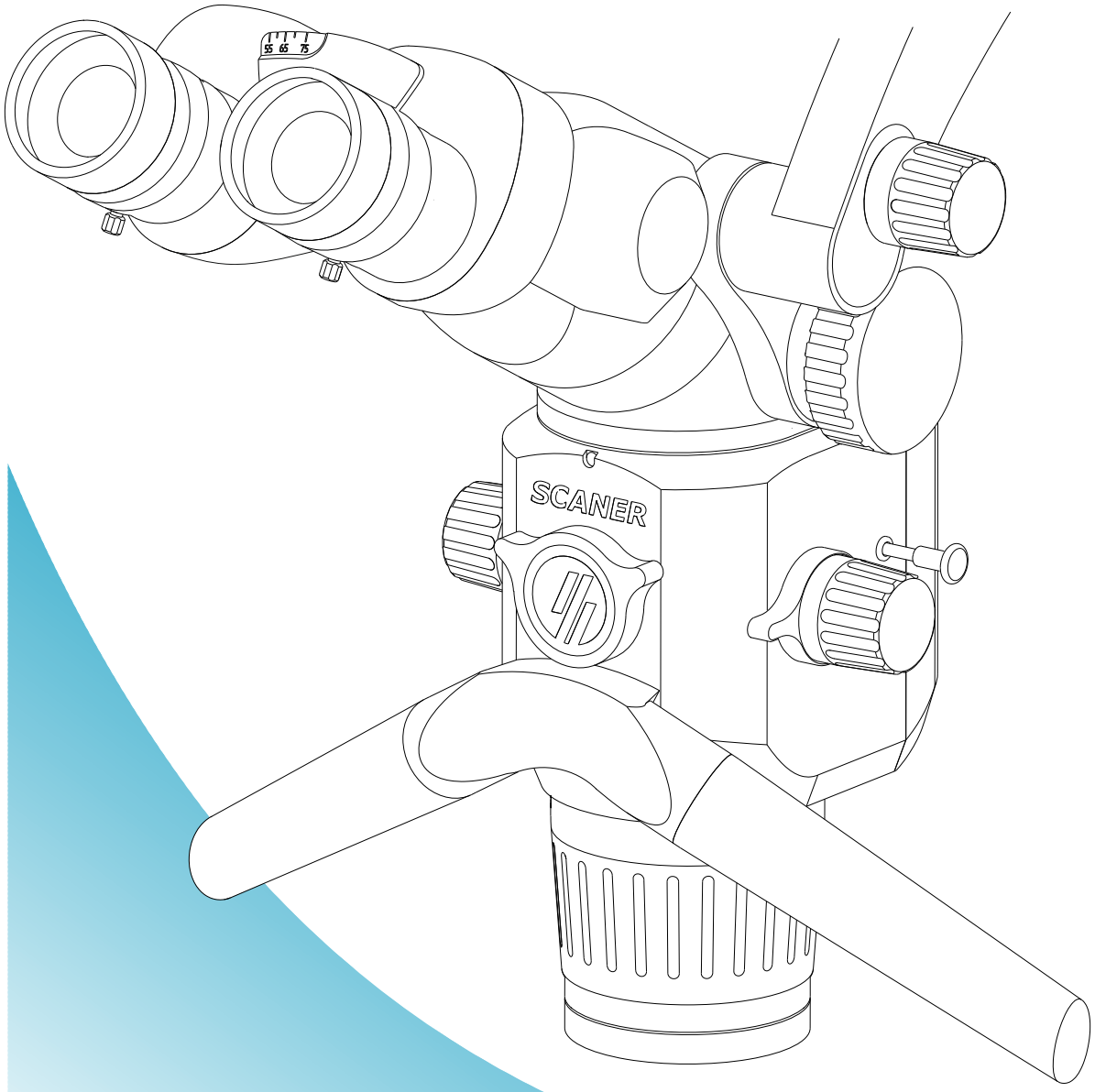
SCANER



MICROSCOPE MD-500

Operation Manual

SCANER

MICROSCOPE MD-500

Operation Manual

Table of Contents

1. Safe Use Instructions

ATTENTION. Before using the microscope read the operation manual thoroughly.

The operation manual contains important recommendations for safety use and maintenance of the microscope MD-500 (hereinafter referred to as microscope). To ensure operational safety, follow all the instructions and warnings given in this manual.

ATTENTION. If the microscope is used for any purposes other than those specified in the manual, there is a risk of injury and material damage.

This manual does not explain any clinical procedures of microscopy. The personnel using the microscope must have a proper qualification level or use the microscope under the guidance of a properly qualified doctor.

The operation manual should be kept is a secure and easily accessible place for the staff using the microscope to have free access to it.

In case of any questions concerning operation or maintenance of the microscope please contact the manufacturer or the authorized representative of the manufacturer.

Manufacturer:

Science & Engineering Center Scaner, Ltd.
122/1 Smilianska st., 18019 Cherkasy, Ukraine
E-mail: scaner@scaner.ua *http://www.scaner.ua*
Tel/Fax: +380472552735(34)
0-800-30-10-19 (free calls from landline phones all over Ukraine)

Representative in EU:

Medicor-Pol Zaklad Techniki Medycznej Sp. Z o.o.
233 Kilinskiego st., 93-133 Lodz, Poland
E-mail: biuro@medicorpol.com.pl *http://www.medicorpol.com.pl*
Tel/Fax: +48426833833 *+48426402741*

Science & Engineering Center Scaner, Ltd. develops and produces medical devices in accordance with the quality management system ISO 13485:2016. The entire production process is subject to constant quality inspection and undergoes a periodic check by inspection audits.

Microscope MD-500 corresponds to the provisions of the European Medical Devices Directive 93/42/EEC and meets the requirements of the Technical Regulations for Medical Devices of Ukraine.

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ТОВ "Науково-інженерний центр "СКАНЕР"
Україна, 18019, Черкаси, вул. Смілянська 122/1

СИСТЕМИ УПРАВЛІННЯ ЯКІСТЮ
відповідно до вимог стандарту
ISO 13485:2016
Medical devices - Quality management systems - Requirements for regulatory purposes

Проектування та розробка, виробництво, реалізація та сервісне обслуговування кольпоскопів, мікроскопів і хірургічних бінокулярних луп

Реєстраційний номер: 00223/0
Дата видачі першого сертифіката: 17 червня 2016 р.
Термін дії: до 26 лютого 2022 р.

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м. Відень, 01 березня 2019 р.

Quality Austria - Trainings, Zertifizierungs und Begutachtungs GmbH.
AT-1010 Vienna, Zelinkagasse 10/3

Konrad Scheiber
Голова правління

Ing. Andreas Aichinger, MSc
Уповноважений спеціаліст

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Development, design, production, distribution and service of Colposcopes, Microscopes and Surgical binocular loupes

Registration No.: 00223/0
Date of initial issue: 17 June 2016
Valid until: 26 February 2022

The validity of the **quality**austria certificate will be maintained by annual surveillance audits and one renewal audit after three years.

Vienna, 01 March 2019

Quality Austria - Trainings, Zertifizierungs und Begutachtungs GmbH,
AT-1010 Vienna, Zelinkagasse 10/3

Konrad Scheiber
General Manager

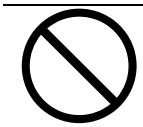
Ing. Andreas Aichinger, MSc
Specialist representative

The current validity of the certificate is documented exclusively on the Internet under http://www.qualityaustria.com/en/cert EAC: 19

1.1. Conventional Signs Used in the Manual

Text containing any warnings and mandatory safety requirements is marked with graphical symbols and words: “ATTENTION” or “PROHIBITED”.

ATTENTION. It is necessary to pay special attention to the instructions in order to avoid errors during operation.



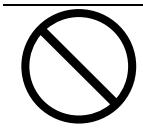
PROHIBITED. Any actions that are forbidden and can be dangerous for human health or can damage the device.

1.2. Operation Conditions

The microscope is intended for use in medical institutions of health. According to its operation conditions the microscope is designed to be used at ambient temperature +10ºC to +40ºC, relative humidity 30% to 75% and air pressure 700 hPa to 1060 hPa.

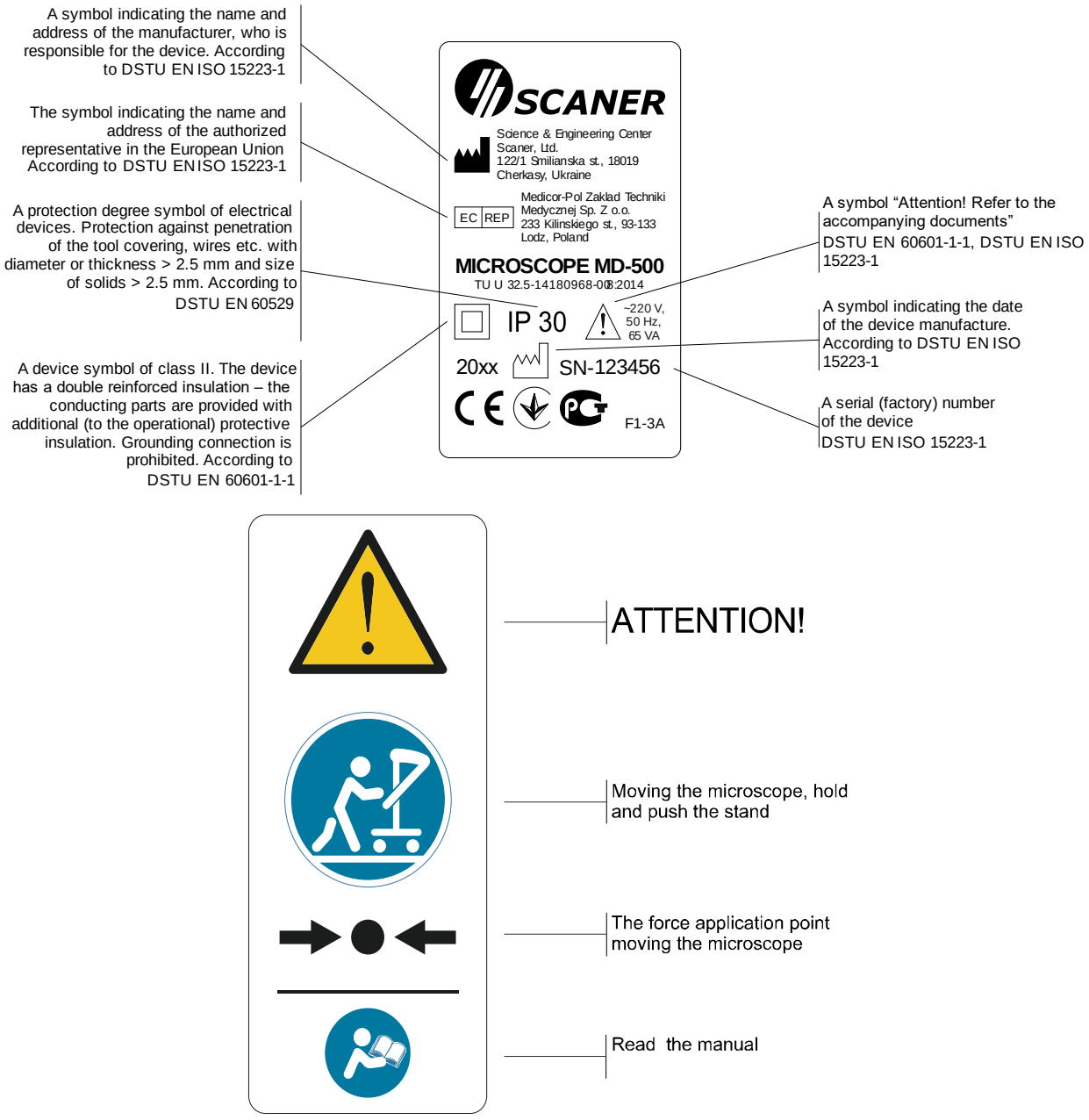
According to its degree of potential risk of using in medical practice the microscope belongs to class I of DSTU State Standard 4388 (Class I, Medical Device Directive 93/42/EEC).

ATTENTION. Avoid letting any fluid inside the microscope.



PROHIBITED. To keep and use the microscope in any places exposed to long-lasting influence of direct sunrays, X-rays or strong electromagnetic emission.

1.3. Labeling and Symbols



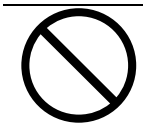
1.4. Warnings and Cautions

When assembling, setting, using and maintaining the microscope, follow all the warnings and instructions below. This information must be supplemented by the warnings given in each chapter.

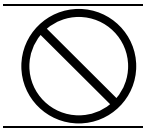
ATTENTION. Before using make sure that the microscope is in operational condition.

ATTENTION. The duration of continuous operation of the microscope illuminator must not exceed 4 hours followed by 30 minutes of pause.

ATTENTION. The microscope is connected to single-phase AC mains with voltage of 220 V only using the cable from the supply kit.



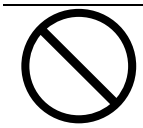
PROHIBITED. To disconnect and dismantle any parts of the microscope except those specified in the operation manual.



PROHIBITED. To unscrew completely and dismantle the controls of movable part motion and fixation when the microscope is in use.

ATTENTION. Each movable part of the microscope has its own range of motion that is limited with a stopper. Do not try to increase this range by moving the microscope beyond these limits with excessive force.

ATTENTION. Ensure that the electrical cable plugs are firmly fixed in the appropriate sockets, and the cables do not get into the movable parts of the microscope and do not wrap around them during operation and displacement of the microscope.



PROHIBITED. To look into the microscope objective when the illuminator is switched on. This can cause retina injury.

ATTENTION. Before cleaning optical surfaces and disinfecting the microscope, it must be switched off.

ATTENTION. For convenient transportation, a balancing lever comes in a fixed state of the vertical stroke. To bring the balancing lever in a working condition, it is necessary to follow the instructions given in the section Mounting and Installation.

ATTENTION. When moving the microscope on a floor stand, it is necessary to keep both hands on the power supply and stand. The locking of stand rollers is carried out by pressing the pedal lock. Before moving, remove the lock from the rollers.

2. The Field of Use, Design and External View

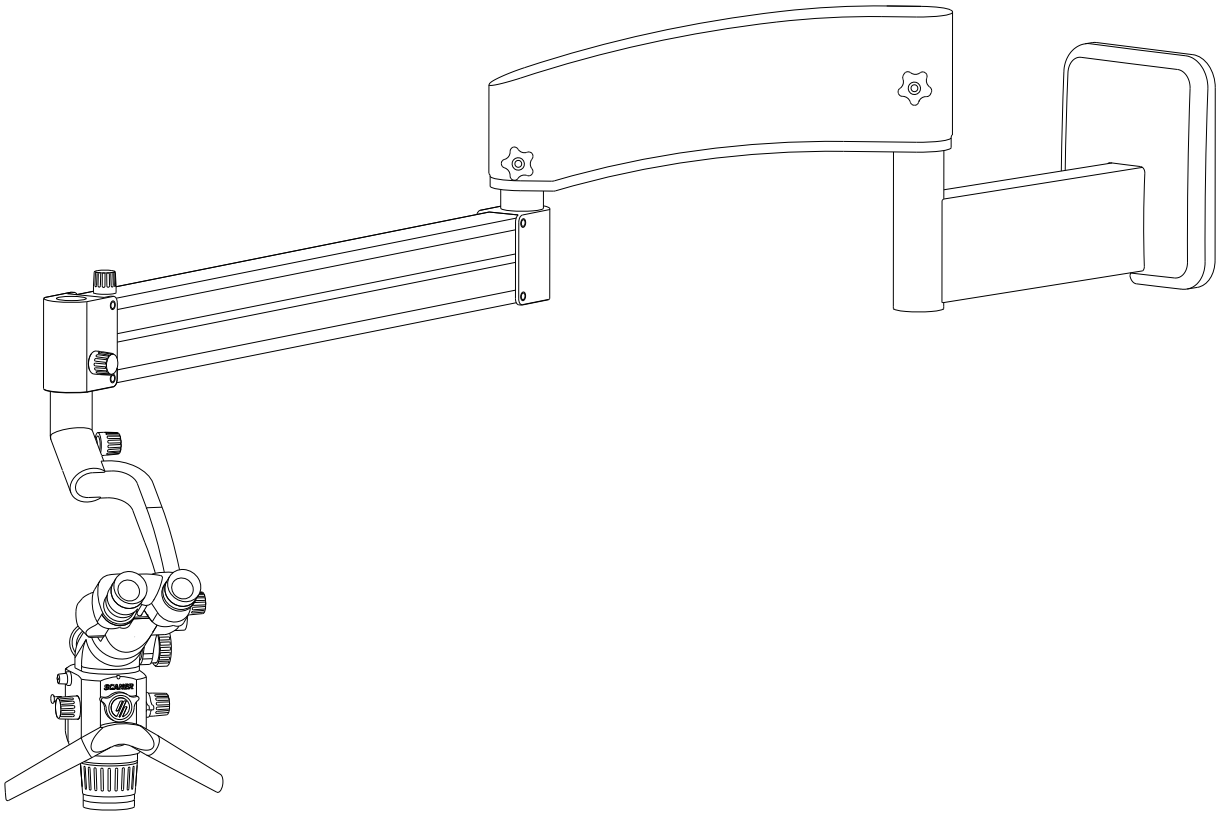
Microscope MD-500 is a medical device designed for stereoscopic magnified examination using a noncontact method in case of diagnosing and surgeries, postsurgical examinations, preparation for medical examinations, teaching in courses. It allows connecting to photo and video documentation devices. The microscope field of use: dentistry, otorhinolaryngology, surgery.

The construction of the microscope includes plenty of degrees of freedom allowing to focus on the observation object smoothly and fix securely the microscope head.

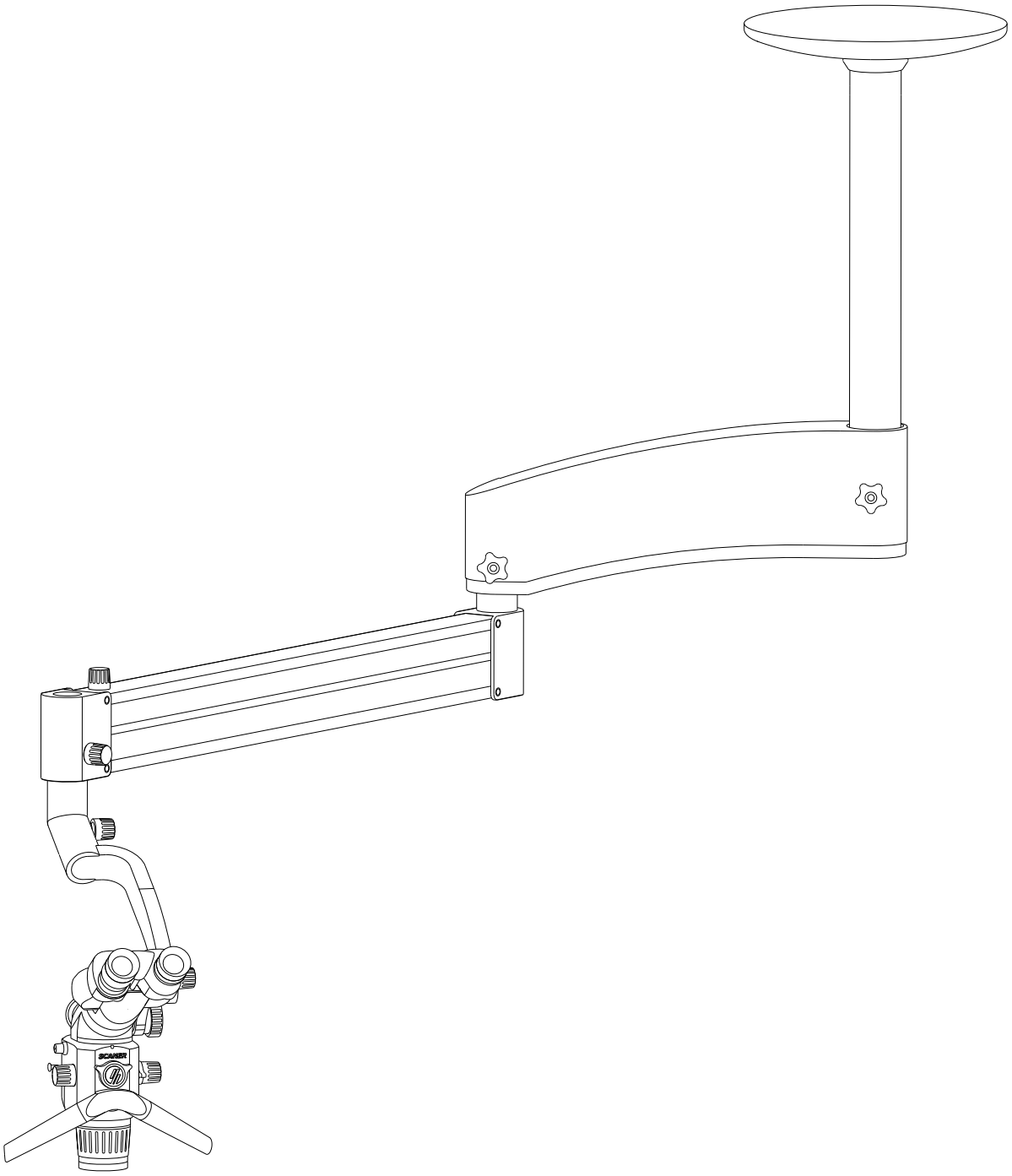
The microscope is delivered in its standard configuration. At the request of the customer the components of the microscope can be replaced by other, similar in functionality, or be removed from the delivery package or delivered additionally.

2.1. Microscope Mount Options

Wall Mount



Ceiling Mount



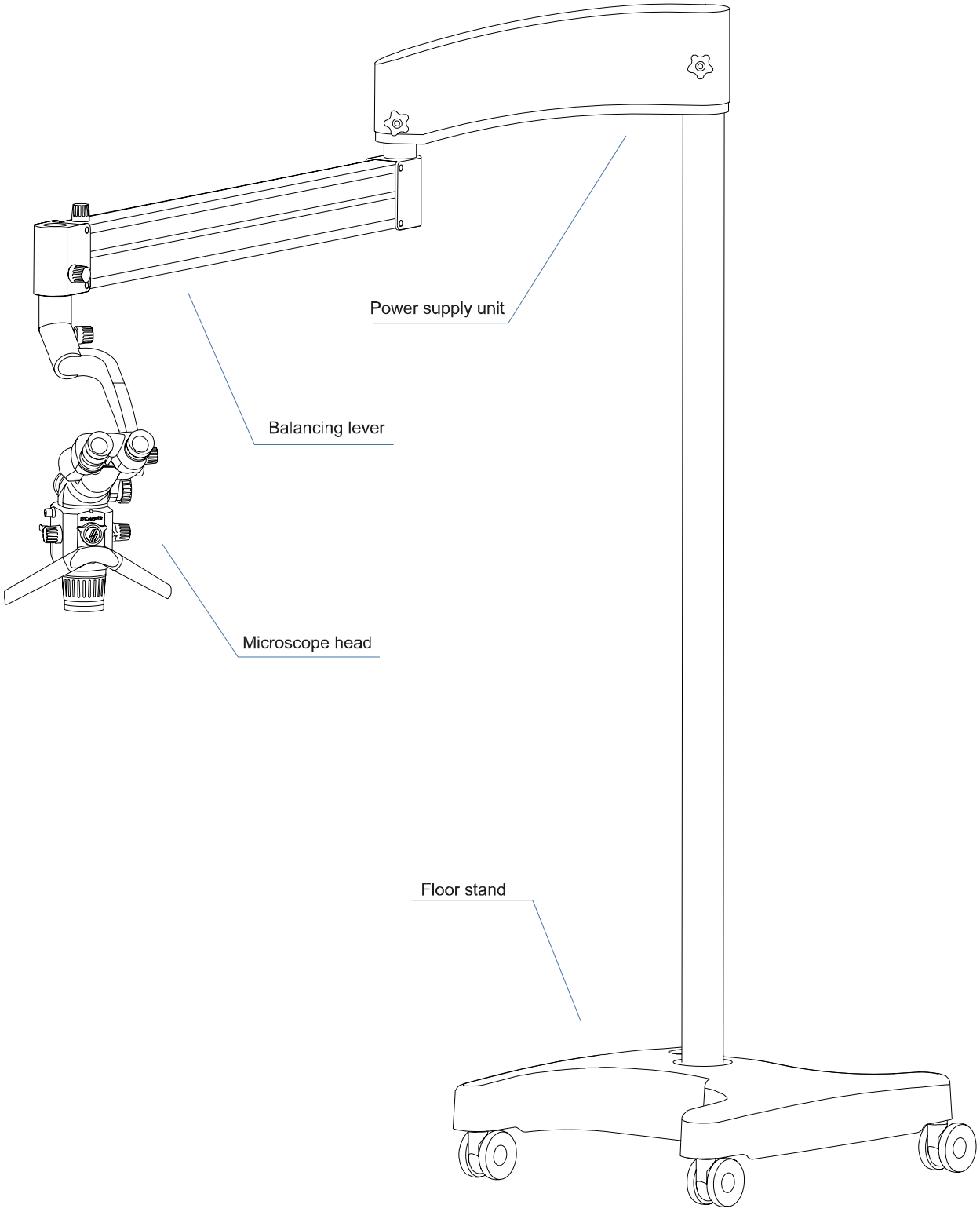
Floor Stand consists of mobile base plate with swiveling (360°) rollers and a mounted stand on it. The rollers are provided with swivel blocking function to prevent self-movement.

2.2. Power Supply Unit

The power supply unit of the microscope provides the LED illuminator with stabilized constant current. The power supply unit is mounted on a floor or other mounting version – ceiling or wall.

2.3. Balancing Lever

The balancing spring lever is intended to hold and balance the microscope head. The balancing lever has a system of automatic disconnection of illuminator supply (a limit switch), when the microscope head reaches the uppermost position.



2.4. Microscope Head

The microscope head includes:
– optical head;
– lens;
– binocular piece with eyepieces;
– illuminator.

Component microscope head parts consist of apochromatic optical components coated with an anti-reflective coating.

Optical head has a 5-stage magnification selector with integrated Galileo optical system that has the following optical magnifications: 0.4x; 0.6x; 1x; 1.6x; 2.5x.

Optical head bracket with USB power connectors (5V in 2 pieces) and the ability to connect power to the assistant monitor.

The lens is intended to focus on the observation object. The lens has a fine focusing mechanism that allows adjusting the image definition of the observation object within the range of 12 mm without changing the position of the microscope head. The microscope is supplied with several lenses of various focal distances:
– f=200 mm (with fine focus) (option);
– f=250 mm (with fine focus);
– f=300 mm (with fine focus) (option);
– f=350 mm (option);
– f=400 mm (option);
– variable lens 200 – 400 mm (option).

Binocular piece is designed to transfer a stereoscopic image of the observation object to the retina. The binocular piece consists of a lens-prism unit with eyepieces and has a mechanism of adjusting the interpupillary distance within the range 53 mm to 78 mm. The microscope can be equipped with binocular pieces with different viewing angles.

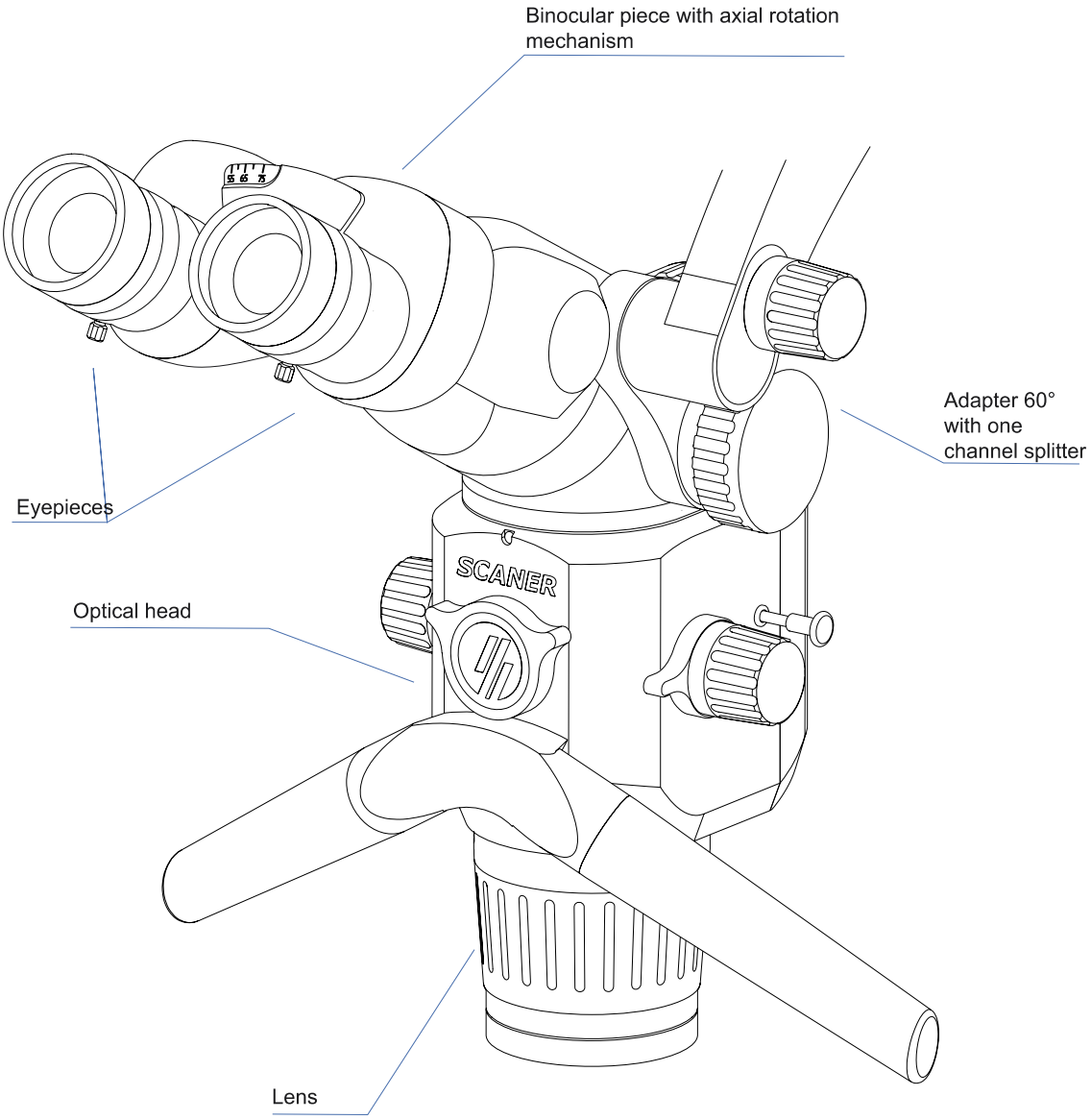
The eyepieces have a mechanism to change the diopter characteristics of each eyepiece within +5 -5 diopter. Diopter correction enables doctors to work with ametropia without glasses. The microscope can be equipped with eyepieces magnification of 12.5x or 16x (option).

The integrated into the optical head **illuminator** is designed for coaxial illumination of the observation object. The optical system of the illuminator creates a bright, even and anti-flickering spot of light in the observation plane due to its installed LED source with a light temperature of 6500 K. The illuminator has the ability to installation one, at the customer's choice, **light filter** into the light channel:
– **orange** – used to prevent premature photopolymerization of a composite material (dentistry);
– **green** – used to increase the contrast of blood vessels (surgery).
– **“Smart light”**- a system of automatic light regulation during zooms in.

– **“Fluorescent light” –** an additional florescent source of light (395 nm) and a system of special filter implementation to increase contract of florescent image.

Mechanism of light filter implementation has three work positions:

- orange;
- empty channel;
- green.



Assistant monitor mounting and connection system (optional) is designed to view a color image of the area under study on a liquid crystal monitor using a digital photo-video documentation system connected to the microscope in real time. The image transmitted on the monitor completely coincides with the image observed through the eyepieces of the microscope.

Tablet mounting and connection system (optional) is intended for viewing a color image of the area under study on a tablet using a digital photo-video documentation system connected to the microscope in real time. The image transmitted to the tablet completely coincides with the image observed through the eyepieces of the microscope.

4D Smartphone Adapter (optional) is designed to be connected to a smartphone microscope as a photo-video documenting device and allows you to view the image of the area under study on your smartphone display in real time. The adapter allows you to fix your smartphone and place it in a position convenient for observation. Special application **SOVA** (Special On View App) for iOS and Android operating systems allows you to rotate the image captured by the smartphone camera on its display. The app is available on the App Store and Google Play.

When using the microscope, there is a risk of getting on its surface, such as force adjustment knobs, patient tissues, potentially containing infections. **Silicone caps** (optional) on the force adjustment handles are designed to ensure sterility during surgery or medical examination and are available as accessories for the microscope. Silicone caps on the handles, which the doctor touches during his work, prevent infection on the handles and make it easier to clean and disinfect the product.

Binocular assistant channel (option) allows the assistant to observe the doctor's actions by visualization through the binocular piece installed on the channel ± 90 ° with an axial rotation mechanism.

3. Scope of Delivery

3.1. Basic Scope of Delivery

Optical head *****
Lens f=250 mm (with fine focus) *****
Binocular piece ±90° with axial rotation mechanism*****
Eyepieces 12.5x *****
Binocular adapter 60°with one channel optical splitter 20/80*
Orange and green light filters*****
V-shaped handle *****
Rotational joint ******
Power supply and balancing lever
Floor stand *****
Set of silicone caps
Power cable
Spare parts, tools and accessories (SPTA)
Documentation
*******The components can be replaced by other with similar functions from the list of additional components, according to the request of the customer (3.2).* *******The components can be excluded from the delivery package according to the request of the customer.*

ATTENTION. Before starting the installation and operation of microscope, the availability of all components in the supply kit must be checked. In the absence of any supplied component, please contact the supplier.

ATTENTION. Make sure the components of the microscope are not damaged during transportation, including the following types of damage: unnatural deformations, cracks and shears, damage of paint coat.
If any damages are detected, contact your supplier.

3.2. Additional Components

Wall Mount
Ceiling Mount
Ceiling Mount (with level adjustment)
Tripod for mounting the monitor (at holder)
T-shaped handle
Mounting system and assistant monitor connection system + monitor/mounting and connection system for a laptop
Variable lens 200 – 400 mm
Lens f=200 mm (with fine focus)
Lens f=300 mm (with fine focus)
Lens f=350 mm
Lens f=400 mm
Binocular piece 0°
Binocular piece 45°
Binocular piece ±90°
Eyepieces 16x
“Smart light”- a system of automatic light regulation during zooms in.
“Fluorescent light” – an additional florescent source of light (395 nm) and a system of special filter implementation to protect eyes and increase contract of florescent image.
Lens protective glass
Ring flash adapter
Binocular adapter 60°with two channels optical splitter 20/80
Video adapter Sony
Photo adapter Sony
Photo adapter Canon
Photo adapter Nikon
GoPro adapter
4D smartphone adapter
Binocular assistant channel
Silicone caps: - silicone cap for shifting magnification knob - silicone cap for handle to adjust illuminator brightness - silicone cap for V-shaped handle - silicone ring for variable lens

4. Technical Specifications

4.1. Optical Parameters

Magnification of eyepieces	12,5x					16x				
Optical head magnification, ratio	**0.4**	**0.6**	**1**	**1.6**	**2.5**	**0.4**	**0.6**	**1**	**1.6**	**2.5**
Lens f=200 mm										
General magnification, ratio	4.1	6.6	10.5	16.9	27	4.9	7.9	12.6	20.3	32.4
Field of view Ø, mm	53.6	33.3	21	13	8.1	44.9	27.8	17.5	10.8	6.8
Resolution, lines/mm	40	60	75	85	90	44	70	85	90	90
Lens f=250 mm										
General magnification, ratio	3.3	5.3	8.5	13.6	22	4	6.4	10.2	16.3	26
Field of view Ø, mm	66	42	26	16	10	55	34	21.6	13.5	8.5
Resolution, lines/mm	32	50	70	85	90	35	55	75	85	90
Lens f=300 mm										
General magnification, ratio	2.8	4.5	7.1	11.4	18.3	3.3	5.3	8.5	13.6	22
Field of view Ø, mm	78.6	48.9	31	19.3	12	66	42	26	16	10
Resolution, lines/mm	26	40	60	70	75	32	50	70	85	90
Lens f=350 mm										
General magnification, ratio	2.4	3.8	6.1	9.8	15.7	2.9	4.6	7.3	11.8	18.8
Field of view Ø, mm	91.6	57.9	36	22.4	14	75.8	47.8	30.1	18.6	11.7
Resolution, lines/mm	23	36	50	60	65	26	40	60	70	75
Lens f=400 mm										
General magnification, ratio	2.1	3.4	5.4	8.6	13.8	2.5	4.1	6.5	10.3	16.6
Field of view Ø, mm	104.8	64.7	40.7	25.6	15.6	88	53.6	33.8	21.4	13.2
Resolution, lines/mm	20	32	44	55	55	23	36	50	60	65

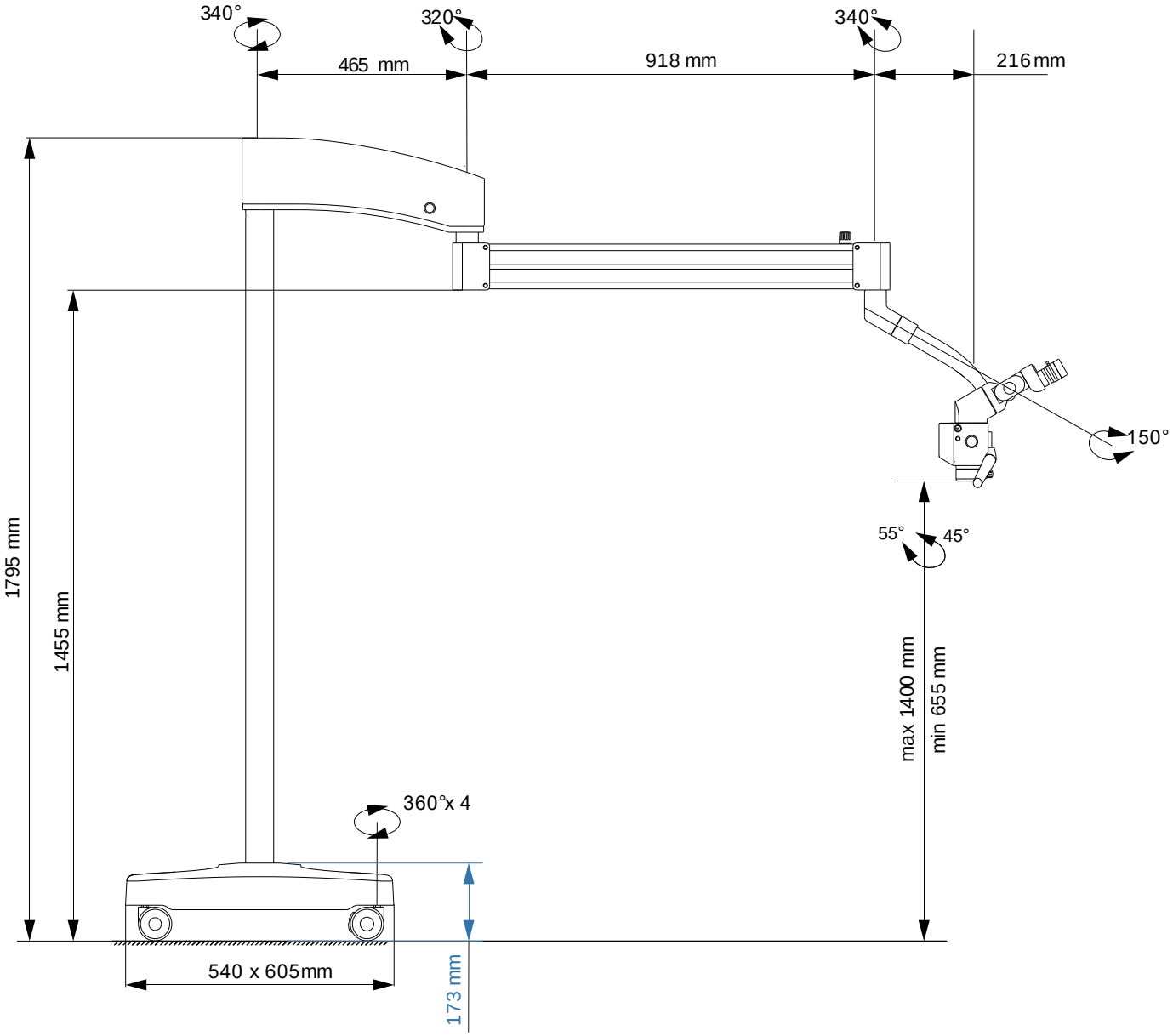
Variable lens 200 – 400 mm

With magnification of eyepiece 12.5x		
Working distance, mm	General magnification, ratio	Field of view Ø, mm
200	2.9 – 18.9	75.8 – 11.6
250	2.5 – 16.2	88.0 – 13.6
300	2.2 – 14.3	100 – 15.4
350	2.0 – 12.8	110 – 17.2
400	1.8 – 11.6	122.2 – 19
With magnification of eyepiece 16x		
Working distance, mm	General magnification, ratio	Field of view Ø, mm
200	3.7 – 24.2	59.4 – 9.1
250	3.2 – 20.7	68.8 – 10.6
300	2.8 – 18.3	78.6 – 12
350	2.6 – 16.4	84.6 – 13.4
400	2.3 – 14.8	95.6 – 14.8

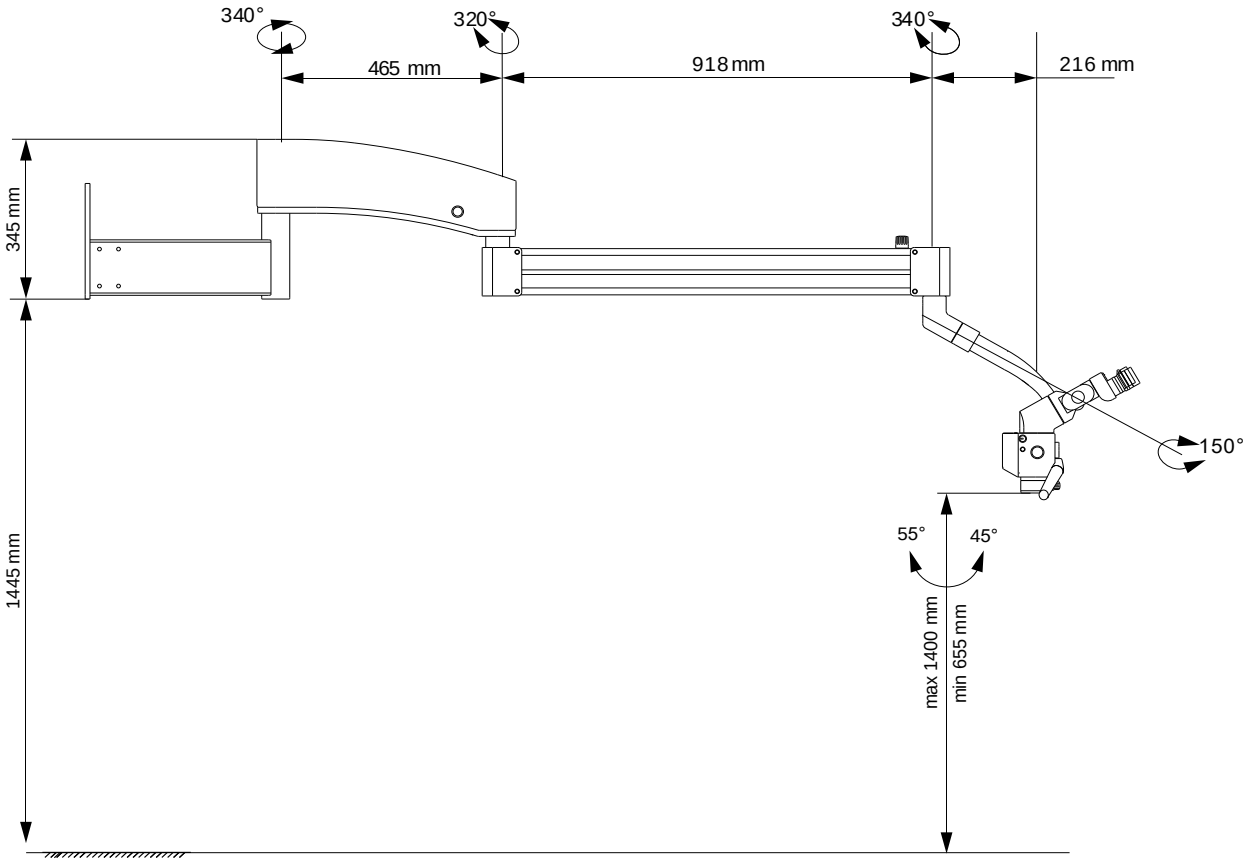
4.2. Technical Parameters

The eyepiece diopter movement, diopter	+5 -5
The range of interpupillary distance variation, mm	from 53 to 78
The diameter of the illuminated field of view, mm, not less	
- with installed lens f=200	55
- with installed lens f=250	68
- with installed lens f=300	80
- with installed lens f=350	90
Maximal illuminance in the object place, lux, no less than:	
- with installed lens f=200	90 000
- with installed lens f=250	60 000
- with installed lens f=300	40 000
- with installed lens f=350	30 000
Power supply voltage from the single phase AC current with frequency of 50/60 Hz, V	from 90 to 250
Power consumption of the microscope, VA, no more than	65
Microscope weight (basic scope of delivery), kg, no more than	130

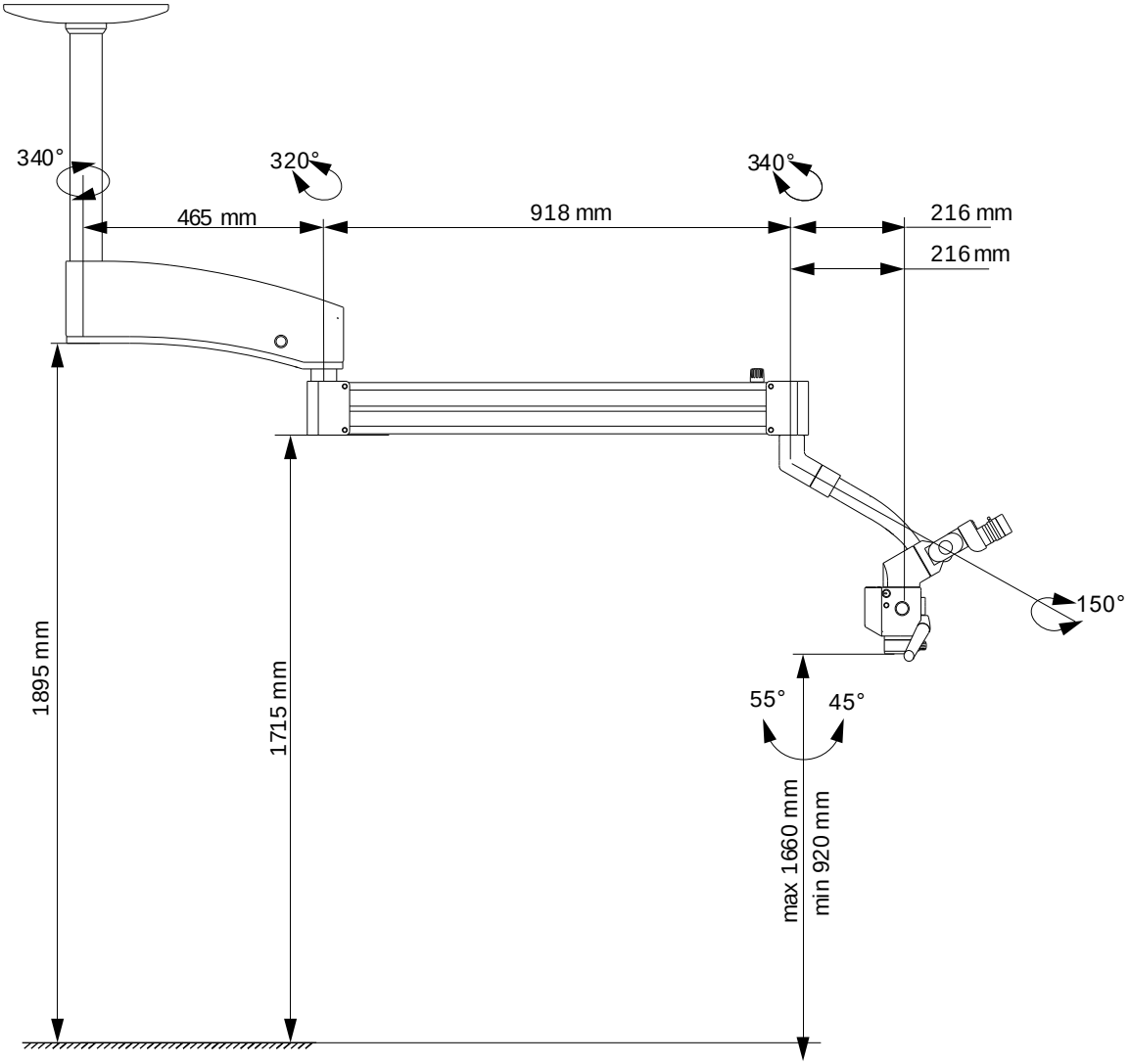
4.3. Floor Stand Parameters



4.4. Wall Mount Parameters

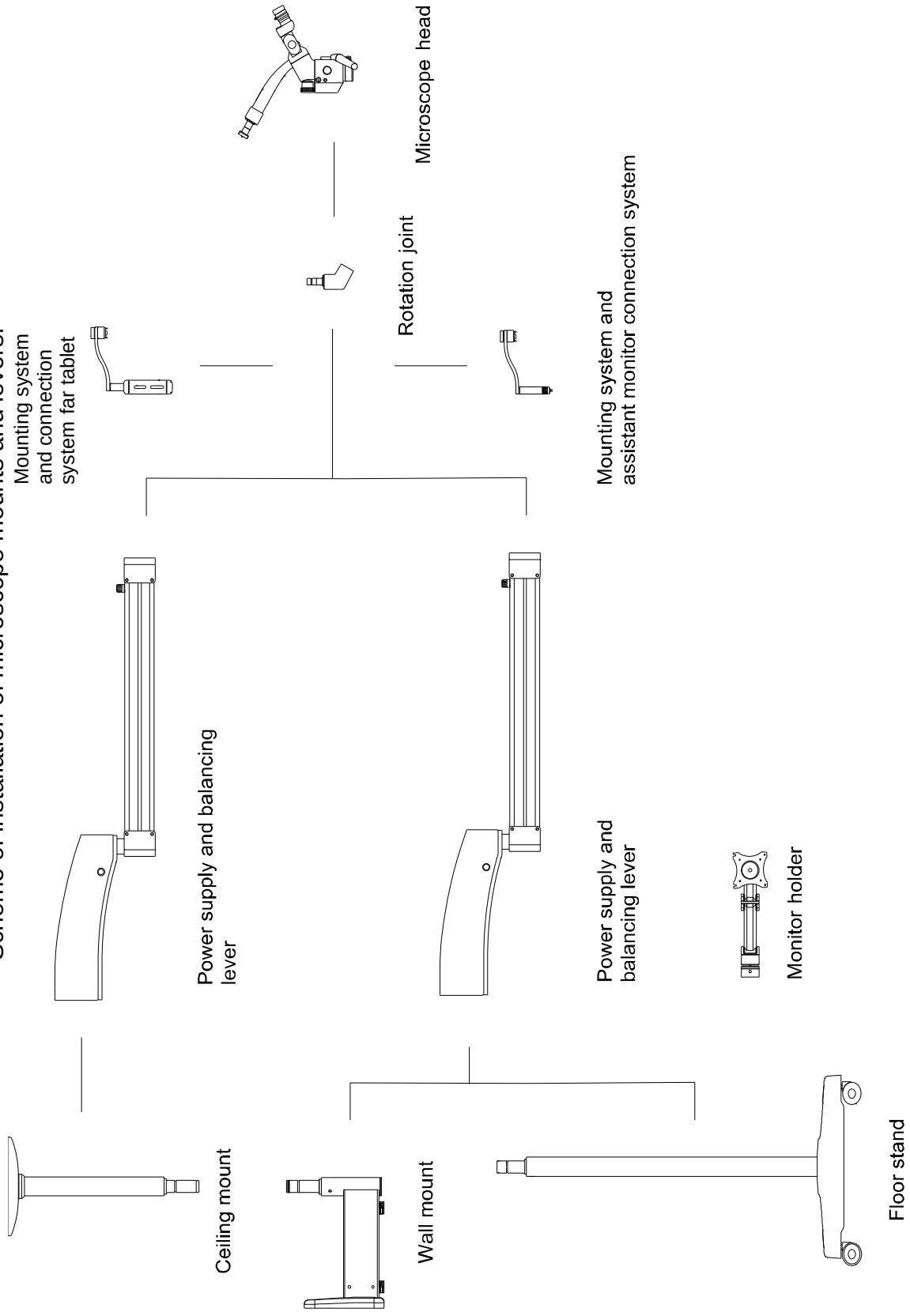


4.5. Ceiling Mount Parameters

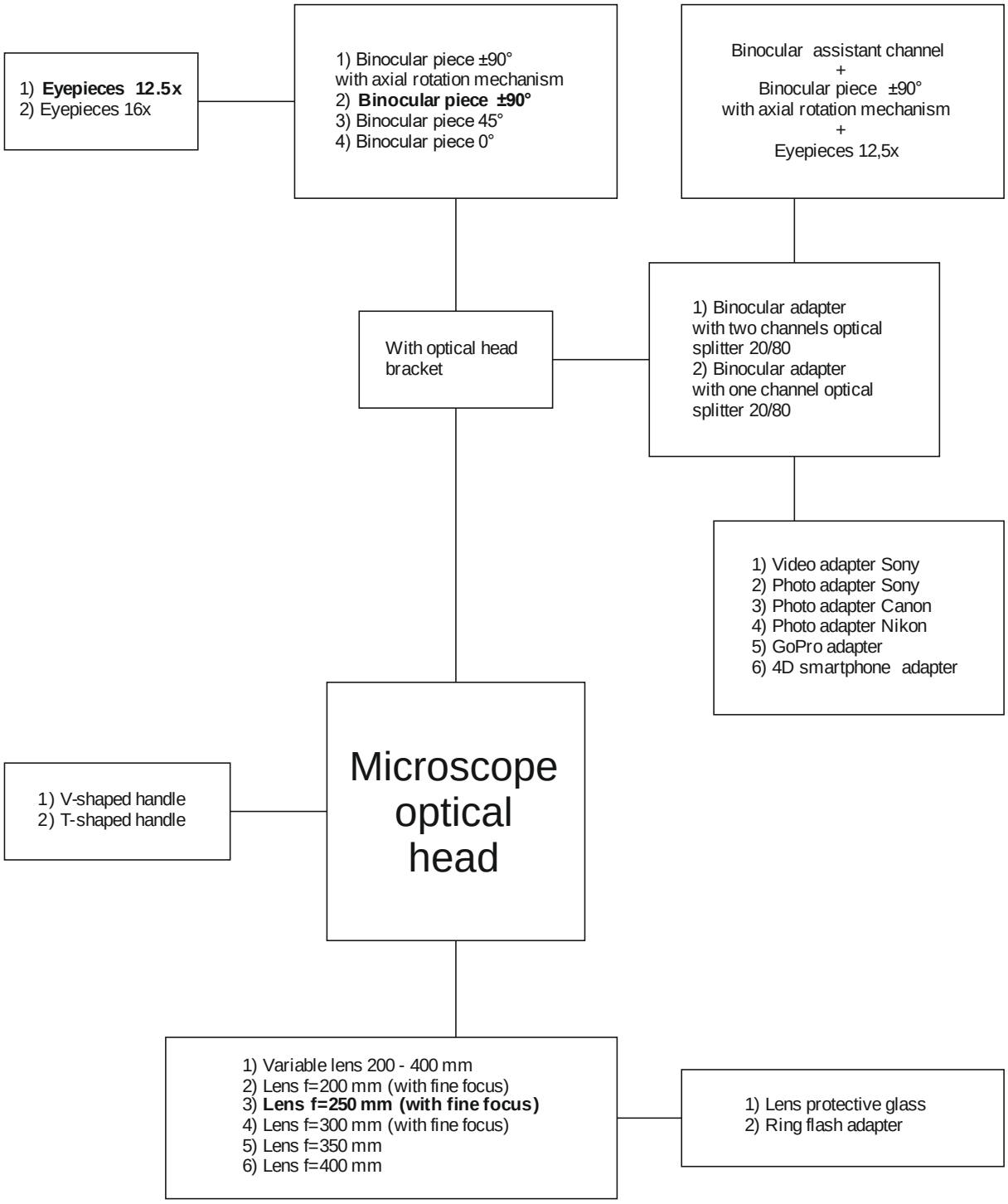


4.6. Options of Microscope Component Installation

Scheme of installation of microscope mounts and levers.



Scheme of installation components parts of microscope head



5. Mounting and Installation

Microscope MD-500 in its standard configuration is delivered in a packing that consists of 5 pieces. The places numbers in the package may differ, depending on the configuration.

Before installation take all the microscope components from the transportation boxes and remove their packages.

Use the tools from the SPTA set to assemble the microscope.

ATTENTION. Before starting the installation and operation of microscope, the availability of all components in the supply kit must be checked. In the absence of any supplied component, please contact the supplier.

ATTENTION. Make sure the components of the microscope are not damaged during transportation, including the following types of damage: unnatural deformations, cracks and shears, damage of paint coat.
If any damages are detected, contact your supplier.

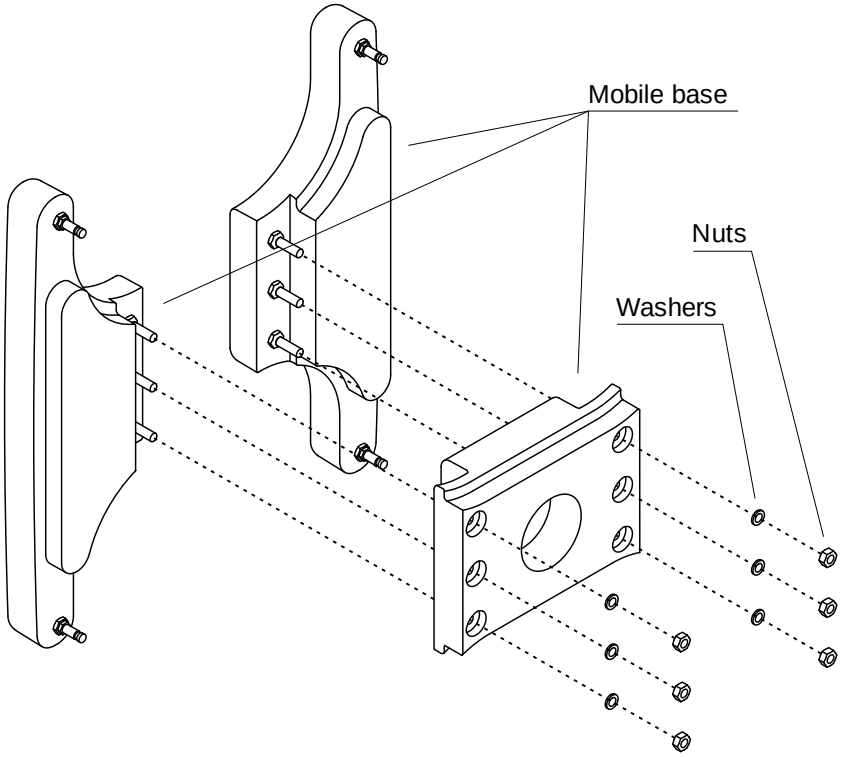
ATTENTION. For convenient transportation, a balancing lever comes in a fixed state of the vertical stroke. To bring the balancing lever in a working condition, it is necessary to follow the instructions given in the 5.10.

5.1. The Floor Stand Assembly

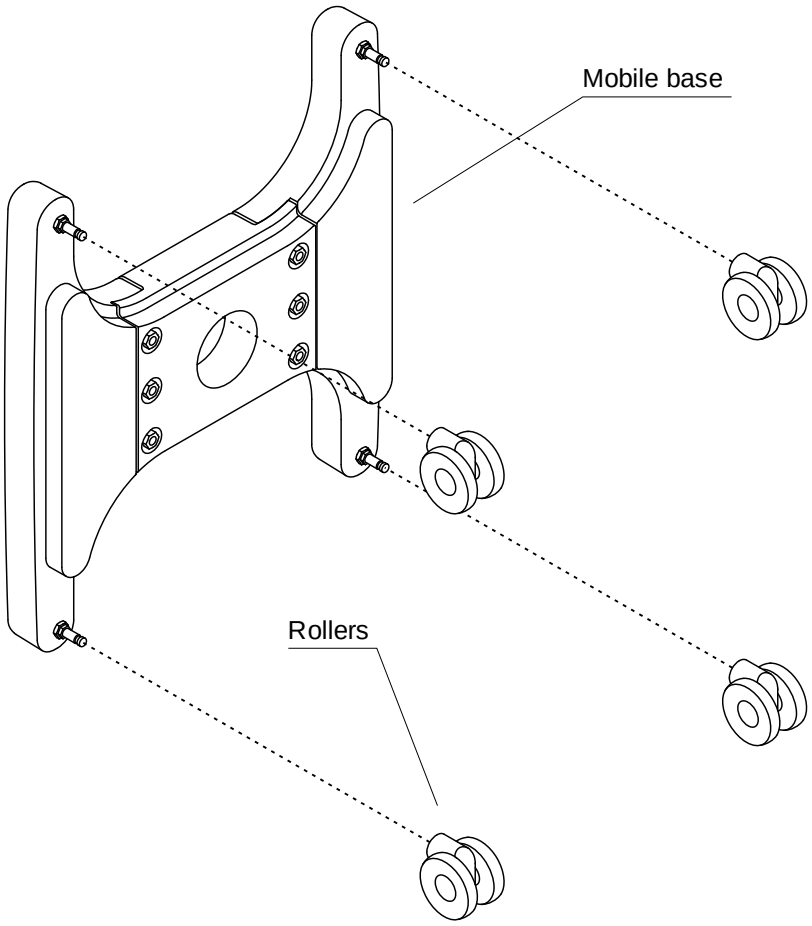
1. Install the two lateral parts of the mobile base on its central part, passing the pins (6 pcs.) of the lateral parts into the holes of the central part, as shown in the picture below.

2. Screw the nuts with washers onto the pins, all the way.

ATTENTION. The mobile base plate is very heavy! The floor stand installation must be carried out with help of a several people.



3. Install the rollers (4 pcs.) on the mobile base, putting them on the pins, as shown in the figure below, all the way to the stop (characteristic click of the lock).



4. Using the hex key included in the delivery set, unscrew the fastening screws with washers from the rack (4 pcs.).

5. Insert the stand into the hole in the base of the mobile, orienting the pin on the stand with the mating hole, as shown in the figure below, avoiding knocks and falls.

6. Pass the fastening screws through the washers (4 pcs.) and screw them into the threaded holes of the stand from the bottom of the mobile base, all the way to the stop.

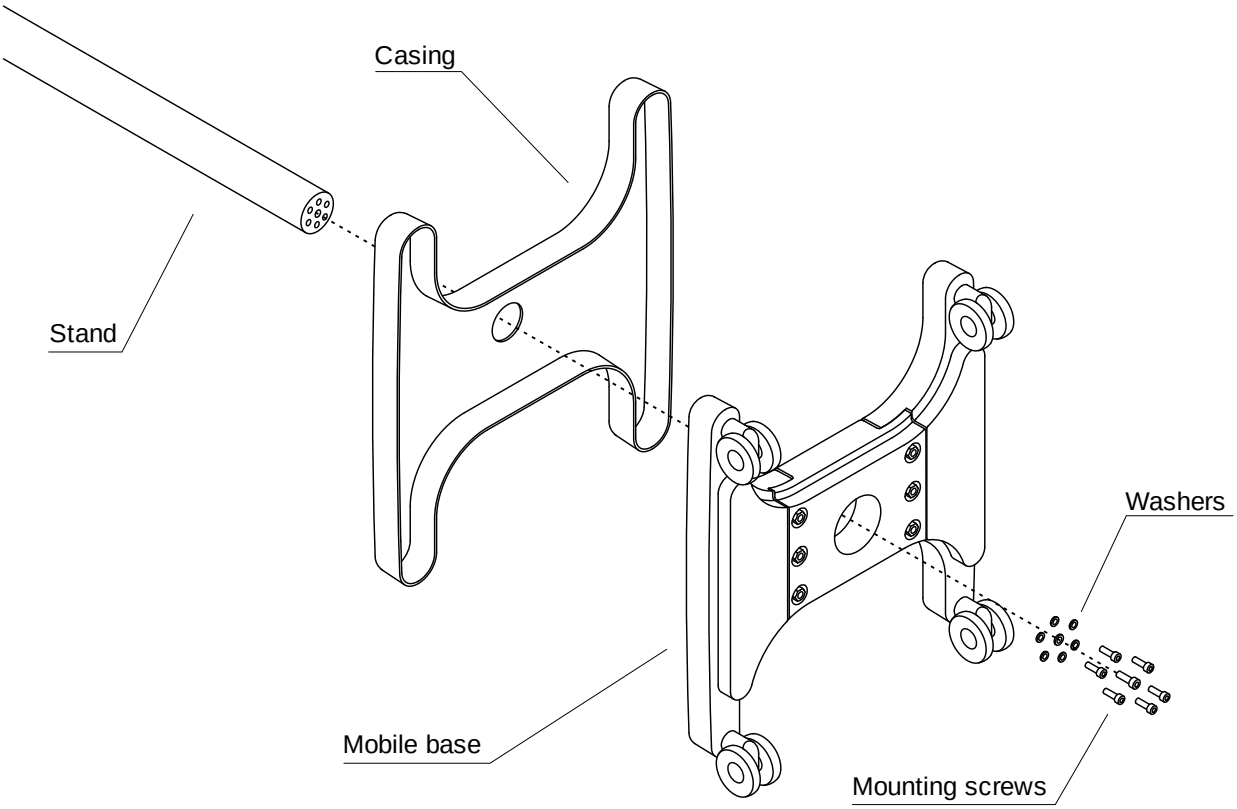
7. Pass the HDMI and power cables through the hole in the rack and secure them from the back.

8. Place the assembled tripod on the floor.

9. Pass the casing through the stand and lower onto the mobile base.

10. Connect the debris power plug to the debris power connector located under the base of the device.

11. Wind the cable around the plates, leaving the required length, and secure it to the cable clamp.



5.2. Wall Mount Assembly

Before assembly, find the desired place on the wall taking into consideration the microscope size and parameters together with the wall mount specified below.

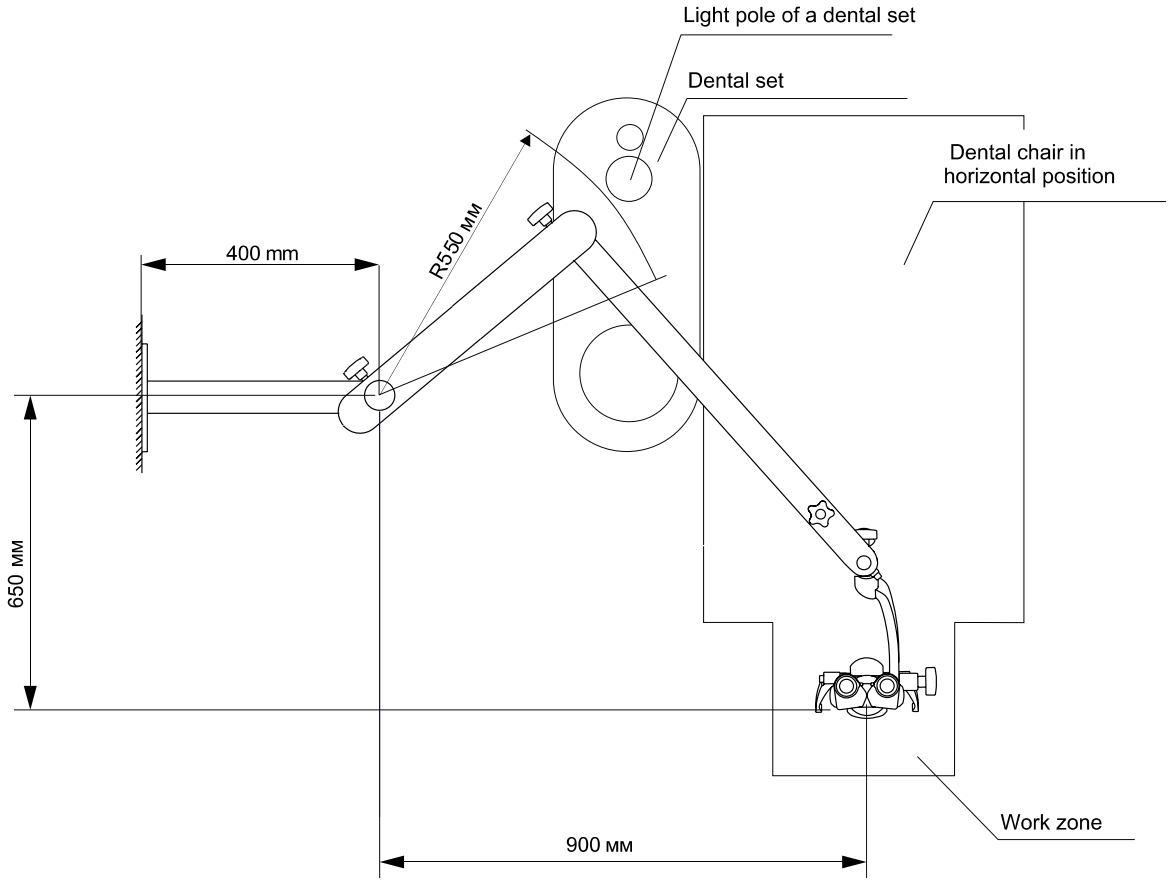
ATTENTION. For the microscope to have power supply, the socket must be situated at a distance not more than 3m from the power supply unit. Take this fact into account during installation too.

ATTENTION. The wall mount assembly is allowed only on solid brick or concrete walls.

ATTENTION. Make sure there is no wiring or other communications inside the wall on the selected place for installation.

ATTENTION. The wall mount assembly is carried out by the customer, because the customer alone is responsible for its own premises, resistibility and safety of floors, availability of hollow spaces, internal communication, etc.

Parameters of the microscope mounting on the wall in a dentist's office as an example.



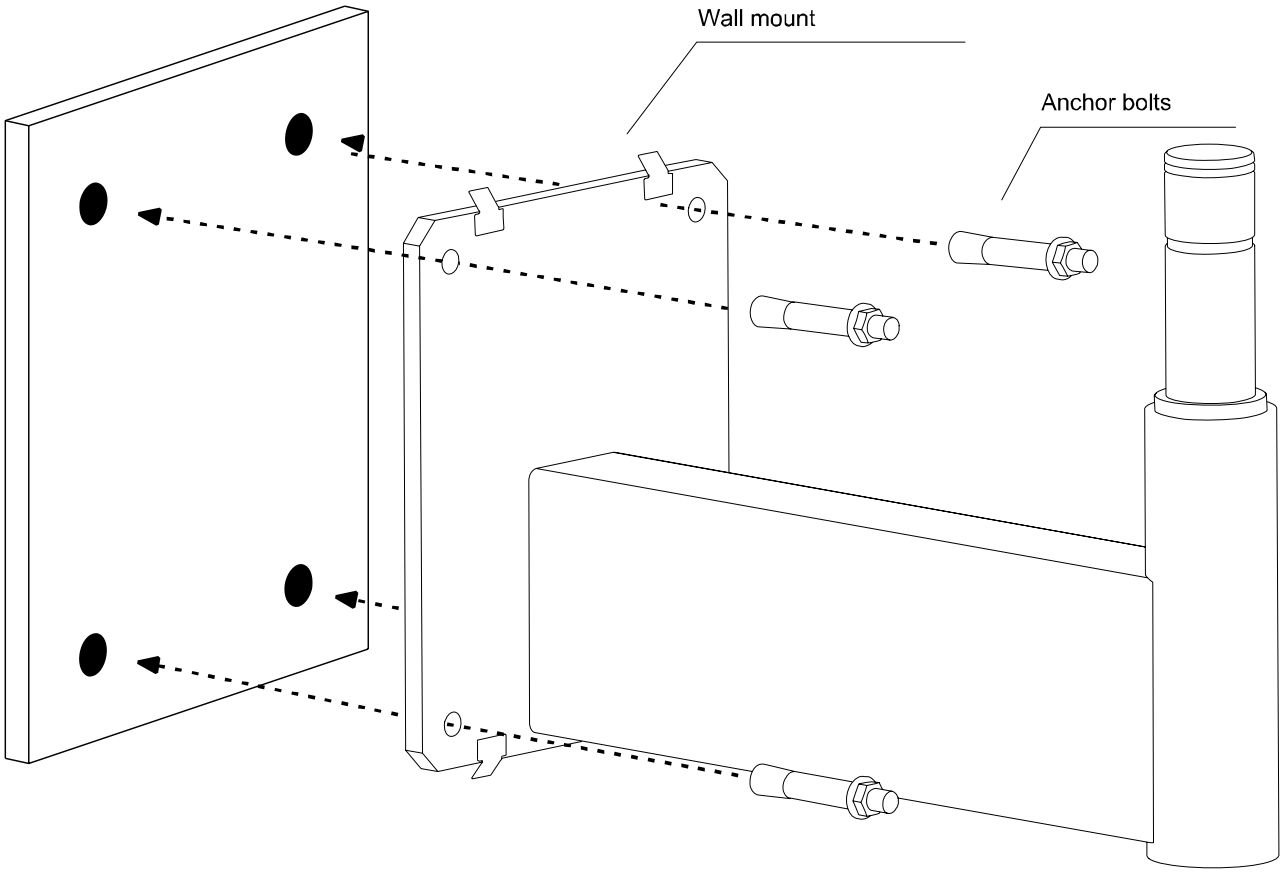
1. Mark places for 4 holes using the wall mount as a template. Apply it to the wall holding it straight according to the horizon with the help of a level along the upper edge.

2. Make holes in the wall.

3. Fix the wall mount by the anchor bolts from the delivery package.

4. Screw the anchor bolts tight.

5. Insert the casing to close the place of installation.



5.3. Ceiling Mount Assembly

Before assembly, find the desired place on the ceiling taking into consideration the microscope size and parameters together with the ceiling mount specified below.

ATTENTION. The allowable ceiling height is no more than 3 meters.

ATTENTION. For the microscope to have power supply, the socket must be situated at a distance not more than 10 cm from the power supply unit. Take this fact into account during installation too.

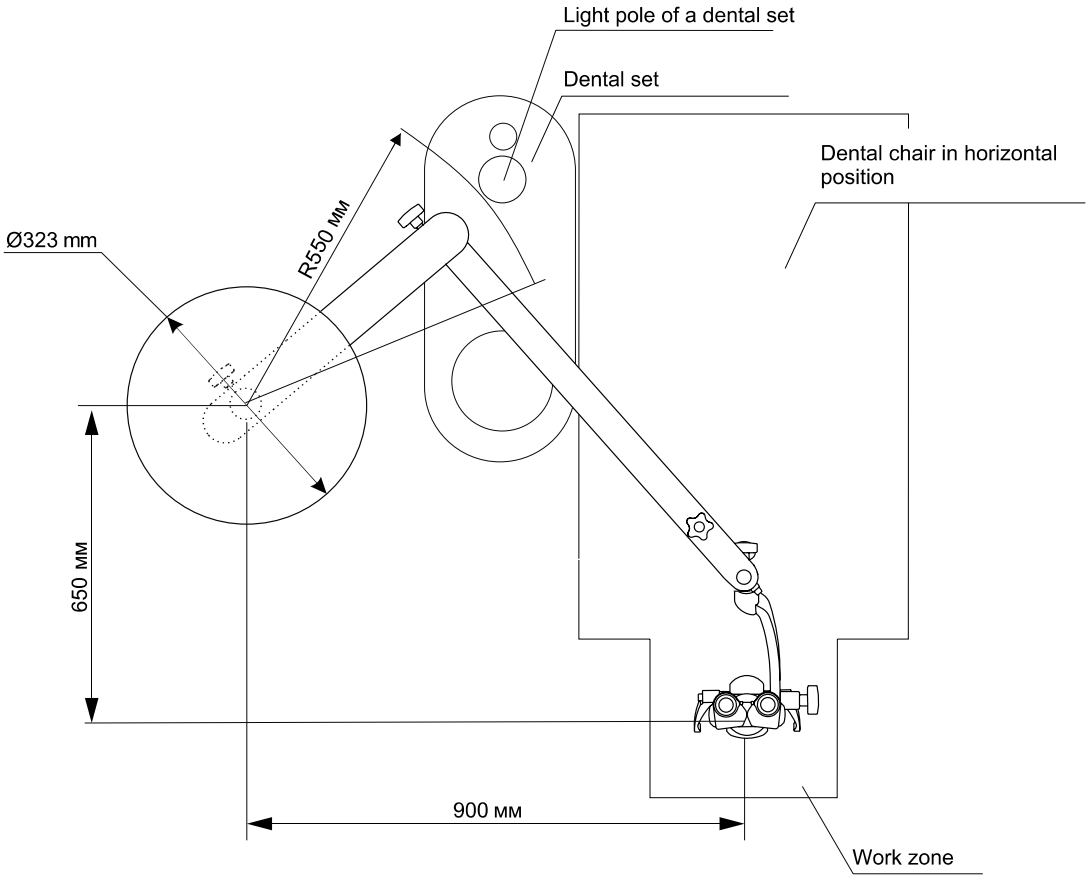
ATTENTION. To ensure the transmission of a video signal (when the microscope is equipped with a photo or video system installed), the HDMI connector must be within a radius of 10 cm from the mounting plate of the ceiling mount of the microscope, which should be taken into account when preparing the installation site.

ATTENTION. The ceiling mount assembly is allowed only on concrete ceiling planks. Make sure the prepared holes do not go into the hollows in the concrete planks.

ATTENTION. Make sure there is no wiring or other communications inside the ceiling on the selected place for installation.

ATTENTION. The ceiling mount assembly is carried out by the customer, because the customer alone is responsible for its own premises, resistibility and safety of floors, availability of hollow spaces, internal communication, etc.

Parameters of the microscope ceiling mount in a dentist's office as an example.



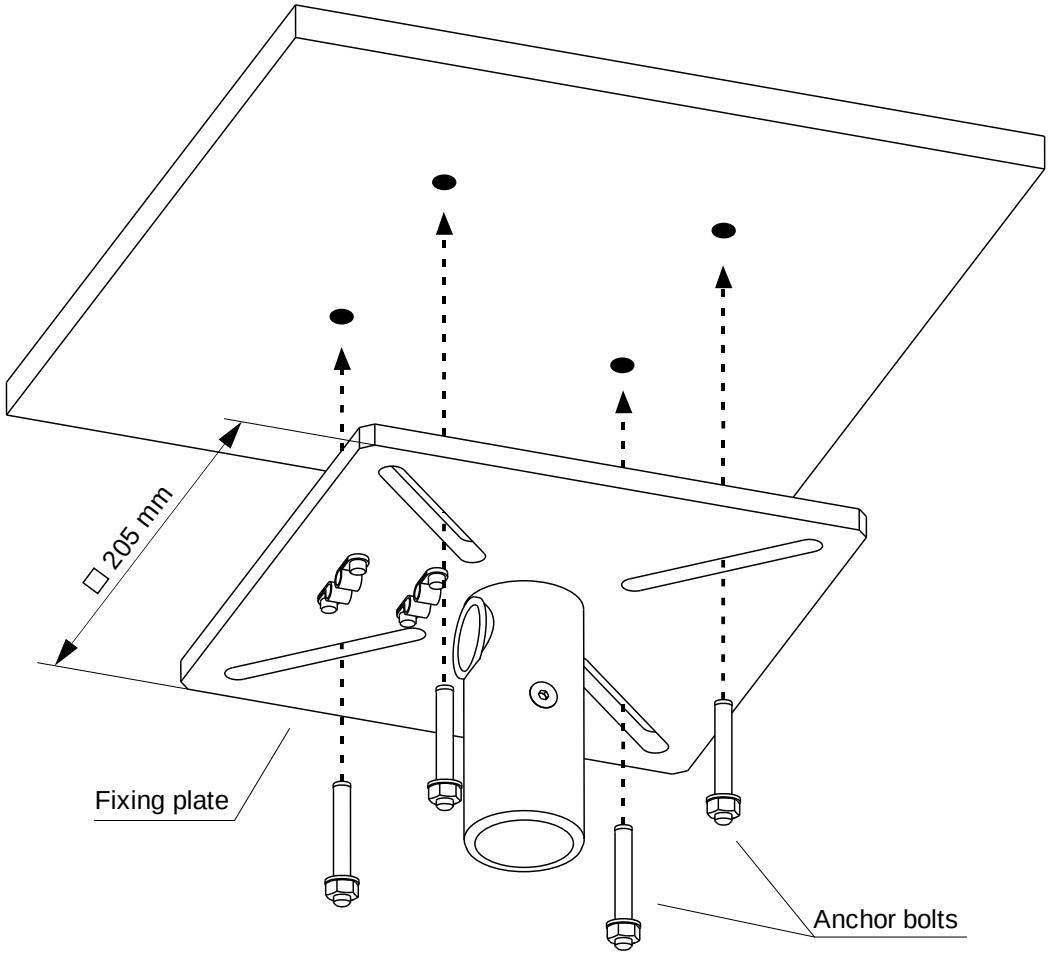
5.3.1. For concrete ceilings

1. Mark places for 4 holes using the ceiling mount as a template.

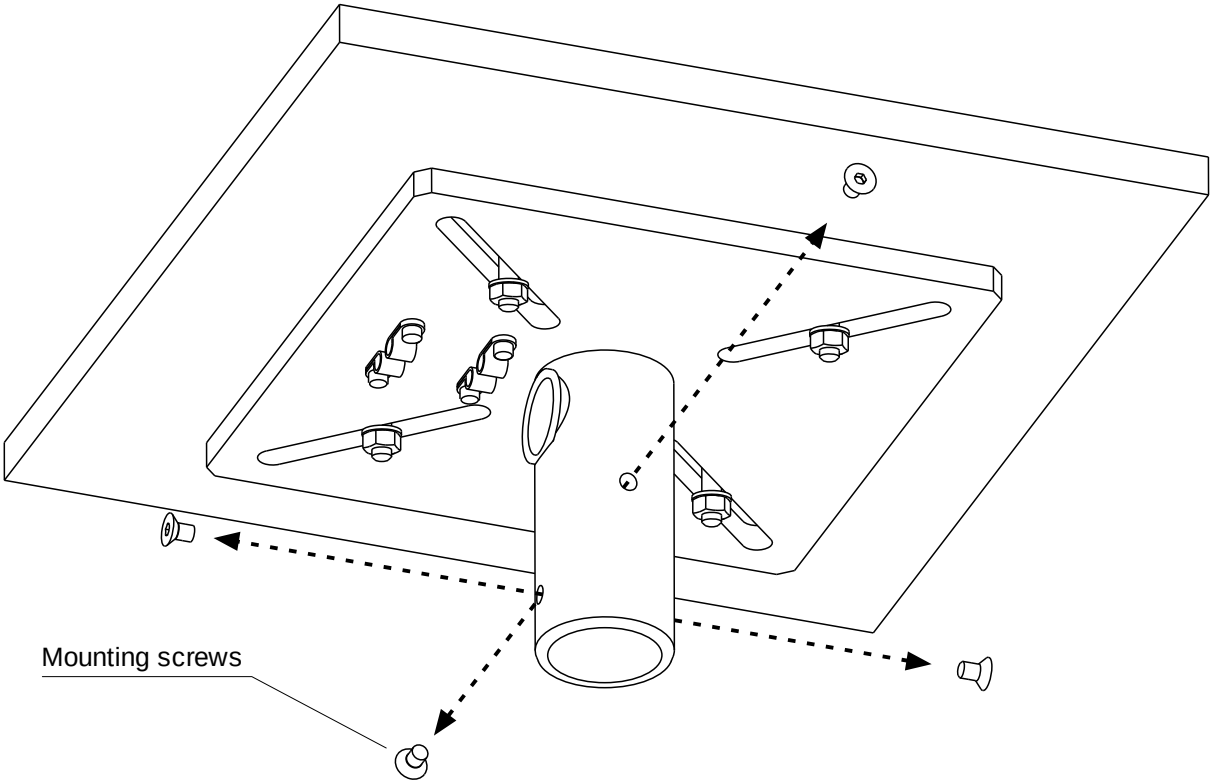
2. Make holes in the ceiling.

3. Mount the mounting plate with the help of the anchor bolts from the delivery package.

4. Screw the anchor bolts tight.



5. Unscrew the mounting screws and remove them from the mounting plate.

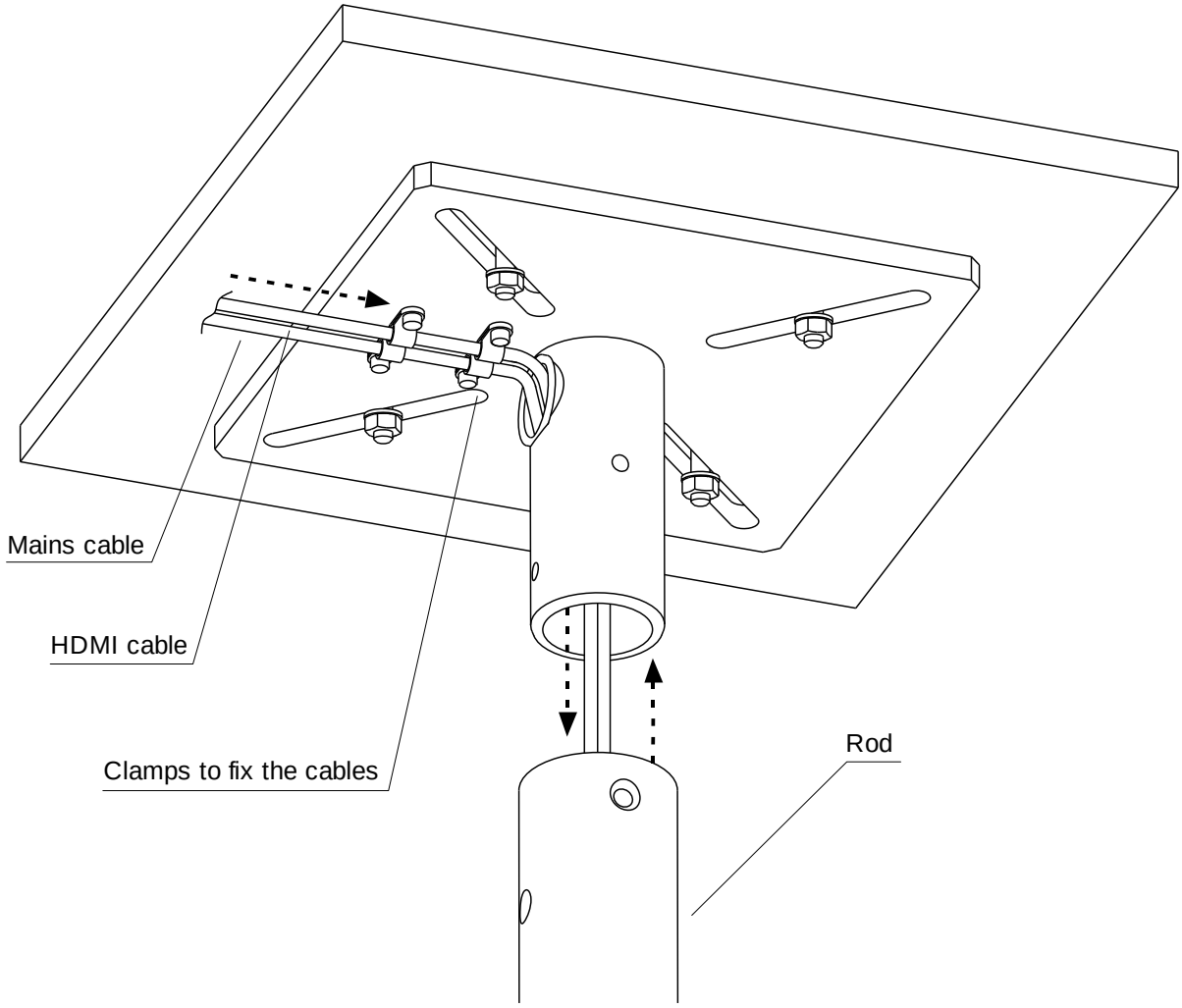


6. Insert the power plug with the cable and the HDMI plug with the cable (if the microscope is equipped with installed photo or video system) through the hole into the mounting plate.

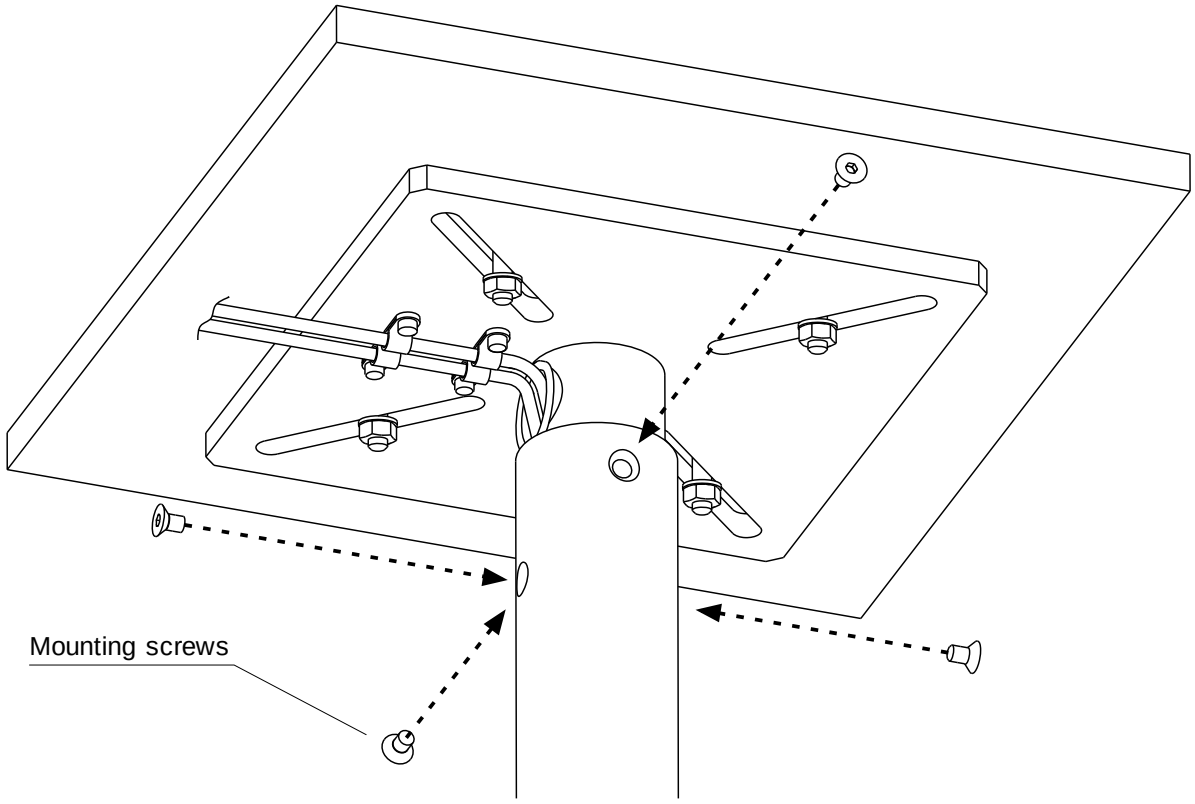
7. Fix cable position with fastening brackets using the key provided ensuring that the cable are sufficiently spanned on both sides.

8. Insert the power plug with the cable and the HDMI plug with the cable (if the microscope is equipped with installed photo or video system) through the rod of the ceiling mount.

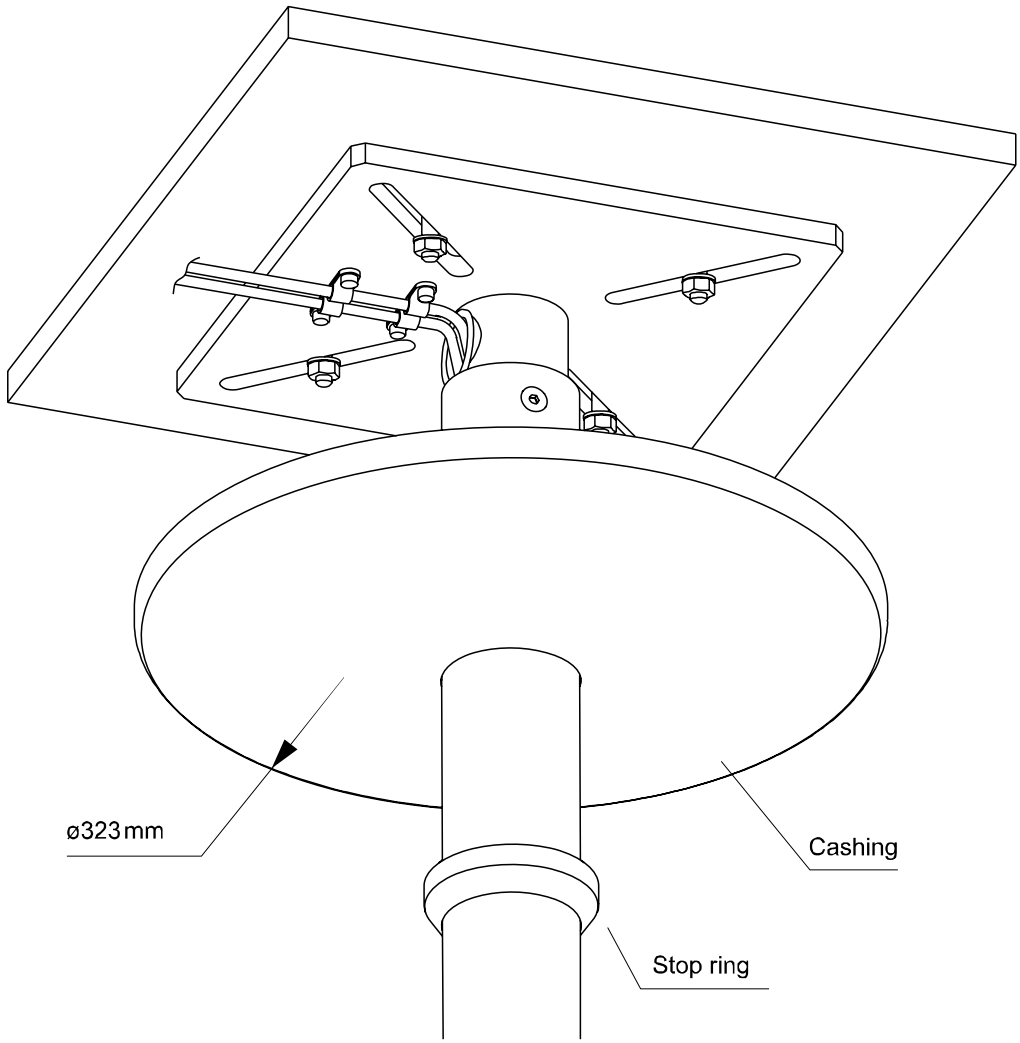
9. Insert the rod straight, without slanting, into the mounting plate from below so that the rod holes match the threaded holes in the plate.



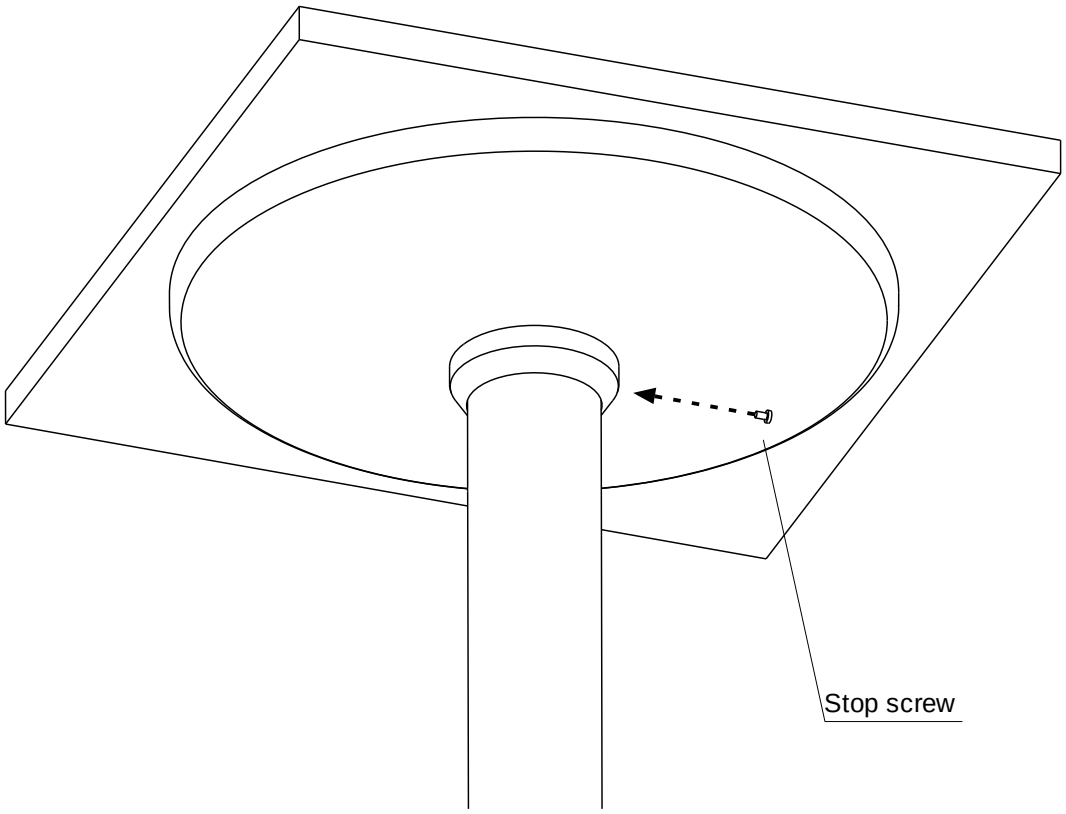
10. Screw the mounting screws tight in the treaded holes of the mounting plate.



11. Install the cover, then the locking ring on the bottom of the rod.



12. With the help of the stop ring move the casing up to the ceiling and screw the stop screw in the ring tight to fix the casing position.



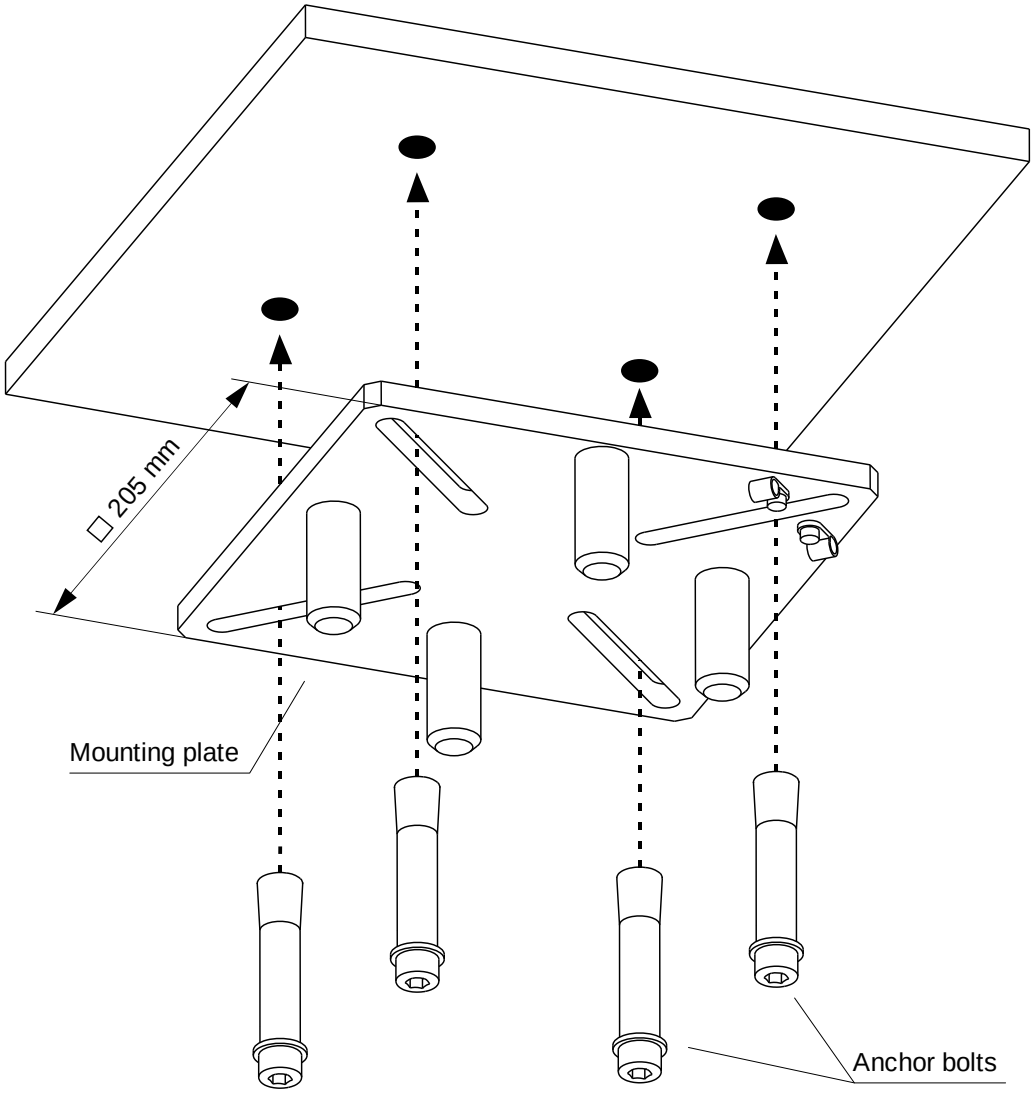
5.3.2. For suspended ceilings

1. Mark the locations of the 4 holes using the mounting plate as a stencil, placing it on the concrete ceiling.

2. Make holes in the concrete ceiling.

3. Install the mounting plate using the anchor bolts supplied.

4. Securely tighten the anchor bolts.

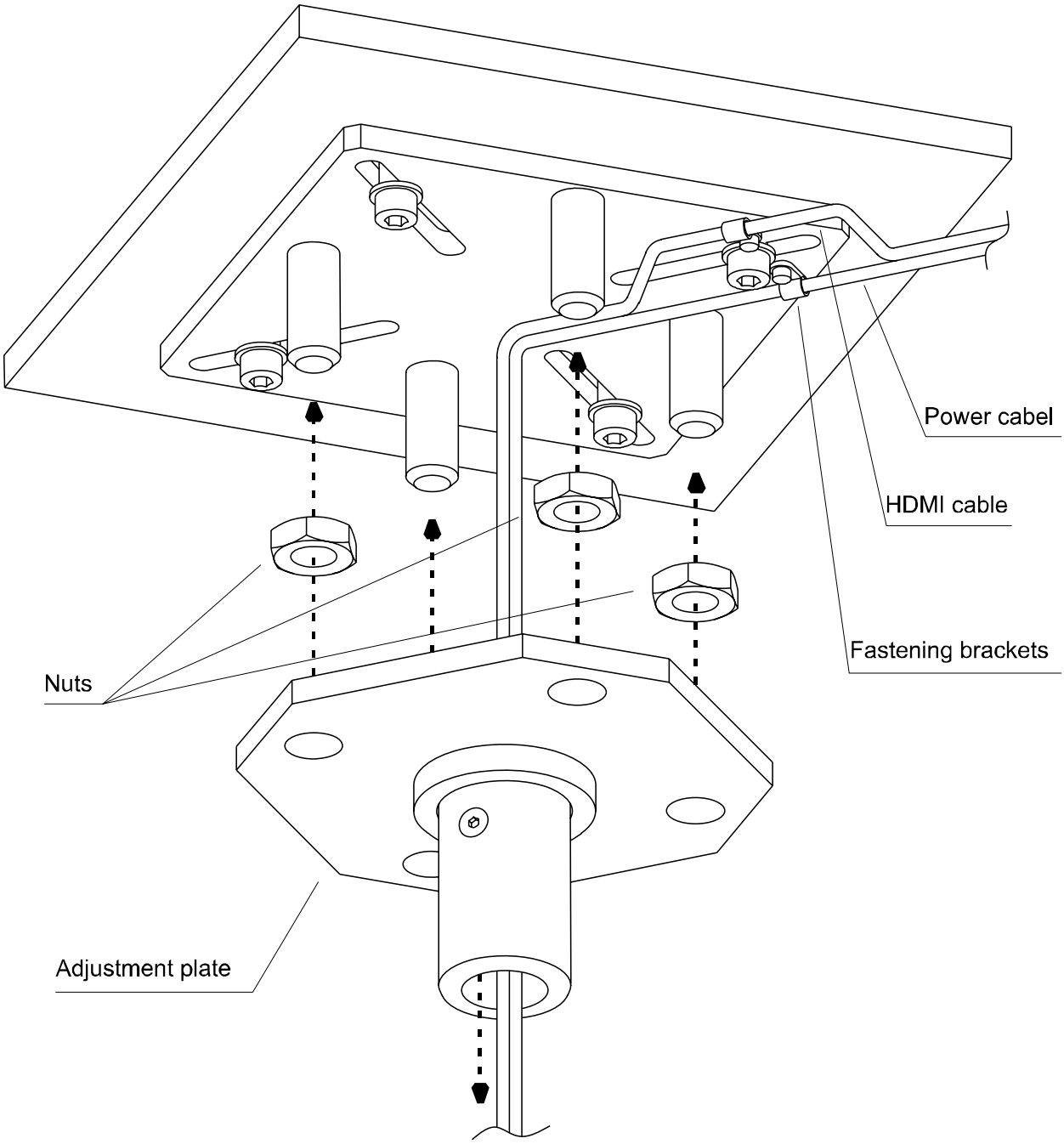


5. Screw nuts on each of the 4 threaded pins protruding from the mounting plate.

6. Insert the power plug with the cable and the HDMI plug with the cable (if microscope is equipped with installed photo or video system) through the hole in the axis of the adjustment plate.

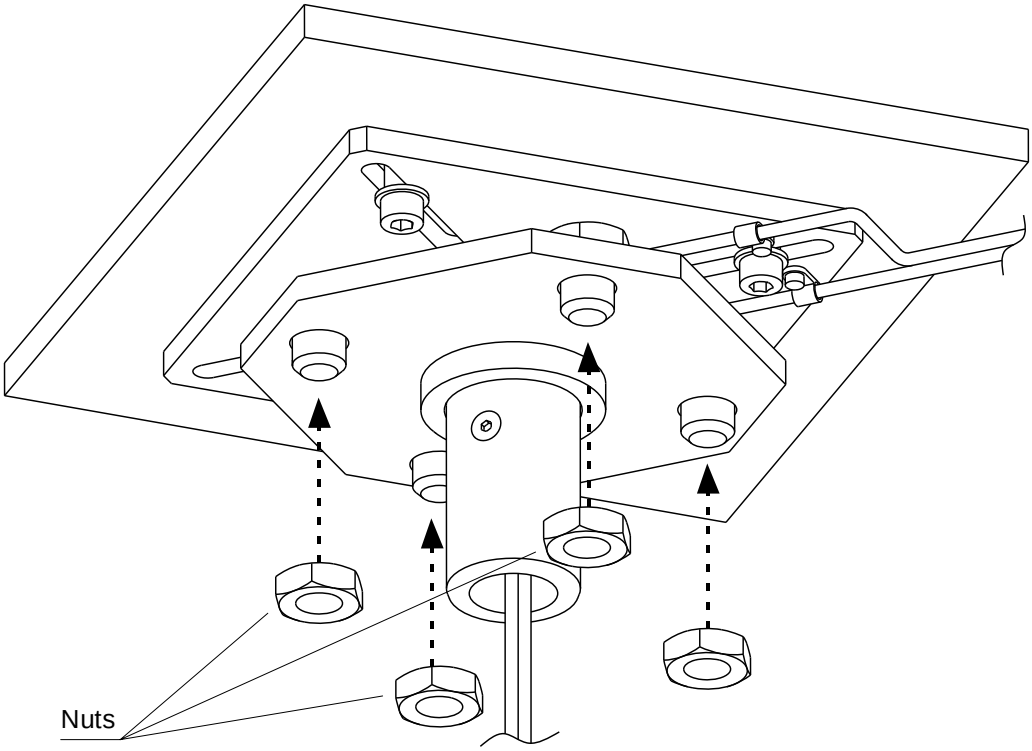
7. Fix cables position with fastening brackets using the key provided ensuring that the cables are sufficiently spanned on both sides.

8. Install the adjustment plate from the bottom of the mounting plate, aligning the holes in the adjustment plate with the threaded pins protruding from the mounting plate.

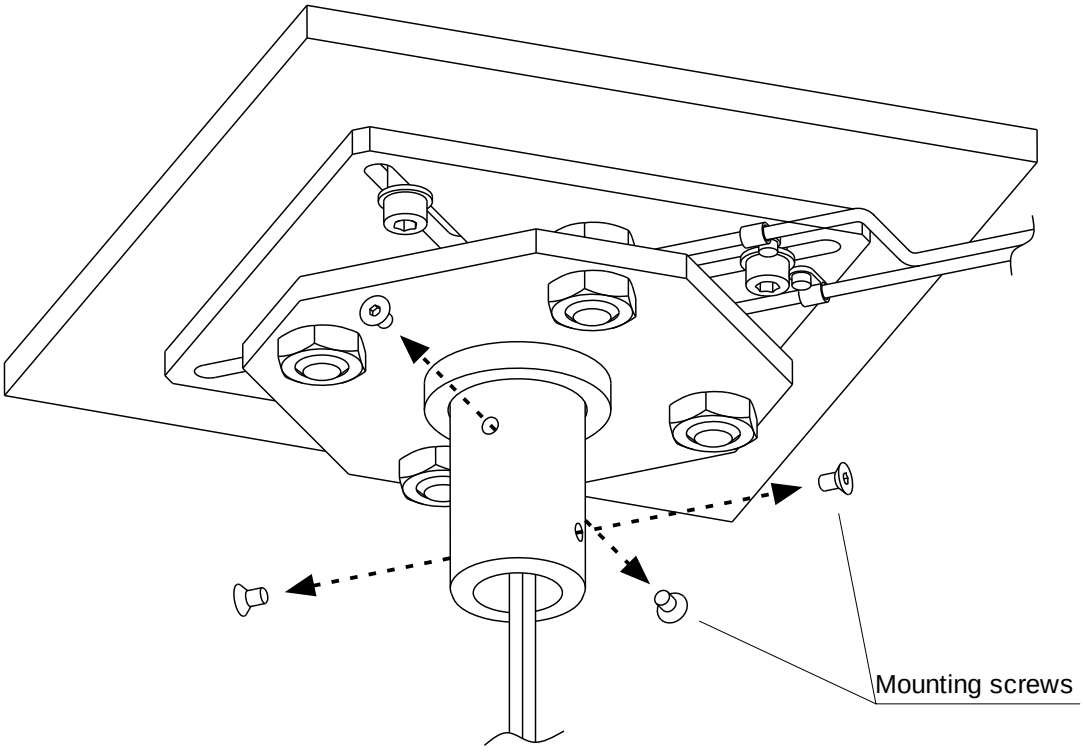


9. Level the position of the adjustment plate with respect to the horizon and fix it in this position by tightening or loosening each of the 4 nuts previously screwed onto the pins that will serve as stops for the plate.

10. Lock the adjustment plate by screwing the locking nuts on the threaded pins on the bottom of the plate, all the way in.

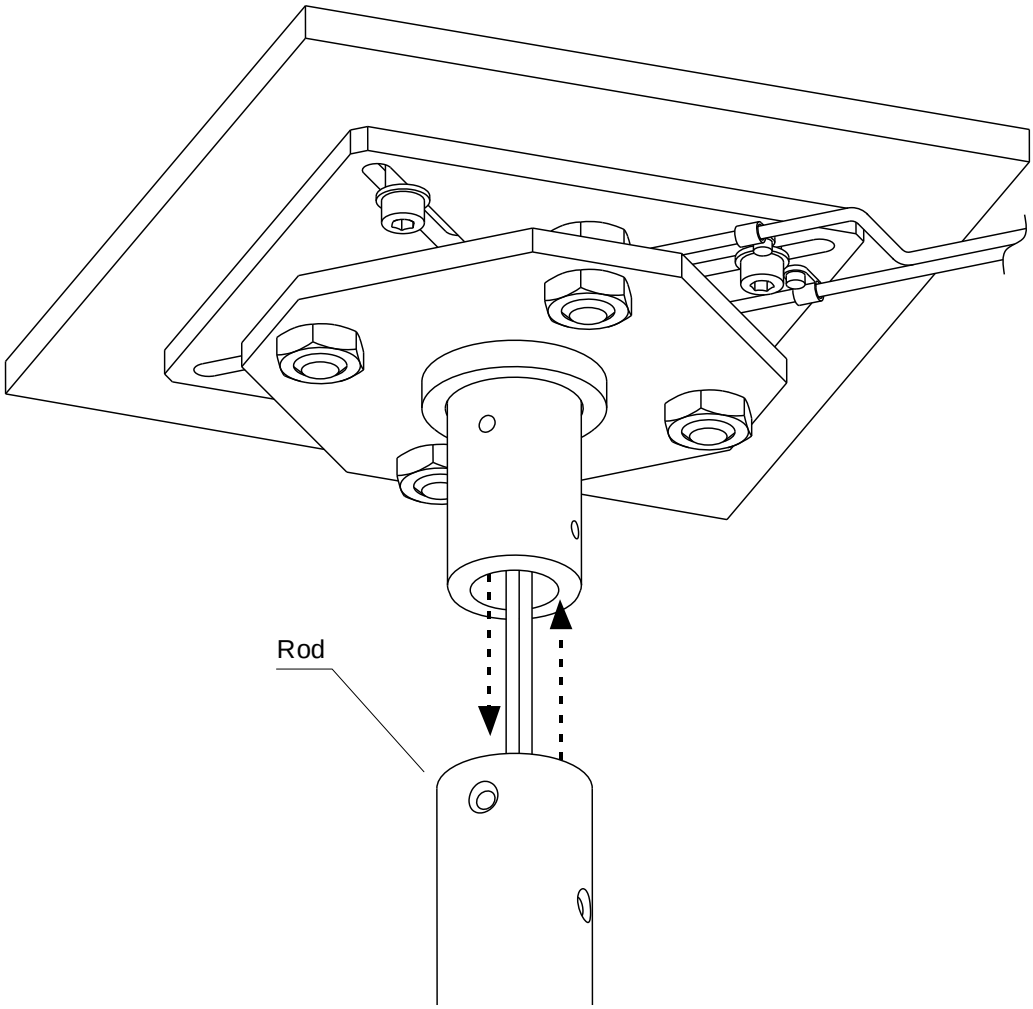


11. Remove the mounting screws from the frame of the adjustment plate.

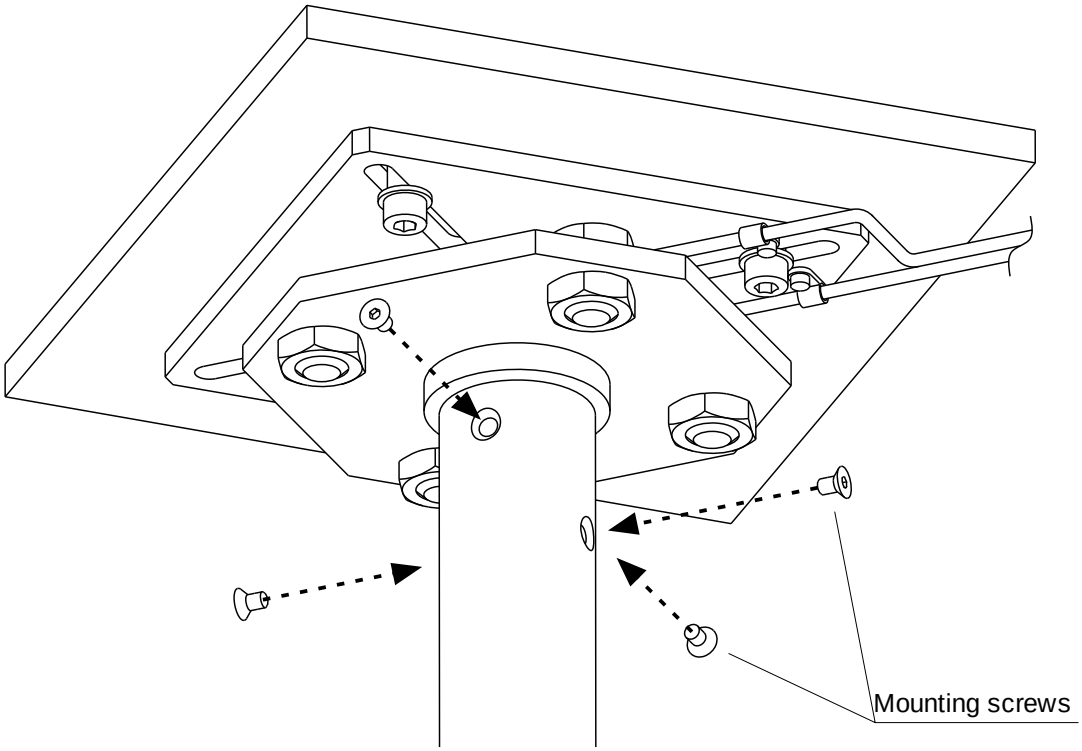


12. Slide the power plug with cable and HDMI plug with cable (if microscope is equipped with installed photo or video system) through the ceiling mount bar.

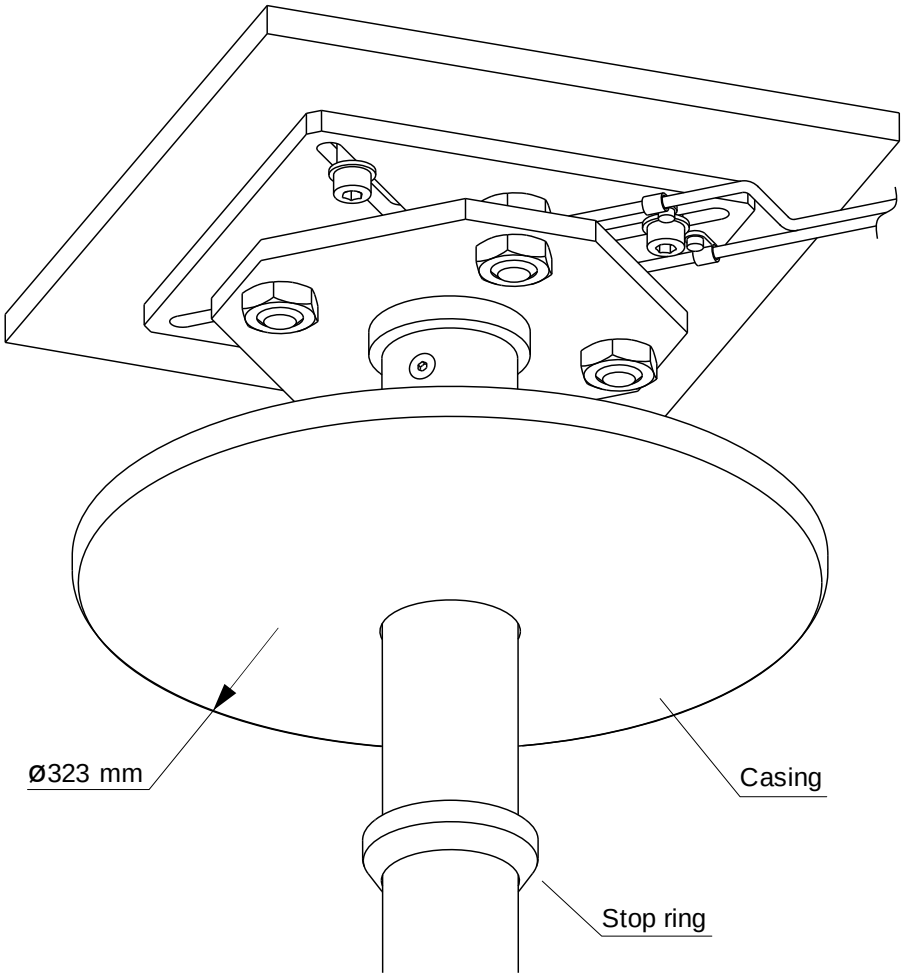
13. Evenly, without skewing, install the rod on the bottom of the adjustment plate, aligning the holes in the rod with the threaded holes in the plate.



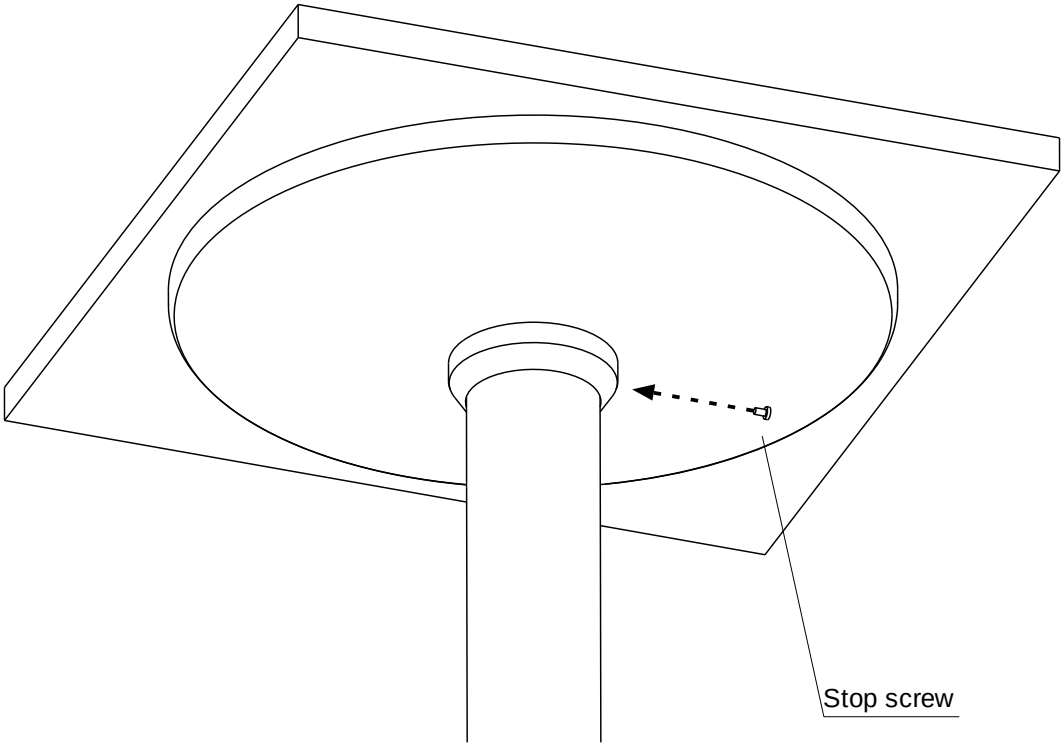
14. Tighten the mounting screws into the threaded holes in the plate, all the way.



15. Install the cover, then the locking ring on the bottom of the rod.



16. Press the cover with the locking ring against the ceiling and tighten the locking screw all the way into the ring body.



5.4. Power Supply Unit Installation on Stand

1. Unscrew the rear axle retainer from the power supply.

2. Unscrew the screw and remove the decorative plate.

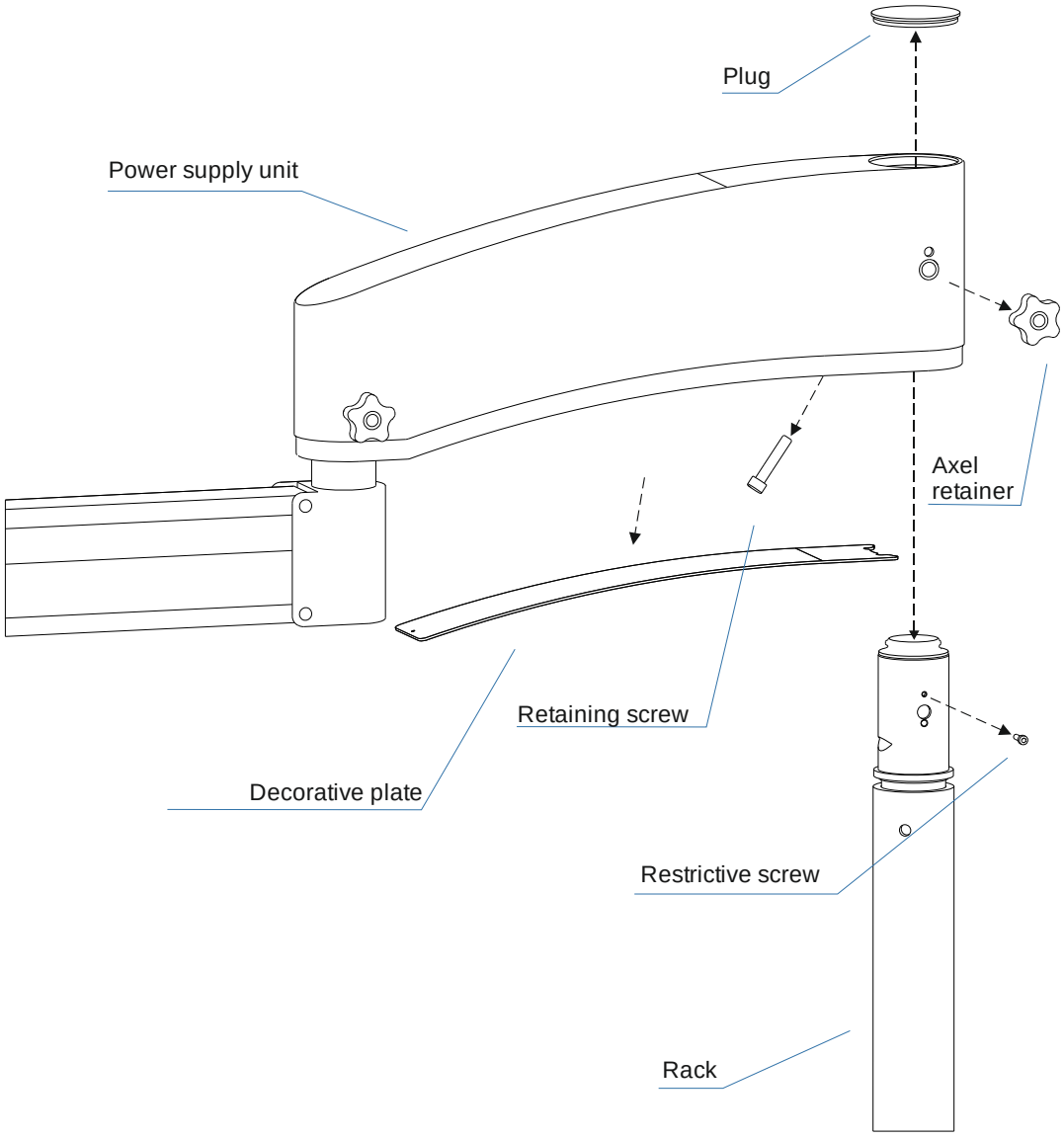
3. Unscrew the plug.

4. Remove the retaining screw from the power supply.

5. Unscrew the restrictive screw from the rack cup.

6. Smoothly, without skewing, install the power supply on the stand, aligning the holes on the stand with the hole on the power supply.

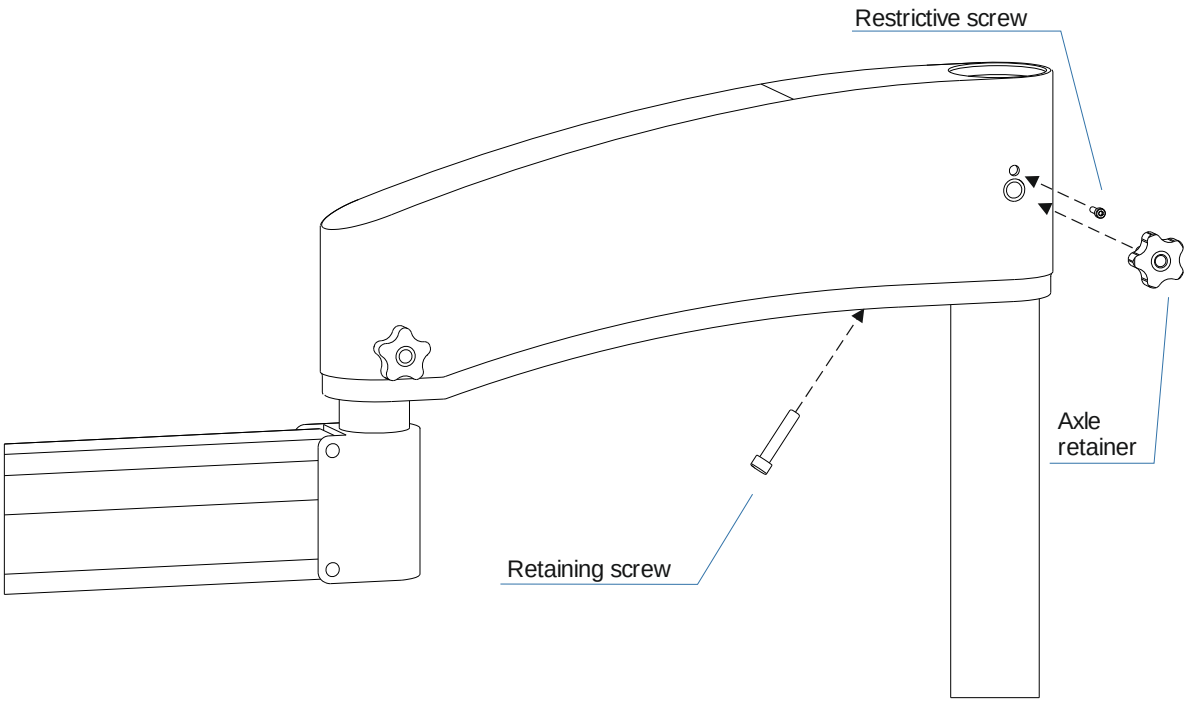
ATTENTION. The microscope power supply unit with the balancing lever installed is very heavy! The power supply unit installation must be carried out with the help of several people.



7. Screw the retaining screw and the restriction screw into the threaded holes of the power supply.

8. Screw the rear axle lock into the threaded hole on the power supply.

9. Cover the decorative plate and plug before connecting the power and HDMI cables (section 5.9.1).



5.5. Power Supply Unit Installation on Wall Mount

ATTENTION. The microscope power supply unit with the balancing lever installed is very heavy! The power supply unit installation must be carried out with the help of several people.

1. Unscrew the rear axle retainer from the power supply.

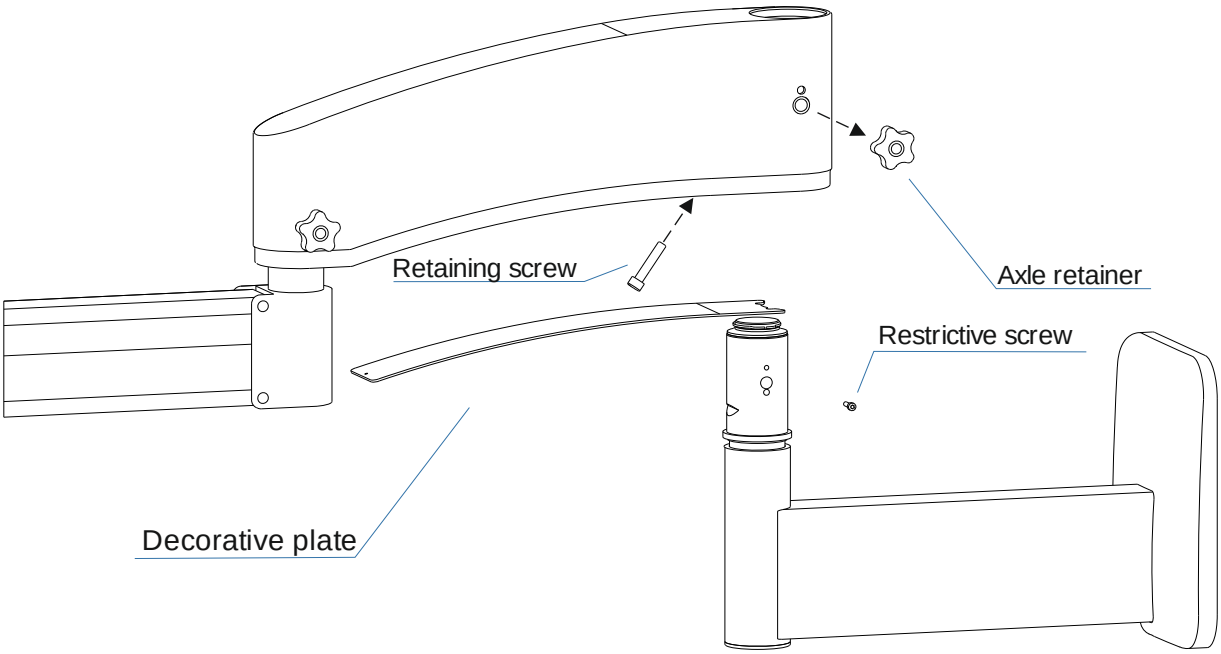
2. Unscrew the screw and remove the decorative plate.

3. Unscrew the plug.

4. Remove the retaining screw from the power supply.

5. Unscrew the restrictive screw from the rack cup.

6. Smoothly, without skewing, install the power supply on the stand, aligning the holes on the stand with the hole on the power supply.

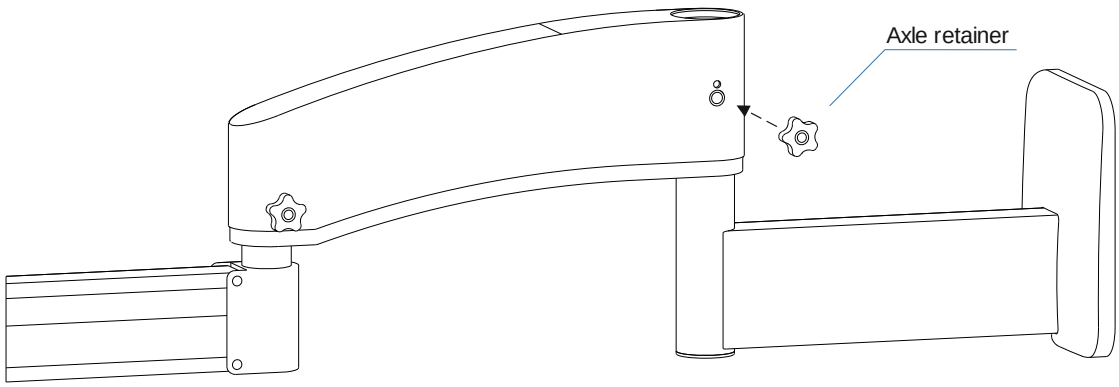


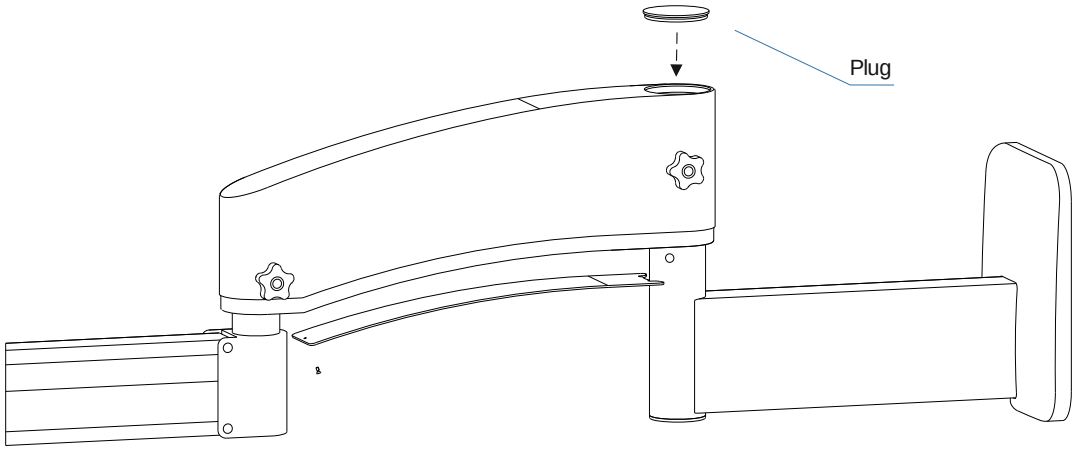
7.

8. Screw the retaining screw and the restriction screw into the threaded holes of the power supply.

9. Screw the rear axle lock into the threaded hole on the power supply.

10. Cover the decorative plate and plug after connecting the power and HDMI cables (section 5.9.3).





5.6. Power Supply Unit Installation on Ceiling Mount

ATTENTION. The microscope power supply unit with the balancing lever installed is very heavy! The power supply unit installation must be carried out with the help of several people.

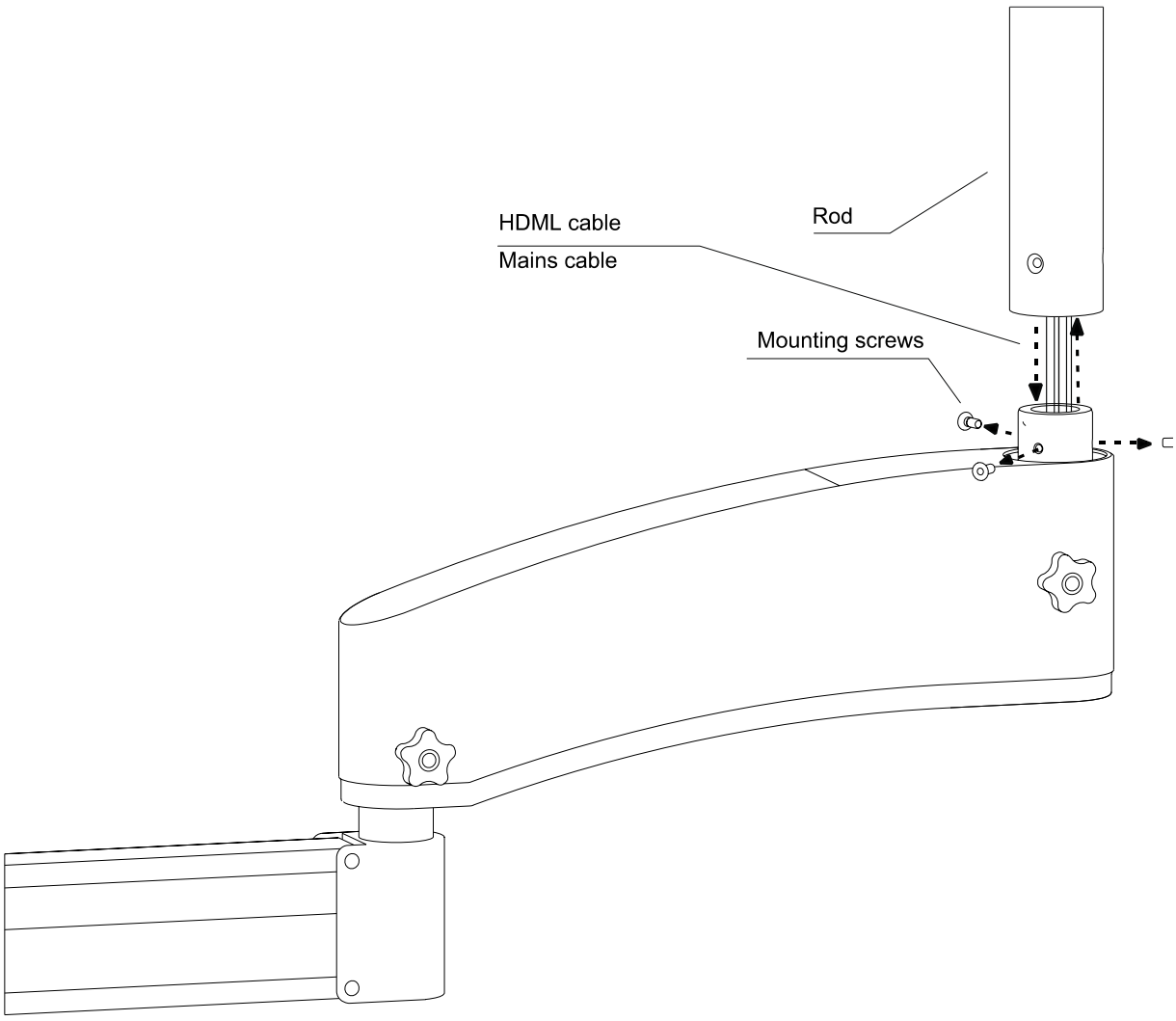
ATTENTION. If the microscope is supplied with the ceiling mount, the position of the power supply unit axis (on the top) differs from its position when the microscope is installed on the floor stand or wall mount (at the bottom).

1. Unscrew and remove the mounting screws from the power supply unit axis.

2. Unscrew the plug from the power supply.

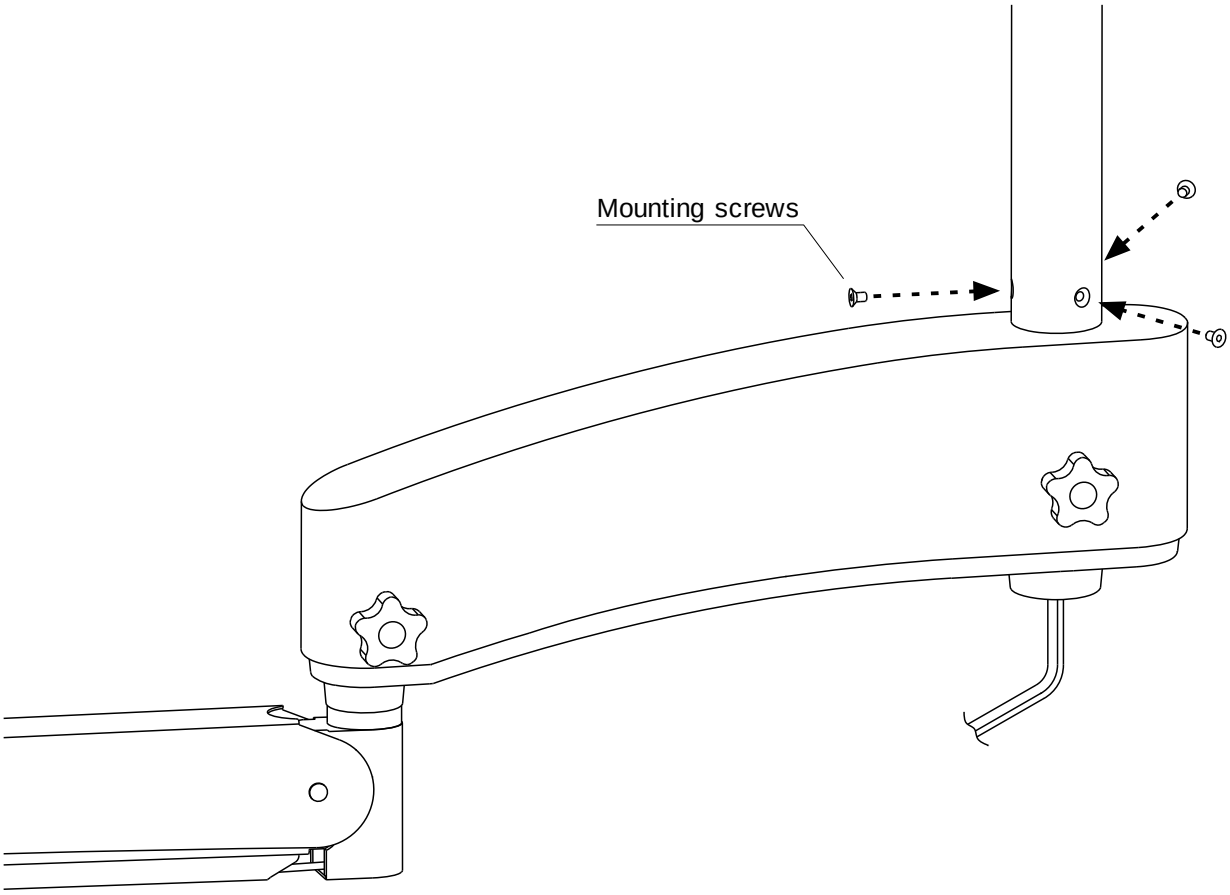
3. Insert the mains cable and HDMI cable (when the microscope is supplied with installed photo and video system) through the hole into the power supply unit axis.

4. Insert the power supply unit axis into the rod, without slanting, passing the power supply unit axis on the bottom of the rod, so that the rod holes match the threaded holes on the power supply unit axis.



5. Screw the mounting screws into the threaded holes on the axle, all the way to the stop.

6. Cover the plug before connecting the power and HDMI cables (section 5.9.3).

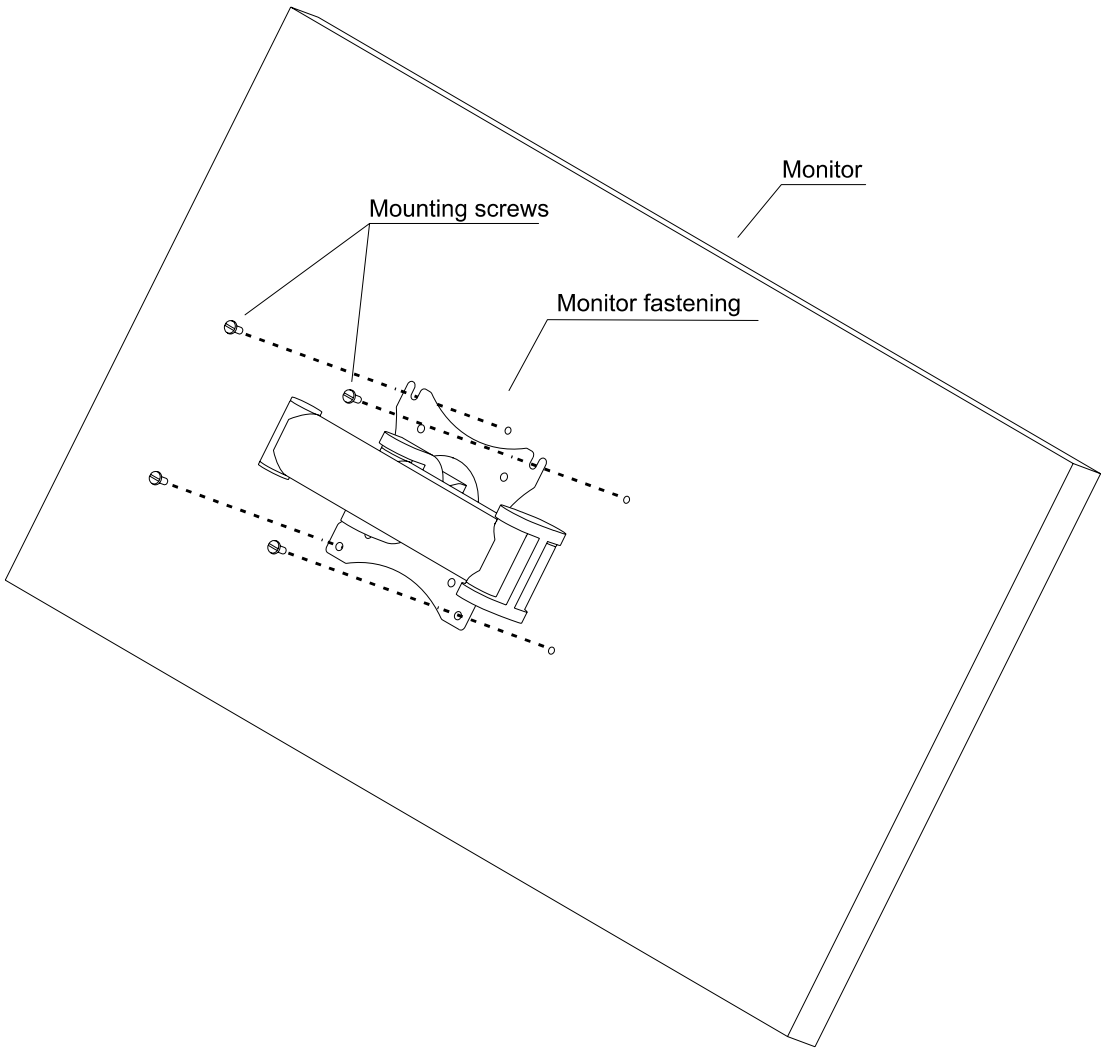


5.7. The Monitor Stand Installation

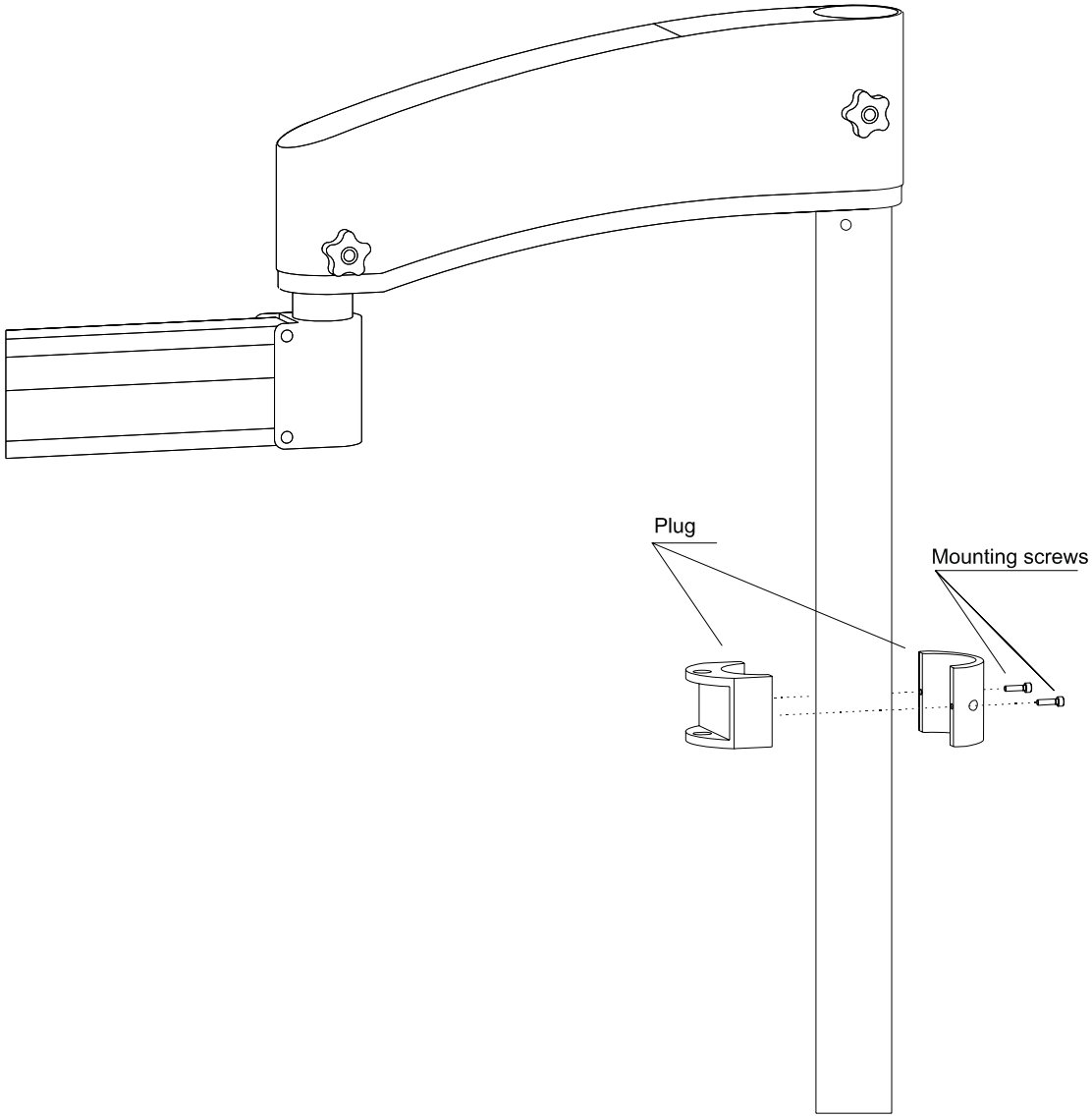
ATTENTION. The monitor stand might be installed just on the floor stand or wall mount microscope.

1. Align the mounting holes in the VESA 75/100 mount with the corresponding mounting holes in the monitor.

2. Screw the mounting screws from the delivery package in the treaded holes of the monitor, all the way.

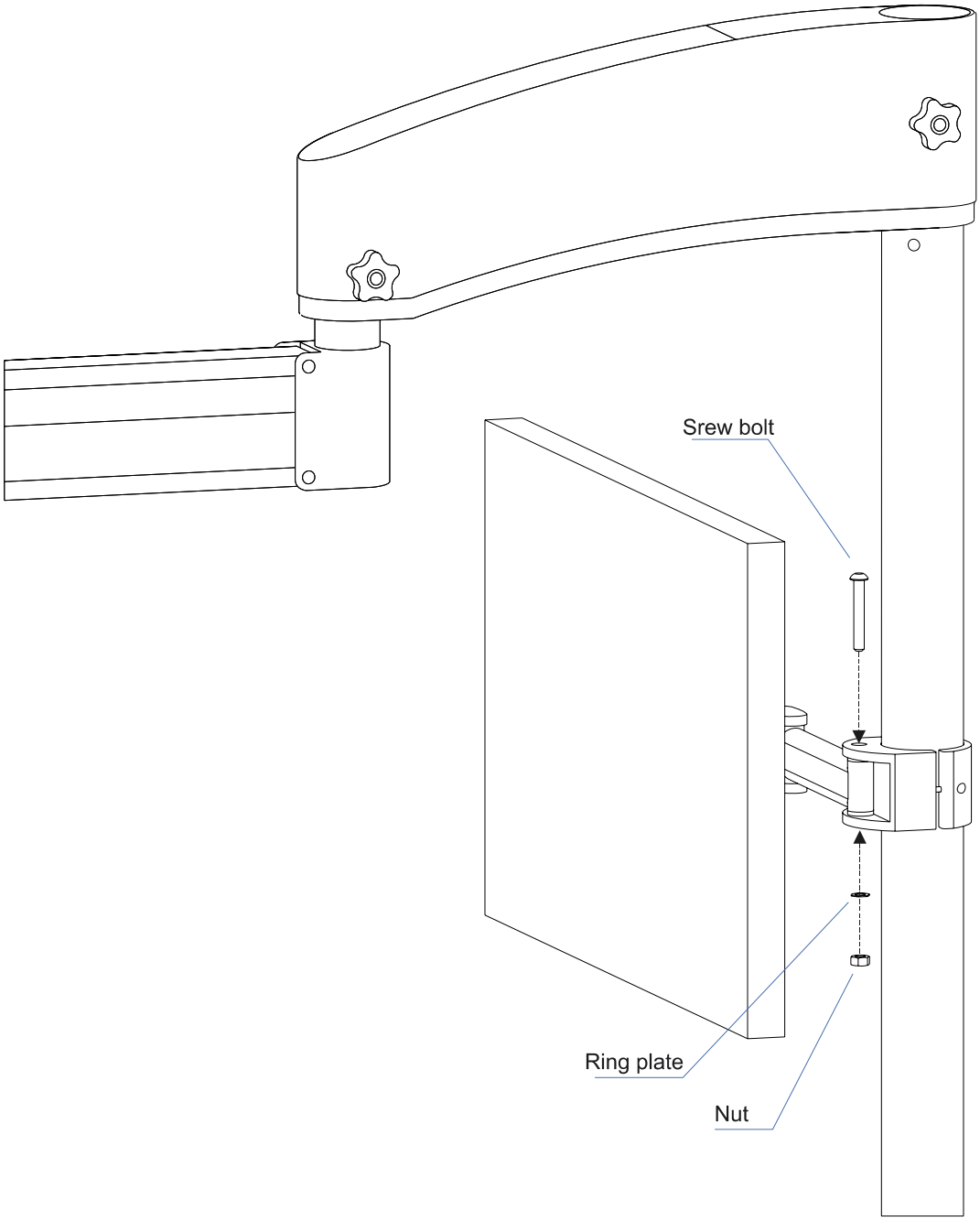


3. Secure the bushing to the upright with two screws.



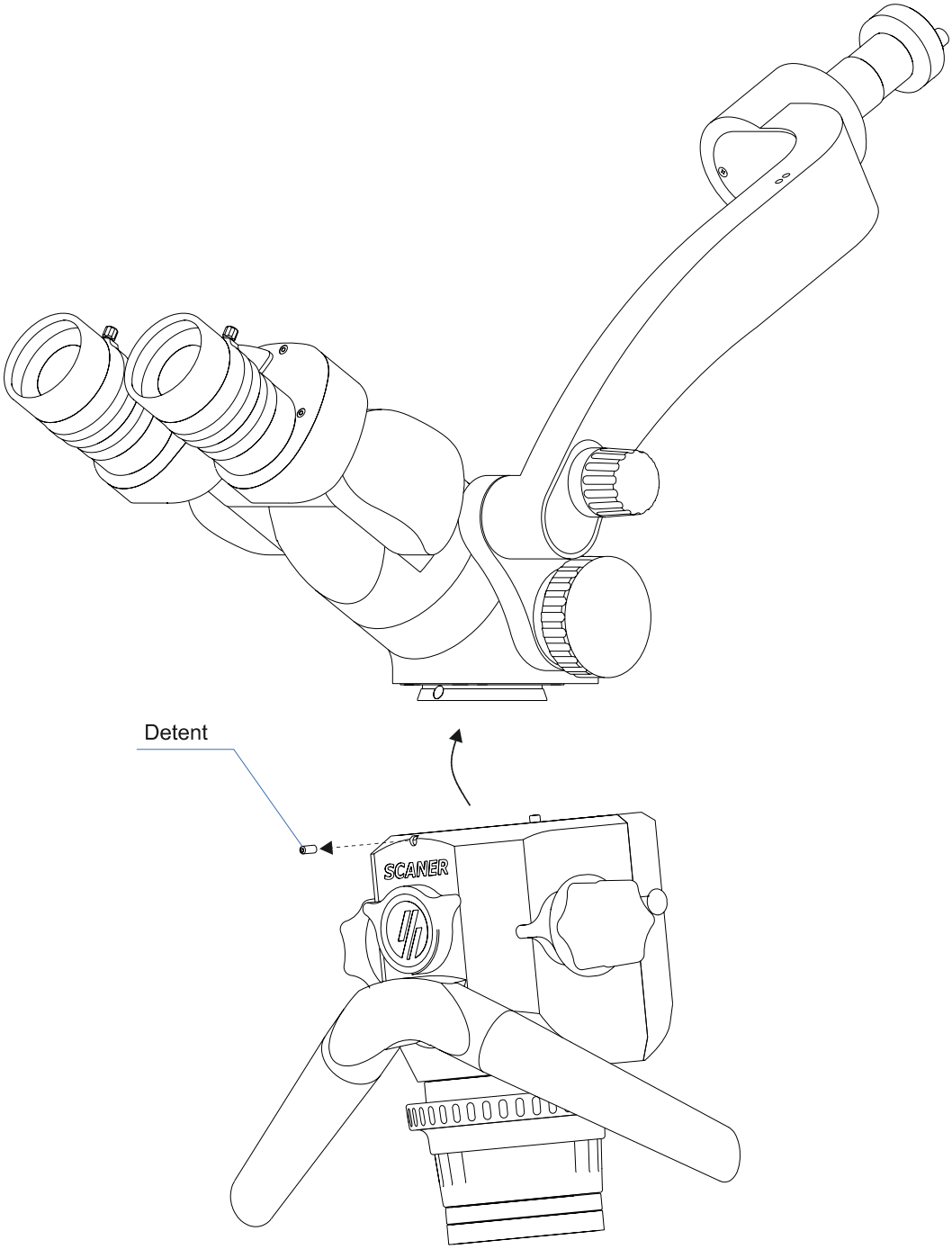
4. Place the monitor with the arm onto the hub and install the screw.

5. Install the washer and nut and tighten the screw.



5.8. Microscope Head Installation

1. Unscrew the detent from the optical head.
2. Place the optical head on the 60 ° adapter.
3. Fix the optical head with the detent.

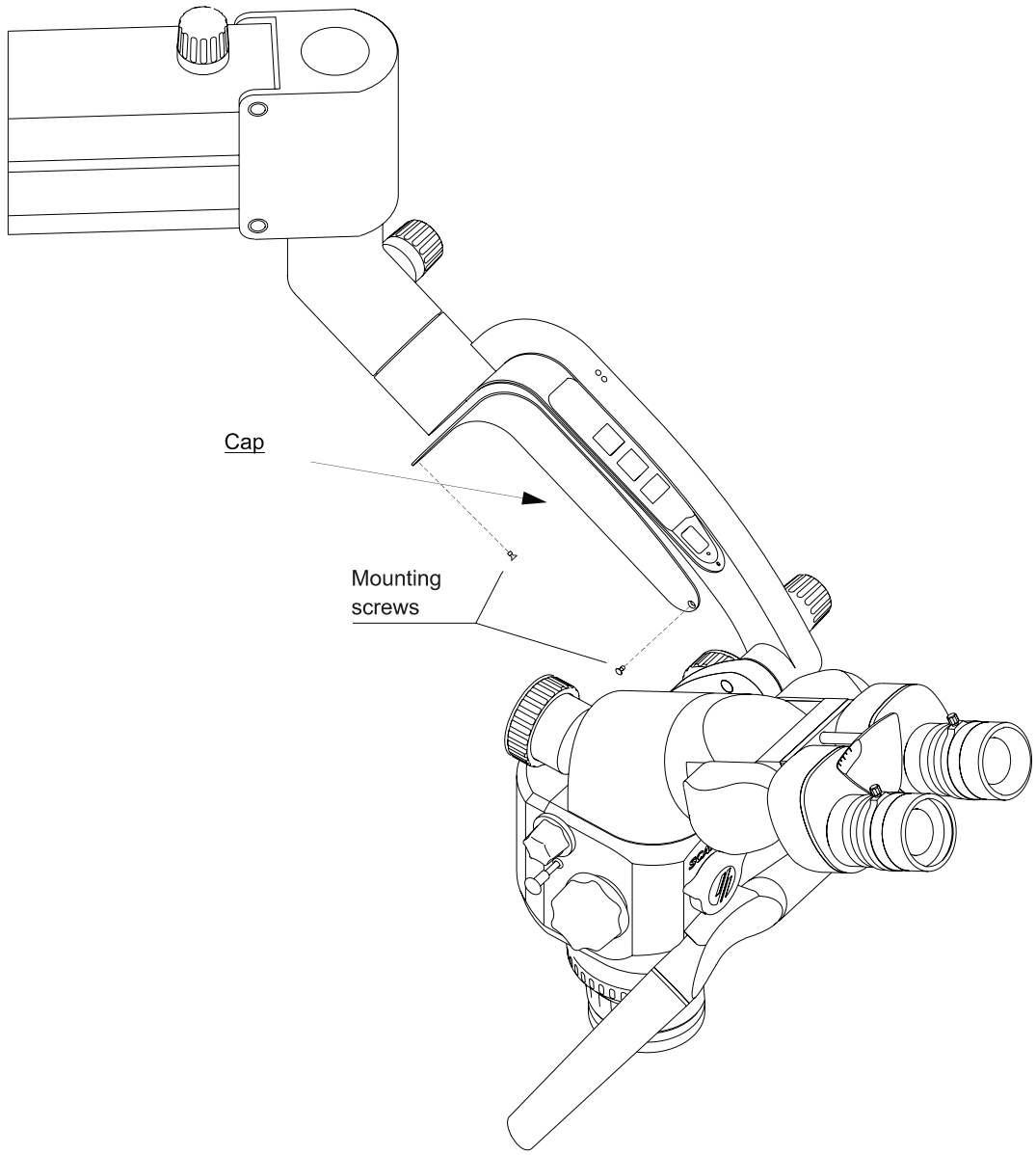


5.9. Cable Connection

ATTENTION. The microscope is connected to single-phase AC mains with voltage of 220 V only using the cable from the supply kit.

PROHIBITED. To connect the power supply unit to the mains if its casing and the cap of optical head support is dismantled.

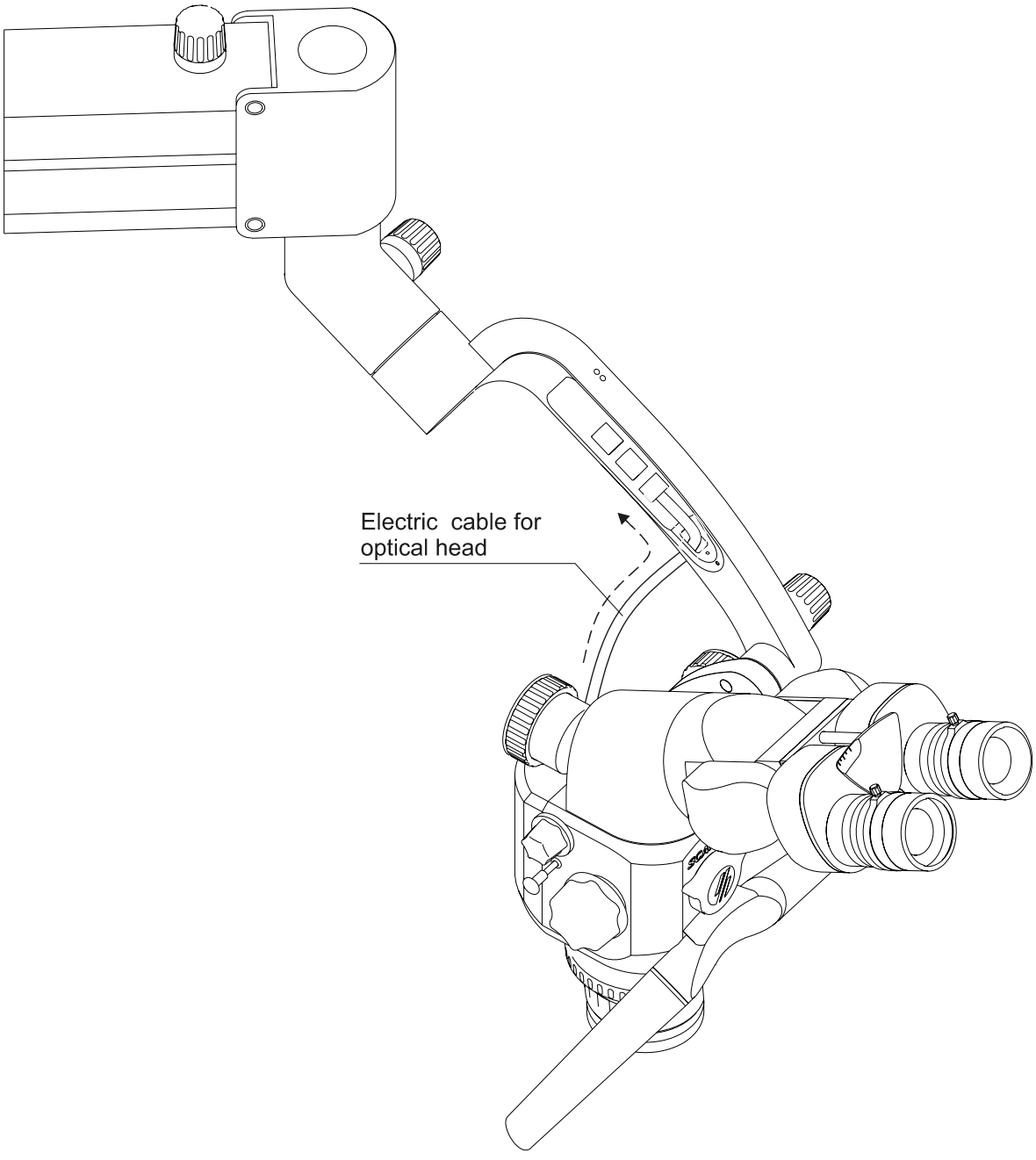
1. Unscrew the fixing screws in the optical head bracket while holding the cover and remove it.



2. Route the cable through the hole in the brackets and push it until you get it out of the box (release the fixing of the cables in the rosettes and push the cables to them in an offensive order:

- red cable to the exit with the sign "+12";
- blue cable to the exit with the sign "+15";
- black cable to the exit with the sign "GND";
- white cable to the exit with the "SW" sign;

then fix the contacts with screws).



3. Install the cover and tighten the screw.

ATTENTION. If the microscope is supplied with an integrated photo and/or video system, the HDMI cable with the connector designed to connect to the photo and video devices is put in the support of the optical head.

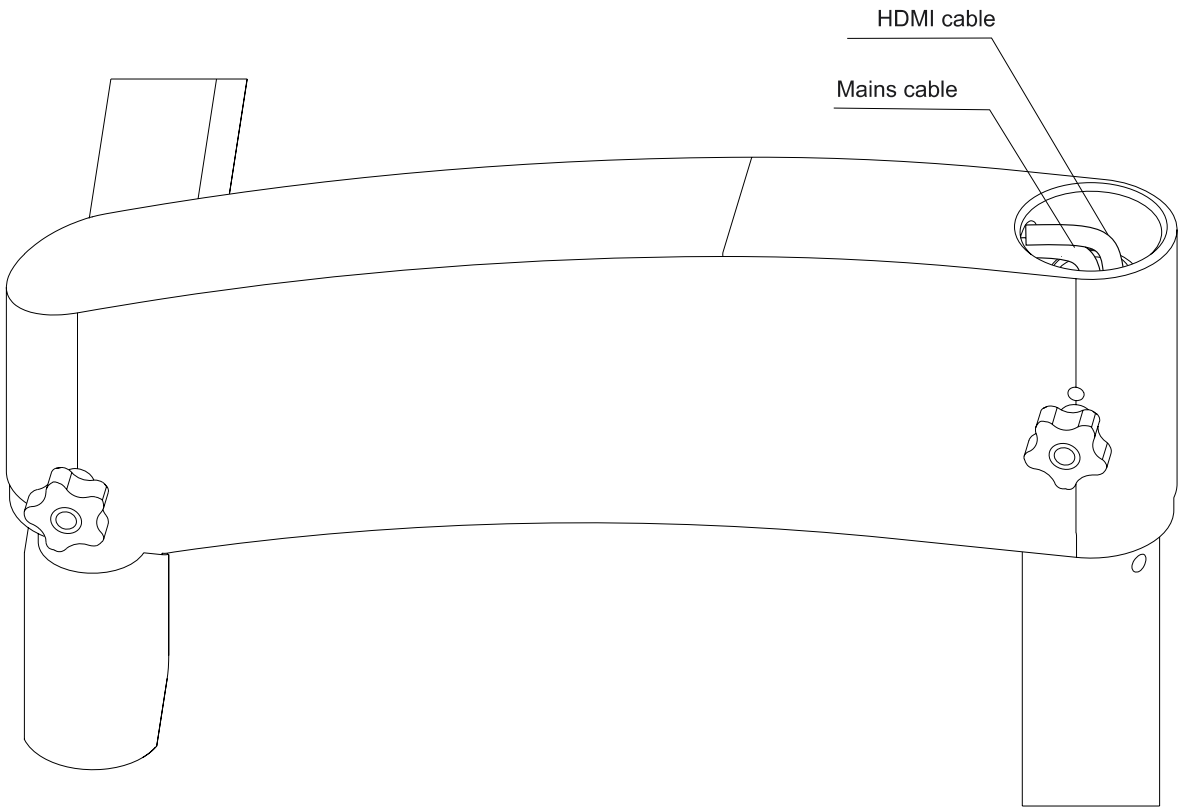
5.9.1. For floor stand and wall mount

1. In advance, insert the power and HDMI cables (if the microscope is equipped with a photo or video system installed) into the power supply rack and insert them into the power supply slot.

2. Connect the plug of the HDMI cable to the socket located inside the power supply.

3. Connect the power cable to the terminal block located at the bottom of the power supply.

4. Install the decorative plate and the plug (section 5.4).



5.9.2. For ceiling mount

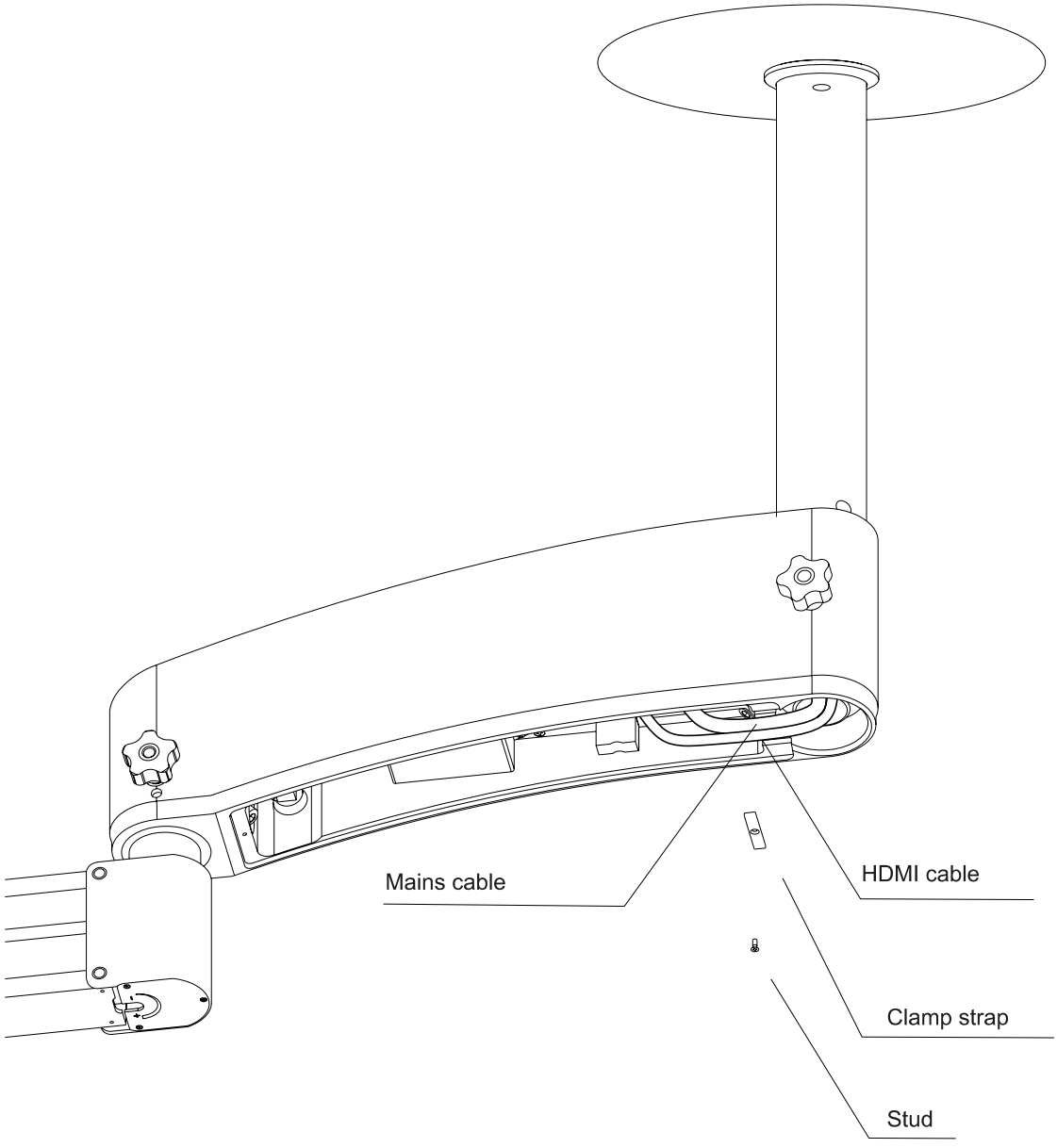
1. Unscrew the screw and remove the decorative plate.

2. Unscrew the screw and remove the retaining plate.

3. Connect the HDMI plug (when the microscope is supplied with installed photo and/or video system) with a cable going from the power supply unit axis into the connector on the bottom of the power supply unit.

ATTENTION. Fix the position of the cable with clamps in such a way as not to interfere with the free rotation of the power supply unit around its axis (loop not less than 3 cm).

4. Connect the mains plug with cable, running from the power supply unit into the socket on the bottom of the power supply unit pushing the clip.

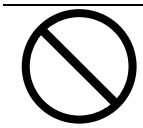


5. Place the debris power plug with cable and HDMI (if the microscope is equipped with a photo or video system installed) into the special channels and fix them with a clamping bar.

6. Install the decorative plate and the plug (section 6).

7. Connect the microscope to the mains.

8. Check the operation of the microscope illuminator by switching it on and off.



PROHIBITED. To use the microscope if the power connector is not fixed with the clip.

5.9.3. For wall mounting

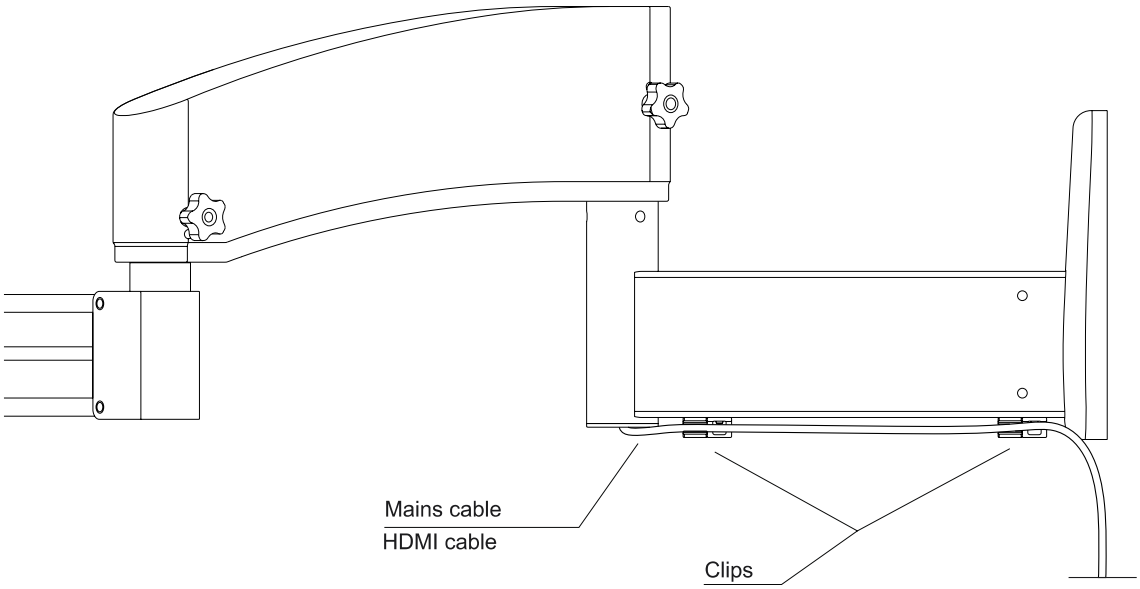
1. Insert the power and HDMI cables (if the microscope is equipped with a photo or video system installed) into the power supply rack and insert them into the power supply slot.

2. Connect the HDMI plug (if the microscope is equipped with a photo or video system installed) with the cable that extends from the axis of the power supply to the connector on the bottom of the power supply.

3. Connect the plug of the mains supply with the cable coming from the axis of the power supply to the connector located inside the power supply.

4. Fix the cables in the clips that are installed on the wall mount.

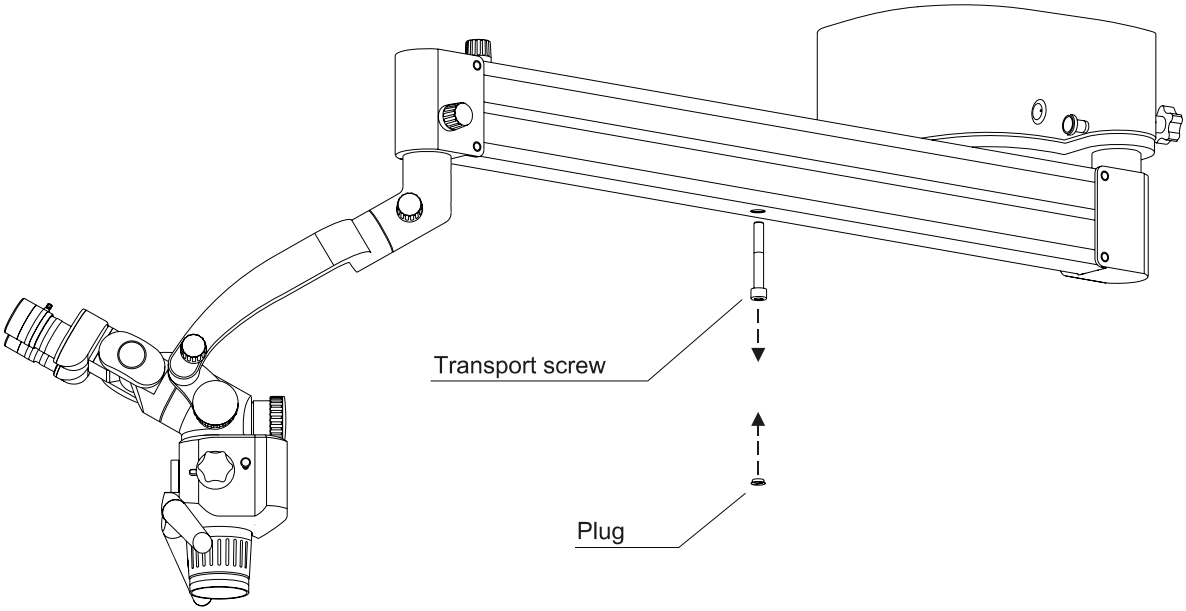
5. Install the decorative plate and the plug (section 5.5).



5.10. Activation of Balancing Lever

1. Firmly holding the balancing lever, unscrew the transport screw, which blocks the vertical movement of the lever, from its body.

2. Install the cover in place of the transport screw.



3. Check the balancing lever balance in various positions (full up and full down position) at the moment of holding.

ATTENTION. Tilt force of the balancing lever is balanced during microscope manufacture specifically for each version at the manufacturing plant.

If the inspection shows that the tilt force is balanced incorrectly, refer to 7.10.

6. Installation/Replacement of Additional Components

Use the tools from the delivered SPTA to install/replace any components of the microscope.

ATTENTION. The microscope is delivered with pre-installed components according to your order. Use this section if any additionally delivered components must be installed/replaced or any components must be dismantled.

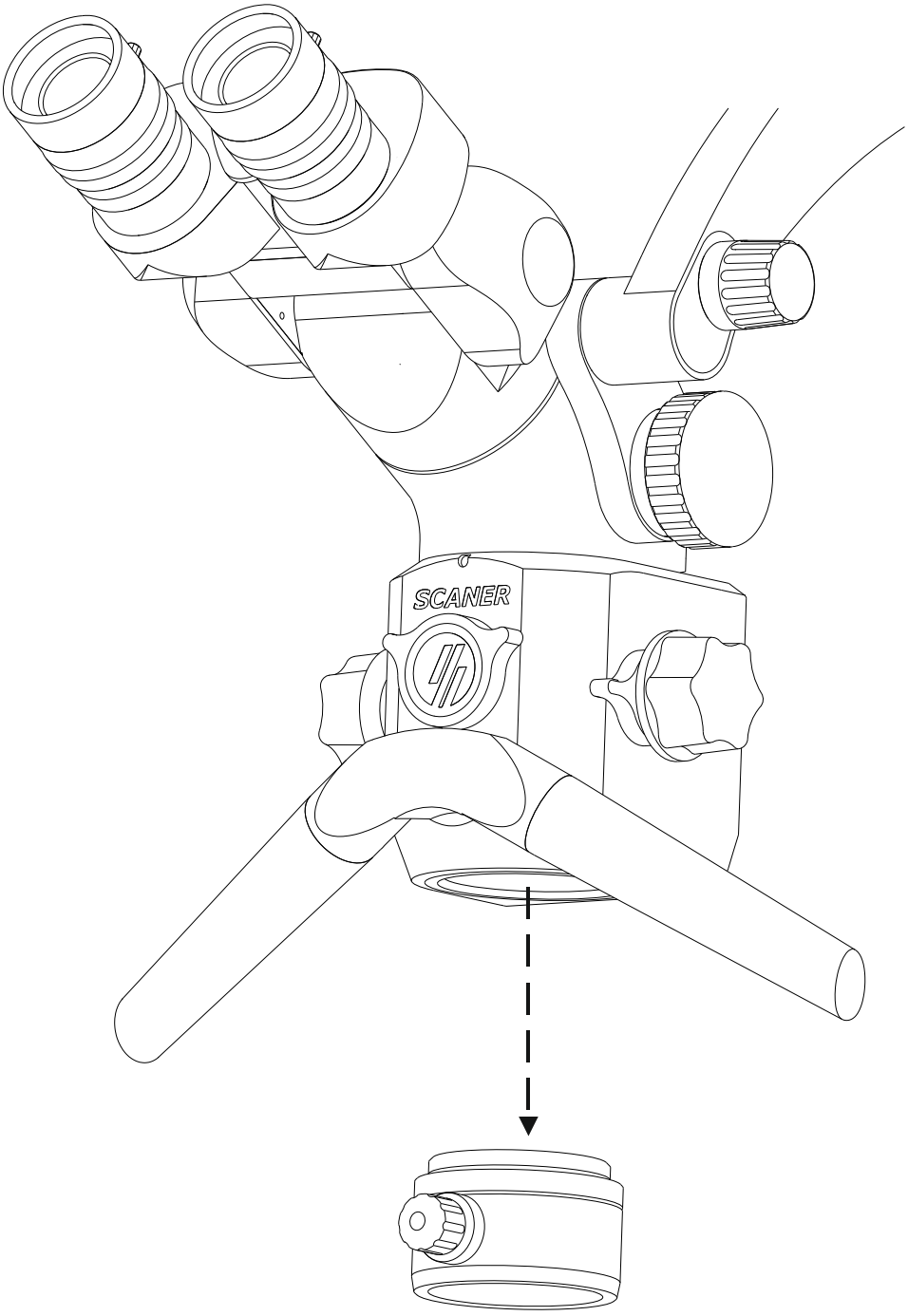
ATTENTION. This section describes only the components that can be installed/replaced or dismantled by the customer individually.

ATTENTION. Possible combinations of microscope components are described in 4.6.

ATTENTION. Additional components must be installed/replaced with extreme care, observing all the instructions below.

6.1. Lens Replacement

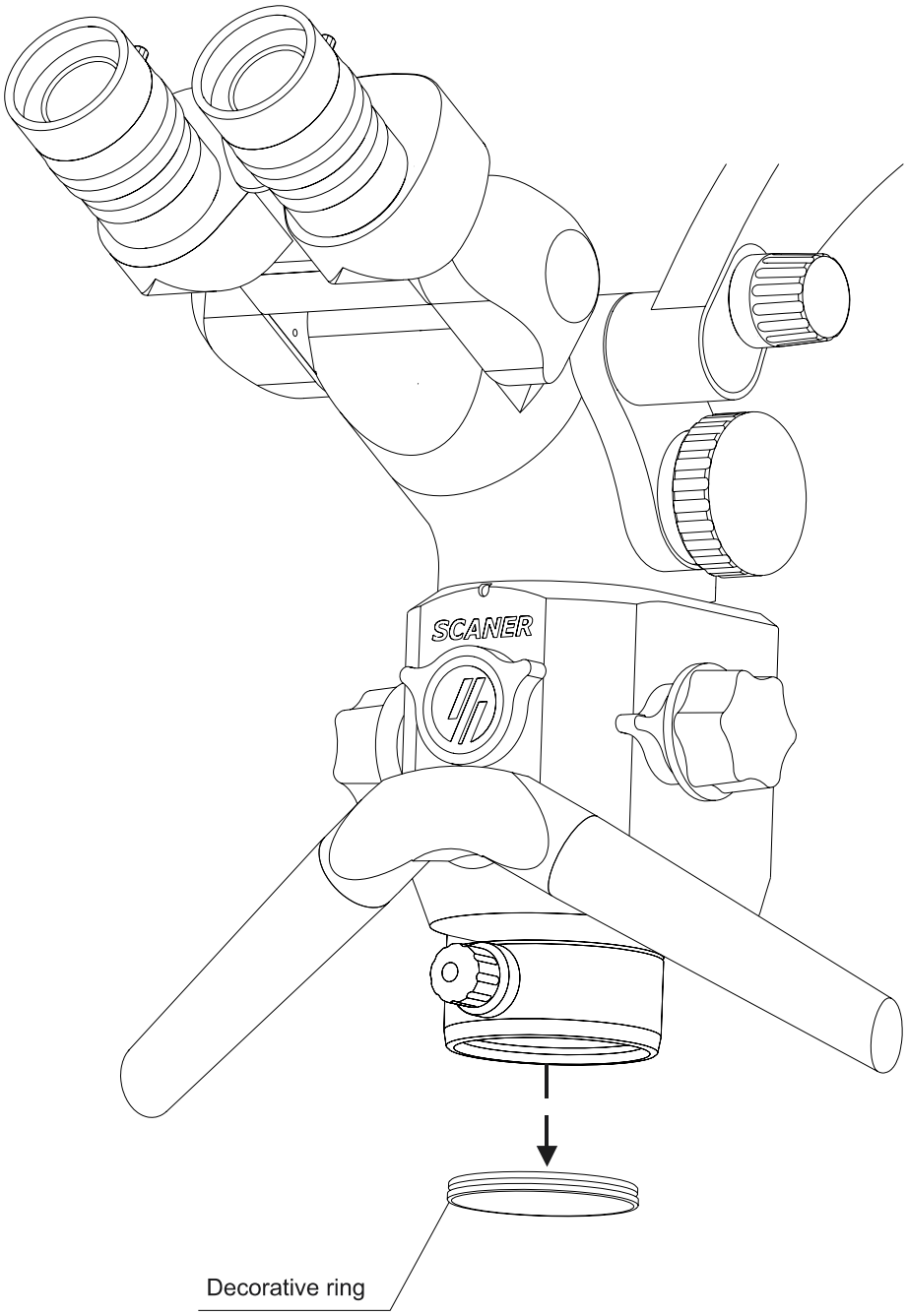
1. Carefully unscrew and remove the lens from the optical head body.



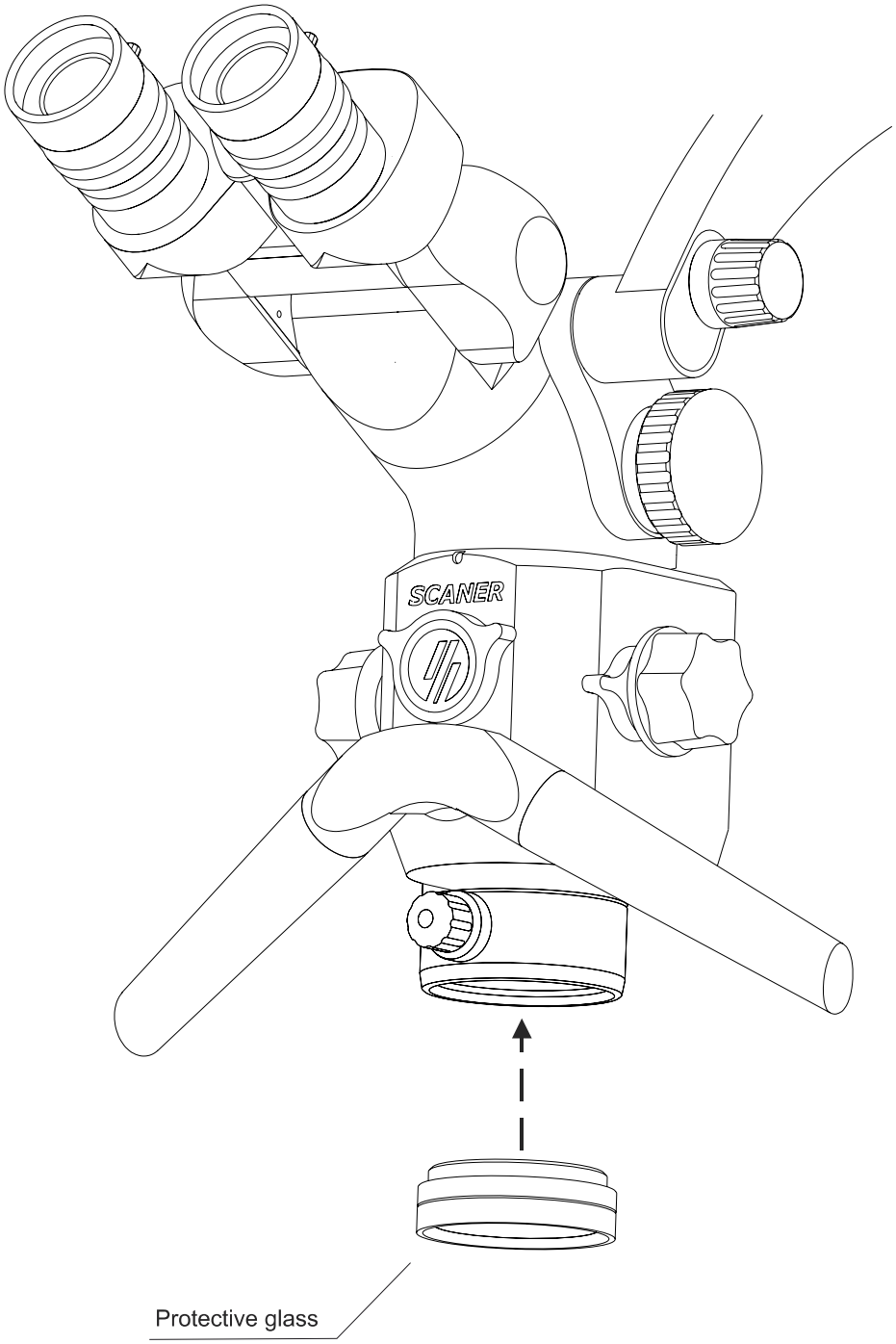
2. Insert a lens with another focus distance and place the fine focus control in a position convenient for use.

6.2. Installation of Lens Protective Glass

1. Unscrew and remove the decorative ring from the lens.



2. Insert the lens protective glass instead of the decorative ring until tight.



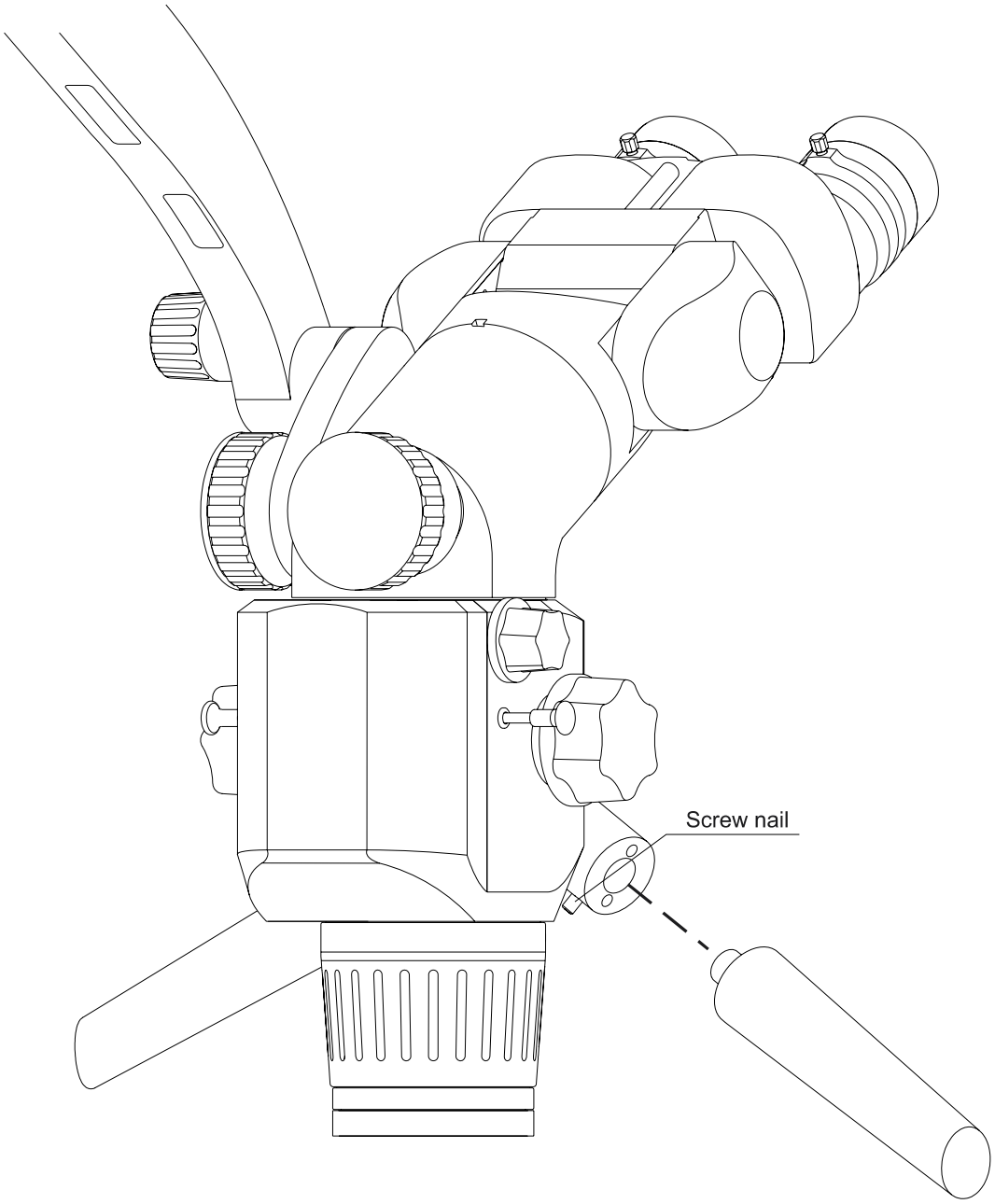
3. By rotation of the ring around its axis position the protective glass so that the label was directed towards the user.

ATTENTION. In using the microscope without the lens protective glass may damage the lens.

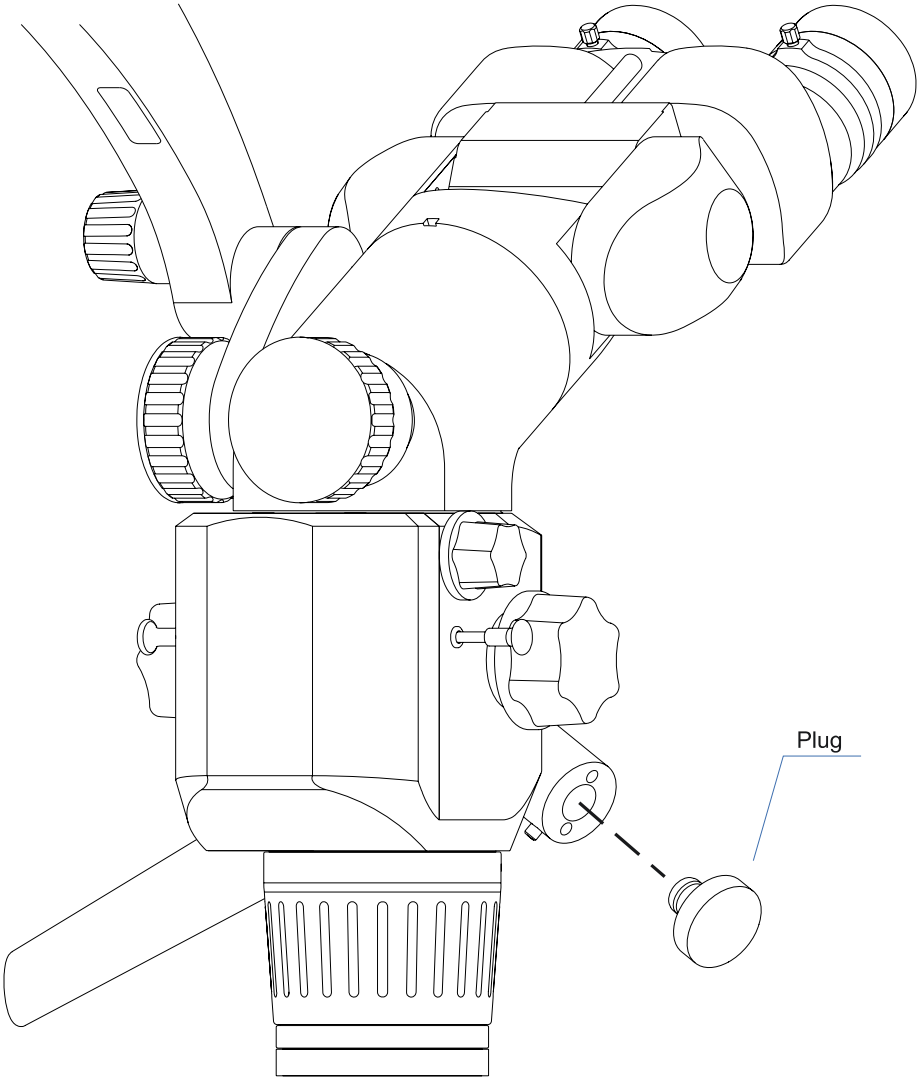
6.3. Installing the V-handle plug

For the convenience of work, if necessary, one of the handles of the V-shaped handle can be detached, for that:

1. Loosen (not completely unscrew) the fixing screw on the side from which you want to remove the handle.
2. Unscrew the handle.

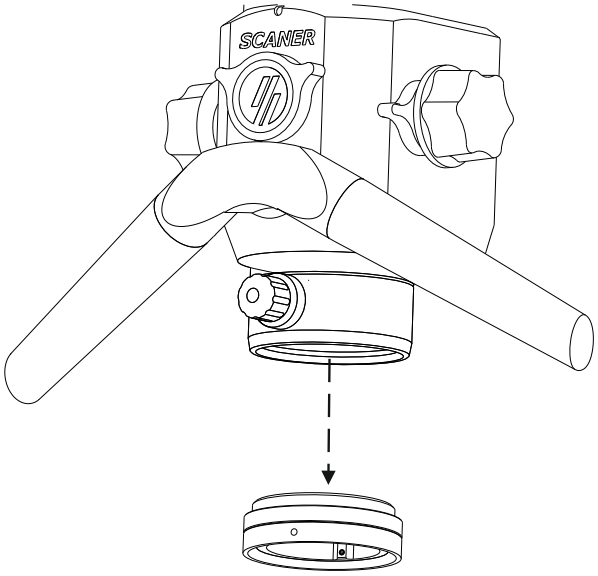


3. Install the plug, in place of the handle, all the way to the stop.
4. Tighten the locking ring all the way to the stop.

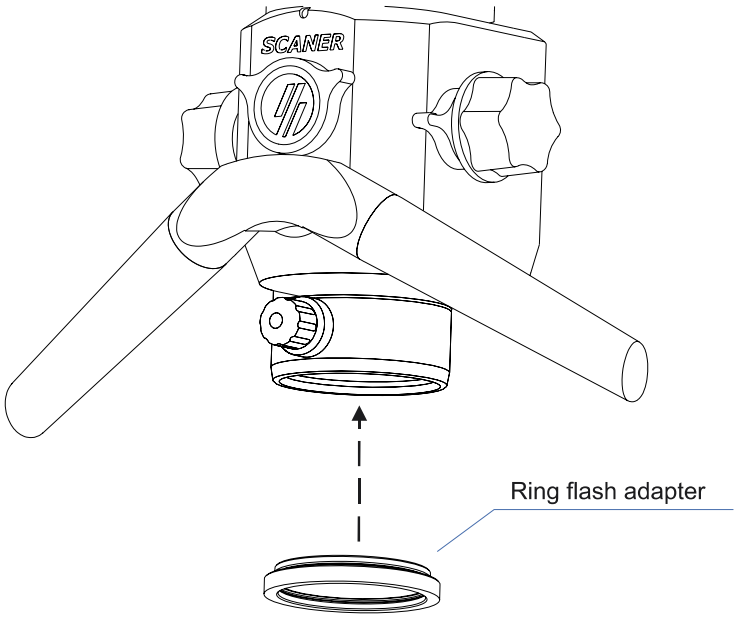

Plug

6.4. Installation of adapter for mounting annular ring flash on the lens

1. Unscrew and remove the lens protective glass from the lens.



2.Screw the ring flash adapter in place of the lens protector all the way down.

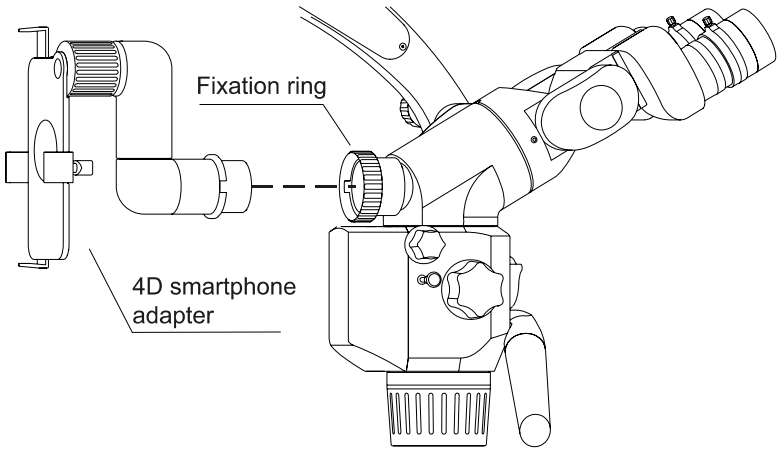


ATTENTION. In using the microscope without the lens protective glass may damage the lens.

ATTENTION. At the end of work with the ring flash adapter install a lens protective glass instead it.

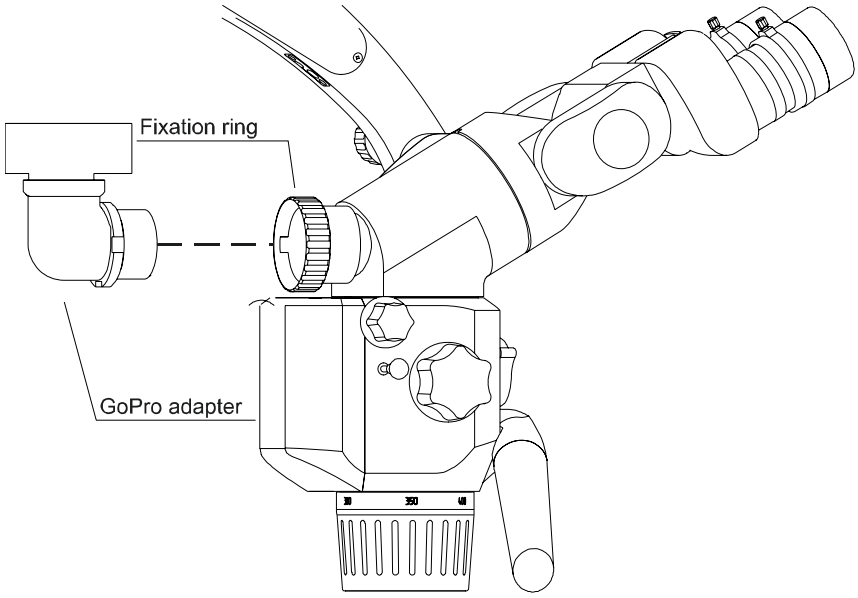
6.5. Installing 4D Smartphone Adapter

1. Unscrew the locking ring and remove the cap from the binocular adapter.
2. Install the 4D smartphone adapter as shown in the picture.
3. Screw in the locking ring all the way to the stop.



6.6. Installing the GoPro adapter

1. Unscrew the locking ring and remove the cap from the binocular adapter.
2. Install the GoPro adapter as shown in the picture.
3. Screw in the locking ring all the way to the stop.

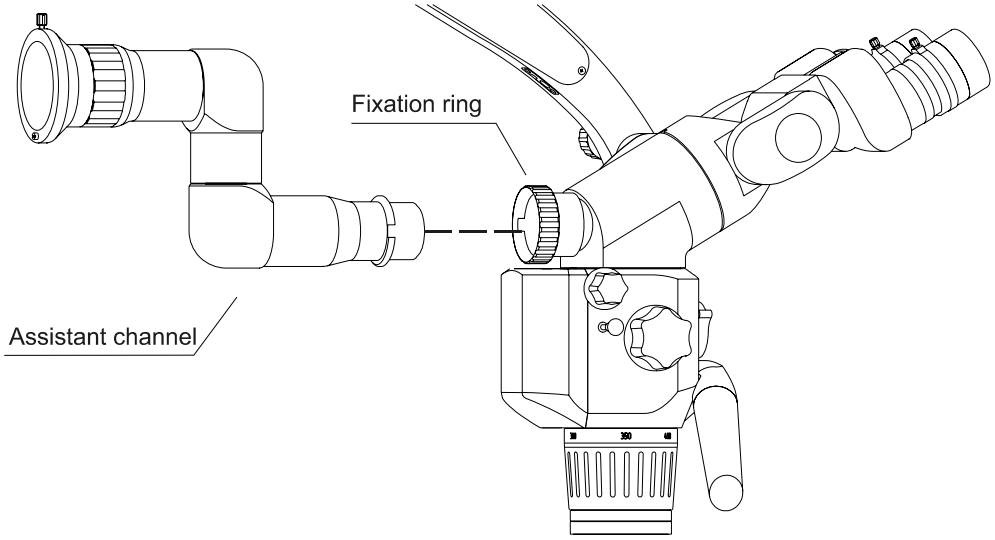


6.7. Binocular Assistant Channel Installation

1. Unscrew the locking ring and remove the cap from the binocular adapter.

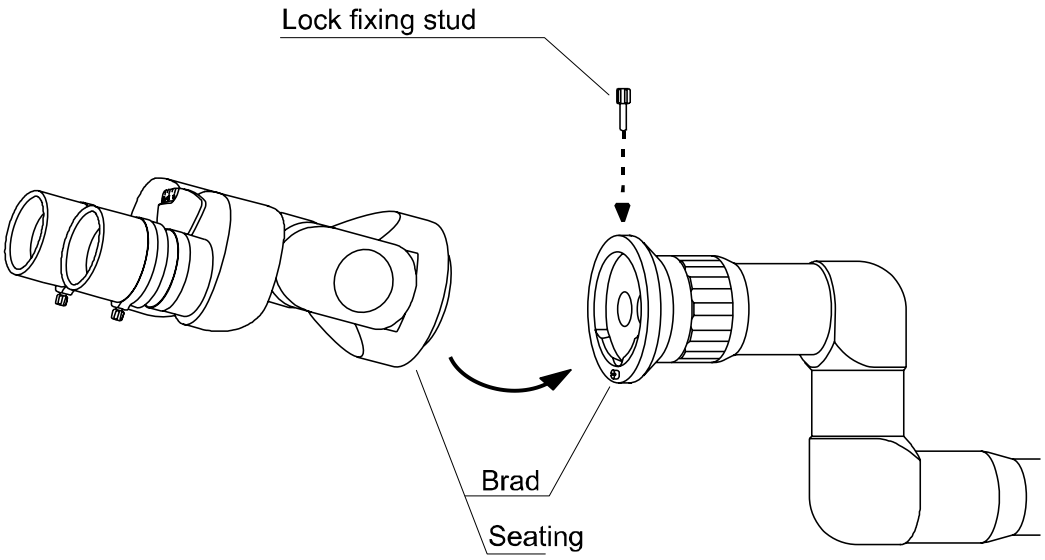
2. Install the assistant's binocular channel as shown in the picture.

3. Screw in the locking ring all the way to the stop.



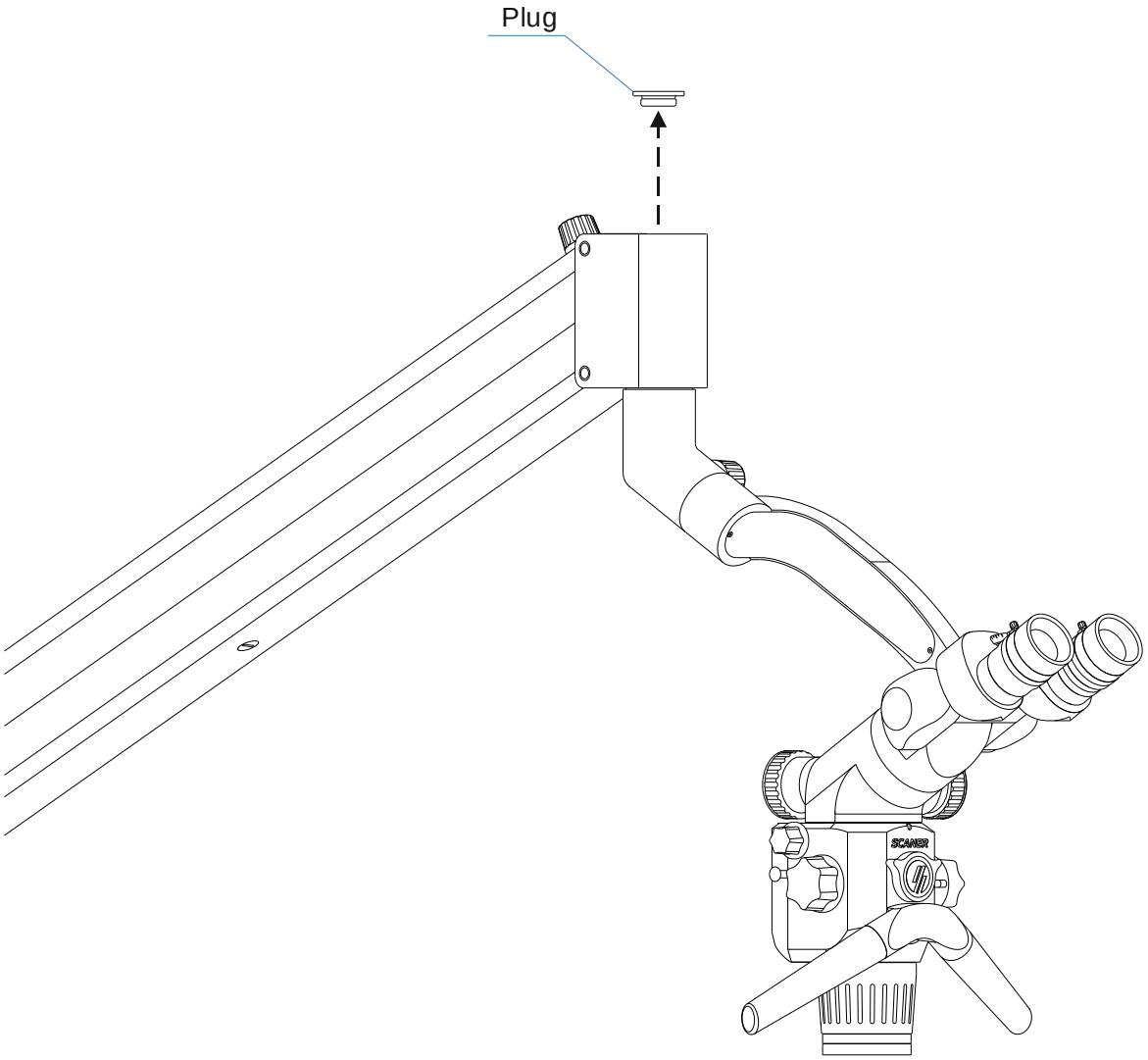
4. Install the binocular piece ± 90 ° with the axial rotation mechanism, aligning the groove on the body of the piece with the pin on the body of the binocular assistant's channel and slightly moving it to the side so that the lock engages.

5. Screw the locking screw of the lock into the channel housing of the binocular assistant, completely until it stops

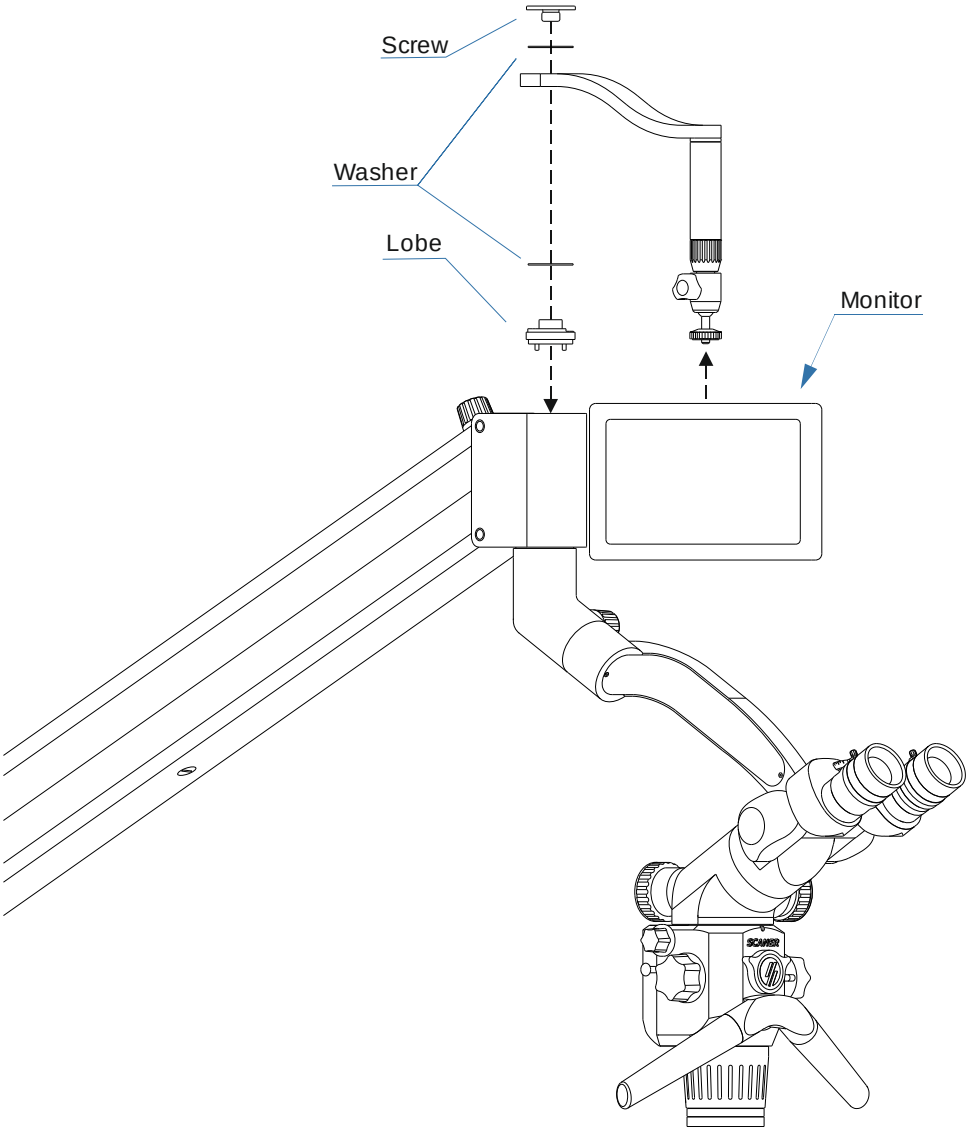


6.8. Installing the assistant monitor mounting and connection system

1. Unscrew the plug from the balance bracket body.

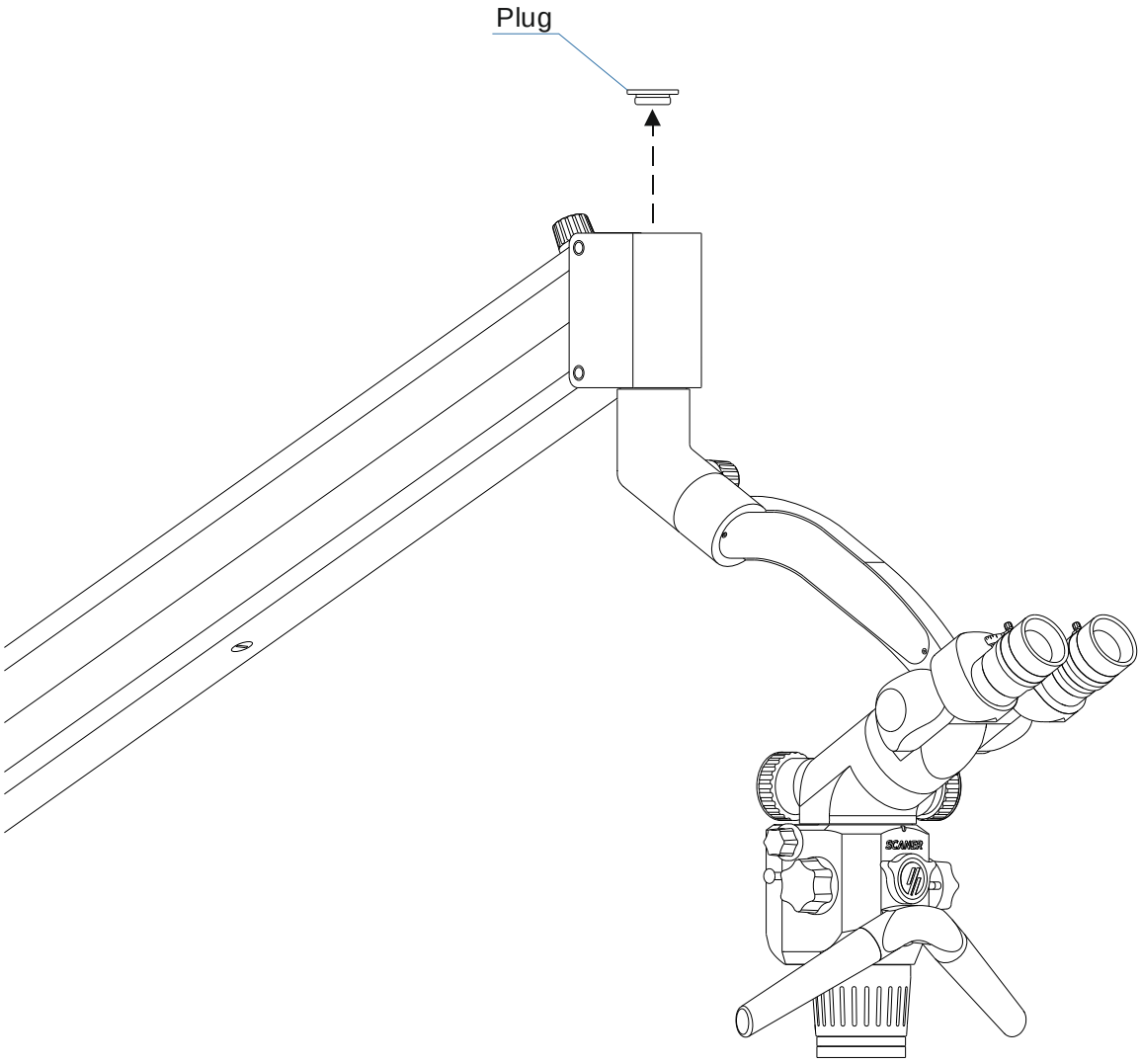


2. Install the lobe by aligning the holes on it and on the body.
3. Secure the lobe by tightening the screws.
4. Thread the washer.
5. Place the assistant's monitor on the arm.
6. Tighten the screw.

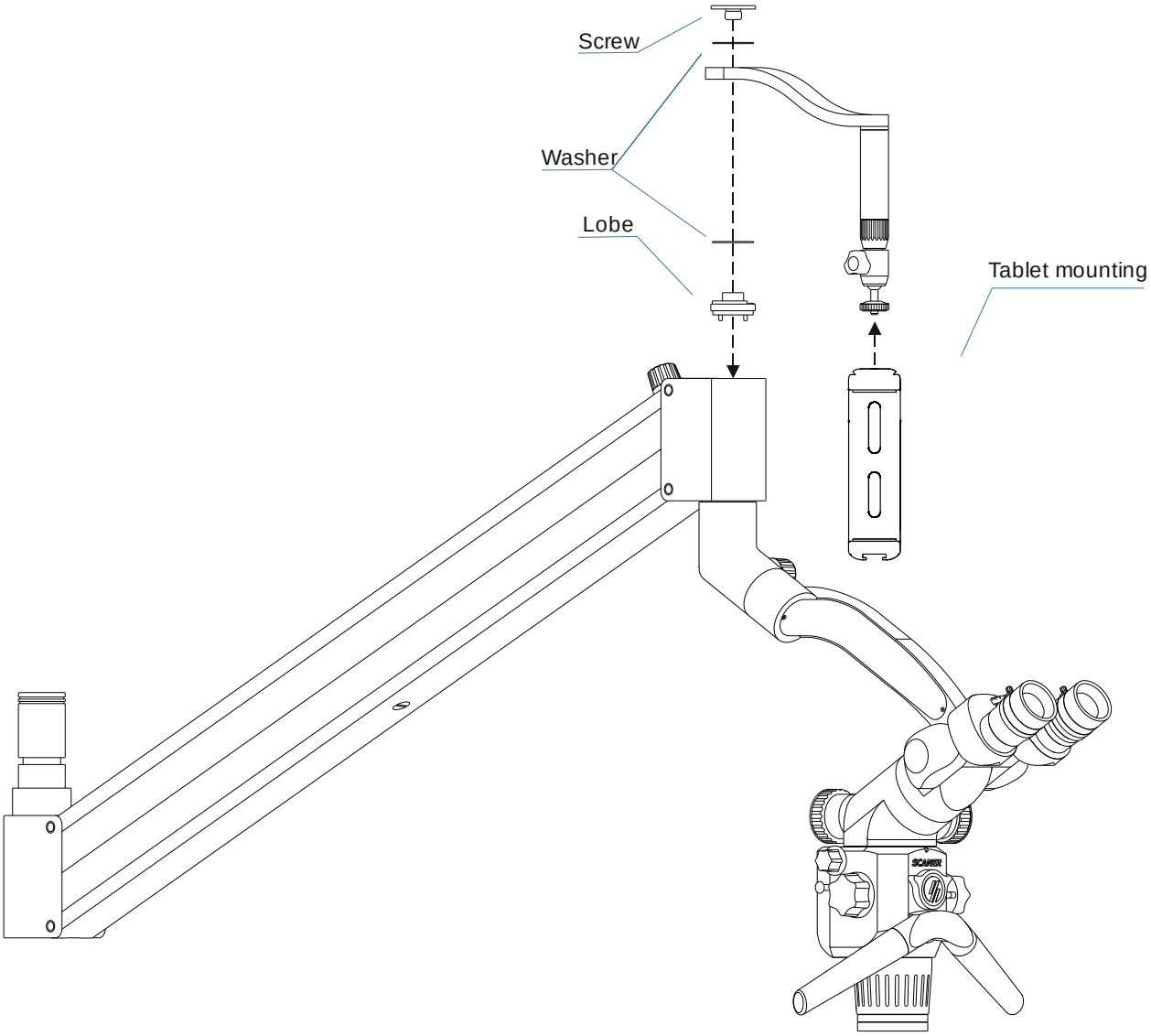


6.9. Installing the tablet mounting and connection system

1. Unscrew the plug from the balance bracket body.



2. Install the lobe by aligning the holes on it and on the body.
3. Secure the lobe by tightening the screws.
4. Thread the washer.
5. Install the tablet mount bracket.
6. Tighten the screw.


Screw
Washer
Lobe
Tablet mounting

7. Operation

ATTENTION. Before using make sure the microscope is in operational condition.

ATTENTION. The duration of continuous operation of the microscope illuminator must not exceed 4 hours followed by 30 minutes of pause.

ATTENTION. Each movable part of the microscope has its own range of motion that is limited with a stopper. Do not try to increase this range by moving the microscope beyond these limits with excessive force.

7.1. Switching on the Microscope. Moving, Fixing and Adjusting the Travel Force of its Movable Parts

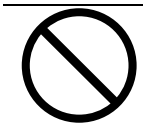
The LED illuminator receives power from the microscope power supply unit that is connected to single phase AC circuit 220 V. There is a switch on/off button with a light indicator located on the side of the power supply unit. Light brightness can be regulated with the help of the brightness control handle situated on optical head.

The balancing lever has a system of automatic disconnection of illuminator supply (a limit switch), when the microscope head reaches the uppermost position.

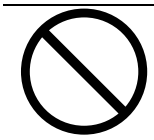
To limit the movement of the balancing bracket, a latch with a spring-loaded element is used (to prevent accidental blows of the balancing bracket on the power supply). In order for the microscope to take up less space when not in use, you need to lower the balancing bracket to a horizontal position, pull the spring-loaded latch handle and bring the bracket closer to the power supply. To bring it to the working position, you need to take it from the horizontal position without lifting the balancing bracket from the power supply, until the latch returns to the working position.

ATTENTION. When moving the microscope on a floor stand, it is necessary to keep both hands on the power supply and stand. The locking of stand rollers is carried out by pressing the pedal lock. Before moving, remove the lock from the rollers.

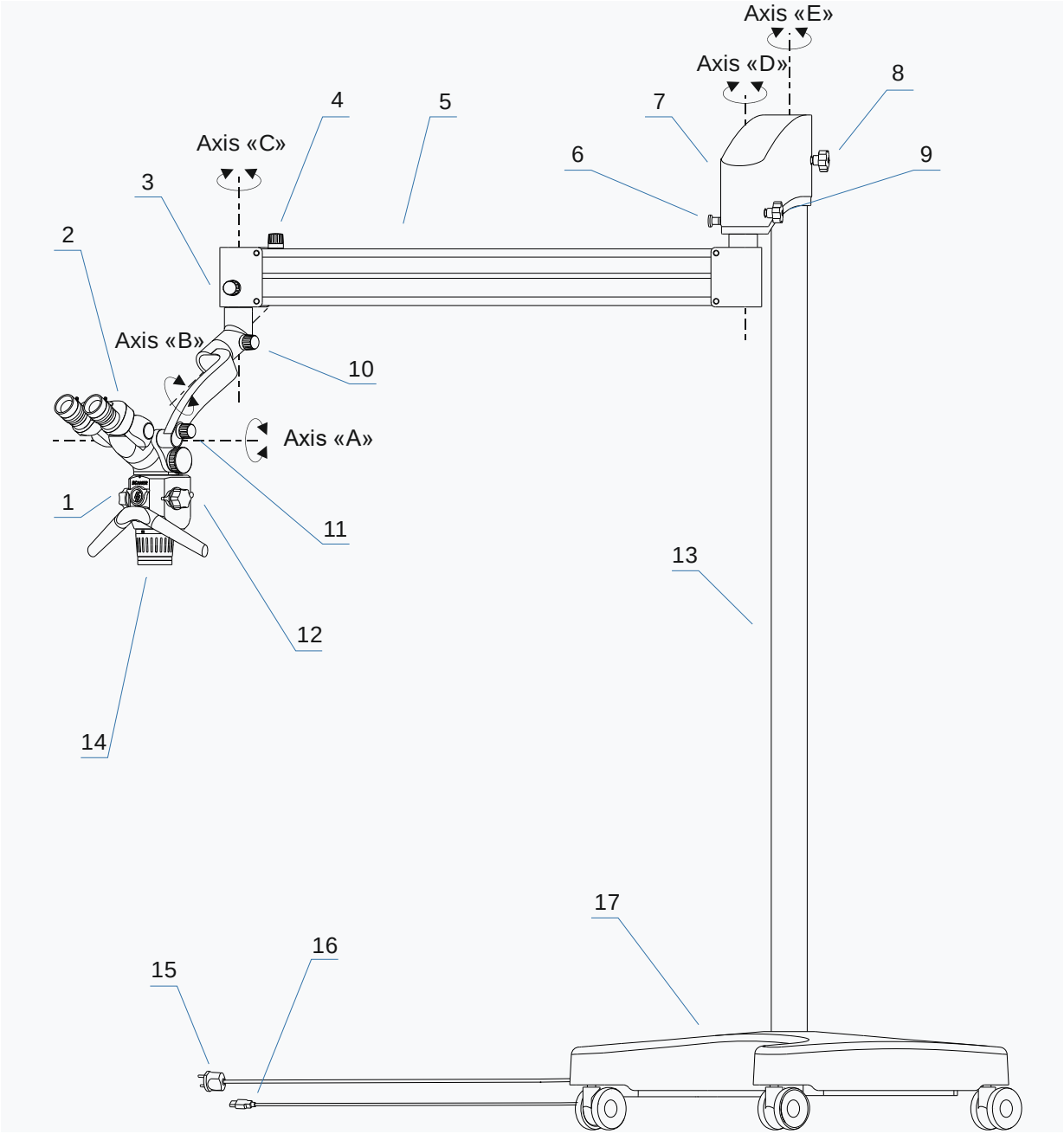
Fixation and adjustment of the travel force of movable parts of the microscope is carried out by rotating the handles on the casing.



PROHIBITED. To fully unscrew and remove the force adjustment knob and the movement adjustment handle of the microscope movable parts during its operation.



FORBIDDEN. Raise the balancing bracket when it is folded.



1 - optical head on a bracket; 2 - binocular attachment with installed eyepieces; 3,4,8,9,10,11 - handles for adjusting the smoothness of movement and fixation; 5 - pantograph spring arm; 6 - movement limiter (latch); 7 - power supply unit; 12 - light filter; 13 - rack; 14 - lens; 15 - power cable; 16 - HDMI cable; 17 - the basis is mobile.

7.2. Adjustment of Interpupillary Distance and Diopter Adjustment

To get a stereoscopic image, the distance between the eyepieces must b adjusted according to the interpupillary distance of the user. The interpupillary distance can be adjusted within the range 53 mm to 78 mm. The interpupillary distance can be adjusted by looking at and revolving the eyepieces with both hands till the images of the observation object seen in the left and right channels totally coincide.

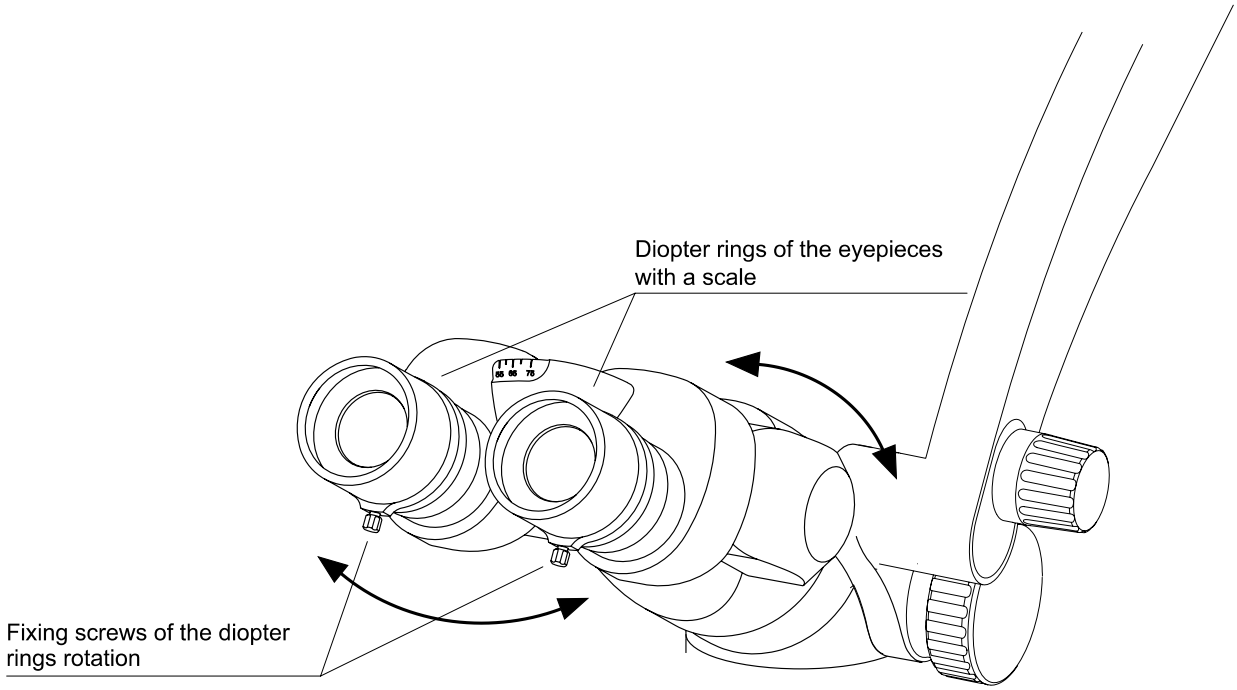
The eyepieces have a mechanism for changing dioptries within +5 -5 D, for each eyepiece. Diopter correction enables doctors to work with ametropia without glasses.

1. Loosen (do not remove completely) the screws fixing the rotation of the diopter rings.

2. While turning the diopter rings around their axis, adjust them according to the diopter aspect of your eyes taking into consideration the diopter scale on the eyepieces.

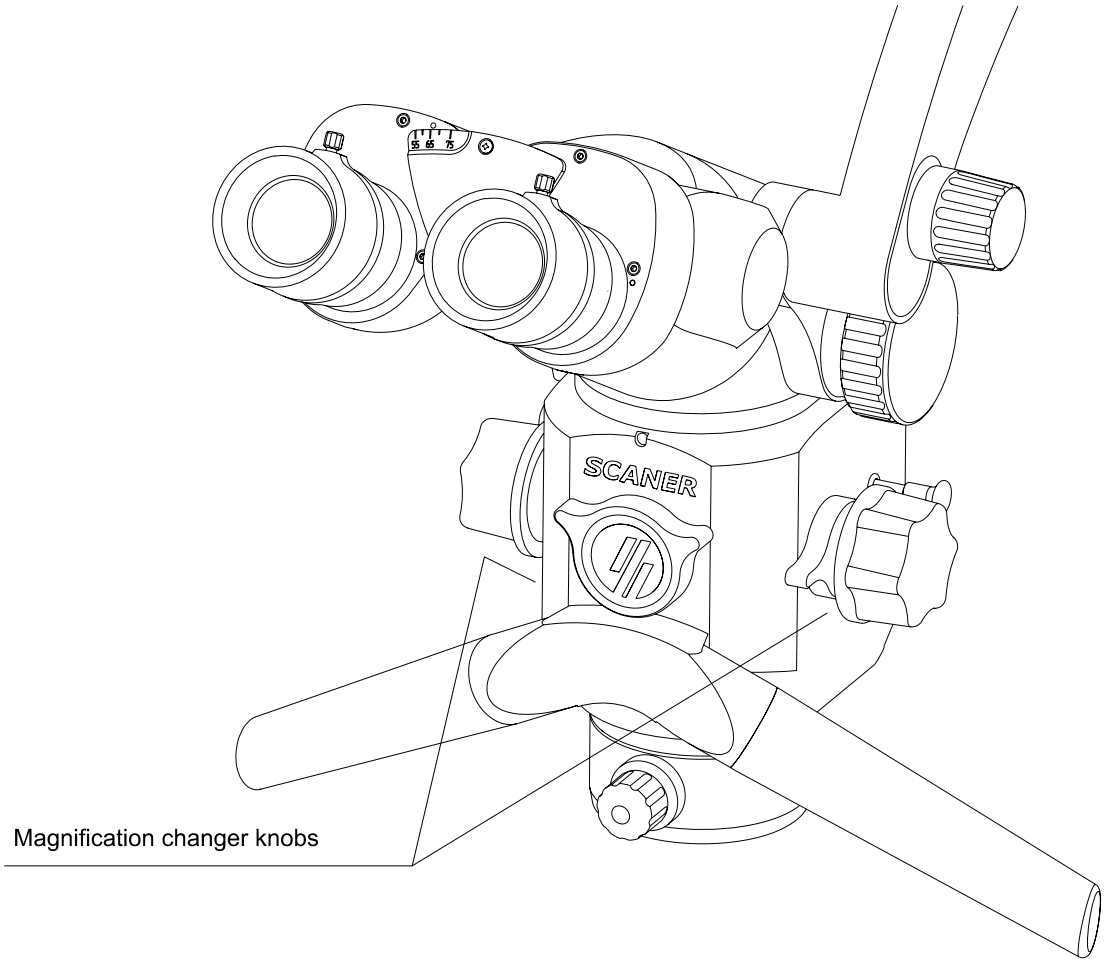
3. Fix the position of the diopter rings by screwing the fixing screws until tight.

4. Focus on the observation object and switch the magnification of the optical system in turn (7.3) to make sure that the image is sharp at all magnifications.



7.3. The Switching of Magnifications of the Optical System

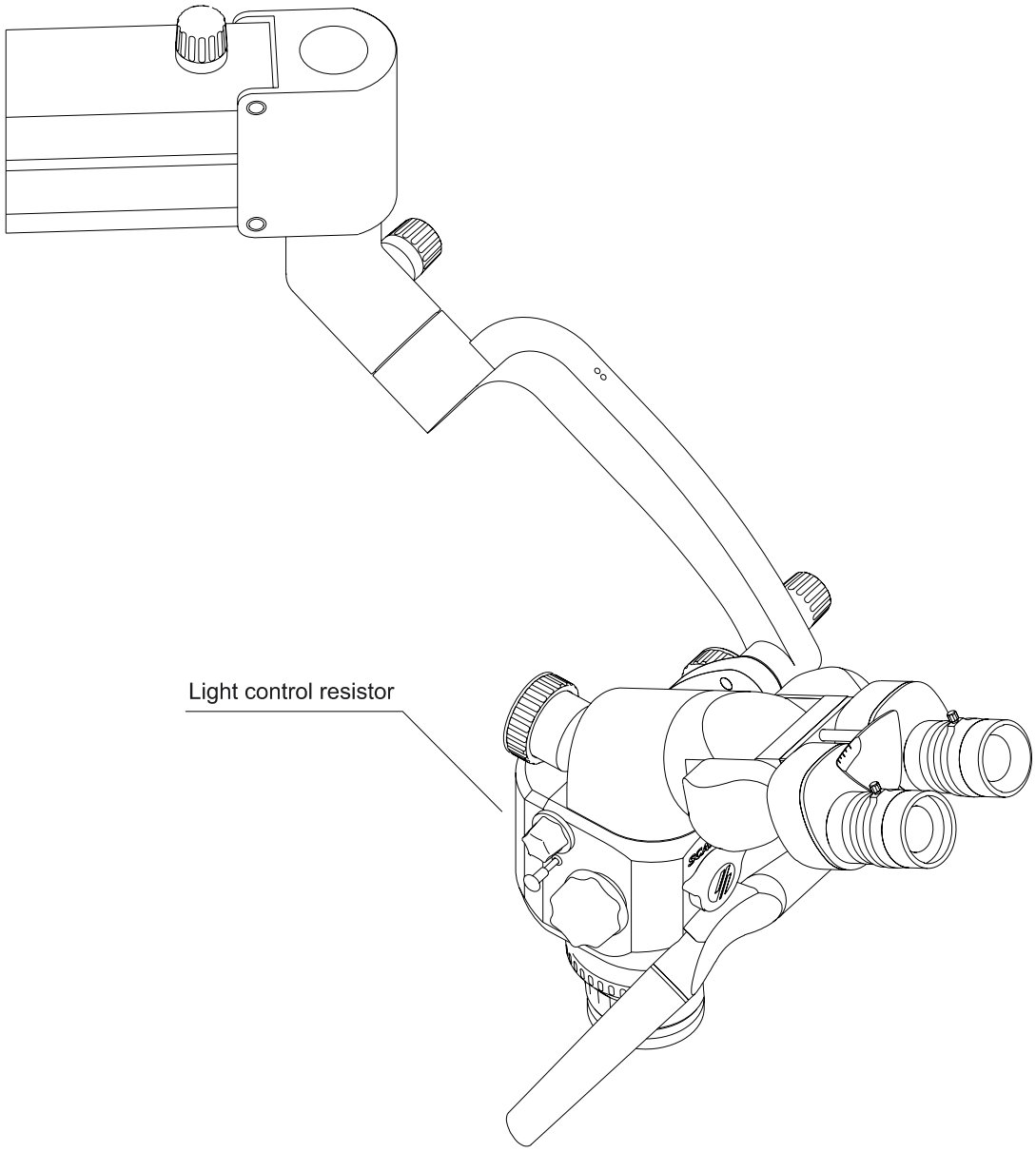
To change magnification of the microscope optical head rotate the magnification selectors that are situated on both sides of the optical head. The knobs have a position marking of the optical head magnification ratio (6 positions) relative to the position of the knobs. Total magnification of the optical system of the microscope is specified in 4.1.



7.4. Using the “Smart light”option

The “Smart light” option is designed to maintain a stable light ratio that returns through the visual channel to the eyepieces, which in turn reduces eye strain when switching magnifications.

To enable this option, you must unscrew the dimming resistor to a minimum until it clicks.

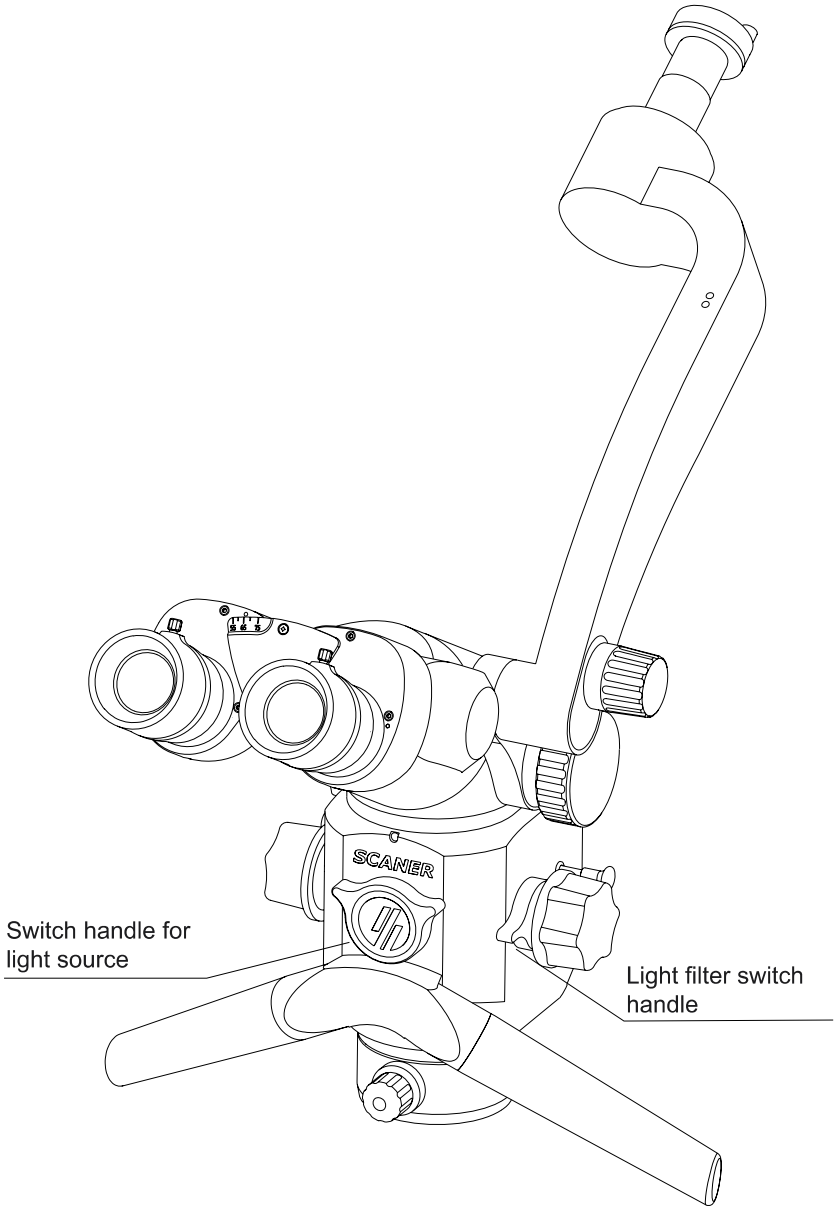


7.5. Using the “Fluorescent light” option

The “Fluorescent light” option is designed to identify carious lesions, accumulation of bacterial plaques, composite restorations and chips.

For greater contrast when working with fluorescent light, the optical head has a built-in light filter in the visual channel.

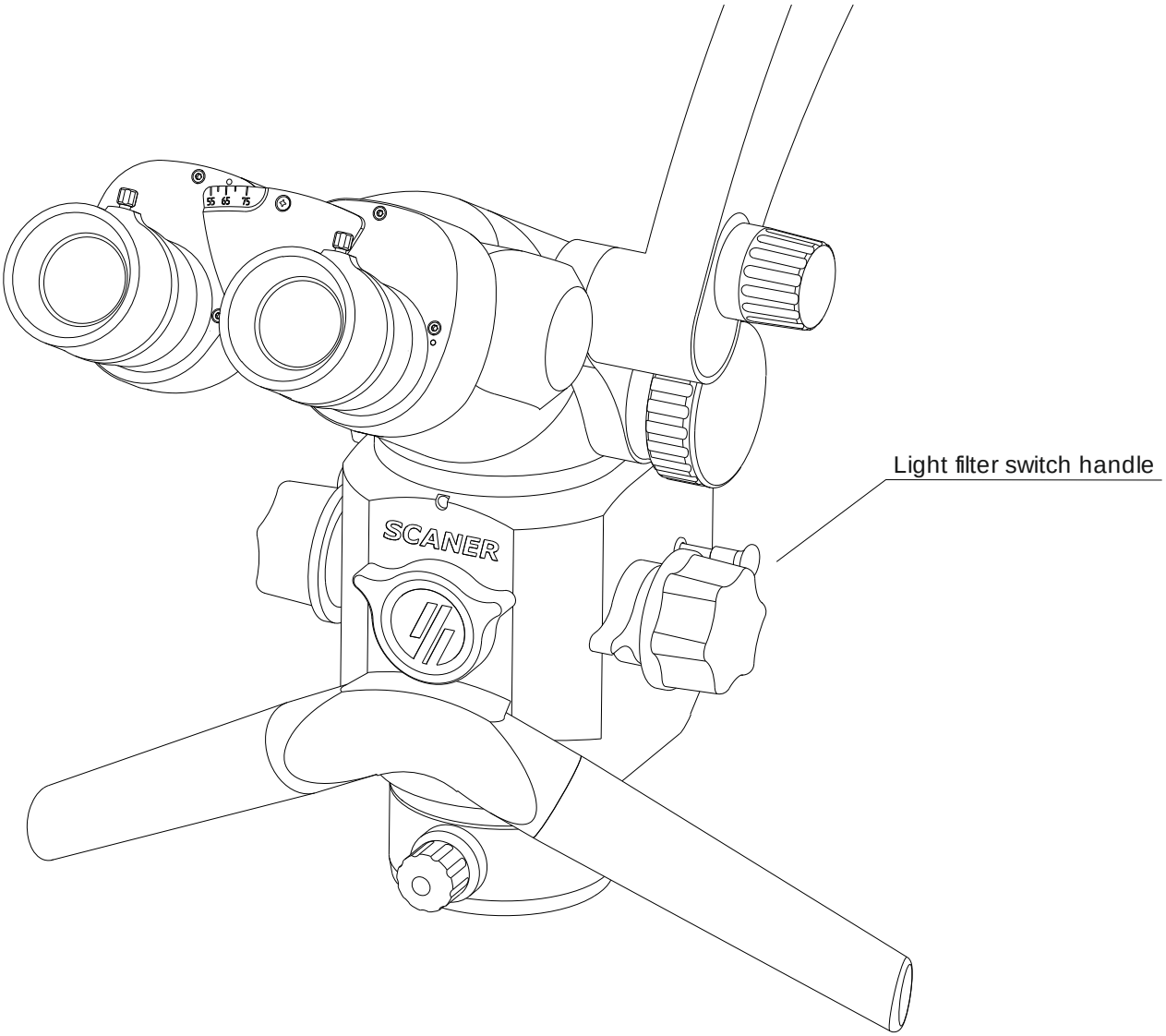
To turn on the light filter, press the lever near the right magnification switch until it stops. After finishing work with fluorescent light, remove the filter from the visual channel by lifting the lever to a horizontal position.



7.6. The Use of the Filter Lens

The illuminator has a built-in light filter: orange is intended to prevent premature photopolymerization of the composite material, and green is to increase the contrast of blood vessels.

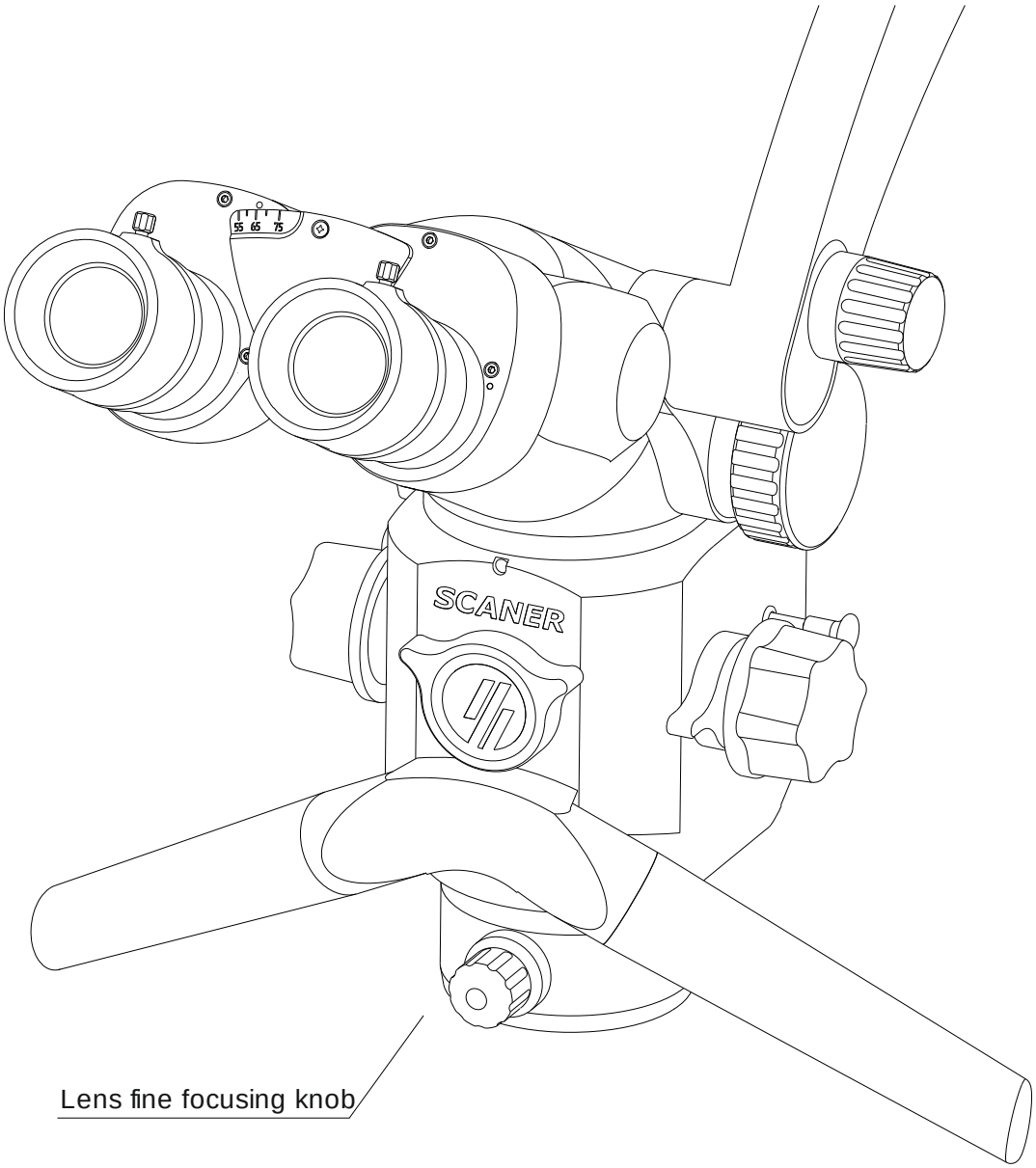
The light filter has 3 working positions. To insert the orange filter into the light channel, you need to move the frame of the filter to the left, all the way to the stop (until you hear a characteristic click). When you move the frame to the right, until a characteristic click, an empty channel is introduced. To enter the green filter into the light channel, it is necessary to move the frame of the filter to the right, all the way to the stop (until you hear a characteristic click).



7.7. Fine Focusing of the Lens

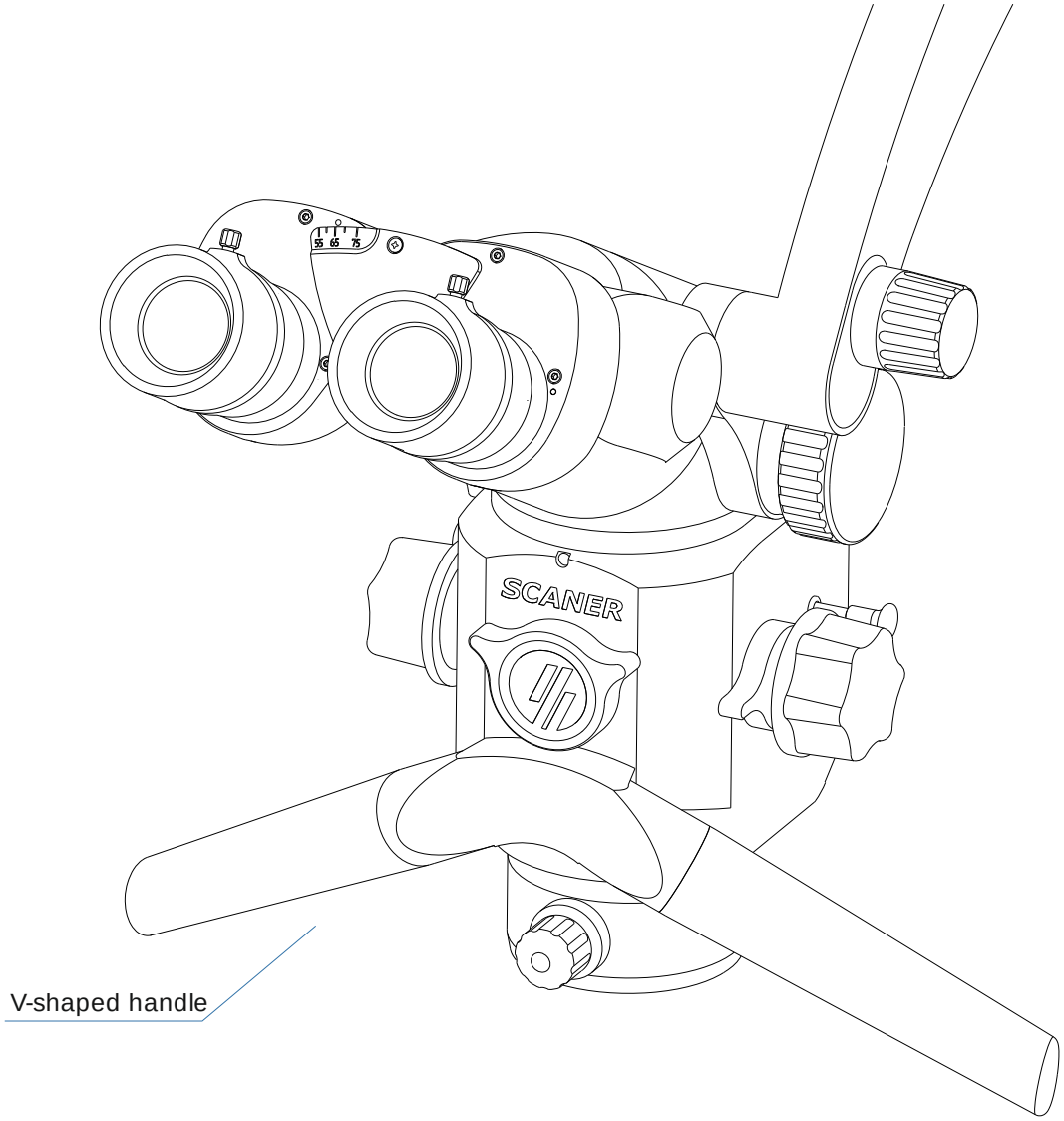
Lenses: f=200 mm, f=250 mm and f=300 mm have a mechanism of fine focusing that allows to adjust the apparent sharpness of the image in the range of 12 mm, without changing the position of the microscope head. To adjust the image sharpness, it is necessary to rotate the fine focusing knob. When using a variable lens, rotation of the outer ring changes the working distance of observation in the range from 200 mm to 400 mm.

The fine focusing knob can be placed in any convenient position relative to the axis of rotation of the lens.



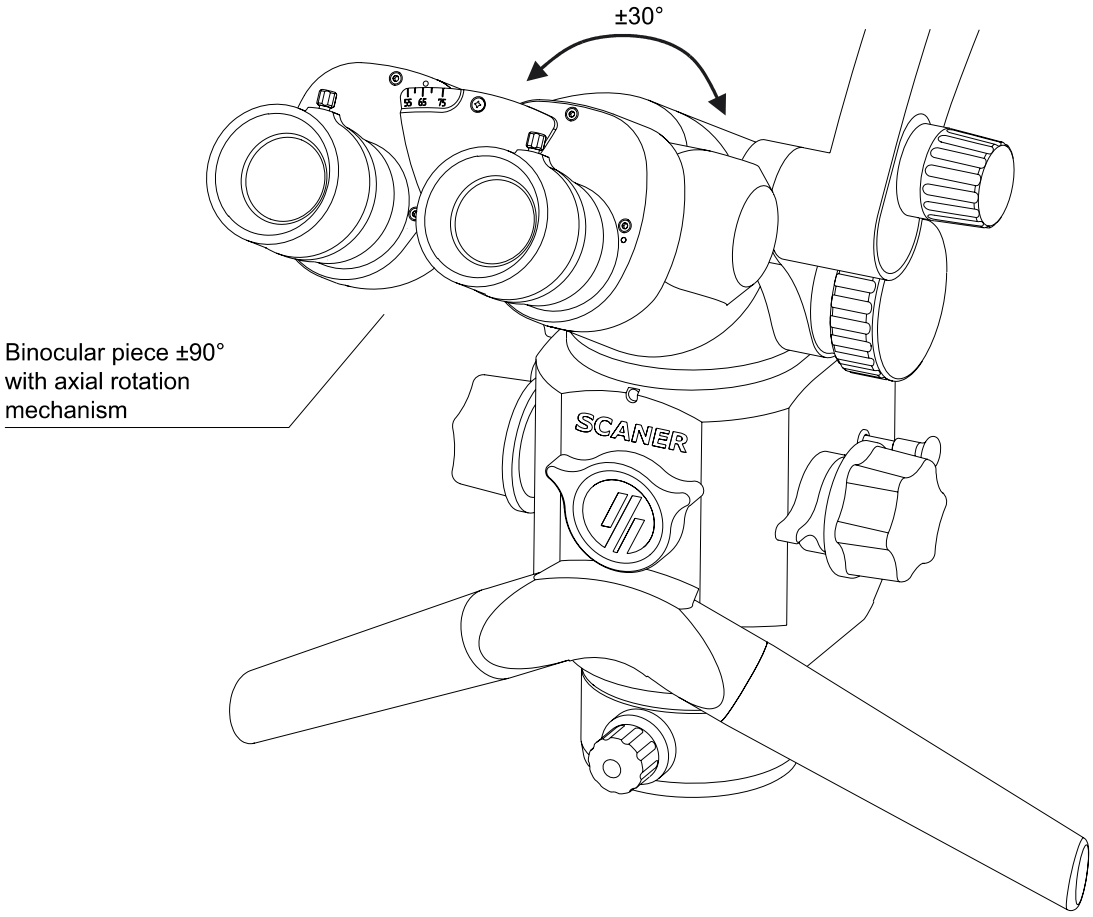
7.8. Пространственное перемещение головки микроскопа

Spatial movement of the microscope head is carried out using a V-shaped handle or a T-shaped handle.



7.9. Rotation of the binocular piece ± 90 ° with the mechanism of axial rotation around the optical axis

Rotation of the binocular piece ± 90 ° with the mechanism of axial rotation around the optical axis of the microscope is carried out in the range of ± 30 °.



ATTENTION. If necessary, remove the binocular rotation ring from the microscope head body, it must be turned to position 0°.

7.10. Using 4D Smartphone Adapter

The 4D smartphone adapter is designed to be connected to a selfphone to a microscope as a photo-video documenting device and allows you to view the image of the investigated area on the smartphone display in real time. The adapter allows you to fix your smartphone and place it in a position convenient for observation. Special application **SOVA** (Special On View App) for iOS and Android operating systems allows you to rotate the image captured by the smartphone camera on its display. The app is available on the App Store and Google Play. The phone must match these parameters:

- Diagonal from 4.7'' to 6.5'';
- The side camera position.

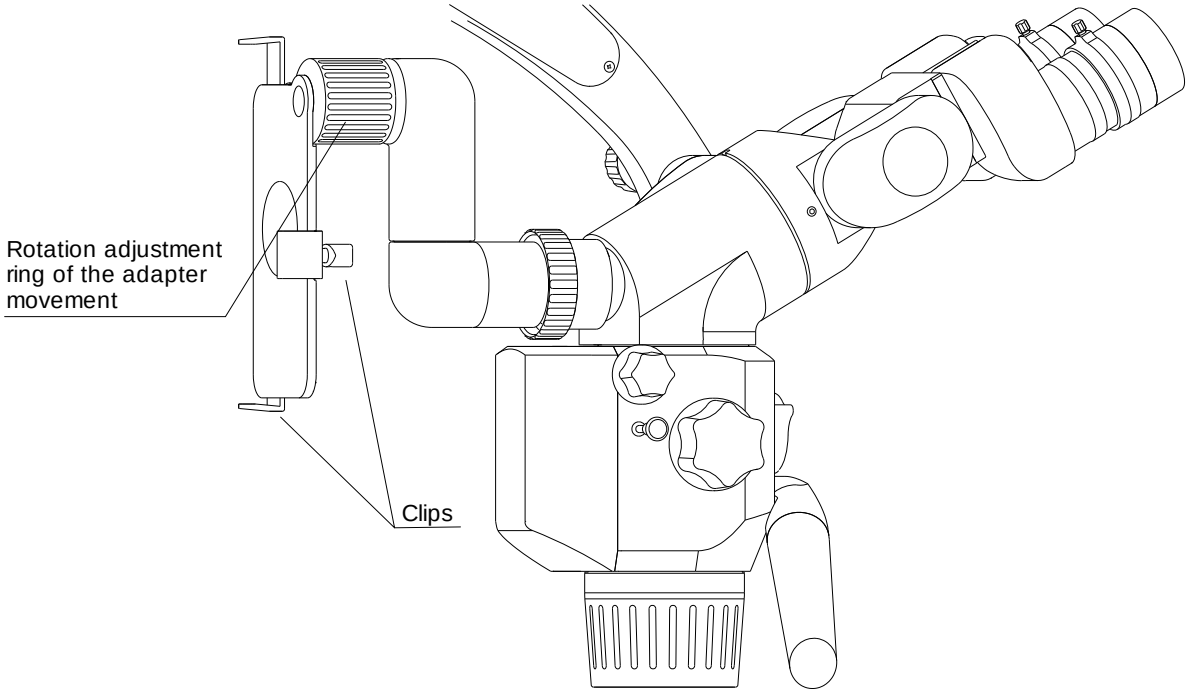
1. Place the magnetic plate between the back of your smartphone and the case.

2. Place the smartphone in the case on the adapter and secure it with the special clips.

ATTENTION. The adapter plate has magnets. The use of a smartphone in a case with a padded magnetic plate is mandatory.

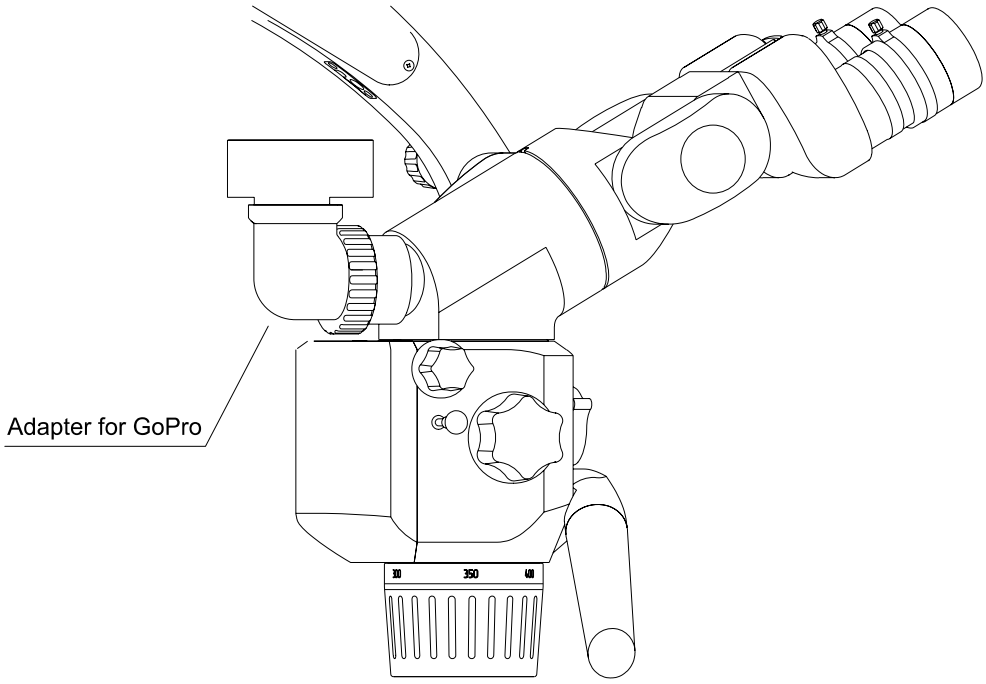
PROHIBITED. When rotating the adapter, hold the smartphone directly as this will cause the smartphone to fall.

ATTENTION. When rotating the adapter, hold it by the clips.



7.11. Using the GoPro adapter

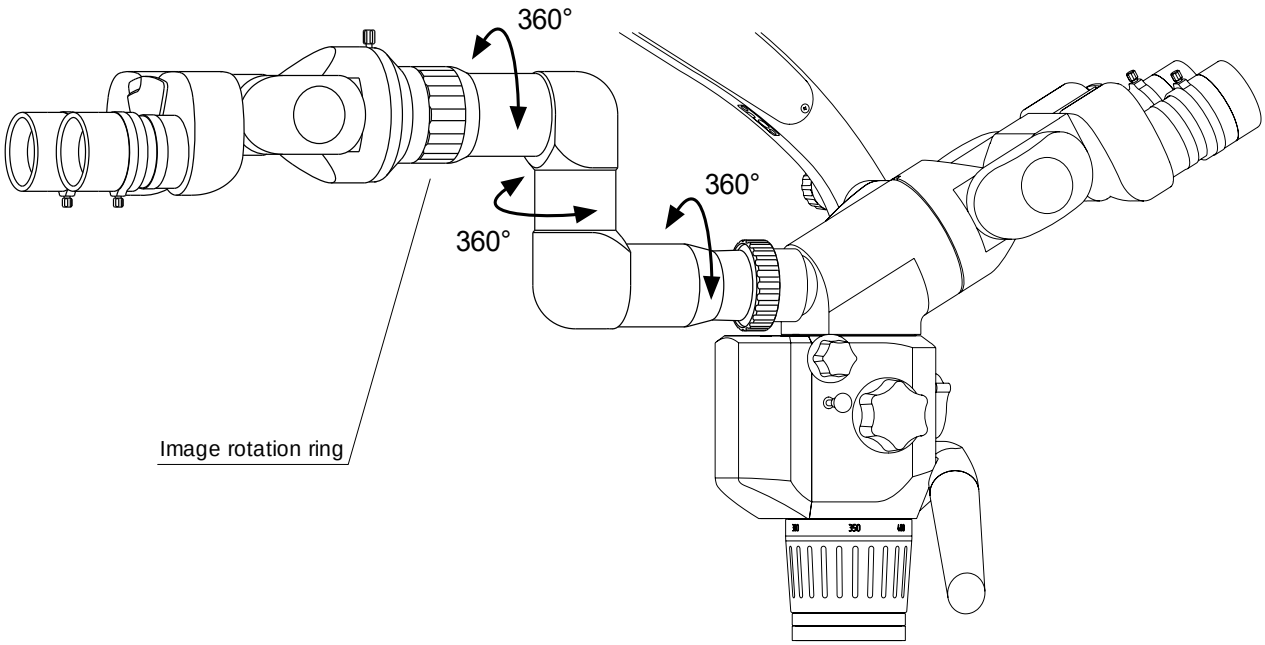
The GoPro adapter is designed to connect a GoPro camera to a microscope as a photo-video documenting device and allows you to view the image of the area of interest on the monitor in real time by the HDMI cable. The adapter allows you to place the camera and fix it in a convenient position for observation. The camera has the ability to broadcast an image in real time to a tablet connected to the microscope using a personal WiFi network.



7.12. Using the binocular assistant channel

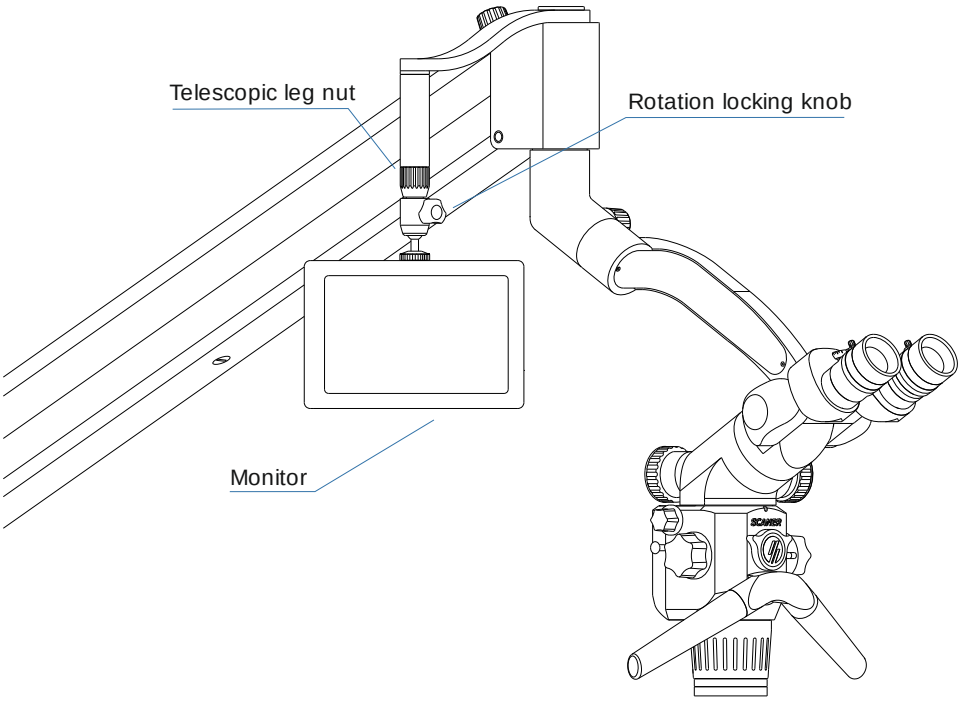
The assistant's binocular channel allows the assistant to observe the doctor's actions by means of visualization through the binocular nozzle installed on the channel ± 90 ° with an axial rotation mechanism.

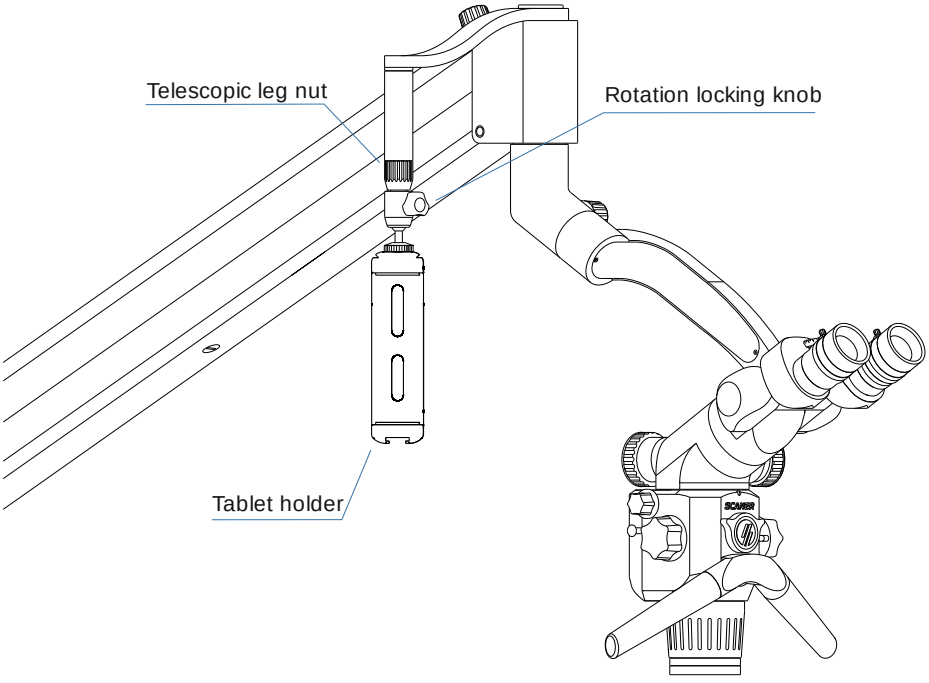
The assistant’s binocular channel allows you to adjust the position of the binocular head in two planes. Rotation of the image is carried out by turning the image rotation ring.



7.13. Using the Assistant Monitor/Tablet Mounting

The system for attaching and connecting the monitor for an assistant / the system for attaching and connecting the tablet is designed to view a color image of the investigated area on a liquid crystal monitor using a digital photo-video documentation system connected to the microscope in real time. The image transmitted on the monitor completely coincides with the image observed through the eyepieces of the microscope. The assistant's monitor is connected to the digital photo-video documentation device mounted on the optical microscope head using an HDMI cable. The monitor can be rotated, and its position is fixed using the rotation lock knob. You can also choose the optimal position of the monitor/tablet in height using a nut.





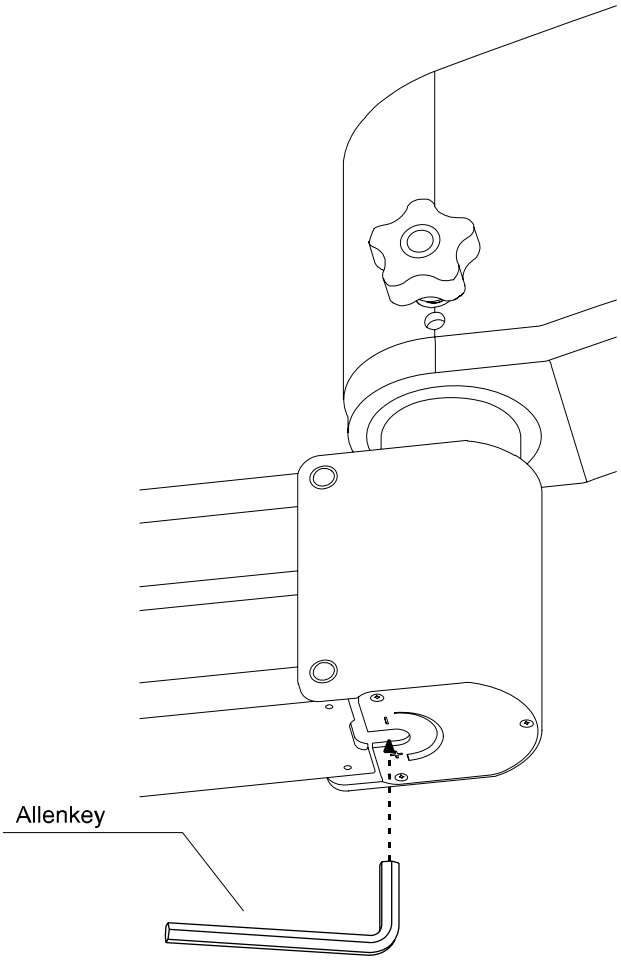
7.14. Adjustment of the Tilt of the Balancing Lever

The need to adjust the tilt of the balancing lever can take place when changing the tension of the gas spring during long-term operation of the microscope or after installation of additional components, которые увеличат общую нагрузку на рычаг.

1. Install the Allen key from the supply kit, in the recess on the bottom of the balancing lever.

2. Turn the key in the direction of strengthening "+" or weakening "-" according to the markings.

3. Check the tilt force of the balancing lever in different positions at the time of the retention.



ATTENTION. The tension force of the gas springs may vary depending on the ambient temperature.

PROHIBITED. To adjust the tension of a gas spring with a sudden change of the ambient temperature.

7.15. Adjustment of the camera optimal parameters

1. To detach the lens from the camera body press and hold the button is located near the mount and rotate the lens (the direction of rotation depends of the camera model). Use the camera's instruction manual if the design of the bayonet lock is different.

2. Connect the camera to the adapter by aligning the marks on the adapter and bayonet and turn the camera body (the direction of rotation depends of the camera model).

3. Plug the microscope to the power supply, turn it on and adjust the brightness value of the illuminator to maximum.

4. Set the magnification of the optical head to "1 time" and look into the eyepieces, focus on any object of observation.

5. Set the camera to "M" (Manual) shooting mode.

6. Set the shutter speed to no longer than "1/125", and the ISO parameter to "auto" (the setting of the aperture parameter, is unavailable when the adapter is connected).

7. Select the white balance mode "manual" and calibrate it, for which:

- place a white sheet of paper as an object of observation, focus on it and make a photo;
- in the camera's setup menu for manual white balance, set a photo of a white sheet of paper as the image for calibration.

8. If it is not possible to select the manual white balance mode in the camera menu, select the "auto" mode.

9. Choose the mode of the image style "standard" or "natural", in which the indicators of sharpness, contrast, saturation and color tone of the image will be zero.

10. Look into the eyepieces, focus on any object and, make a test picture, alternately for each zoom head.

8. Microscope Maintenance

To provide safe and secure operation of the microscope, it is necessary to check the cleanliness of its outer surfaces and optical parts each time before and after the operation. If any outer surfaces or optical parts of the microscope are dirty, perform the cleaning and disinfection procedures described below.

ATTENTION. When using the microscope, there is a risk that potentially infectious patient's tissues can get on its surfaces. In such cases the device must be cleaned and disinfected with the help of individual protection means.

To ensure sterility during surgery or medical examination, use silicone caps available as accessories for the microscope. Silicone caps on the handles, which the doctor touches during his work, prevent infection on the handles and make it easier to clean and disinfect the product.

8.1. Cleaning and Disinfection of Outer Surfaces

1. When any surfaces of the microscope, except for its optical components, become dirty, clean them with a clean piece of cotton cloth and a cleanser.

ATTENTION. It is not recommended to use any acrid or aggressive cleansers because they can damage the paint coating.

ATTENTION. Avoid letting any fluid inside the microscope.

2. After cleaning and disinfection and before using, make sure that the outer surfaces of the microscope are absolutely dry.

8.2. Cleaning of Optical Surfaces

1. When the external optical surfaces are soiled, clean them with cotton swab or clean cotton lint-free cloth soaked in 70% ethyl alcohol.
2. Then wipe them with dry cotton swab.

3. After cleaning and before using, make sure that the outer optical surfaces must be completely dry and have no traces of streaks.

8. 3. Sterilizing/cleaning silicone caps

1. Steam method - 132 - 134 ^{O}C for 5-10 minutes;
2. Air method - 180 ^{O}C for 60 minutes.

9. Troubleshooting

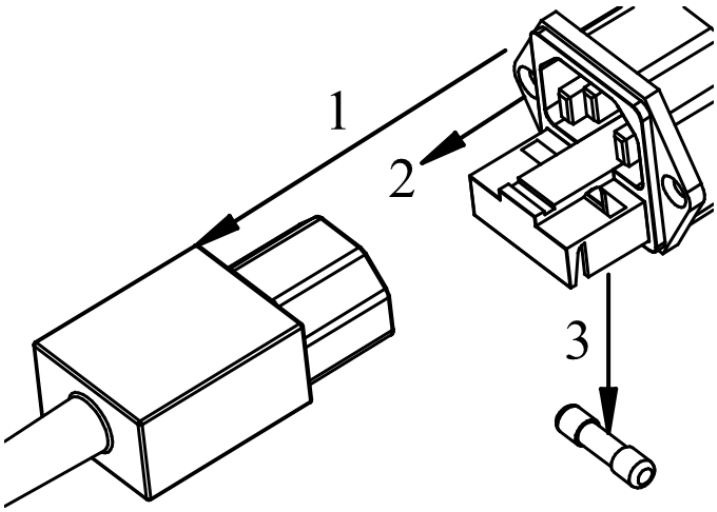
In this section you can find some malfunctions that can take place in operation of the microscope, as well as their possible causes and ways to eliminate them.

In case of a malfunction refer to troubleshooting suggestions. If the malfunction persists or any troubleshooting suggestions concerning this case are absent, contact the manufacturer or its authorized representative in EU.

Signs of malfunction	Possible cause	Troubleshooting method
"Power on" indicator on the illuminator switch in not on	No voltage in the supply mains 220 V 50Hz	Connect the microscope to the proper supply mains 220 V 50 Hz
	Poor contact in power supply circuit	1. Disconnect the plug from the power supply unit; 2. check the integrity of the cable, make sure there is no mechanical damage, and if any damage is absent, connect the plug tightly; 3. fix the plug with a locking connector.
	The fuse element is out of order (safety fuse)	Replace the fuse element (safety fuse) to another one from the supply kit (0)
The light indicator is lit, but the Illuminator does not work	Poor contact in the illuminator socket	1. Disconnect the power supply plug of the illuminator guided by (5.9); 2. check the integrity of the cable, make sure there is no mechanical damage, and if any damage is absent, connect the plug tightly;
Image is not distinct	The surface of the lens optics is soiled	Clean the outer optical surfaces (2)
	The surface of the eyepieces optics is soiled	
Left and right fields of view do not align	Distance between the eyepieces does not correspond to the interpupillary distance of the operator	Adjust the interpupillary distance (7.2)
The image is out of focus	The focus distance to the observation object is not sustained	1. Put the objective at a correct distance from the observation object according to its focus distance. 2. While looking in the eyepieces, move the microscope head closer or farther from the observation object until the image is distinct.
		While looking in the eyepieces, rotate the fine focus control handle of the objective until the image is distinct (7.7)
Image is not distinct when magnification is changed	Diopter adjustment of eyepieces is wrong	Adjust the values of the diopter of the eyepieces (7.2)
Eyes get tired during observation	Diopter adjustment of eyepieces is wrong	Adjust the values of the diopter of the eyepieces (7.2)

9.1 Replacement of the fuse element

The fuse element (safety fuse) is located inside a special compartment of the fuse holder in the power network connector body.



1. Disconnect the power supply plug 1.
2. Pull out the fuse element compartment 2.
3. Remove the fuse element 3 and replace it with new one from the supply kit of the spare parts.
4. Close the fuse compartment and connect the power supply plug.
5. Secure the power plug with holding lock.

PROHIBITED. To use the microscope if the power connector is not fixed with the lock.