical data must be observed.
- The microscope meets the immunity requirements of the standard IEC 60601-1-2 / EN 60601-1-2 "Electromagnetic compatibility - Medical electrical microscopes".
- CJ-Optik is not liable for personal and property damage if:
  - No original CJ-Optik parts are used.
  - The instructions for use of these instructions for use are disregarded.
  - Assembly, new settings, changes, extensions and repairs were carried out by persons not authorised by CJ-Optik.
- Only use accessories authorised by CJ-Optik. Failure to do so will invalidate the operating license.
- These instructions for use correspond to the standard version of the microscope and the status of the underlying safety standards at the time of printing. All property rights are available for the specified microscope circuits, processes, names and software programs.
- Unplug the device immediately if you notice smoke, sparks or unusual noises on your device.
- Any light source may cause the tissue to heat up due to absorption. Please take care to keep the duration of use as short as necessary, switch off the light source when not in use and check the heat generation of the light source if necessary.
- The microscope may only be operated in medical rooms, but not in potentially explosive and oxygen-enriched areas.
- When commissioning, take into account that the spring force of the arm is very strong without the microscope head. Do not move the arm from the park position without the microscope head attached to avoid injuries.

Type of activity	Hazard situation	Safety information
Connection to the power supply	Electric shock due to touching the housing	Only accessories approved by the manufacturer may be used
Illumination with LED	User is supplied with energy by laser light	Avoid looking directly into the light source; use laser filter in the microscope; patient must wear protective goggles
Illumination with LED	Person is supplied with energy by LED (white light)	Avoid looking directly into the light source
Illumination with LED	Person is supplied with energy by double the number of LEDs (white light)	Avoid looking directly into the light source
Illumination with LED	Patient is supplied with energy by LED (UV light)	Avoid looking directly into the light source; patient must wear protective goggles
Illumination with LED	Person touches hot passive heat sink of microscope head	Avoid contact
Attachment to wall/ceiling/floor	Product falls down, product tips over	Bracket may only be dismantled/assembled by trained personnel
Movement on the ground	Product tips over	While moving the rolling stand, bend the arm to a 90° position.
Disassembly/assembly, change of parts	Product falls down, product tips over	Only accessories approved by the manufacturer may be used
Treatment	Person bumps into microscope parts	Careful and level-headed handling when working with the microscope
Treatment, operation, disinfection	Pathogens can be transmitted through contact with parts	Microscope and sterile caps are regularly disinfected (for each patient) --> routine cleaning (see Hygiene Plan, page 51)
Treatment	Detergent is aggressive and attacks the skin	Please observe the detergent's safety data sheet
Treatment	Surfaces are touched that have not been cleaned	Use gloves, sterile caps can be removed; disinfect microscope
Treatment	Optics quality is reduced (fogging, optical defects occur). It is no longer possible to look through and/or illuminate properly (through optical lenses).	Before treatment, all functions must be checked.
Setting and reading the functions	Doctor uses microscope and accessories in sterile area without special cover or uses microscope for ophthalmology	Observe warnings and intended use in the instructions for use.
Disassembly/assembly, change of parts	Incorrect disassembly/assembly and operation	Follow the instructions in the instruction manual
Storage of images and videos	Pictures and videos of the treatment are spread unintentionally	Pay attention to data security (e.g. SD card, hard disk, smartphone). Security updates, theft protection.



All service and repair work may only be carried out by authorised personnel.



All serious incidents related to the device shall be reported to the manufacturer and to the competent authority of the Member State where the user and/or the patient is established.

## 2.1 Liability for function and damage

Liability for the function of the unit is always transferred to the owner or operator if the unit is improperly maintained, repaired or modified by persons who do not belong to an authorised specialist company or if it is handled in a way that does not correspond to its intended use.

The device must be maintained and operated in accordance with these operating instructions. CJ-Optik GmbH & Co. KG is not liable for damage caused by failure to observe the above information.

Warranty and liability conditions of the sales and delivery conditions of CJ-Optik GmbH & Co. KG are not extended by the above information.



**Product liability expires if the device is modified due to the attachment and / or installation of non-authorised or unauthorised parts. Only original CJ-Optik parts are to be used as replacements.**

The operator of the device must make the operating instructions available to the operator and ensure that the operator has read and understood them. Only then can the operator start up the device.



**It must be ensured that the operating instructions are accessible, read and understood at all times.**

## 3 Commissioning

- Take the microscope out of the packaging. Check whether the voltage values indicated on the type plate correspond to the mains voltage provided.
- Check the scope of delivery.
- It is imperative that you observe the safety instructions in section "Safety Instruction" (page 10) before using the device for the first time.
- After transport at cold temperatures, the microscope must be left to stand at room temperature for at least six hours before being used for the first time. If the microscope is not acclimatised, it must not be operated. Store the device in a dry place for 48 hours at room temperature.
- When commissioning, take into account that the spring force of the arm is very strong without the microscope head. Operate the brake height adjustment with appropriate care.
- To activate the microscope, please press the on / off switch on the left side of the microscope head (s. pages 48, 50, 52).

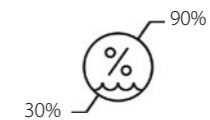
### 3.1 Ambient conditions

For the treatment

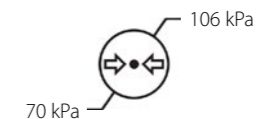
Temperature +10°C up to +40°C



Air humidity (without condensation) 30% up to 90%



Air pressure 70 kPa up to 106 kPa



## 4 Overview of Flexion microscope configurations

The microscope system can be configured differently.

### 4.1 Mobile stand configuration



### 4.2 Floor stand configuration



### 4.3 Ceiling mount configuration



### 4.4 Wall mount configuration



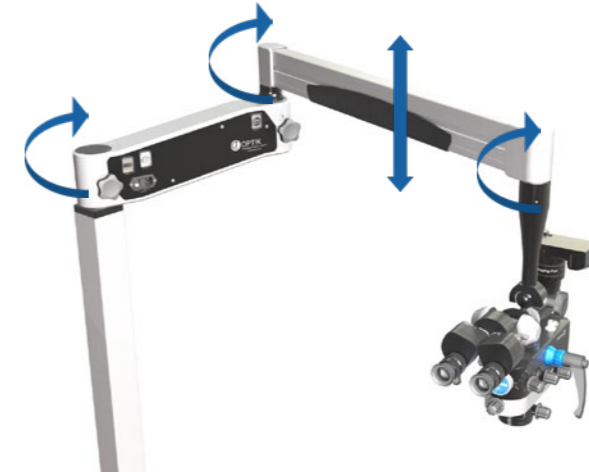
### 4.5 Labscope configuration



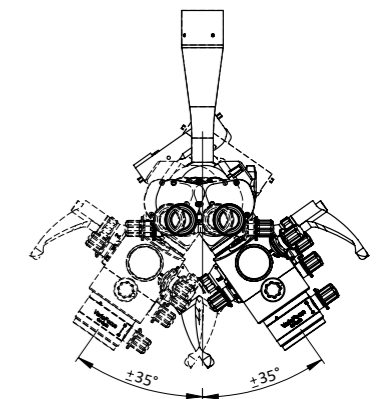
#### 4.6 Examples of microscope head configurations



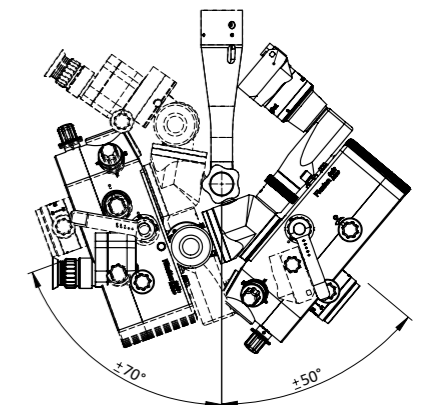
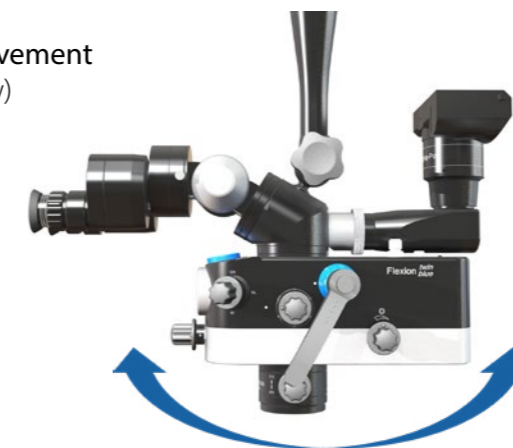
#### 4.7 Possible movement options of the microscope



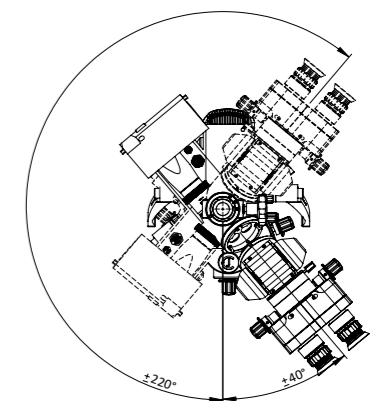
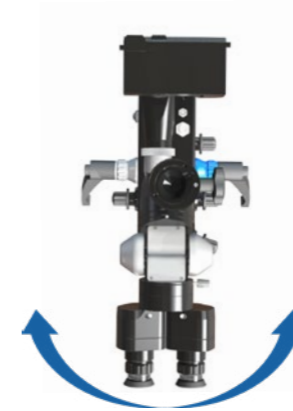
Roll movement  
(front view)



Pitch movement  
(side view)



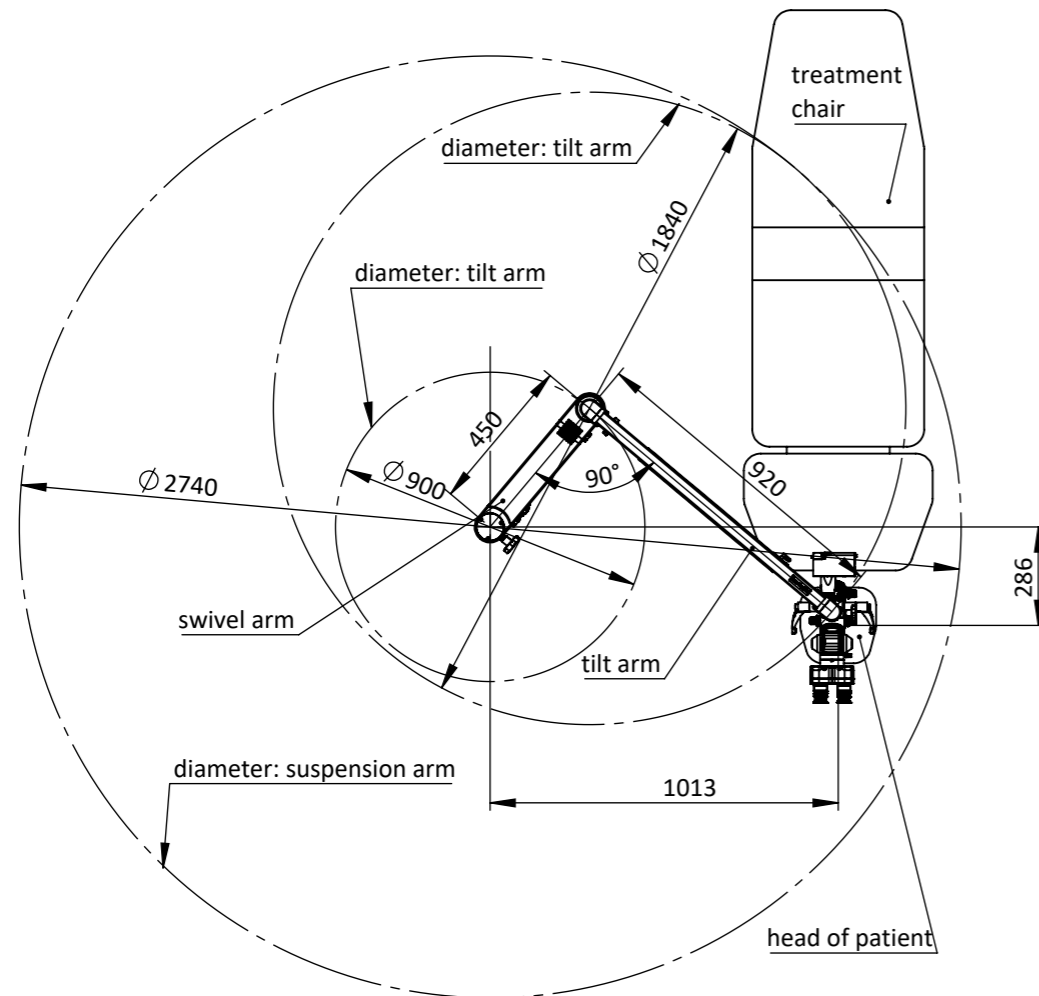
Yaw movement  
(top view)



## 5 Assembling of the microscope

### 5.1 Overall positioning of the wall, floor, ceiling mount and mobile stand

Lengths and diameters from the suspension arm and its parts are shown below (in mm).

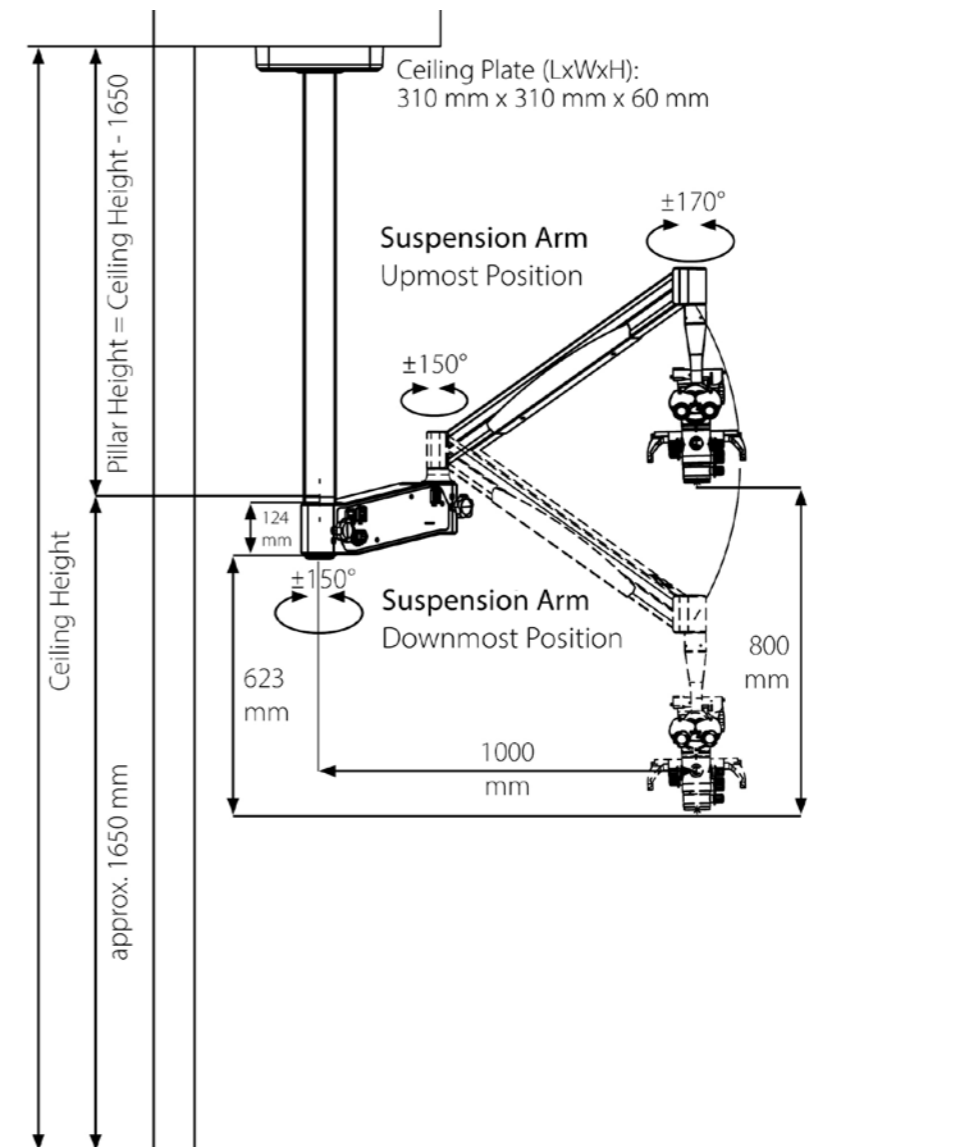


### 5.2 Ceiling mount

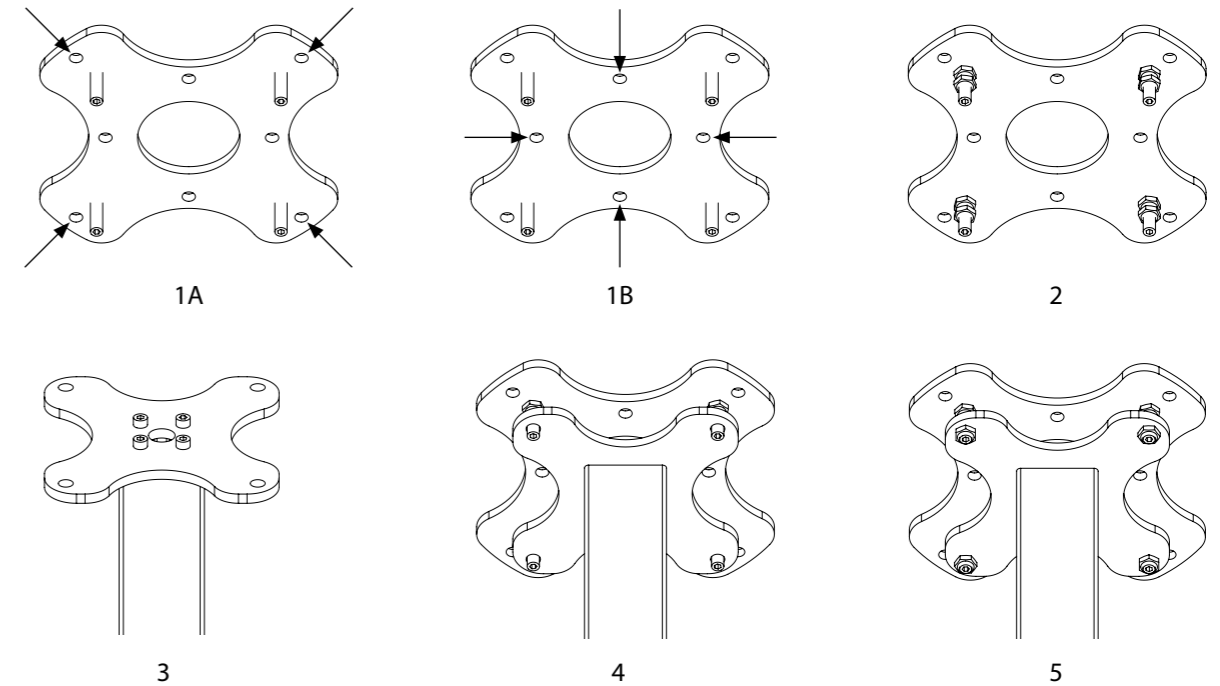
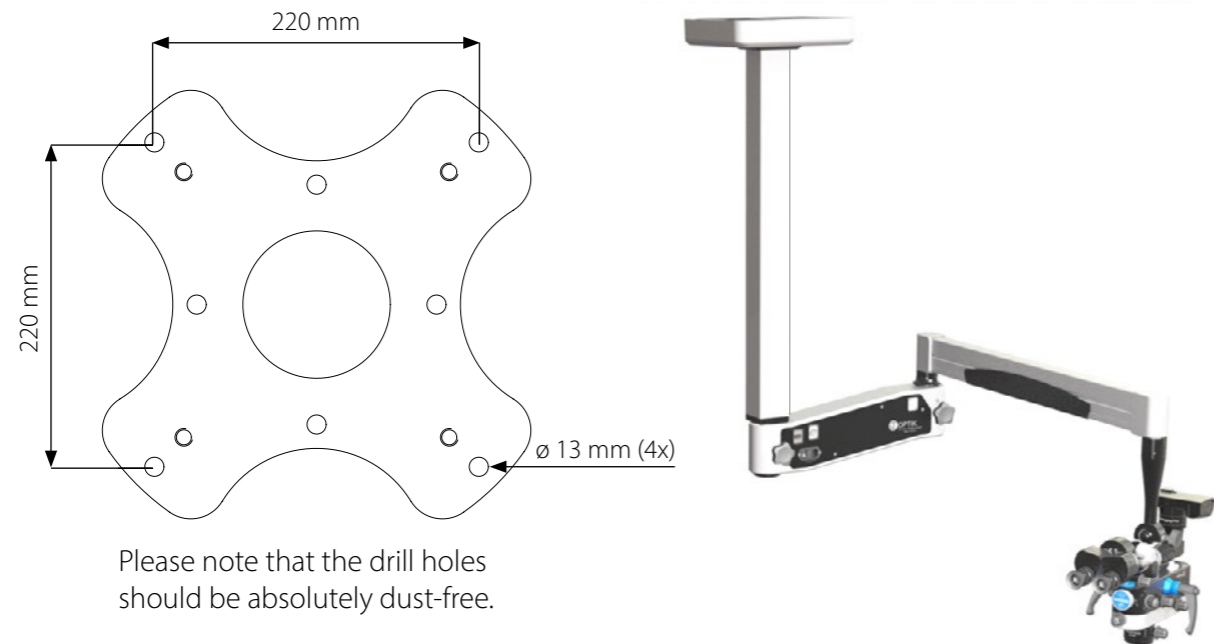
The following example shows a ceiling mount.



Mounting work is only permitted by experienced and trained personal with the permitted fastening material! Pay attention to the position of the boom stop when aligning the ceiling mount. The possible rotation movement depends on it.



Make sure that the ceiling mount is correctly aligned during planning and installation. Please refer to the following drawings for the position of the bracket. In principle, it is possible to vary the height of the stand. This must be communicated to CJ-Optik before the project begins. Please consider ergonomic aspects and radii of action of other devices or installations.



**Fig. 1A:** Use the holes to fix the ceiling flange to the ceiling.  
**Fig. 1B:** If there are difficulties with drilling, the other four screw holes can be used as an alternative.  
**Fig. 2:** Screw the lock nuts lightly by hand up to the stop. Then fit the levelling screws.  
**Fig. 3:** Now screw the pillar to the flange.  
**Fig. 4:** Place column on grub screws.  
**Fig. 5:** Place nuts and tighten them lightly by hand.

**Please note that two persons are required to carry out these assembly steps.**

Align column vertically using nut and secure position with lock nuts.  
 Tighten the lock nuts of the column flange firmly with wrench (19 mm).  
 Tighten the lock nuts of the ceiling flange firmly with wrench (19 mm).  
 Push on hood together with counter piece and secure with grub screw (G) with 2 mm Allen key.



The mains cable must not be connected during assembly!



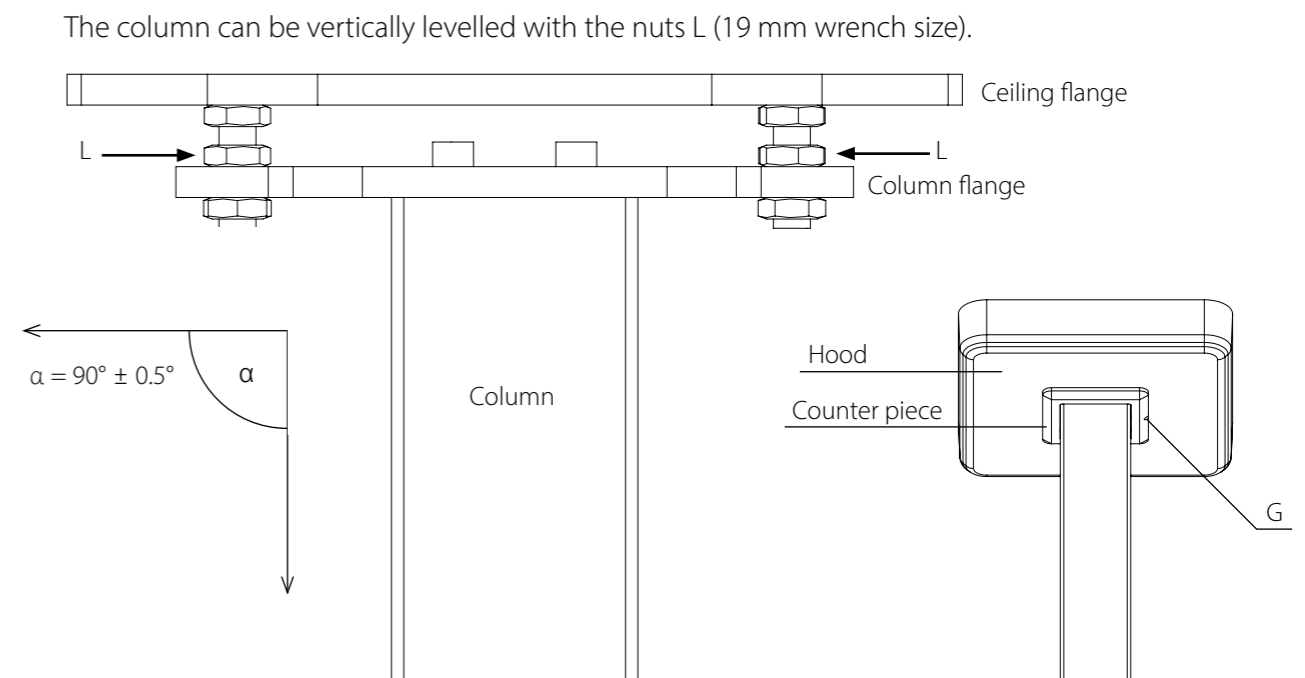
A confirmation of the structural analysis must be enclosed with the order by the customer. The microscope may only be mounted if the statics of the ceiling allow it.

If a mounting deviating from these data is desired, the customer has to take care for the static proof.

When reinstalling or replacing a ceiling bracket, the existing dowels must not be used again. New holes must be drilled. When determining the effective nominal strength of the new anchorage, the reductions in the ceiling strength caused by old holes must be taken into account. It must be ensured that the dowels used cannot be used again.



The column must be aligned vertically (max.  $\pm 0.5^\circ$  deviation).  
 The ceiling must have a minimum thickness of 16 cm.  
 The concrete quality at least C20 / 25 (B25).  
 Use only the delivered anchors.



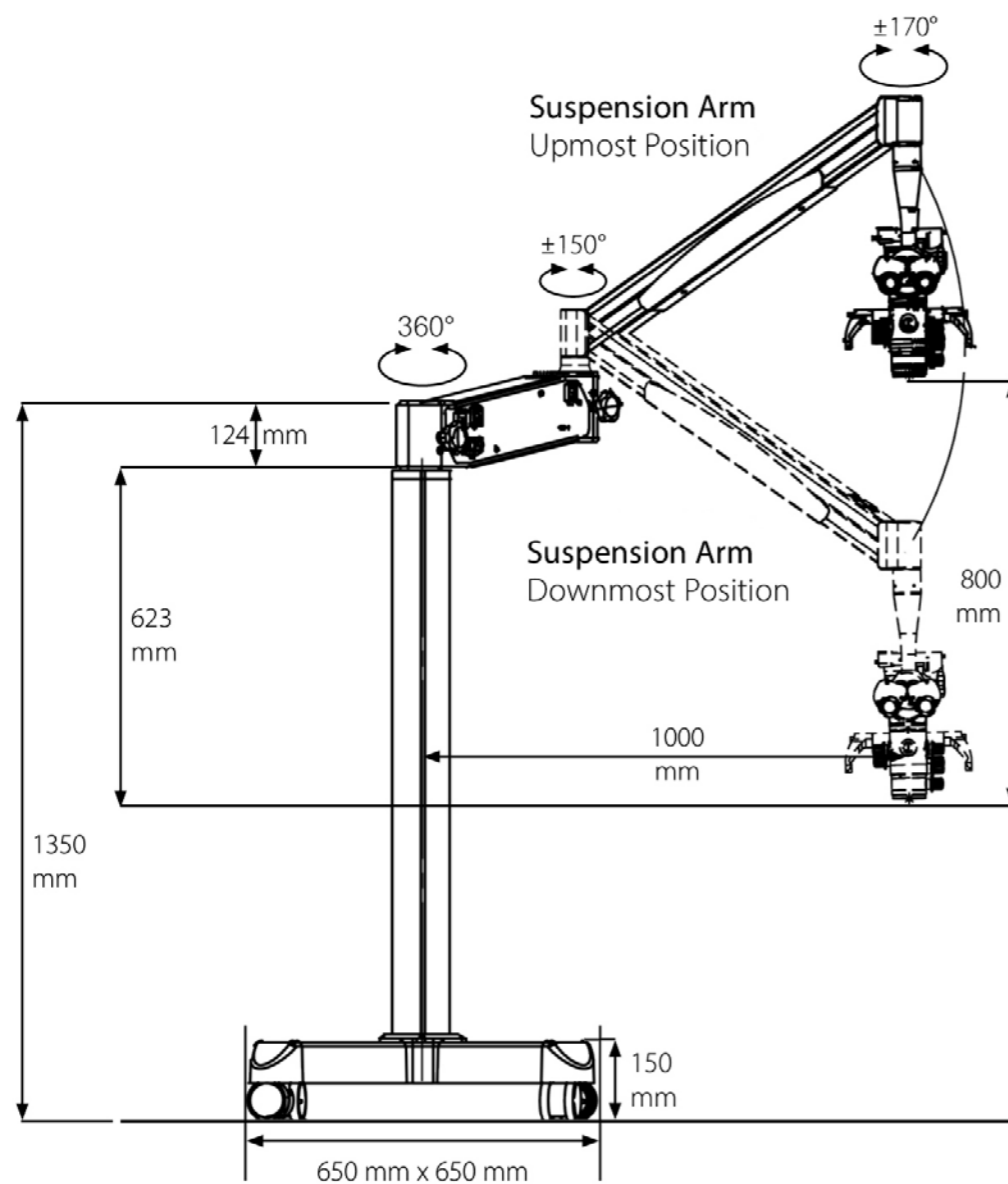
The following services are the responsibility of the customer:



1. Mounting of the ceiling flange
2. Laying of supply lines / empty conduits
3. Establishing the electrical connection
4. Establishing the protective measure "potential equalization".

### 5.3 Mobile stand

The following example shows a mobile stand.



The mains cable must not be connected during assembly!  
It is recommended to wear gloves during handling!  
During assembling there is a risk of skin bruise!

#### Assembly of the mobile stand



1. Remove cover.



2. Remove the balance weights by loosening the screws with an 8 mm Allen key. The screws are secured at the bottom with M12 nuts (wrench size 19 mm).



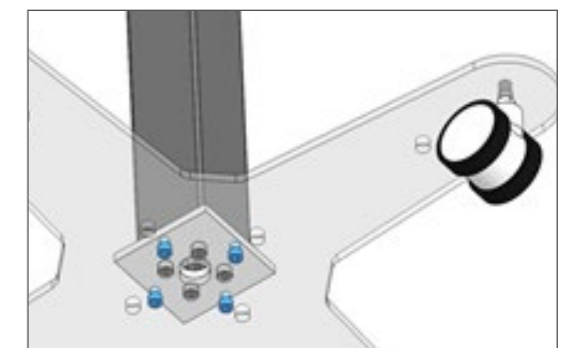
3. Remove balance weights and pull moving base out of the box.



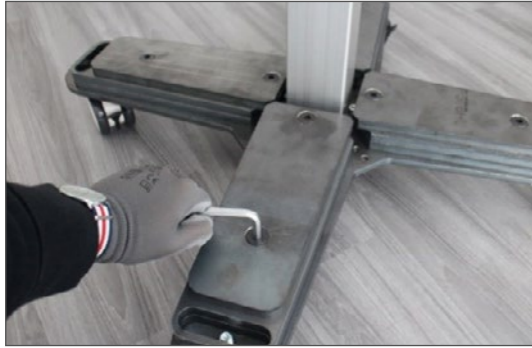
4. Disassemble screws.



5. Pull pillar out of the carton.



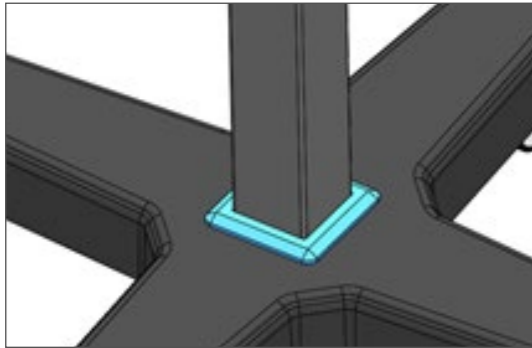
6. Assemble pillar to the moving base with a 6 mm Allen key (from below).



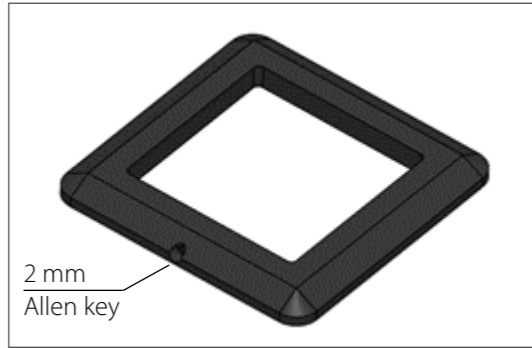
7. Assemble balance weights. Note that the counter screws are put back in place (wrench size 19 mm).



8. Attach cover to moving base.



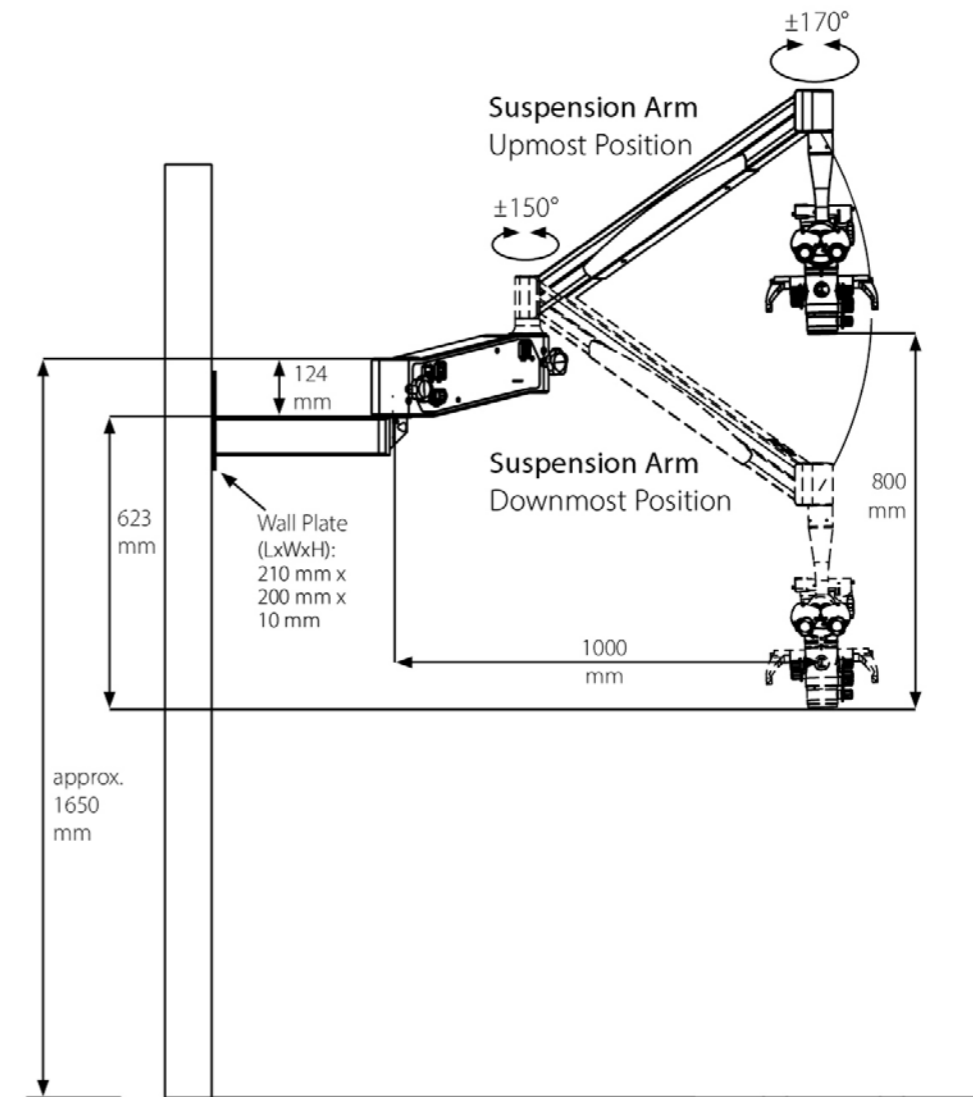
9. Attach counter piece.

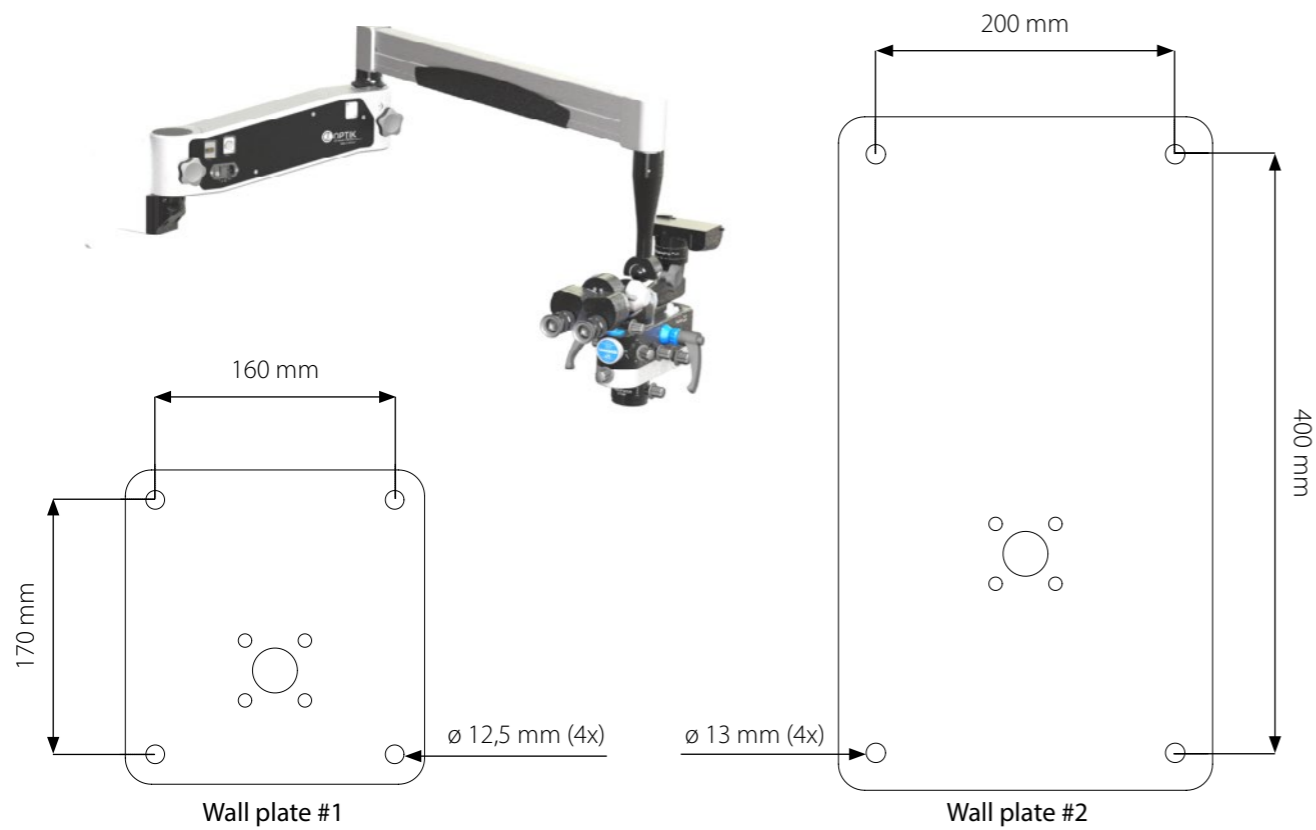


10. Fix the counter piece by using a 2 mm Allen key.

## 5.4 Wall mount

The following example shows a wall mount.





Depending on the premises two wall plates are available for different installations.



The mains cable must not be connected during assembly!



A confirmation of the structural analysis must be enclosed with the order by the customer. The microscope may only be mounted if the statics of the wall allow it. If a fastening deviating from these data is desired, the customer has to take care for the static proof.

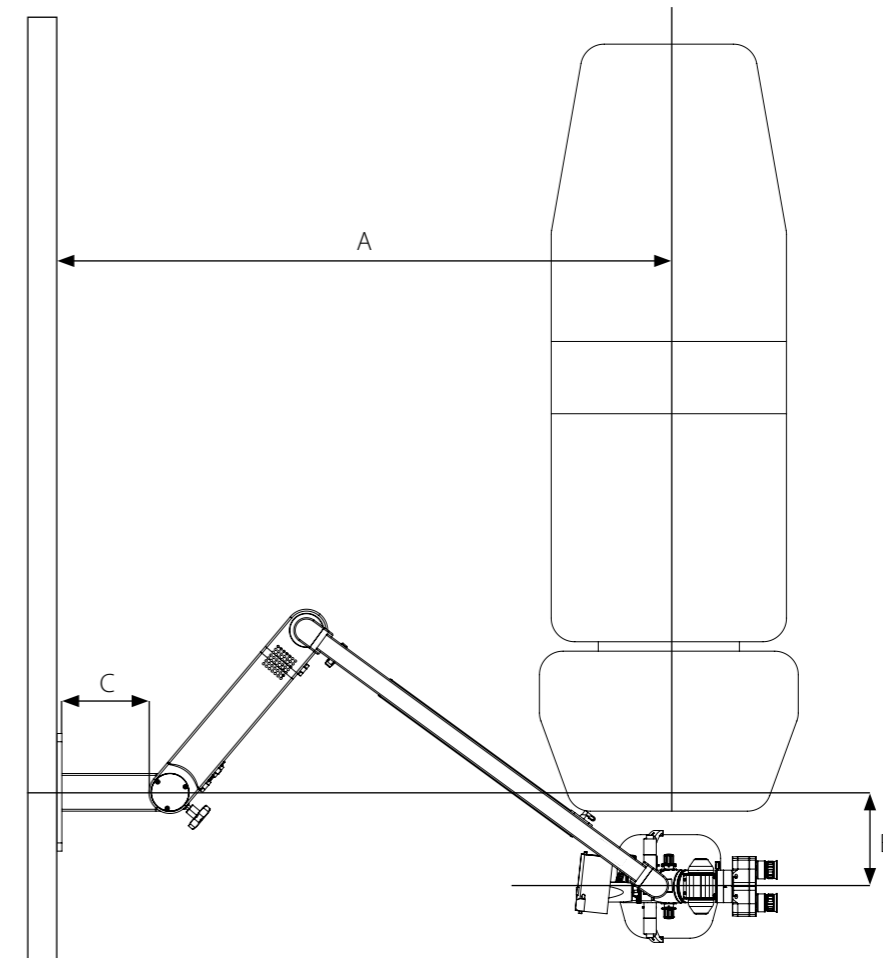


When reinstalling or replacing a wall bracket, the existing dowels must not be used again. New holes must be drilled. When determining the effective nominal strength of the new anchorage, the reductions in the wall strength caused by old holes must be taken into account. It must be ensured that the dowels used cannot be used again.



The flange plate must be aligned vertically (max.  $\pm 0.5^\circ$  deviation).  
The wall must have a minimum thickness of 20 cm.  
The concrete quality at least C20 / 25 (B25).  
Use only the delivered anchors.

Depending on the room, the following figure and table assist by choosing the correct mount position.

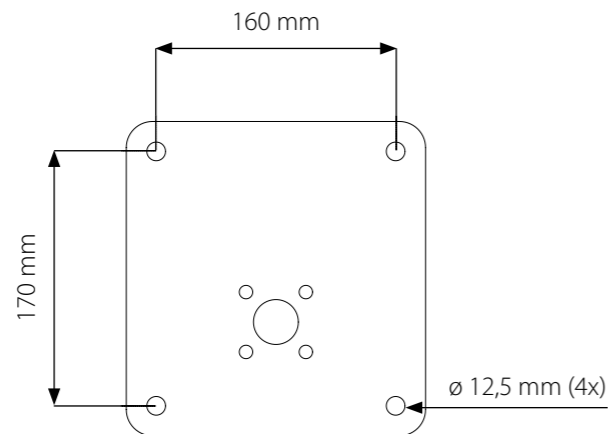
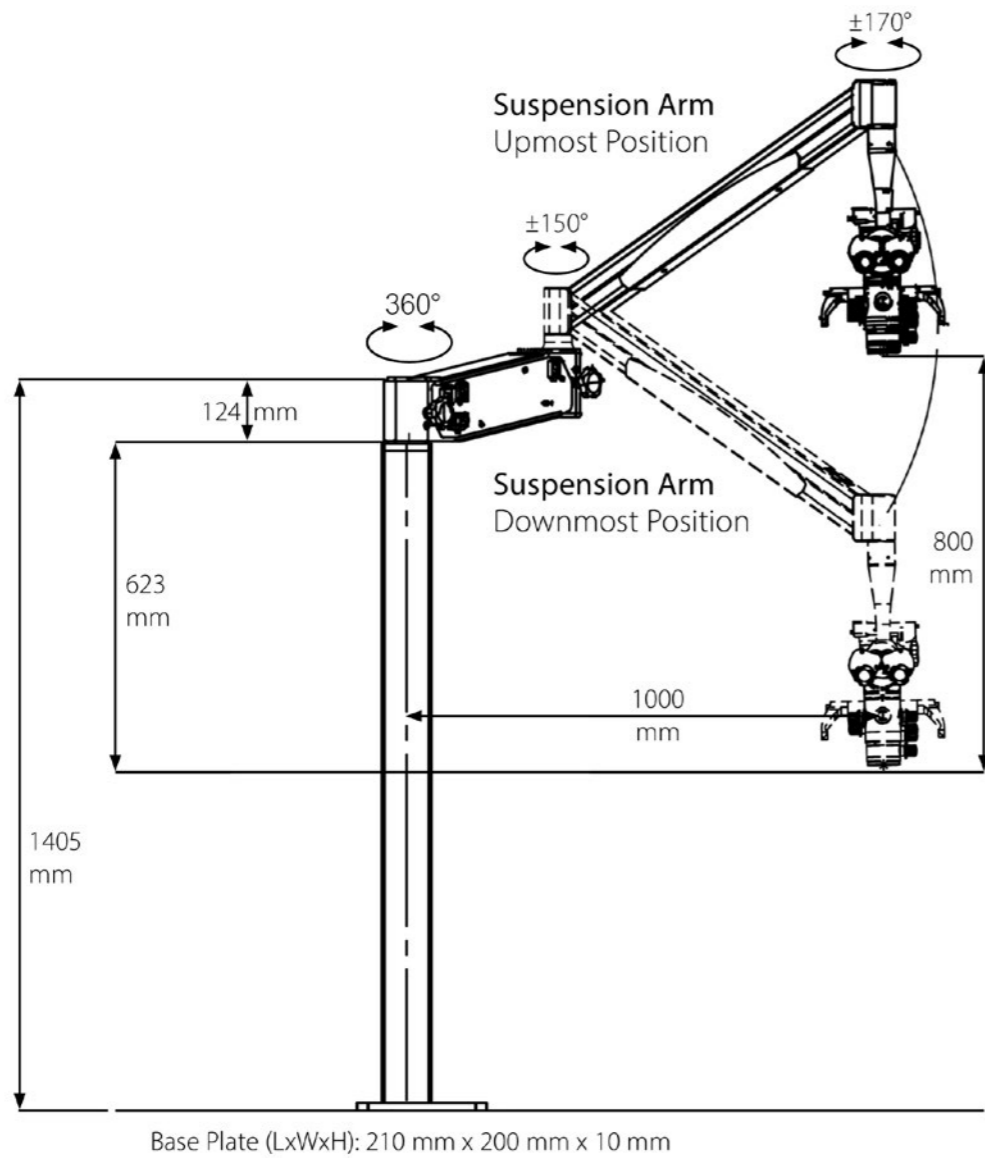


The table values show the distance in millimetres for the section C.

B (mm) \ A (mm)	0 - 200	200 - 350	350 - 450	450 - 500
1050	X	X	X	100
1100	X	X	100	150
1150	X	100	150	200
1200	100	150	200	250
1250	150	200	250	300
1300	200	250	300	350
1350	250	300	350	400
1400	300	350	400	X
1450	350	400	X	X
1500	400	X	X	X

## 5.5 Floor mount

The following example shows a floor mount.



The mains cable must not be connected during assembly!



A confirmation of the structural analysis must be enclosed with the order by the customer. The microscope may only be mounted if the statics of the floor allow it.

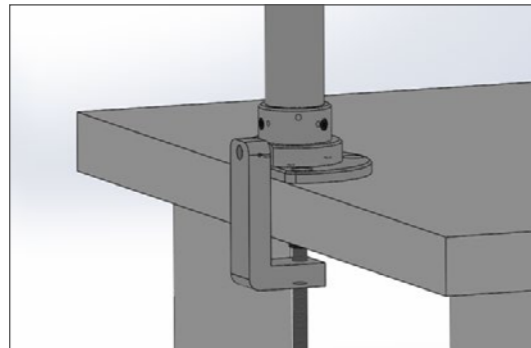
If a fastening deviating from these data is desired, the customer has to take care for the static proof.

When reinstalling or replacing a floor bracket, the existing dowels must not be used again. New holes must be drilled. When determining the effective nominal strength of the new anchorage, the reductions in the wall strength caused by old holes must be taken into account. It must be ensured that the dowels used cannot be used again.

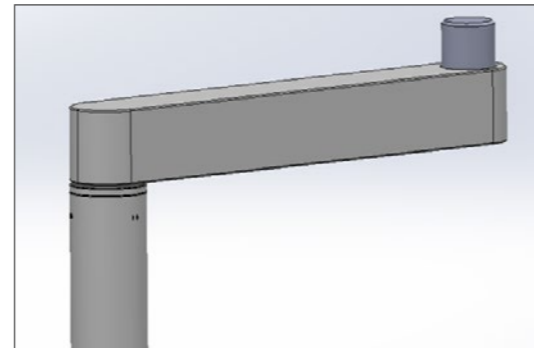


The flange plate must be aligned horizontally (max.  $\pm 0.5^\circ$  deviation).  
The floor must have a minimum thickness of 16 cm.  
The concrete quality at least C20 / 25 (B25).  
Use only the delivered anchors.

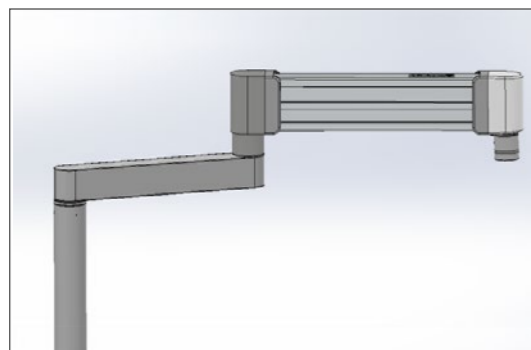
## 5.6 Labscope (table mount)



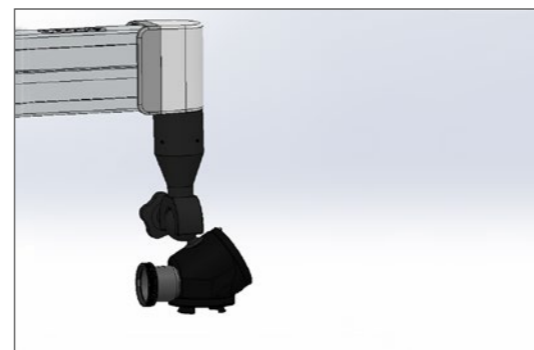
1. Depending on your needs, fix the table mount in the desired position with screws or with the table clamp.



2. Place the swivel arm on the table column.

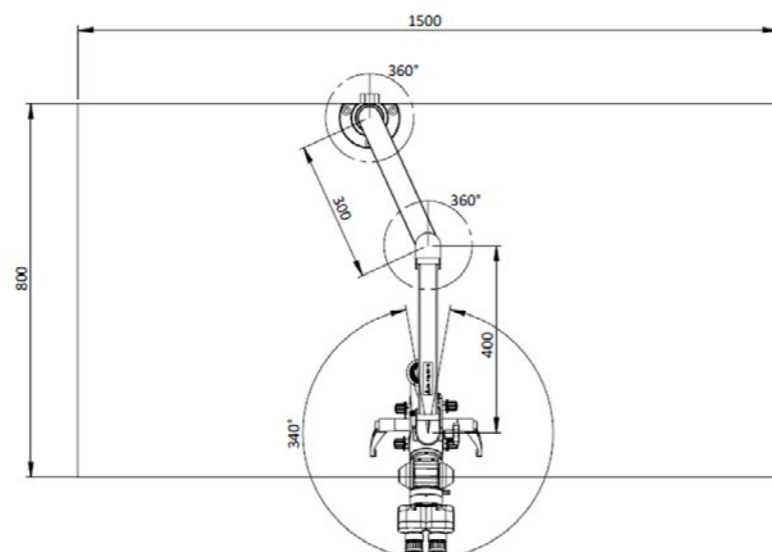


3. Mount the tilt arm on the swivel arm.



4. Attach the extension together with the angled optics with grub screws and with a cylinder head screw to the tilt arm.

When planning and mounting, make sure that the table bracket is correctly aligned. It is sufficient to select the correct side of the table, which you can see in the following picture. The exact position of the bracket may vary, but please take into account ergonomic considerations and the radius of action of other devices or installations.



## 5.7 Assembling of the suspension arm

### 5.7.1 Assembling of the suspension arm onto the ceiling parts

#### 1 = Rotation stop

Note that the rotation stop is aligned so that the microscope's range of movement will not be restricted.

#### 2 = Stop screw

- Unscrew stop screw
- Push swivel arm onto locating bolt
- Secure stop screw again

#### 3 = Bearing

Insert bearing carefully (already pre-greased)

#### 4 = Counter bearing

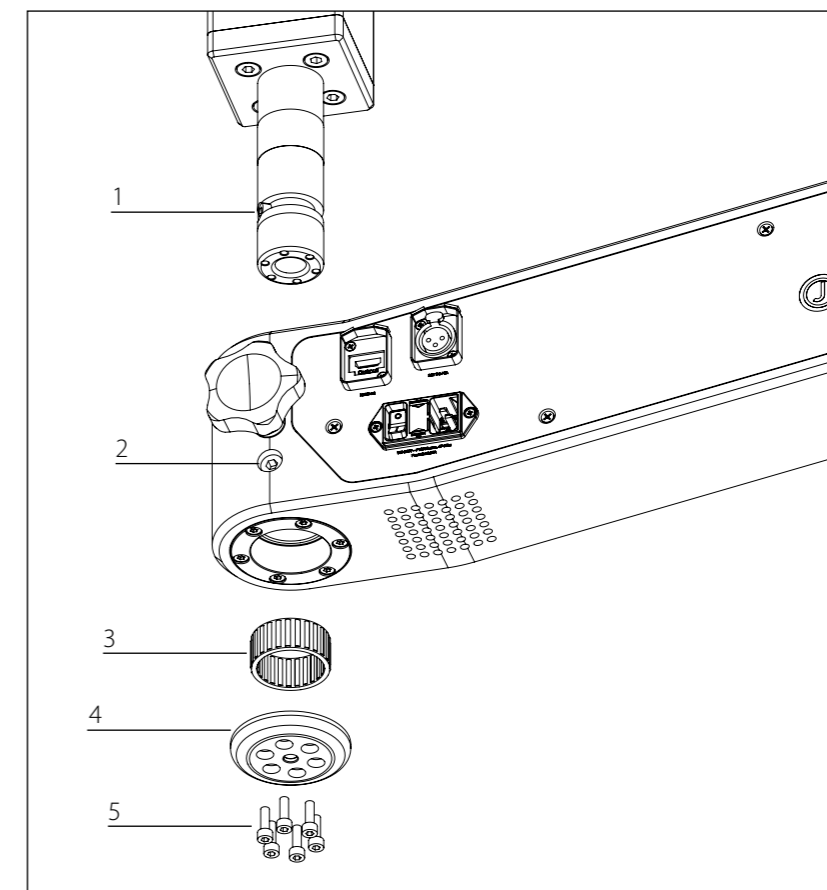
Put on counter bearing

#### 5 = Screws

Secure counter bearing with screw



1. Please note that two persons are required to carry out this assembly step.
2. It is imperative that the instructions from points 2 and 5 are followed.



### 5.7.2 Assembling the suspension arm onto the floor and wall parts



1. Take out bearings.



2. Place slide disk.



3. Attach guide bearing.



4. Pull out suspension arm carefully.



5. Attach suspension arm to guide bearing.



6. Assemble cover (not if delivered with monitor or iPad mount).

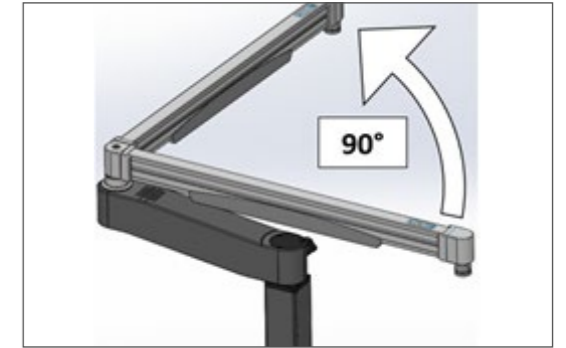


7. Connect the power supply.

### 5.7.3 Assembling the tilt arm onto the swivel arm



1. Loosen the hexagon socket wrench screw. The needed wrench is enclosed.



2. Move the swivel arm 90° out of the parking position.



3. Tighten the hexagon socket screw.



4. Please adjust the load only if a weight is mounted that is different to the weight in the original delivery status (e.g. when an accessory is added).



This is an important note for the first installation of your microscope. If you do not follow this instruction the integrated cables will be bending and damaged!

## 5.8 Assembling the monitor and iPad bracket onto the swivel arm



1. Disassemble cover.



2. Take out the monitor arm.



9. Unpack iPad mount.



10. Fit the monitor/iPad mount into the monitor arm and lock it.



3. Needed components.



4. Components assembled (take care of countersunk position).



11. Assembled monitor mount.



12. If needed adjust the monitor arm to the weight of the monitor.



5. Disassemble cover.



6. Assemble mount (take care of angle position).



7. Attach monitor arm.



8. Secure the arm with a screw.



Medical approval of the product is void if unauthorised monitors are connected.

## 5.9. Assembling of the microscope head and modules

### 5.9.1 Assembling for Exepto, Basic, Advanced and Advanced SensorUnit



1. Take out components.



2. Assemble lighting unit to ergo optic.  
(2 mm Allen wrench).



3. Assemble binocular and tiltable tube to  
ergo optic (2 mm Allen wrench).



4. Remove dust guard from optical  
connector.



5. Fit adapter in optical connector and  
save with ring.



6. Connect the power supply.

### 5.9.2 Assembling for Twin and Twin lite



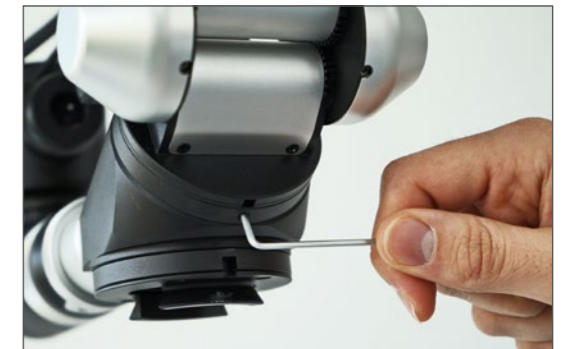
1. Take out components.



2. Remove dust guard from optical  
connector.



3. Fit adapter in optical connector and  
save with ring.



4. Assemble binocular and tiltable tube to  
ergo optic (2 mm Allen wrench).



5. Remove the magnetic badge.



6. Assemble lighting unit to ergo optic  
(2 mm Allen wrench).



7. Connect the power supply.

## 5.10 Assembling the camera to the microscope / Configuration



1. Remove dust guard from the adapter and mount camera.



2. Fit power supply in battery compartment. Pay attention to the correct battery alignment.



3. Connect power supply for the camera.



4. Connect the HDMI cable to the camera (consider warning notice).



Never connect the camera directly to the mount!  
There is 24V on the mount cable.



5. Select [Enable] in the custom settings of the Sony camera in order to activate the shutter function because no common lens is attached.



6. Only for Advanced SensorUnit, Twin and Twin lite:  
The "Remote Ctrl" mode must be set in the setup menu of the Sony camera to ensure the function of the SensorUnit.

Please note that different Sony Alpha cameras operate with different power adapters.

Camera power adapter Sony / 103-4000-0010

The small power adapter is suitable for all Sony cameras with the NP-FW50 battery.  
Models 5000 - 6000 to 7II series except 6600

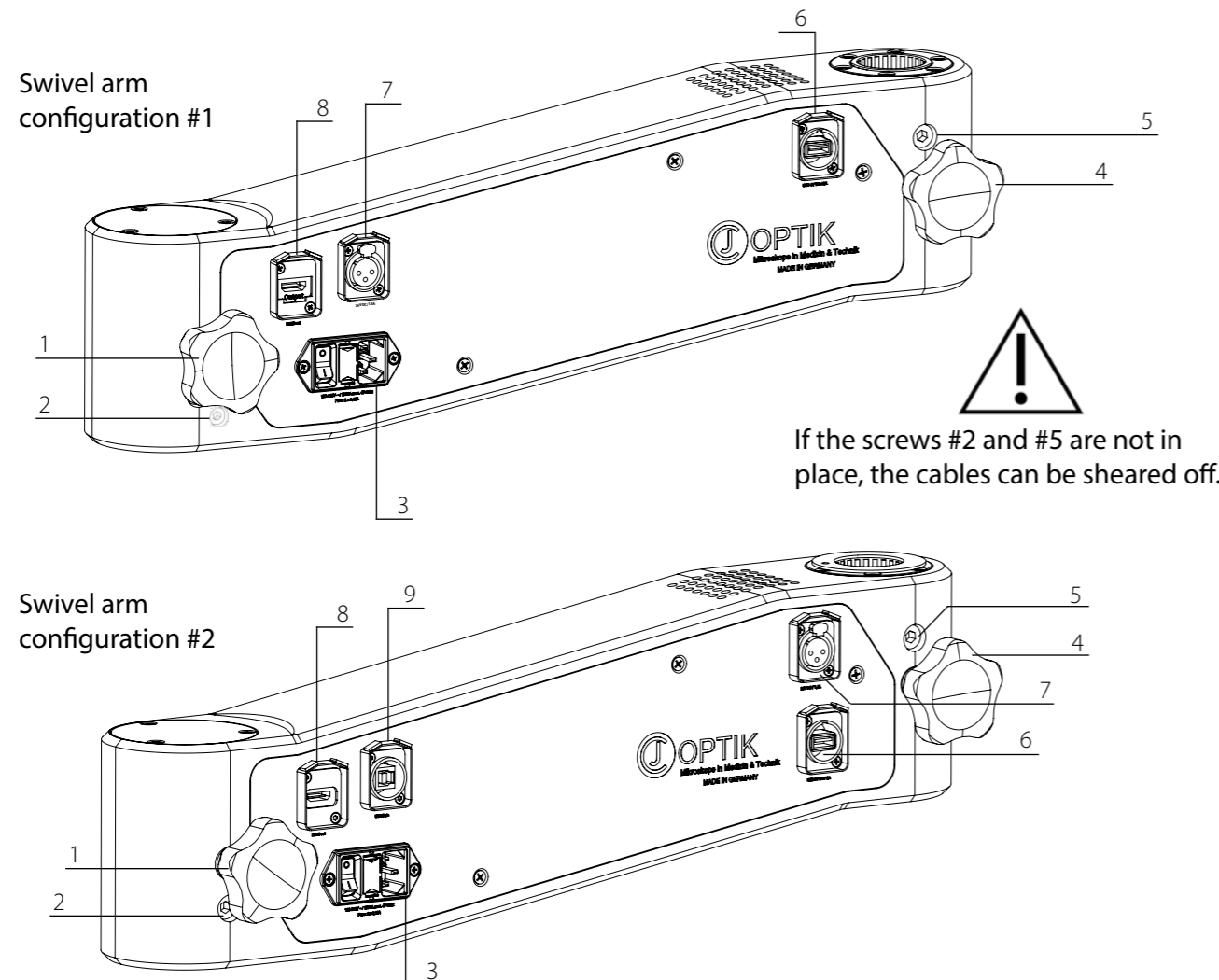
Camera power adapter Sony Alpha 7-3 / 103-4000-0011

The large power adapter is suitable for all Sony cameras with the NP-FZ100 battery.  
(7 III, 7C and 6600)

## 6 Operation of the product and its interfaces

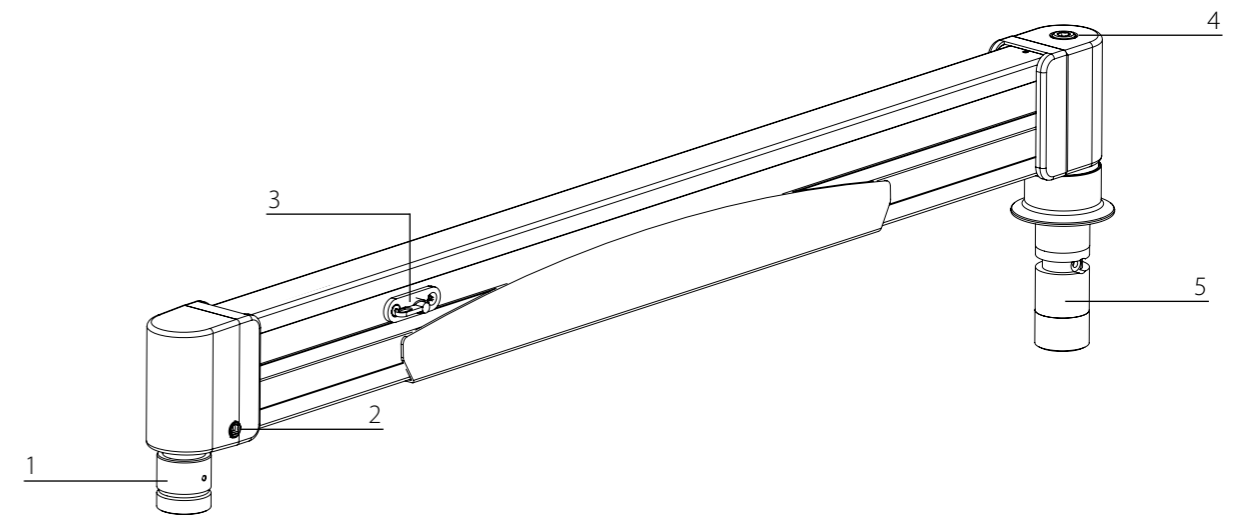
### 6.1 Swivel arm

- 1 = Boom brake
- 2 = Boom stop  
Rotation limit
- 3 = Mains plug connection with fuse and on/off switch  
100-240V, max. 100 VA, 47-63hz, fuse = 2x3.15A
- 4 = Suspension arm stop
- 5 = Stop suspension arm  
Rotation limit + parking position
- 6 = Output USB 5V / 2A (optional)  
Optional USB charging adapter
- 7 = Output DC 24V / 1.5A XLR  
Power supply for an optional monitor authorised by CJ-Optik
- 8 = Output HDMI  
HDMI connection for an optional monitor authorised by CJ-Optik
- 9 = USB 3.0 for data transfer



### 6.2 Tilt arm

- 1 = Interface microscope head  
Used to mount a microscope head
- 2 = Brake of the microscope head  
Adjustable with special tools
- 3 = Transport lock  
Locking of the suspension arm in "parking position"
- 4 = Weight balance adjustment  
Allows readjustment of the weight balance
- 5 = Assembly bolt  
Used for mounting on a boom



Do not open the transport lock (3) without the head mounted, as the arm may spring up.



Observe the maximum load on the suspension arm.

## 6.3 Microscope head

### 1 = Binocular tube

Allows personalised adjustment of the microscope to the user.

### 2 = Swivel tube

Tilts the binocular by  $\pm 100^\circ$

### 3 = Ergo optic

Improves ergonomics. Contains the option of an optical output.

### 4 = Lighting unit

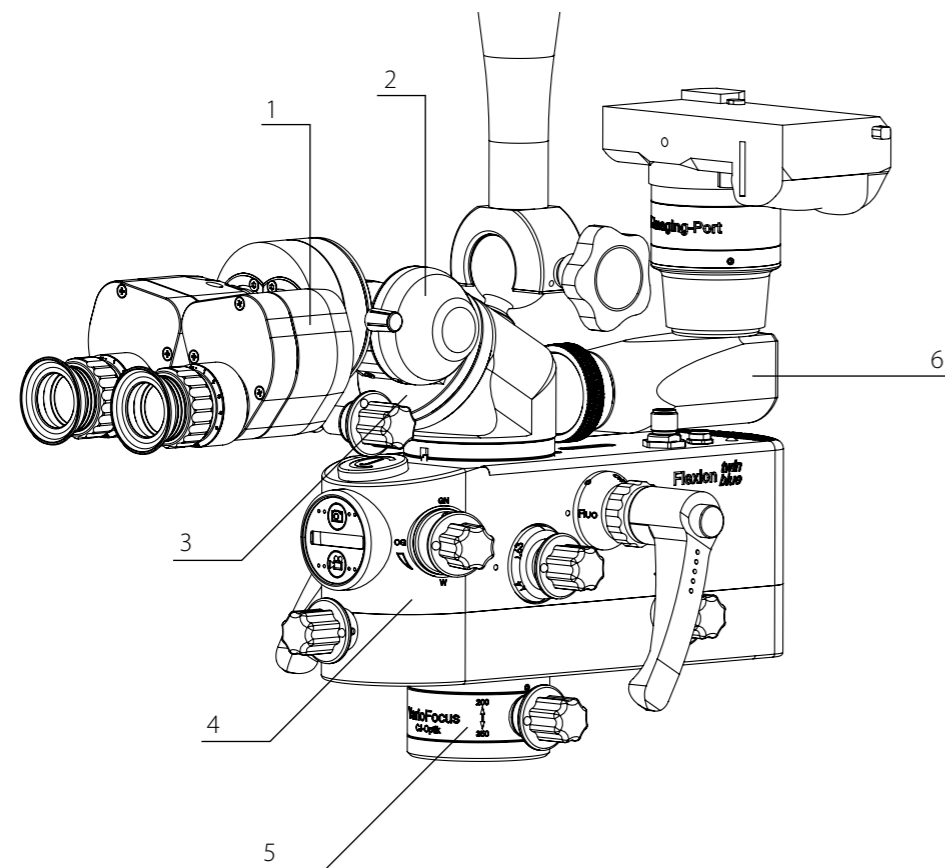
Light source with selective filter system and built-in magnification changer

### 5 = Lens/Objective

Focusing

### 6 = Imaging port or counterweight

4K/HD-Imaging-Port or Phone-Imaging-Port



## 6.4 Binocular

### 1 = Eyecup

Can be adjusted in height for users with visual aids.

### 2 = Dioptre ring

To compensate for ametropia ( $\pm 5$  diopter).

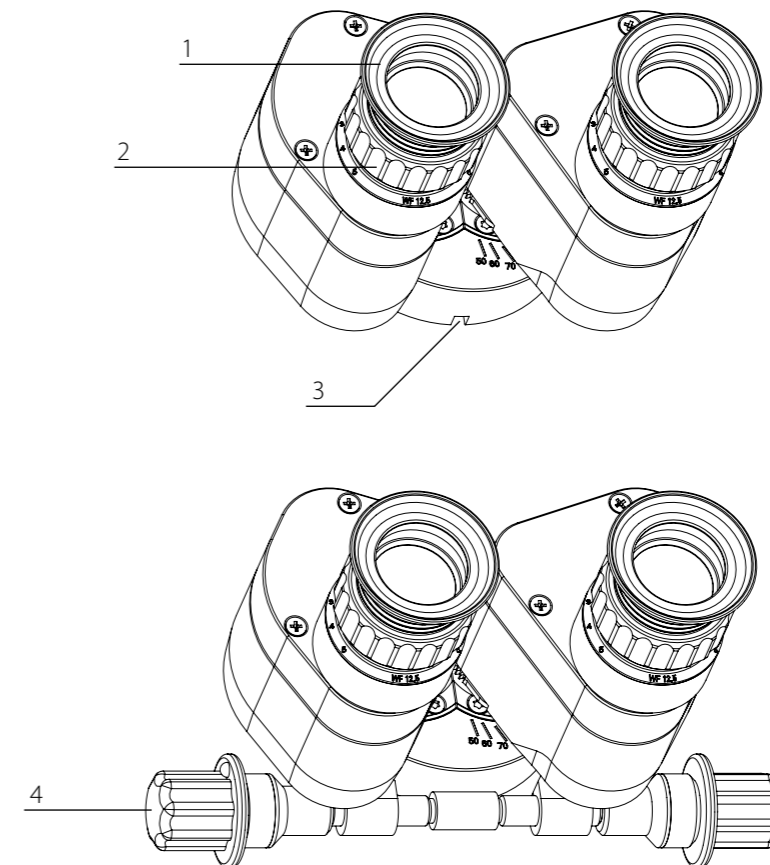
Glasses wearers set the ring to position 0.

### 3 = Allen screw (2 mm)

For fixing the Ergo optic (always tighten securely. Safety relevant!).

### 4 = Interpupillary Distance Adjuster IPD (optional)

Adjustment of the binocular with the distance between the eyes



### Ocular adjustment

1. Zero (dioptre ring) the left and right ocular.
2. Turn the adjustment wheel on the VarioFocus lens to get a sharp image.
3. Only look with your left eye through the left ocular and adjust the dioptre ring of the left ocular until you get a sharp view with your left eye.
4. Only look with your right eye through the right ocular and adjust the dioptre ring of the right ocular until you get a sharp view with your right eye.
5. Look with both eyes and check (and make fine adjustment if necessary).

There are two binoculars to choose from. The optional f200 binoculars offers 18% more magnification than the f170.

## 6.5 Swivel tube

### 1 = Clamping screw

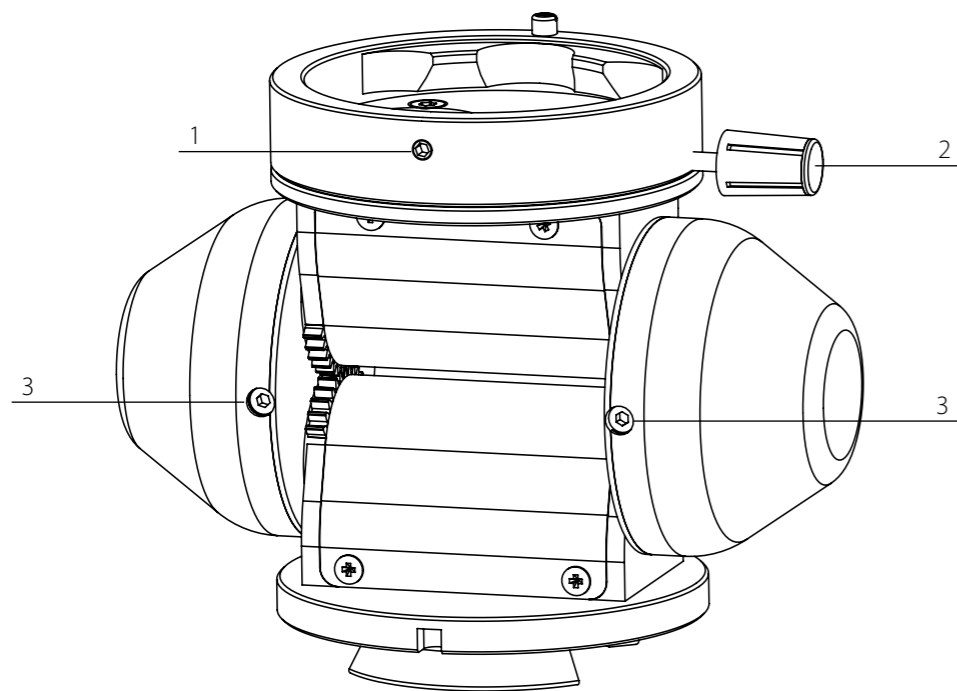
For fixing used components (always tighten securely. Safety relevant!).

### 2 = Turntable fixing screw

Prevents the turntable from rotating (Attention! Loosen before turning).

### 3 = Tilting moment fine adjustment

Sets the smoothness of the tilt function. If you change the tightness, please make sure to tighten the left and right screw (3) with the same torque.



## 6.6 MonoGlobe & Beam Splitter

### 1 = Ball joint (adjustable)

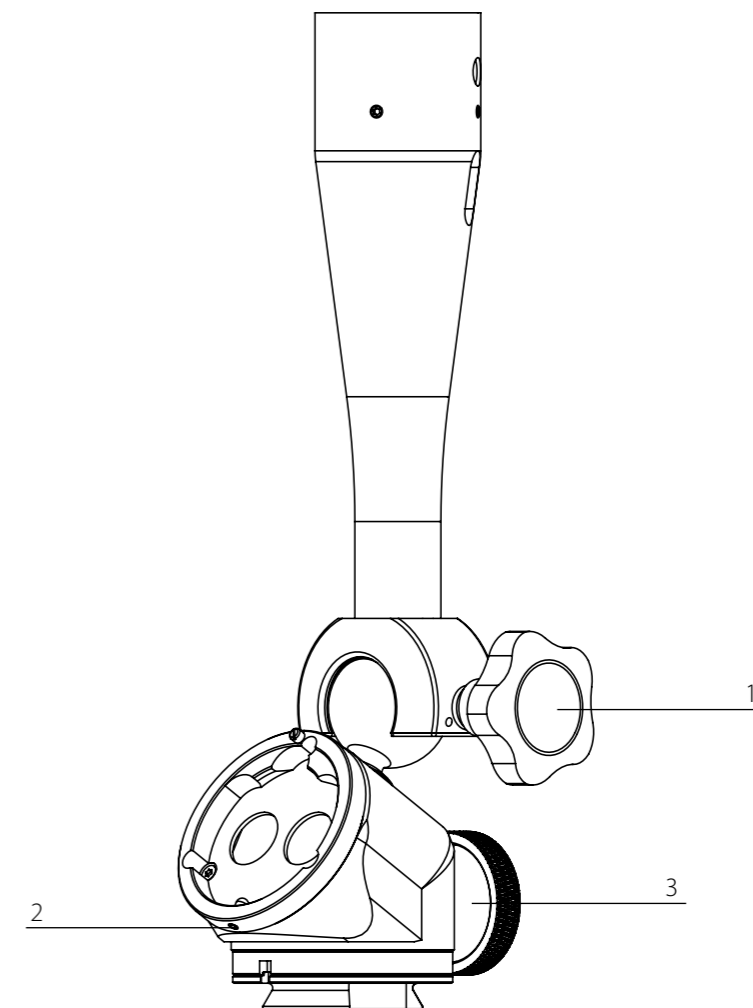
Allows swiveling and fixing of the microscope head.

### 2 = Allen screw (2 mm)

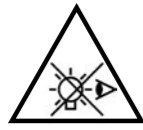
For fixing the Ergotube (always tighten securely. Safety relevant!).

### 3 = Optical output (beam splitter)

Allows you to connect an imaging port (remove dust guard from optical connector first).



## 6.7 Lighting unit for Exepto, Basic, Advanced and Advanced SensorUnit



Never look directly into the light beam (eye damage)!



The patient must wear safety goggles!

1 = Ergo optic connection

2 = Output DC 24V / 3.2 A  
Power supply for the lighting unit

3 = Power supply for camera (*Advanced, Advanced SensorUnit*)

4 = IR transmitter LED for camera release (*Advanced SensorUnit*)

5 = Illuminated field diaphragm of the LED, (*Advanced, Advanced SensorUnit*)  
Adjustable, sets the size of the LED light field

6 = Orange filter (swivels in)  
Prevents early curing of composites (530nm)

7 = Handle (adjustable)  
The orientation of the handle can be changed by pulling it out and turning it.

8 = Magnification changer  
5 magnification levels can be set by turning it manually (*Basic, Advanced, Advanced SensorUnit*):  
 $\gamma = 0.4x$ ,  $\gamma = 0.63x$ ,  $\gamma = 1.0x$ ,  $\gamma = 1.6x$ ,  $\gamma = 2.5x$   
3 magnification levels (*Exepto*):  $\gamma = 0.7x$ ,  $\gamma = 1.0x$ ,  $\gamma = 1.45x$

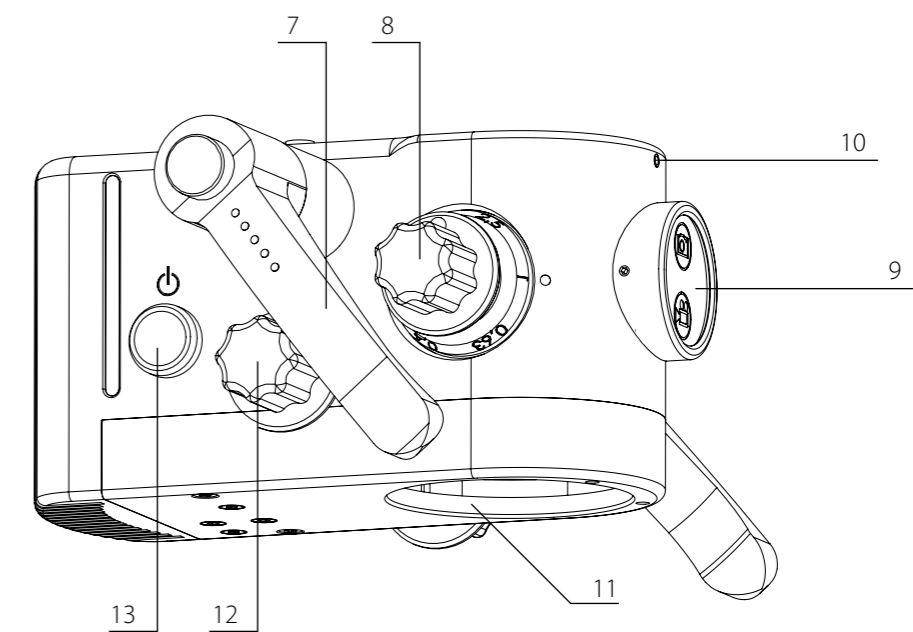
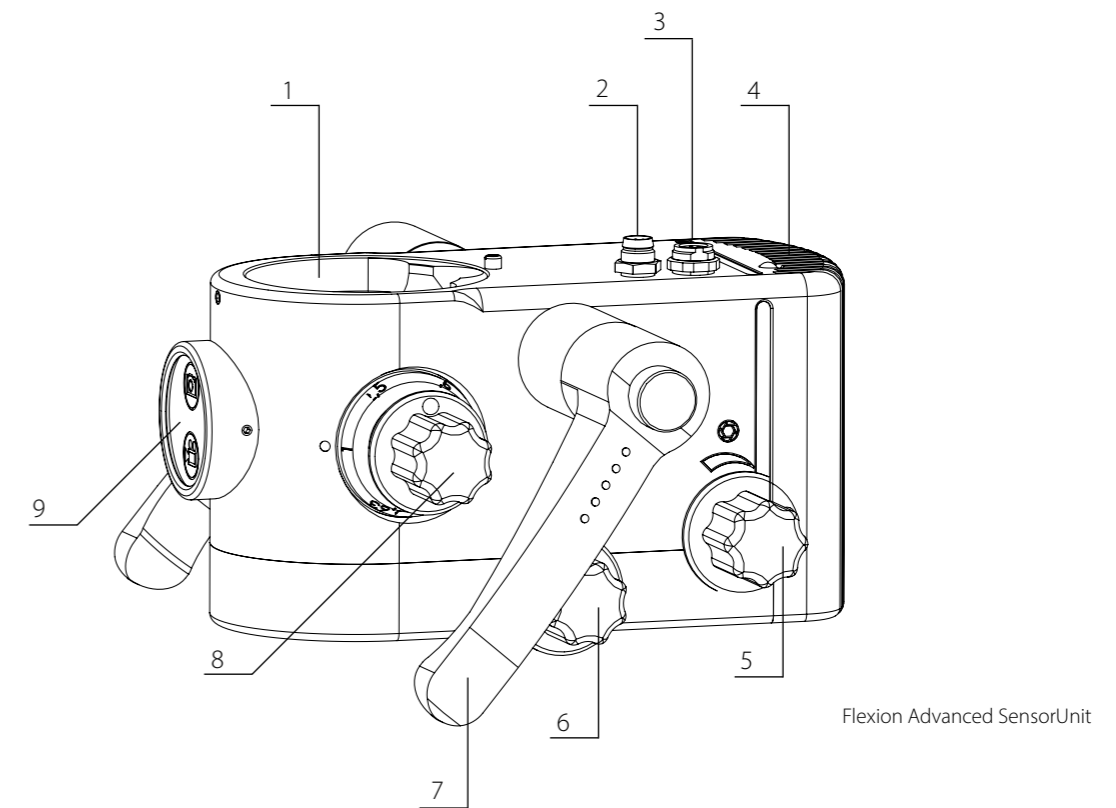
9 = SensorUnit (*Advanced SensorUnit*)  
Images and video recording by using Sony cameras

10 = Allen screw  
To attach to ergo optic (safety-relevant)

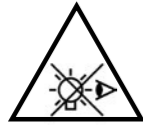
11 = Lens thread

12 = LED lighting control  
Controls the intensity of the lighting.

13 = On / off switch  
Press for at least 2 sec to switch the lighting on and off (*Advanced, Advanced SensorUnit*)  
With models Exepto and Basic turn the switch.



## 6.8 Lighting unit for Twin lite



Never look directly into the light beam (eye damage)!



The patient must wear safety goggles (included with delivery)!

1 = Allen screw

To attach to ergo optic (safety-relevant). **Note:** Remove the magnetic CJ-Optik badge first.

2 = Ergo optic connection

3 = Output DC 24V / 3.2 A

Power supply for the lighting unit

4 = Power supply for camera

5 = IR transmitter LED for camera release

6 = Illuminated field diaphragm of the rear LED (adjustable)

Sets the size of the LED light field

7 = Handle (adjustable)

The orientation of the handle can be changed by pushing the button, pulling the handle and turning it. Please put the rubber covers on the handles before use (scope of delivery).

8 = Rotating ring to select the front LED

Twin lite Blue: If the UV LED is activated (ring position = "Fluo"), the rear white LED is switched off.

Twin lite White: In the Light Boost mode (ring position = "W"), the front LED and the rear LED are switched on.

**Note:** The natural light filter cannot be activated when the front LED is switched on.

9 = Magnification changer

5 magnification levels can be set by turning the changer manually

( $\gamma = 0.4x$ ,  $\gamma = 0.63x$ ,  $\gamma = 1.0x$ ,  $\gamma = 1.6x$ ,  $\gamma = 2.5x$ )

10 = Light intensity control

Turning knob. When the knob is pressed, each brightness setting can be stored individually.

11 = SensorUnit

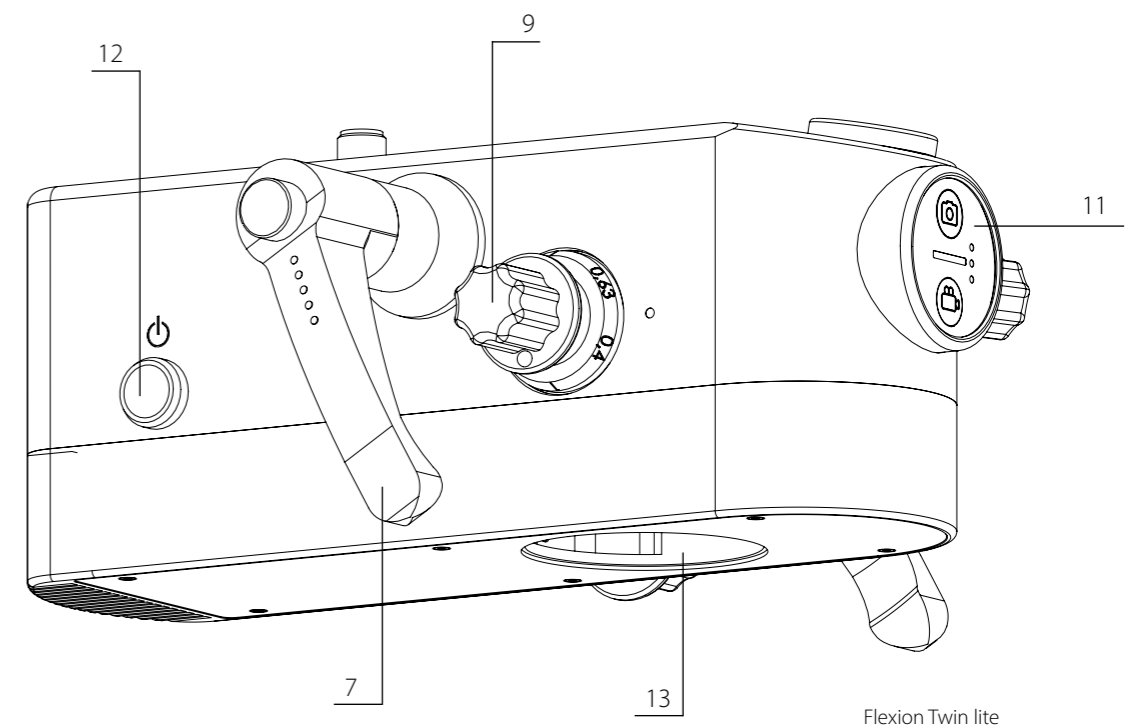
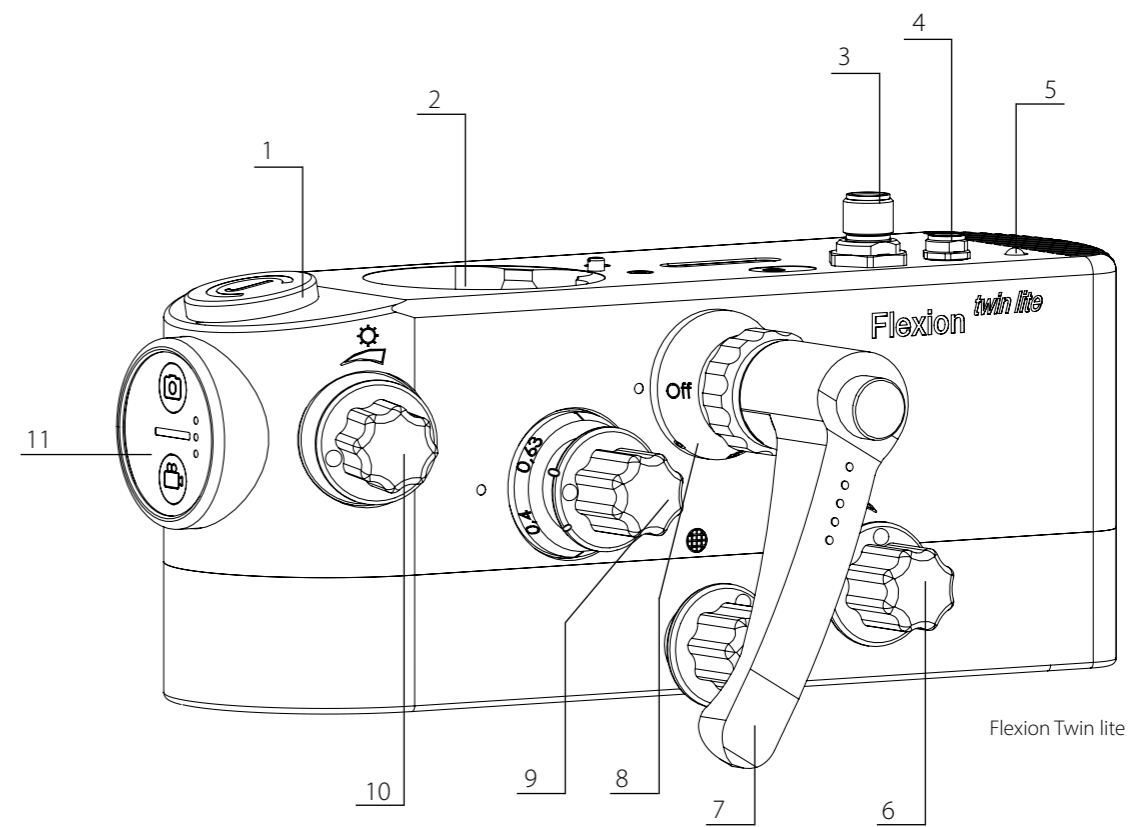
Start an image or video recording when using Sony cameras.

12 = On / off switch

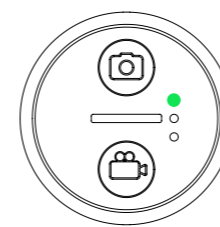
Switches the lighting on and off.

Press for at least 2 sec to switch the lighting on and off.

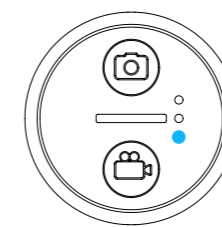
13 = Lens thread



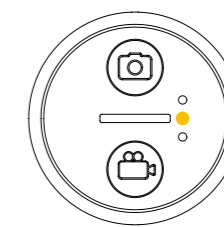
### Twin lite SensorUnit Display



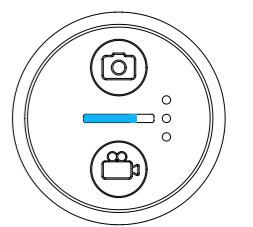
White Light Mode  
activated



Fluorescence Mode (Twin lite Blue)  
or Light Boost Mode (Twin lite White)  
activated

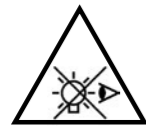


Natural Light Filter  
activated



LED Intensity Panel  
(illustrated here: approx. 75 %)

## 6.9 Lighting unit for Twin



Never look directly into the light beam (eye damage)!



The patient must wear safety goggles (included with delivery)!

### 1 = Allen screw

To attach to ergo optic (safety-relevant). **Note:** Remove the magnetic CJ-Optik badge first.

### 2 = Ergo optic connection

### 3 = Output DC 24V / 3.2 A

Power supply for the lighting unit

### 4 = Power supply for camera

### 5 = IR transmitter LED for camera release

### 6 = Illuminated field diaphragm of the rear LED (adjustable)

Sets the size of the LED light field

### 7 = Handle (adjustable)

The orientation of the handle can be changed by pushing the button, pulling the handle and turning it. Please put the rubber covers on the handles before use (scope of delivery).

### 8 = Rotating ring to select the front LED

Twin Blue: If the UV LED is activated (ring position = "Fluo"), the rear white LED is switched off.

Twin White: In the Light Boost mode (ring position = "W"), the front LED and the rear LED are switched on.

**Note:** No colour filters can be activated when the front LED is switched on.

### 9 = Magnification changer

5 magnification levels can be set by turning it manually

( $\gamma = 0.4x$ ,  $\gamma = 0.63x$ ,  $\gamma = 1.0x$ ,  $\gamma = 1.6x$ ,  $\gamma = 2.5x$ )

### 10 = Joystick for filter selection and lighting control

Different filters can be selected. See pages 54, 55.

### 11 = Illuminated field diaphragm of the front LED (adjustable)

Sets the size of the LED light field

### 12 = SensorUnit

Images and video recording when using Sony cameras. See page 54.

### 13 = On / off switch

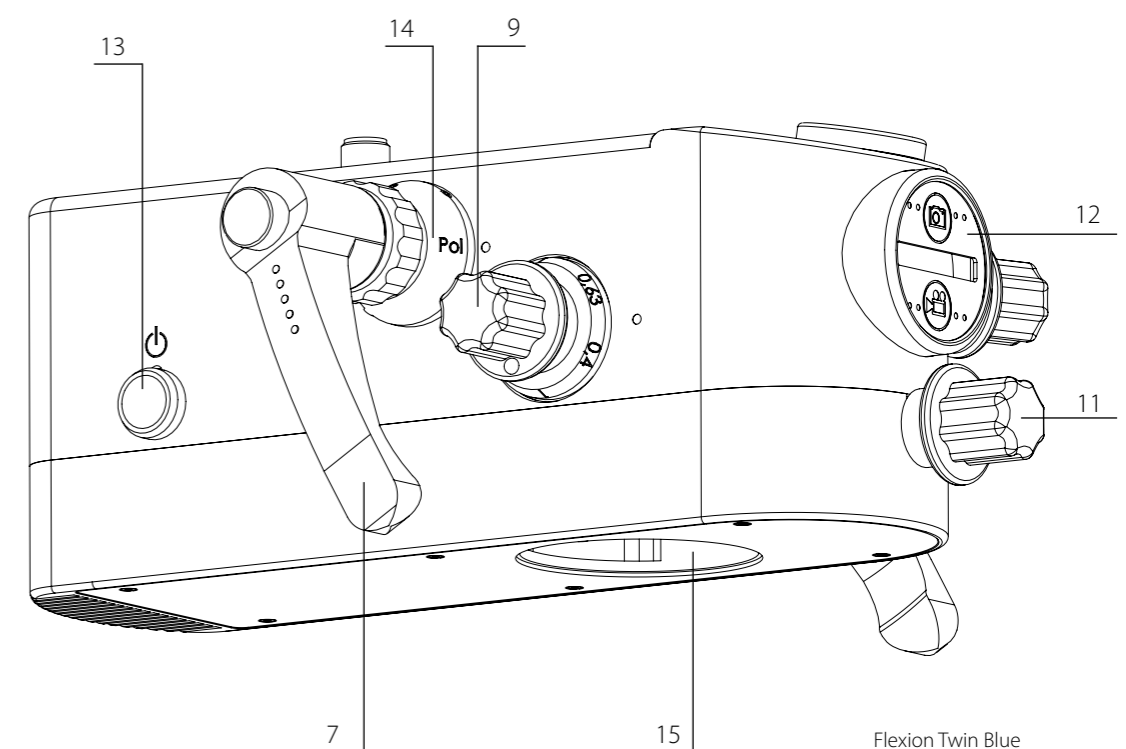
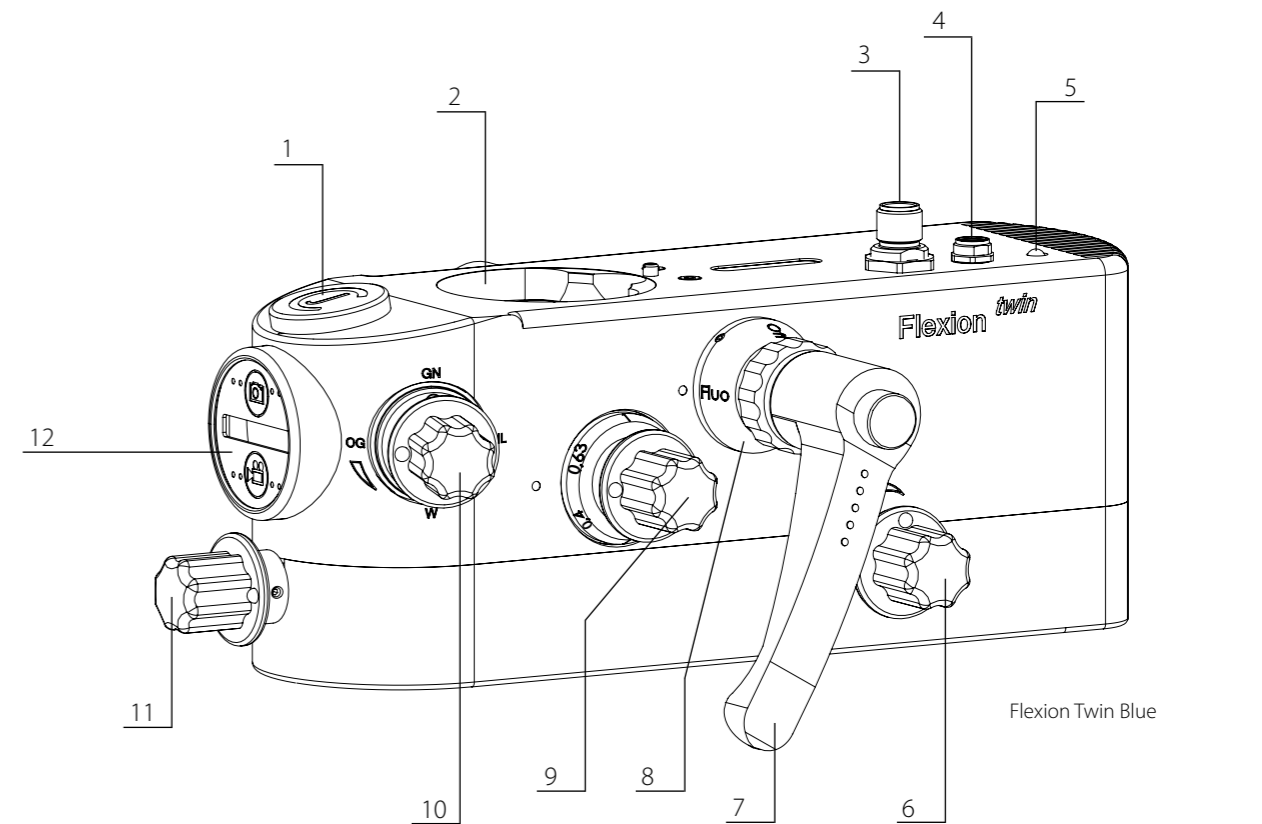
Switches the lighting on and off.

Press for at least 2 sec to switch the lighting on and off.

### 14 = Polarizing filter (AntiGlare Mode)

This filter eliminates all unwanted reflections on the tooth caused by the light and allows you to see the tooth structure. **Note:** Cannot be combined with any of the other filters.

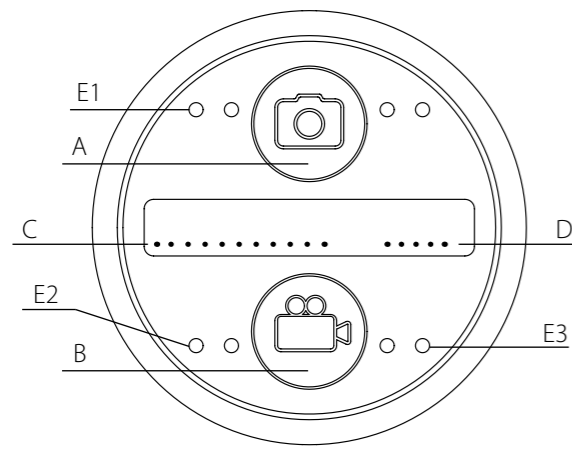
### 15 = Lens thread



In Light Boost mode of the Twin White, you can activate the front or rear LED separately by moving the joystick to the left or right. Their different beam angles can be used to make structures more visible. The subsequent movement of the joystick up or down reactivates the Light Boost mode.

## 6.10 SensorUnit and Display for Twin

The SensorUnit allows you to take a photo or start a video recording by lightly tapping the top circle (A) or bottom circle (B) with your fingertip, see figure below.



SensorUnit and display



Exemplary overview of different values in the display

### A = Image acquisition

An IR signal is sent to the camera at the imaging port.

### B = Video recording

An IR signal is sent to the camera at the imaging port.

### C = Indications in the display (five front digits)

White	No filter selected (free passage)
Orang	Orange Filter
Green	Green Filter
NatLi	Natural Light Filter (allows to prepare the composite longer)
Polar	Polarizing Filter (activated in the optical and illumination beam path)
Fluo	Fluorescence mode with UV protective filters in the optical beam path for the eyes <i>(only applies for Flexion Twin Blue)</i>
Front	Only front LED active <i>(only applies for Flexion Twin White)</i>
Rear	Only rear LED active <i>(only applies for Flexion Twin White)</i>
Boost	Front and rear LED active <i>(only applies for Flexion Twin White)</i>
Error	Polarizing Filter and the front LED were activated at the same time <i>(Twin Blue &amp; Twin White)</i>

### D = LED power (two rear digits)

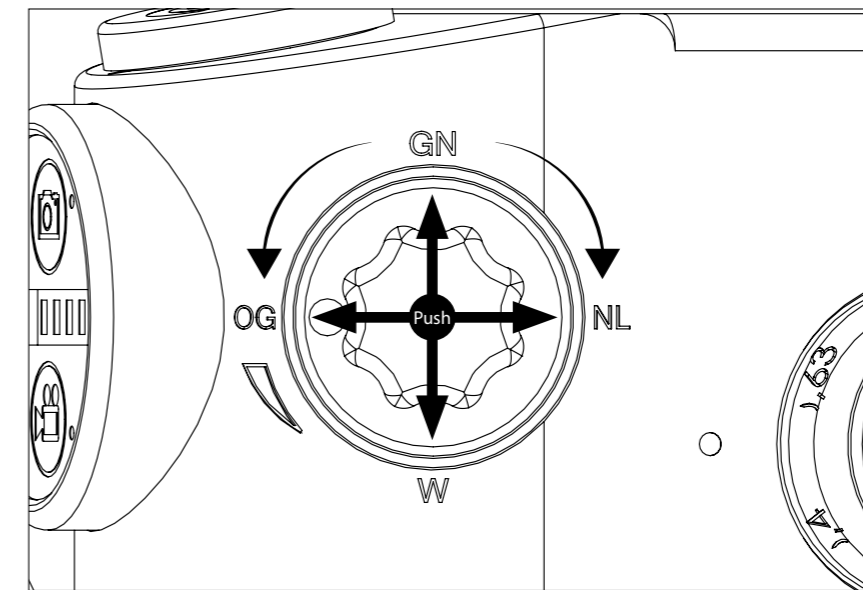
Shows the active filter. Ranges from 0 to 99 %.

### E = LED for additional information

- E1 = Photo and video is being processed
- E2 = Indicates that the main LED is overheated
- E3 = LED problem

## 6.11 Selective Filter System / Joystick for Twin

The joystick for filter selection and lighting control is located on the side of the housing.



←  
Left

Rotating Ring 8 On ---> Front LED active  
Rotating Ring 8 Off ---> OG = Orange Filter

By pushing the joystick to the left the Orange Filter is being activated. The Orange Filter avoids composite curing when prepping for restorations/adhesives.

↑  
Up

Rotating Ring 8 On ---> Front and rear LED active = Boost Mode (Twin white only)  
Rotating Ring 8 Off ---> GN = Green Filter

By pushing the joystick upwards the Green Filter is being activated. The Green Filter improves the visibility for the blood supply in surgery applications.

→  
Right

Rotating Ring 8 On ---> Rear LED active  
Rotating Ring 8 Off ---> NL = Natural Light Filter

By pushing the joystick to the right the Natural Light Filter is being activated. The Natural Light Filter extends the preparation time for composite materials. The rendering is closer to real warm light than the Orange Filter. Improved visibility for passages between hard and soft tissues.

↓  
Down

Rotating Ring 8 On ---> Front and rear LED active = Boost Mode (Twin white only)  
Rotating Ring 8 Off ---> W = White Light (no colour filter)

By pushing the joystick downwards the White Light is being activated. The White Light is the standard setting with a homogeneous field of view and 5.500 K colour temperature.



### Setting the LED light intensity

By turning the joystick the light intensity is adjusted between 0 and 99 %.  
If the front LED is switched on, only this can be controlled.  
If the rear LED is to be controlled, the front LED must be switched off.



### Storage of the LED light intensity

By pushing the joystick in the direction of the microscope housing all filter settings can be saved separately. The values are retained when the microscope is switched off and switched on again.

## 6.12 Objective / Lens

### 1 = Connection microscope

Allows a subsequent exchange of a fixed focal length or a variable focus.

### 2 = Allen screws

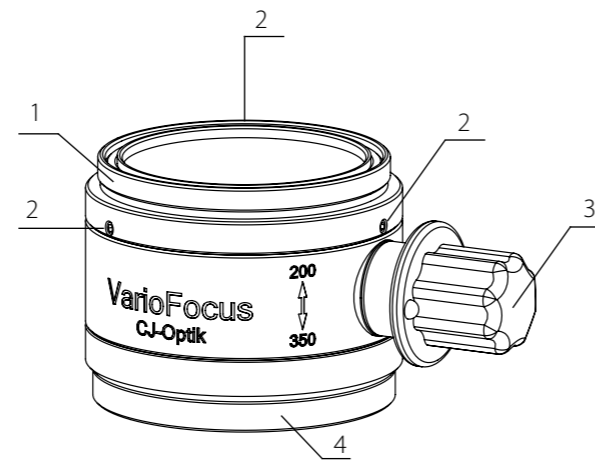
The VarioFocus lens can be adjusted for left- and right-handed operation. To switch to another working position, loosen the three Allen screws and turn the lens 180°. Then tighten the screws again.

### 3 = Focusing

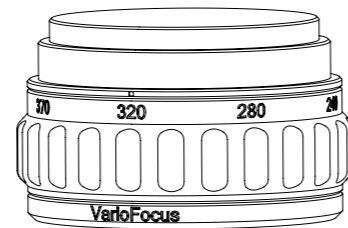
Enables fine focusing, which is necessary at high magnification.

### 4 = Protective glass

Protects the optics from the ingress of dirt (can be cleaned with the microfiber cloth included in the delivery)



VarioFocus<sup>2</sup> (200-350 mm)  
The functions are identical for the VarioFocus<sup>3</sup> (210-470 mm).



VarioFocus<sup>4</sup> (200-350 mm)  
and VarioFocus<sup>5</sup> (210-500 mm)

## 6.13 Imaging Ports

### 1 = Bayonet lock (depending on the camera)

Adaptation to a camera with Sony E-Mount. Install port on the imaging port.

### 2 = Alignment ring

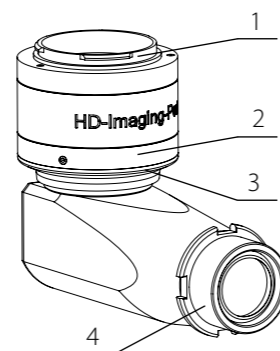
For fine adjustment of the image rotation

### 3 = Focusing

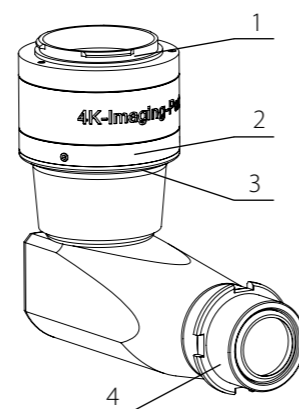
Allows fine focusing of the sharpness to the camera sensor

### 4 = Connection microscope

Used for mounting on a microscope



HD-Imaging-Port



4K-Imaging-Port

## 6.14 Compatibility of Cameras and CJ-Optik Imaging Ports

	HD-Imaging-Port	4K-Imaging-Port
<b>Sony E-Mount</b>	Sony Nex 3, 5, 6, 7 / Alpha 6000, 6100, 6300, 6400, 6500, 6600	Sony Alpha 7 II, 7 III, 7R IV, 7S III (further models by request)
<b>Canon EF-S</b>	Canon 7D Mark II, 90D, 77D, 800D (further models by request)	Canon EOS 1D, 5D Mark 2, 6D Mark 2
<b>Nikon F</b>	Nikon D3500, D7500, D5600, D3400 (further models by request)	Nikon D5, D610, D750

## 7 Maintenance and cleaning

### 7.1 Maintenance

To ensure smooth operation, the device should be cleaned at regular intervals. Apart from "normal" care (microfiber cloth, soft cloths, disinfectant, distilled water), the device does not require any chemical additives.

However, care must be taken that the optical components are only cleaned with a microfiber cloth. If there is rough dirt inside the device (can only happen if it is operated incorrectly), do not clean the device yourself but have it cleaned by a person authorised by CJ-Optik.



The type plate must always be legible and must not be removed. When cleaning or maintenance work, always pull the power plug of the entire device and make sure that no contaminants can penetrate the device.

CE	Typ	Flexion Microscope
RohS	SN	19071233
	Volt	100 - 240 V 47 - 63 hz
	VA	Max. 100
	Fuse	2x 3,15 A
	IP	20
		<a href="http://www.cj-optik.de">www.cj-optik.de</a>
		Willeckstraße 1
		D-35614 Aßlar

### 7.2 Maintenance guidelines

These maintenance guidelines only cover procedure pertaining maintenances that are considered to be easily performed. For more involved maintenances or repairs, it is recommended that you contact a qualified service engineer from your local authorized CJ-Optik dealer.

### Visual inspection (once a year)

Are the operating instructions and type plate present and legible?

### Functional tests (once a year)

Is a backlash-free movement of the swivel and floating arm possible?

Are all star screws present and tightened?

Is the movement of the gas pressure spring smooth and jerk-free?

Do the brakes function properly?

### Mount (once a year)

Is there any mechanical play at the transition to the stand base?

Can the four rollers rotate freely (for mobile stand)?

Do the four brakes of the rollers engage (for mobile stand)?

### VarioFocus (once a year)

Can the VarioFocus be adjusted without play?

**Please also use the inspection sheet on page 69 to document the maintenance.**

## 7.3 Cleaning

From time to time, clean external contamination with a damp, soft cloth and then disinfect it. You can wipe all mechanical surfaces of the microscope with a damp cloth. Do not use aggressive or abrasive cleaning agents.

Sterilization sleeves (drapes) can be used to cover the device in a sterile manner. Use the sterilization pouches only once. In order to get enough freedom of movement for the microscope carrier and the device, you should attach the tissues as loosely as possible. The drapes should be attached particularly loosely around the handle, since the surgeon must operate the microscope through the cloth.

If disinfectants containing aldehyde and amine are used on the same object, this can lead to discoloration.

CJ-Optik recommends the use of the CJ-Optik cleaning set (order number 006-004-0000). For cleaning the optical parts of your microscope, we recommend using the optics cleaning cloth included in the scope of delivery.



Cleaning agents can damage the paintwork, lettering or even the optical components.



Disconnect the power plug before cleaning and disinfecting the microscope surface.



If liquid has entered the microscope, it may only be put into operation again after being checked by the authorised customer service.

## 7.4 Recommended disinfectants

Disinfectant	Suitable for			
	Microscope	Handles	Other mechanical surfaces	Optical surfaces
Green & Clean SK			x	x
Bacillo® 30 Foam			x	
Kohrsolin® FF (Application concentrate)	x	x	x	
Kohrsolin® extra (Application concentrate)	x		x	x
Mikrobac® forte (Application concentrate)	x	x	x	
Mikrozid® Sensitive Wipes			x	
SaniCloth® Active	x		x	

### Do not use:

- Disinfectants with organic or inorganic acids or bases, as these can cause corrosion damage.
- Disinfectants containing chloramides or phenol derivatives, as these can cause stress cracks in the material used for the housing.

## 7.5 Hygiene plan

What	How		When		Information
	Cleaning	Disinfection	After every application	Daily	
Casing	x	x	x		Manual wipe cleaning and disinfection
Lens/Optics	x	x		x	Manual wipe cleaning and disinfection
Handles	x	x	x		Manual wipe cleaning and disinfection
Buttons	x	x	x		Manual wipe cleaning and disinfection
Sterilization Caps	x	x	x		Manual wipe cleaning and disinfection

## 8 Service and warranty

### 8.1 Basic information

Carry out a visual inspection of the microscope and the connecting cable before each use. Replace damaged lines immediately!

CJ-Optik recommends: Hire an authorised CJ-Optik service partner / dealer. So you can be sure that repairs and tests are carried out professionally, original spare parts are used and warranty claims are retained.

### 8.2 Service

Service or repairs may only be carried out by trained specialist personnel. Only original parts are to be used as replacements.



Product liability expires if the device is changed by unauthorised persons and if parts of a different design are installed or installed.



The medical approval expires if parts are installed that are not authorised by CJ-Optik.



Connection to a monitor is prohibited except for the one supplied by CJ-Optik. Failure to do so will void the medical license.

### 8.3 Warranty

Our devices are guaranteed for 24 months. If your device becomes defective within the warranty period, please contact us directly.

The microscope may only be operated in a technically perfect condition. If defects occur that could endanger employees or third parties, the device may only be used again after it has been repaired.

Damage caused by improper use, furthermore by external mechanical influences, transport damage as well as unauthorised tampering with the device by unauthorised persons are not covered by this guarantee.

Product liability expires if the device is changed by unauthorised persons and if parts of a different design are installed or installed.

### 8.4 Send in the device

- Remove and dispose of consumables properly
- Clean and disinfect the product and accessories according to the operating instructions
- Put used accessories with it
- Fill out the return form
- Pack the product well padded with suitable packaging
- Include the return form
- Glue the mailing bag on the outside of the packaging
- Send the product to CJ-Optik or your dealer
- Please send an information to CJ-Optik before sending it back

## 9 Help with malfunctions

Malfunction	Possible cause	Solution
No function	Main switch switched off	Switch on the main switch on the boom (lights up green)
		Plug in the main power plug
	Check fuse if necessary	
Operating field lighting out of function	Power failure	Inform the house electrician
	No connection to boom	Establish voltage supply for lighting unit
	Potentiometer not switched on	Turn the potentiometer clockwise until switched on
Operating field lighting poor	Failure of the electronics	Illuminate the surgical field with an operating light
		Contact service
Operating field lighting poor	Set brightness too low	Turn the potentiometer clockwise until the desired brightness is reached
Magnification changer is defective	-	Contact service
Filter in the illumination beam path is defective or cannot be swung in / out	-	Contact service
Illuminated field diaphragm is defective or cannot be adjusted	-	Contact service
The balance arm does not balance the microscope	Accessories added or removed	Readjust the weight balance on the balance arm
Swivel tube does not hold the set position	Tilting moment too large	Readjust the tilting moment fine adjustment
Brakes out of function	-	Contact service

## 10 Technical data

Voltage	100-240V, 47-63hz
Power consumption	Max. 100 VA
Fuses	2 x 3.15A
Illuminance	<b>Exepto, Basic, Advanced, Advanced SensorUnit, Twin Blue, Twin lite Blue:</b> 30 kLux - 120 kLux (depending on the working distance, lens type and settings of LED intensity) <b>Twin White and Twin lite White:</b> 30 kLux - 200 kLux (depending on the working distance, lens type and settings of LED intensity)
Colour temperature	5.500 K ± 10%
Operating time	Continuous operation
Cooling	Fanless/passive
Protective resistor	max. 0.1 Ω
Earth leakage current	max. 0.5 mA
Housing leakage current	max. 0.1 mA
Patient leakage current	max. 0.1 mA
Environmental conditions Transport / storage	-10° up to +50°C 10% up to 95% humidity without condensation Air pressure 500 up to 1060 hPa
Environmental conditions Operation	+10° up to +40°C 30% up to 90% humidity without condensation Air pressure 700 up to 1060 hPa
Weight (microscope head with camera, approx.)	Exepto: 4,6 kg Basic: 4,7 kg Advanced: 4,8 kg Advanced SensorUnit: 4,8 kg Twin lite: 4,9 kg Twin: 4,9 kg
Recurring safety checks	Safety checks must be carried out annually in accordance with the accident prevention regulations. CJ-Optik recommends an annual inspection.
Protection class (EN 60601-1)	I
Degree of protection	IP 20
Risk classification according to Annex VIII Regulation (EU) 2017/745	Class 1 (according to rule 1 and 13)
CE-mark	CE
Suitable for operation up to a height above sea level	≤ 3000 m

## 11 Field of view measurements

### 11.1 Measurements with Bino f170

**VarioFocus<sup>2</sup>** and **VarioFocus<sup>4</sup>** WD 200 - 350 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
200 mm	67 mm	43 mm	38 mm	27 mm	19 mm	17 mm	11 mm
225 mm	73 mm	46 mm	42 mm	29 mm	20 mm	18 mm	12 mm
250 mm	79 mm	50 mm	45 mm	32 mm	22 mm	20 mm	13 mm
275 mm	85 mm	54 mm	49 mm	34 mm	23 mm	21 mm	14 mm
300 mm	91 mm	58 mm	52 mm	36 mm	25 mm	23 mm	15 mm
325 mm	97 mm	61 mm	55 mm	39 mm	27 mm	24 mm	15 mm
350 mm	102 mm	65 mm	59 mm	41 mm	28 mm	26 mm	16 mm

**VarioFocus<sup>3</sup>** WD 210 - 470 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
210 mm	74 mm	47 mm	42 mm	29 mm	20 mm	18 mm	12 mm
250 mm	84 mm	53 mm	48 mm	33 mm	23 mm	21 mm	13 mm
300 mm	96 mm	61 mm	55 mm	39 mm	27 mm	24 mm	15 mm
350 mm	109 mm	69 mm	62 mm	44 mm	30 mm	27 mm	17 mm
400 mm	121 mm	77 mm	69 mm	49 mm	34 mm	30 mm	19 mm
470 mm	139 mm	88 mm	79 mm	56 mm	39 mm	35 mm	22 mm

**VarioFocus<sup>5</sup>** WD 210 - 500 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
210 mm	74 mm	47 mm	42 mm	29 mm	20 mm	18 mm	12 mm
250 mm	84 mm	53 mm	48 mm	33 mm	23 mm	21 mm	13 mm
300 mm	96 mm	61 mm	55 mm	39 mm	27 mm	24 mm	15 mm
350 mm	109 mm	69 mm	62 mm	44 mm	30 mm	27 mm	17 mm
400 mm	121 mm	77 mm	69 mm	49 mm	34 mm	30 mm	19 mm
470 mm	139 mm	88 mm	79 mm	56 mm	39 mm	35 mm	22 mm
500 mm	147 mm	93 mm	84 mm	59 mm	40 mm	37 mm	23 mm

\* Exepto

## 11.2 Measurements with Bino f200

VarioFocus<sup>2</sup> and VarioFocus<sup>4</sup> WD 200 - 350 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
200 mm	57 mm	36 mm	33 mm	23 mm	16 mm	14 mm	9 mm
225 mm	62 mm	39 mm	36 mm	25 mm	17 mm	16 mm	10 mm
250 mm	67 mm	43 mm	38 mm	27 mm	19 mm	17 mm	11 mm
275 mm	72 mm	46 mm	41 mm	29 mm	20 mm	18 mm	12 mm
300 mm	77 mm	49 mm	44 mm	31 mm	21 mm	19 mm	12 mm
325 mm	82 mm	52 mm	47 mm	33 mm	23 mm	21 mm	13 mm
350 mm	87 mm	55 mm	50 mm	35 mm	24 mm	22 mm	14 mm

VarioFocus<sup>3</sup> WD 210 - 470 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
210 mm	63 mm	40 mm	36 mm	25 mm	17 mm	16 mm	10 mm
250 mm	71 mm	45 mm	41 mm	28 mm	20 mm	18 mm	11 mm
300 mm	82 mm	52 mm	47 mm	33 mm	23 mm	20 mm	13 mm
350 mm	92 mm	59 mm	53 mm	37 mm	26 mm	23 mm	15 mm
400 mm	103 mm	66 mm	59 mm	41 mm	29 mm	26 mm	17 mm
470 mm	118 mm	75 mm	68 mm	47 mm	33 mm	30 mm	19 mm

VarioFocus<sup>5</sup> WD 210 - 500 mm at WD --> Ø / mm

Working distance	Overall magnification (Y)						
	0.4	0.63	0.7 *	1	1.45 *	1.6	2.5
210 mm	63 mm	40 mm	36 mm	25 mm	17 mm	16 mm	10 mm
250 mm	71 mm	45 mm	41 mm	28 mm	20 mm	18 mm	11 mm
300 mm	82 mm	52 mm	47 mm	33 mm	23 mm	20 mm	13 mm
350 mm	92 mm	59 mm	53 mm	37 mm	26 mm	23 mm	15 mm
400 mm	103 mm	66 mm	59 mm	41 mm	29 mm	26 mm	17 mm
470 mm	118 mm	75 mm	68 mm	47 mm	33 mm	30 mm	19 mm
500 mm	125 mm	79 mm	71 mm	50 mm	34 mm	31 mm	20 mm

\* Exepto

## 12 Notes on EMV

- Medical electrical equipment is subject to special precautions regarding EMC and must be installed in accordance with the EMC instructions described below.
- Portable and mobile RF communication devices can affect medical electrical devices.
- The use of accessories, converters and cables other than those specified can lead to increased emissions or reduced interference immunity of the device or system.

### 12.1 Guidelines and manufacturer's declaration - electromagnetic emissions

The microscope is intended for use in an environment as specified below. The customer or the user of the microscope should ensure that it is operated in such an environment.


Interference emission measurements	Compliance	Electromagnetic environment - guidance
HF emissions according to CISPR 11	Group 1	The microscope uses HF energy only for its internal function. Therefore, their HF emissions are very low and it is unlikely that neighboring electronic devices will be disturbed.
HF emissions according to CISPR 11	Class B	The microscope is suitable for use in all facilities, including those in the living area and those that are directly connected to a public supply network that also supplies buildings that are used for residential purposes.
Harmonic emissions according to IEC 61000-3-2	Class A	
Transmission of voltage fluctuations / flicker according to IEC 61000-3-3	Matches	

## 12.2 Guidelines and manufacturer's declaration - electromagnetic immunity

The microscope is intended for use in the electromagnetic environment specified below.  
The customer or user of the microscope should ensure that it is used in such an environment.

Immunity tests	IEC 60601-Test level	Compliance level	Electromagnetic environment - guidance
Static discharge Electricity (ESD) after IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be made of wood or concrete or be covered with ceramic tiles. If the floor is covered with synthetic material, the relative air humidity must be at least 30 %.
Fast transient electrical disturbances / bursts according to IEC 61000-4-4	± 2 kV for power lines ± 1 kV for input and Output lines	± 2 kV for power lines ± 1 kV for input and Output lines	The quality of the supply voltage should correspond to a typical business or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV push-pull voltage	± 1 kV push-pull voltage ± 2 kV common mode voltage	The quality of the supply voltage should correspond to a typical business or hospital environment.
Magnetic field at the Supply frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	applicable 3 A/m	Magnetic fields at the network frequency should correspond to the typical values found in the business and hospital environment.
Voltage dips, Short-term breaks and fluctuations the supply voltage to IEC 61000-4-11	< 5 % UT (> 95 % drop in UT) for 0.5 periods 40 % UT (60 % drop in UT) for 5 periods 70 % UT (30 % drop in UT) for 25 periods < 5 % UT (> 95 % drop in UT) for 5 s	< 5 % UT (> 95 % drop in UT) for 0.5 periods 40 % UT (60 % drop in UT) for 5 periods 70 % UT (30 % drop in UT) for 25 periods < 5 % UT (> 95 % drop in UT) for 5 s	The quality of the supply voltage should correspond of a typical business or hospital environment. If the user of the microscope requests continued operation even when there are interruptions in the power supply, it is recommended that the microscope be powered from an uninterruptible power supply or a battery.

**Note:** UT is the AC main power voltage before the test level is applied.

Immunity tests	IEC 60601-Test level	Compliance level	Electromagnetic environment - guidance
Guided disturbances according to IEC 61000-4-6	V1 = 3 V <sub>eff</sub> 150 kHz - 80 MHz	3 V	Portable and mobile radio devices should not be used closer to the microscope including the lines than the recommended protective distance, which is calculated according to the equation applicable for the transmission frequency. Recommended separation distance: $d = [3.5 / V1] \sqrt{P}$ $d = [3.5 / E1] \sqrt{P}$ - 80 MHz - 800 MHz $d = [7.0 / E1] \sqrt{P}$ - 800 MHz - 2500 MHz with P as the nominal power of the transmitter in watts (W) according to the specifications of the transmitter manufacturer and d as the recommended protective distance in meters (m). The field strength of stationary radio transmitters should be lower than the compliance level (b) at all frequencies according to an on-site examination (a). Faults are possible in the vicinity of devices with the following symbol: 
Guided disturbances according to IEC 61000-4-3	E1 = 3 V/m 80 MHz - 2.5 GHz	3 V/m	

**Note:** At 80 MHz and 800 MHz, the higher frequency range applies.

**Note:** These guidelines may not apply in all cases. The spread of electromagnetic variables is influenced by absorption and reflection from buildings, objects and people.

a. The field strength of stationary transmitters, e.g. Base stations of radio telephones and mobile land radio devices, amateur radio stations, AM and FM radio and television transmitters cannot theoretically be predetermined precisely. A site study should be considered to determine the electromagnetic environment due to stationary transmitters. If the measured field strength at the location where the microscope is used exceeds the above compliance level, the microscope should be observed to demonstrate its intended function. If unusual performance characteristics are observed, additional measures may be required, such as a changed orientation or a different location of the microscope.

b. Over the frequency range from 150 kHz to 80 MHz, the field strength should be less than 3 V/m.

### 12.3 Recommended protective distances between portable and mobile HF telecommunication devices and the microscope

The microscope is intended for use in an electromagnetic environment in which the HF interference is controlled. The customer or the user of the microscope can help to avoid electromagnetic interference by maintaining the minimum distance between portable and mobile HF telecommunication devices (transmitters) and the microscope - depending on the output power of the communication device, as stated below.

## 13 Disposal

Improper handling of old devices can have negative effects on people and the environment. The microscope contains no dangerous goods. The housing material is fully recyclable. Pay attention to a careful material separation. Observe country-specific disposal regulations (e.g. waste incineration).

#### Disposal in the EU

The microscope described above is a high-quality medical product with a long service life. After the end of a life cycle, the microscope must be disposed of properly. According to the EU guidelines (WEEE and RoHS), the microscope must not be disposed of with general household waste. Please note the laws and regulations applicable in the respective country, which exist for the disposal of old microscopes.

#### Disposal in Germany

Within Germany, the ElektroG (ElektroG) regulates the disposal process of old electrical microscopes. It must be assumed that these microscopes can be infected. For this reason, this type of microscope is excluded from the ElektroG according to the rules of the EAR (Stiftung Elektro-Altmikroskope Register). In order to ensure the proper disposal process, either leave the old microscope to your responsible specialist dealer or send it directly to CJ-Optik for correct disposal.

The surface of the microscope itself must be disinfected before disposal or transport.



Disposal in domestic waste is prohibited.

## 14 Maintenance inspection sheet

Please enter the result of your annual inspection and date in the inspection sheet.

Once a year	Inspection #1	Inspection #2	Inspection #3	Inspection #4	Inspection #5
Operating instructions and type plate present and legible?					
Backlash-free movement of the swivel and floating arm possible?					
Movement of the gas pressure spring smooth and jerk-free?					
Mechanical play at the transition to the stand base?					
Do the four rollers rotate freely (for mobile stand)?					
Can the VarioFocus be adjusted without play?					

Once a year	Inspection #6	Inspection #7	Inspection #8	Inspection #9	Inspection #10
Operating instructions and type plate present and legible?					
Backlash-free movement of the swivel and floating arm possible?					
Movement of the gas pressure spring smooth and jerk-free?					
Mechanical play at the transition to the stand base?					
Do the four rollers rotate freely (for mobile stand)?					
Can the VarioFocus be adjusted without play?					





## **CJ-Optik GmbH & Co. KG**

Willeckstrasse 1  
35614 Asslar-Werdorf  
Germany

Phone: +49 (0) 64 43 - 81 81 33 0

Fax: +49 (0) 64 43 - 81 81 33 9

[office@cj-optik.de](mailto:office@cj-optik.de)

[www.cj-optik.de](http://www.cj-optik.de)

