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User instructions
Biological inverted microscope

KERN **OCM-1**

OCM 161, OCM 162, OCM 165, OCM 166,
OCM 167, OCM 168

Version 1.3
06/2025



GB

KERN OCM-1

Version 1.3 06/2025

User instructions

Biological inverted microscope

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1 Technical data / Features

Kern model	OCM 161	OCM 162
Item number/type	TOCM 161-B	TOCM 162-A
Dimensions (WxDxH)	304×599×530 mm	
Tubus Art	Trinocular	
Optical system	Infinity	
Revolving nosepiece screw-in positions	5	
Lens quality	Infinity Plan	
Standard objectives	4x 10x 20x 20x (PH) 40x	
Eyepiece field width	HWF	
Illuminance Transmitted light	30W	5W
Type of lighting Transmitted light	Halogen	LED
Lighting equipment	Transmitted light	
Condenser type	ABBE	
Condenser aperture	1,25	
Input voltage power supply / current [Max]	100 – 240V AC 50/60Hz 1,5A	100 – 240V AC 50/60Hz 0,3A
Input voltage device / current [Max]	12V, 4A	5V, 1A
Plug-in power supply type	Desktop power supply	Plug-in power supply
Focusing mechanism	Coaxial coarse and fine drive	
Packaging dimensions	660x590x325 mm	
Net weight	15 kg	
Gross weight	17 kg	

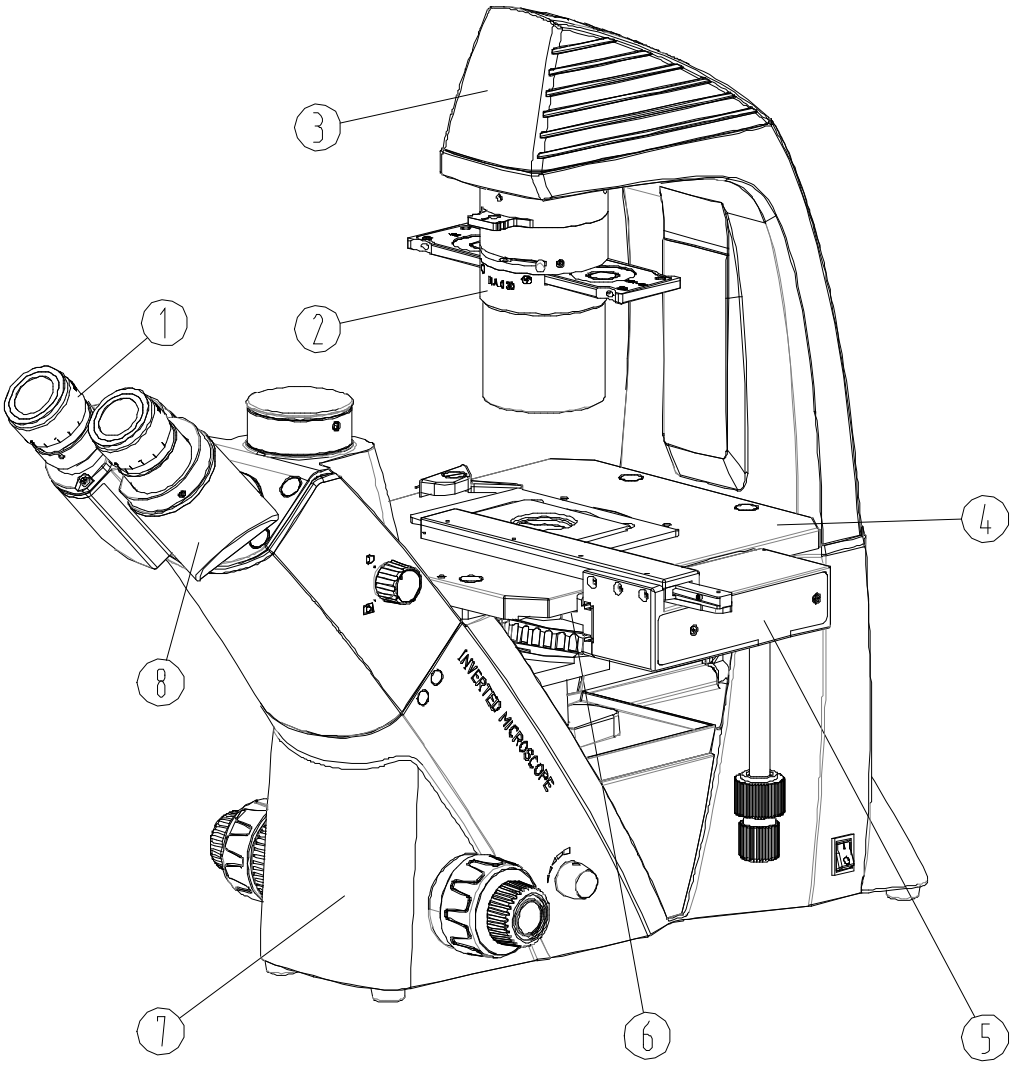
Kern model	OCM 165	OCM 166
Item number/type	TOCM 165-B	TOCM 166-B
Dimensions (WxDxH)	304×782×530 mm	
Tubus Art	Trinocular	
Optical system	Infinity	
Revolving nosepiece screw-in positions	5	
Lens quality	Infinity Plan	
Standard objectives	4x 10x 20x 20x (PH) 40x	
Eyepiece field width	HWF	
Illuminance Transmitted light	30W	
Type of lighting Transmitted light	Halogen	
Illuminance Reflected light	100W	
Type of lighting Reflected light	HBO Epi-Fluorescence (B/G)	HBO Epi-Fluorescence (B/G/V/UV)
Lighting equipment	Transmitted and reflected light	
Condenser type	ABBE	
Condenser aperture	1,25	
Input voltage power supply / current [Max]	100 – 240V AC 50/60Hz 1,5A	
Input voltage device / current [Max]	12V, 4A	
Plug-in power supply type	Desktop power supply	
Focusing mechanism	Coaxial coarse and fine drive	
Packaging dimensions	670x590x540 mm	
Net weight	22 kg	
Gross weight	26 kg	

Kern model	OCM 167	OCM 168
Item number/type	TOCM 167-C	TOCM 168-B
Dimensions (WxDxH)	304×782×530 mm	
Tubus Art	Trinocular	
Optical system	Infinity	
Revolving nosepiece screw-in positions	5	
Lens quality	Infinity Plan	
Standard objectives	4x 10x 20x 20x (PH) 40x	
Eyepiece field width	HWF	
Illuminance Transmitted light	5W	
Type of lighting Transmitted light	LED	
Illuminance Reflected light	5W	
Type of lighting Reflected light	LED Epi- Fluorescence (B/G)	LED Epi- Fluorescence (B/G/V/UV)
Lighting equipment	Transmitted and reflected light	
Condenser type	ABBE	
Condenser aperture	1,25	
Input voltage power supply / current [Max]	100 – 240V AC 50/60Hz 0,3A	
Input voltage device / current [Max]	5V, 1A	
Plug-in power supply type	Plug-in power supply	
Focusing mechanism	Coaxial coarse and fine drive	
Packaging dimensions	670x590x540 mm	
Net weight	16 kg	
Gross weight	20 kg	

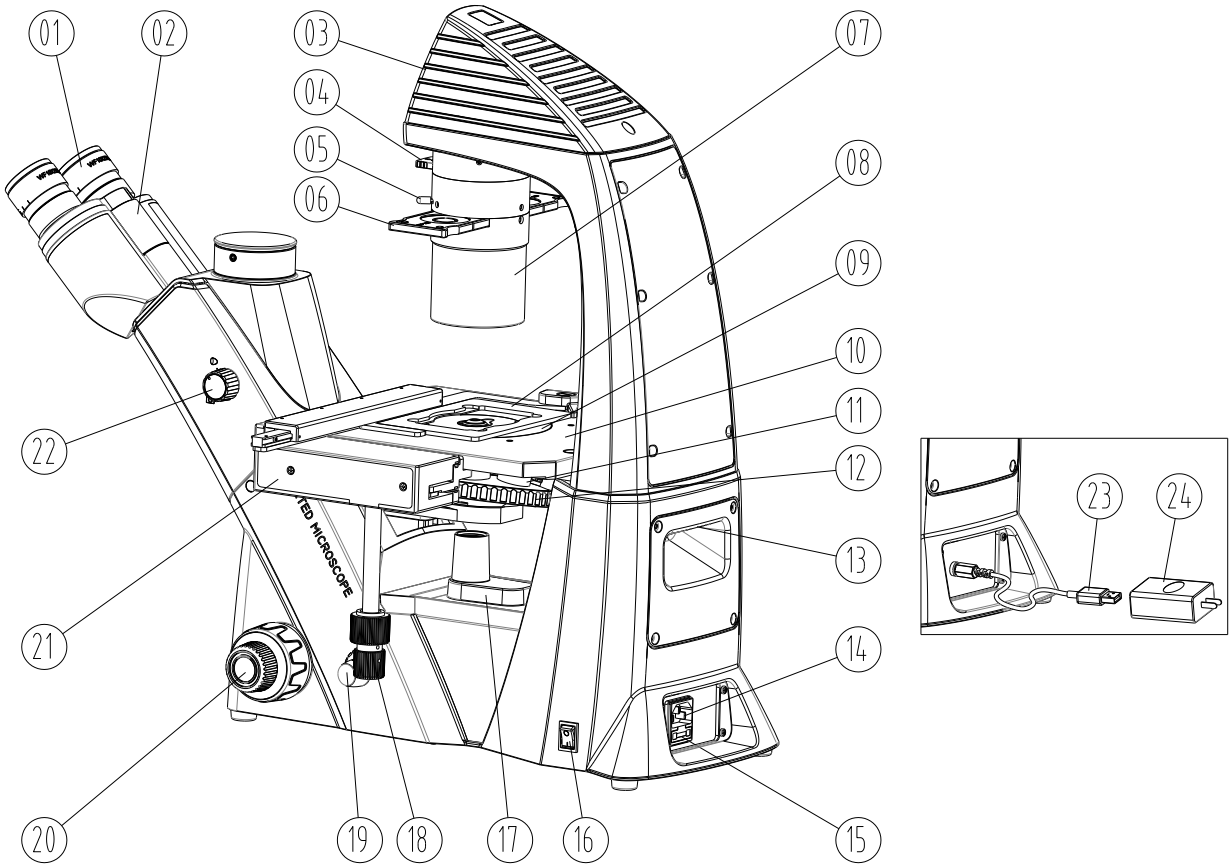
2 Declaration of conformity

The current EC/EU Declaration of Conformity can be found online at:
https://www.kern-sohn.com/shop/de/DOWNLOADS/

3 Device overview



1） Eyepiece
2） Condenser
3） Lamp housing
4） Specimen Stage
5） Attached Mechanical Stage
6） Nosepiece
7） Microscope body
8） Microscope head / Tube



1） Eyepiece
2） Microscope head / Tube
3） Lamp housing
4） Color filter slide
5） Lever for aperture diaphragm
6） Phase contrast slide
7） Condesor
8） Sample holder
9） Stage plate
10） Specimen stage
11） Objetive
12） Nosepiece
13） Carrying handle
14) Power connection
15) Fuse housing
16) Main switch
17) Collection tray for fluids
18) Control wheel for attached stage
19) Dimmer
20) Coarse and fine adjustment
21) Attached machanical stage
22) Trinocular toggle wheel
23) USB cable
24) plug-in power supply

4 Before use

4.1 General notes

You must open the packaging carefully, to make sure that none of the accessories in the packaging fall on the floor and get broken.

In general, microscopes should always be handled carefully because they are sensitive precision instruments. When using or transporting the microscope it is particularly important to avoid abrupt movements, as this may damage the optical components.

You should also avoid getting dirt or finger prints on the lens surface, because in most cases this will reduce image clarity.

To maintain the performance of the microscope, it must never be disassembled. So components such as lenses and other optical elements should be left as they were before use. Also the electrical parts on the rear and base of the device must not be tampered with, as in this area there is an additional risk of triggering an electric shock.

5 General Information

5.1 General information on warnings

Warnings are used in these operating instructions to warn you of possible personal injury or damage to property in certain situations.

Signalword	Discription
DANGER	Failure to observe the instructions will lead directly to serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
WARNING	Failure to observe the instructions may result in serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
CAUTION	Failure to observe the instructions may result in minor injuries or temporary damage to the user or third parties (e.g. minor cuts)
NOTE	Failure to observe the instructions may result in damage to property

Symbols in warning notices:

Symbol	Meaning
Warning signs	Warning signs warn you of dangers that may lead to personal injury. The symbol indicates the type of hazard.
	Indicates general hazards or a danger point
	Warning of electrical voltage
	Warning of flammable substances
	Warning of explosive substances

Symbol	Meaning
Commandment sign	Mandatory signs prescribe measures that you must take to avoid personal injury or damage to property. The symbol indicates the necessary actions or objects to prevent damage.
	Indicates a prescribed action

5.2 Intended use

The OCM-1 is used in particular for the observation of preparations in culture vessels (flaskes, pertri dishes, microtiter plates), translucent and thin, low-contrast demanding preparations (e.g. living mammalian cells, tissue, possibly also microorganisms, immunofluorescence, FISH, DAPI staining, etc.).

5.3 Improper use

Do not use the device in potentially explosive atmospheres or for measurements in liquids or on live parts.
Unauthorized structural changes, additions or conversions to the device are prohibited.

5.4 Warranty

Warranty expires in case of

- Non-compliance with our specifications in the operating instructions
- Use outside the described applications
- Modifying or opening the device
- Mechanical damage and damage caused by media, liquids, natural wear and tear
- Improper set-up or electrical installation
- Improper assembly or electrical installation

5.5 Notes on the electrical system

Before connecting to a mains power supply, you must make sure that you are using the correct input voltage. The information to select the correct mains cable is located on the device, on the rear of the product directly above the connection socket. You must comply with this information. If you do not comply with these specifications, then fires or other damage to the device could occur.

The main switch must also be switched off before the mains cable is connected. In this way you will avoid triggering an electric shock.

If you are using an extension cable, then the mains cable you use must be earthed.

If the original fuse should blow, it must only be replaced by an appropriate fuse. Suitable replacement fuses are included with the delivery.

When carrying out any procedures whereby you come into contact with the electrical system of the device, such as, for example, changing the bulb or fuse, only carry out these procedures when the power is disconnected.

Under no circumstances should you touch the halogen bulb (for transmitted illumination) or the HBO lamp (OCM 165, OCM 166) for the reflected light unit either during operation or directly after use. These bulbs produce significant heat and therefore there is a risk that the user could be severely burnt. So before handling the bulbs, you must check that they have cooled down.
Furthermore the housing of the reflected light unit heats up during operation. That is indicated by the warning symbol on the backside of the lamp housing. We recommend to only carefully handle this housing during the usage and to let it cool down before it is packed for transportation or covered by a protective hood.

5.6 Transport and storage

You should ensure that the device is not exposed to direct sunlight, temperatures which are too high or too low, vibrations, dust or a high level of humidity.

The ideal temperature range is between 0 and 40°C and a relative humidity of 85% should not be exceeded.

The device should always be located on a rigid, smooth, horizontal surface.

When the microscope is not being used, you should cover it with the enclosed dust protective cover. When doing this, the power supply is stopped by switching off at the main switch and unplugging the mains cable. If the eyepieces are being stored separately, the protective caps must be fitted to the tube connectors. In most cases, if dust and dirt gets inside the optical unit of a microscope this can cause irreversible errors or damage.

The best way to store accessories which consist of optical elements, such as, for example, eyepieces and objectives, is in a dry box with desiccant.

Note

If you store or transport the device improperly, the device may be damaged. Observe the information on transporting and storing the appliance.

Packaging / Return transport

Returns are only possible within the limits of the general terms and conditions Keep all parts of the original packaging for any necessary return transport.

- Only the original packaging is to be used for return transport.
- Disconnect all connected cables and loose/movable parts before dispatch.
- Refit any transport locks provided.
- Secure all parts against slipping and damage.

6 Unpacking and commissioning

6.1 Unpacking

! In the event of a return, please observe the instructions in the chapter ‘Packaging/return transport

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Upon receipt of the device, please check in advance that no transport damage has occurred and that the outer packaging, the housing, other parts or even the device itself have not been damaged. If any damage is evident, please notify KERN & Sohn GmbH immediately.

7 Maintenance, servicing and disposal



Disconnect the appliance from the power supply before carrying out any maintenance, cleaning or repair work.

7.1 Maintenance and cleaning

In any event, the device must be kept clean and dusted regularly.
If any moisture should be occur, before you wipe down the device you must ensure that the mains power is switched off.

When glass components become dirty, the best way to clean them is to wipe them gently with a lint-free cloth.

To wipe oil stains or finger prints off the lens surface, moisten the lint free cloth with a mixture of ether and alcohol (70 / 30 ratio) and use this to clean the lens.

You must be careful when handling ether and alcohol, as these are highly flammable substances. You must therefore keep it away from naked flames and electrical devices which can be switched on and off, and only use it in well-ventilated rooms.

However organic solutions of this type should not be used to clean other components of the device. This could lead to damage to the paint finish. To do this, it is sufficient to use a neutral cleaning product.

You could also use the following cleaning products to clean the optical components:

- Special cleaner for optical lenses
- Special optical cleaning cloths
- Bellows
- Brush

When handled correctly and checked regularly, the microscope should give many years of efficient service.

Should repairs still be necessary, please contact your KERN dealer or our Technical Department.

7.2 Disposal



Old appliances and accessories must not be disposed of with household waste.

The operator must dispose of the packaging and appliance in accordance with the applicable national or regional legislation at the place of use.The device consists of various components and materials, such as:

- Electronic components (circuit boards, electrical cables
- Plastic (housing)
- Metal

Improper disposal of the appliance can have harmful effects on people and the environment.

Proper and environmentally friendly disposal can prevent harmful effects and recover raw materials.

8 Basic warnings and safety instructions

8.1 Observe the notes in the operation instructions



Read the operating instructions carefully before commissioning/using the device, even if you already have experience with KERN devices. Always keep the instructions in the immediate vicinity of the device.

8.2 Staff training

The appliance may only be used by persons who have read and understood the operating instructions, in particular the chapter on safety.

8.3 Safety

⚠ WARNING	
	**Read all safety information and instructions.** Failure to comply with the safety information and instructions may result in electric shock, fire and/or serious injury**.** **Keep all safety notices and instructions for future reference.** ● The design of the device must not be modified. This can lead to incorrect measurement results, safety defects and destruction of the device ● Do not operate the device in potentially explosive rooms or areas and do not set it up there. ● Do not operate the device in an aggressive atmosphere. ● Do not immerse the device in water. Do not allow any liquids to penetrate the inside of the device. ● The device may only be used in a dry environment and under no circumstances in rain or at a relative humidity above the operating conditions. ● Protect the device from permanent direct sunlight. ● Do not expose the device to strong vibrations. ● Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in a legible condition ● Do not open the device ● Während des Betriebs weist die Lampe eine sehr starke Hitzeentwicklung auf. Es sollte vermieden werden das Lampengehäuse während des Betriebs und einige Zeit danach zu berühren. ● Do not operate the device in an aggressive atmosphere. ● Es darf niemals in die Okulare geschaut werden, wenn der Strahlengang (mittels Schieber für Strahlengangblockade geöffnet ist..

⚠ WARNING	
	**Risk of injury due to electric shock!** ● Risk of short circuit due to liquids entering the housing! ● Do not immerse the device and accessories in water. Ensure that no water or other liquids get into the housing. ● Work on electrical components may only be carried out by an authorized specialist company!

⚠ WARNING



Danger of suffocation!
Do not leave the packaging material lying around carelessly. It could become a dangerous toy for children.
● The appliance is not a toy and does not belong in the hands of children.
● This appliance can be dangerous if it is used improperly or not as intended by untrained persons! Observe the personnel qualifications**!**

⚠ WARNING



Electrostatic sensitive device!
● The device can be destroyed by electrostatic discharges. Connectors for HF signals are particularly at risk.
● Please observe the handling instructions for electrostatically sensitive components.

⚠ WARNING





●The built-in HBO replacement lamp must never be touched with bare hands on its glass housing. Contamination increases the risk of explosion during operation. If contamination does occur, the lamp must be cleaned.
● An HBO lamp has a certain service life. The closer it is brought to its limit, the greater the risk of the lamp exploding and releasing toxic mercury vapor. This must be prevented by all means.

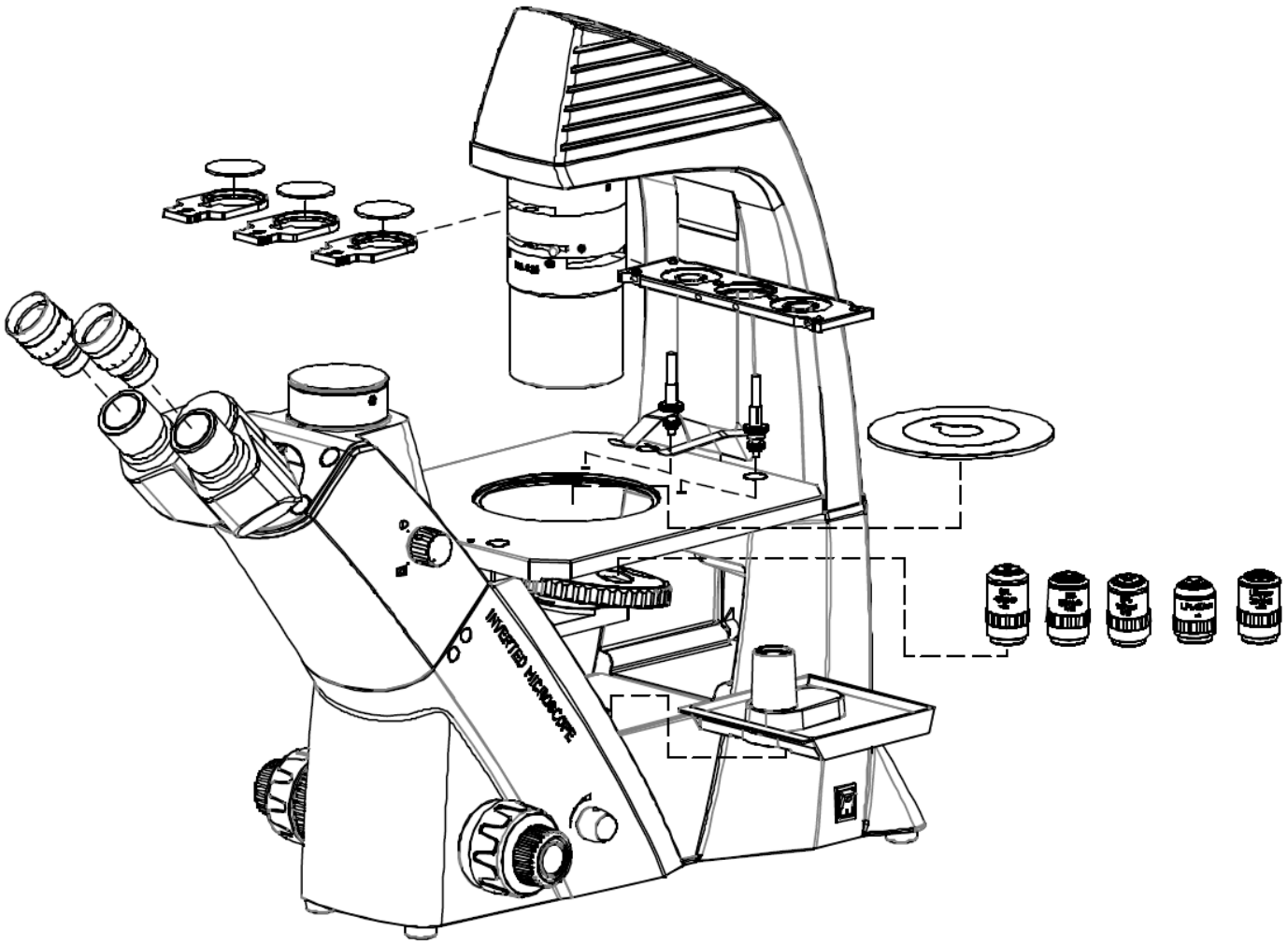
CAUTION

Keep a sufficient distance from heat sources.
Do not use the device in environments with high humidity or water mist

NOTE

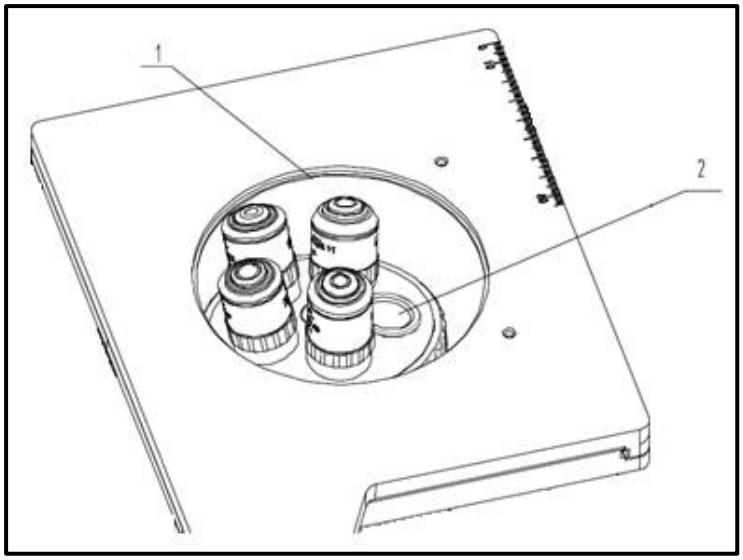
● To avoid damaging the appliance, do not expose it to extreme temperatures, extreme humidity or moisture.
● Do not use harsh cleaning agents, abrasives or solvents to clean the appliance.

9 Assembly



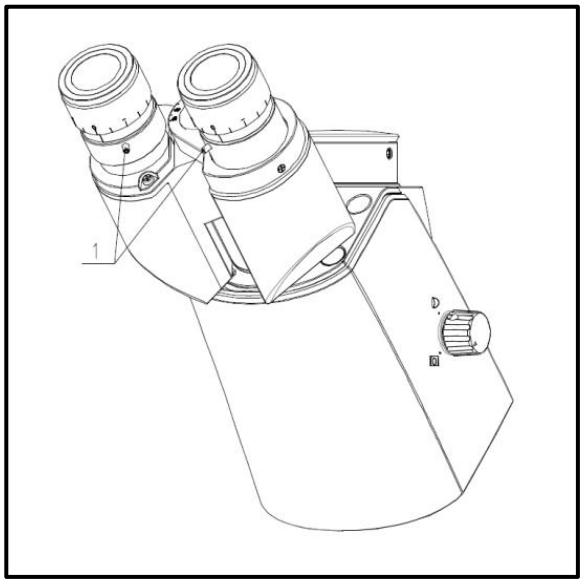
9.1 Objectives

The nosepiece must be in its lowest position so that the objectives [1] can be screwed into it. You can then pass the objectives through the opening of the specimen stage and screw them into the nosepiece, so that when you turn the nosepiece in a clockwise direction, the objective with the next strongest magnification appears. You must make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.
To the screw locations which are not filled with an objective [2], you must attach the protective cap.



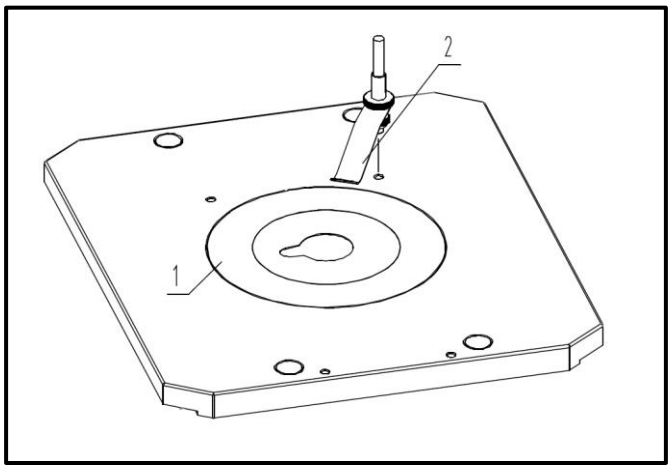
9.2 Eyepieces

You must always use eyepieces with the same magnification for both eyes. These are simply placed onto the tube connectors, once you have first removed the plastic protective caps. There is a way of fixing them by an Allen screw [1] for each eyepiece that is located on the tube connector (*see illustration*). You should always make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

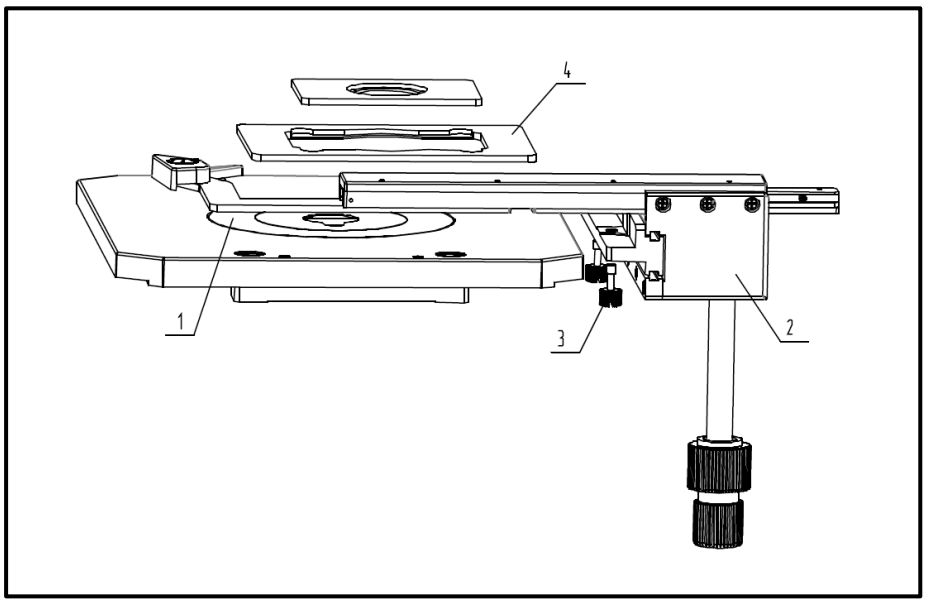


9.3 Specimen stage

The supplied stage plate [1] needs to be fitted to the opening of the specimen stage, in order to get a support area for relatively small observation objects and to protect the objectives which are located underneath.
Furthermore you can attach an object holder to one of the threads on stage surface [2].



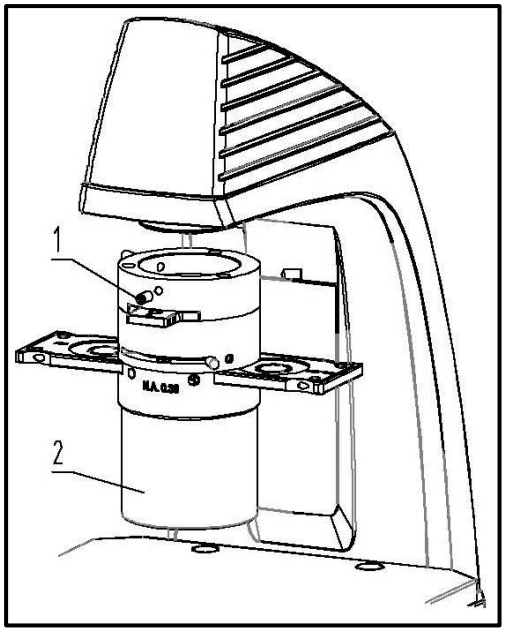
The scope of delivery standardly includes an attached mechanical stage [2].
It can be mounted on both sides of the specimen stage, so that the control wheels can be operated, as the user wishes, on the left or on the right side. Also it provides the possibility to place further object holders on the stage plate for using certain trays (culture dishes).
The mounting is done by two screws [3], which then are fixating the attached stage onto the left or right bottom side of the stage.
Furthermore you can apply additional object holders [4] in order to fix and move culture dishes with special dimensions on the stage surface.



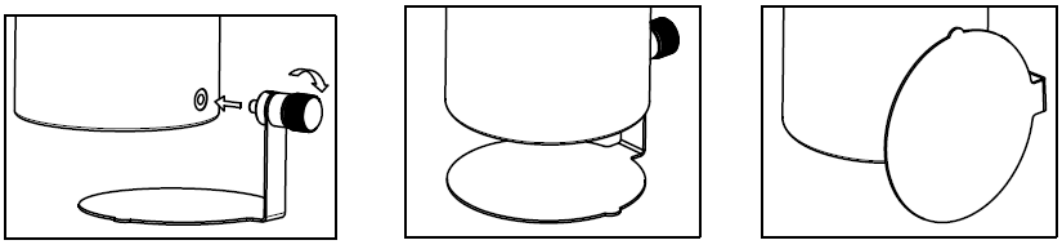
9.4 Condenser

The condenser [2] must be mounted on the microscope housing underneath the lamp housing. By using the Allen screw [1] it must be firmly attached onto the connection point.
The condenser includes the following control elements:

- Color filter slide (*see 5.7 Adjusting the illumination*)
- Aperture diaphragm (*see 5.7 Adjusting the illumination*)
- Slot for phase contrast slide (*see 8.2 Phase contrast unit*)



Installation and use of light-cover plate:
When in fluorescent observation, light-cover plate should be installed as shown below in order to reduce the impact of environmental stray light.



a. Screw the knurled screw into the corresponding screw hole at the rear of the condenser and ensure that it's tightened.

b. Put the light-cover plate down over the sample for fluorescence observation.

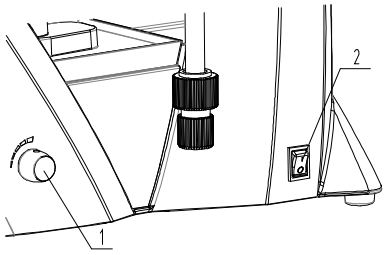
c. When in bright field observation, turn the light-cover plate to the side or remove it.

For the connection of a microscope camera and the using of phase contrast or fluorescence units, please see chapter 12 Using optional accessories.

10 Operation

10.1 Getting started

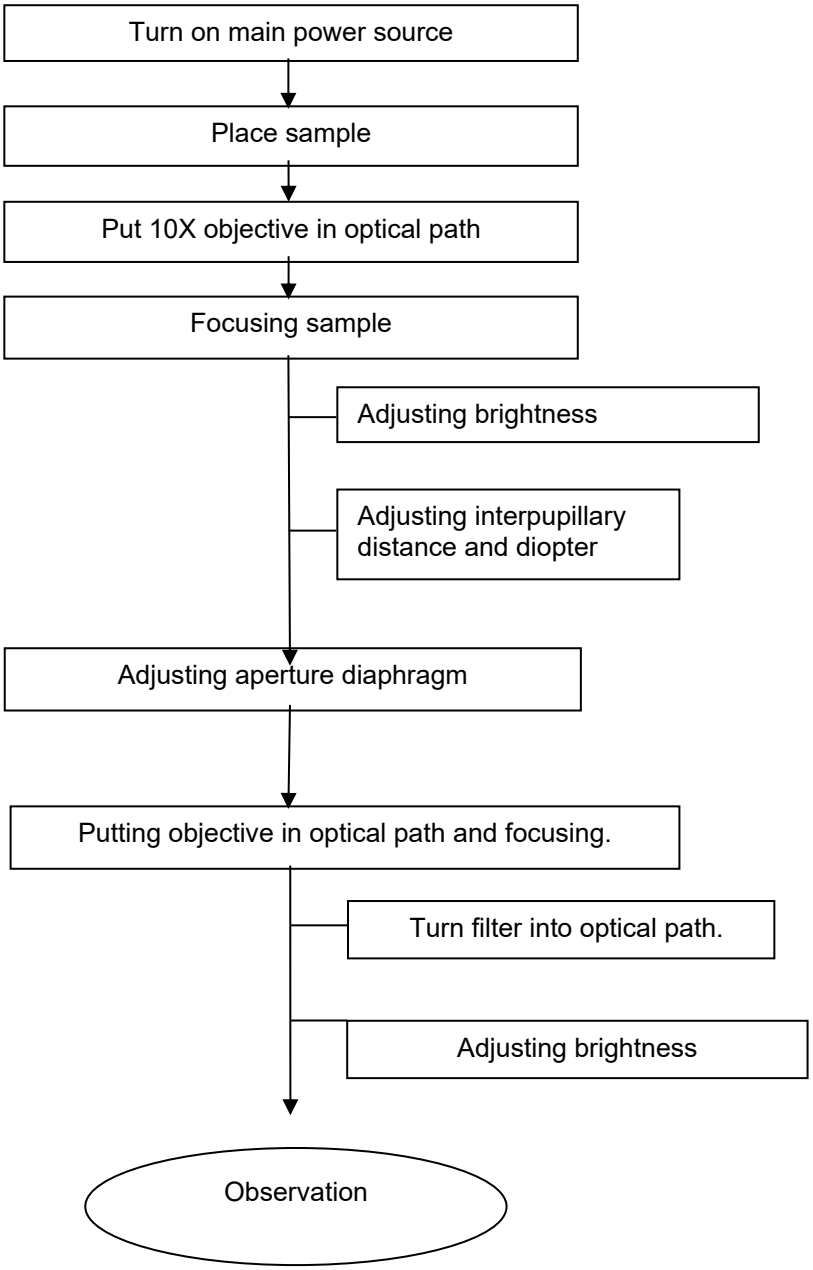
The very first step is to establish a power connection using the mains plug. You should first adjust the **dimmer (1)** to a **low level**, so that when you look through the eyepiece for the first time, your eyes are not immediately subject to a high level of light. You can now switch on the **lighting** using the **main switch (2)**.



The next step is to **place an object holder** with the sample on the specimen stage. For the models of the OCM-1 series you can fixate the samples on the stage with help of one of the available object holders (*also see section 4.3 Specimen stage*).

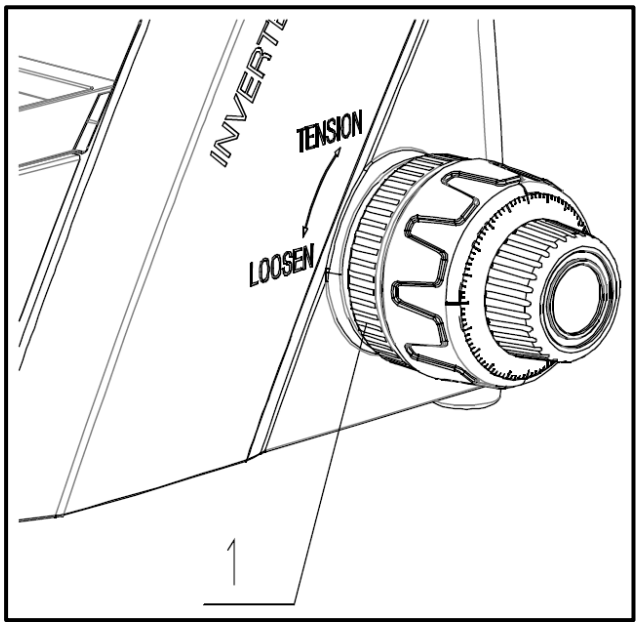
For the models of the OCM-1 series you can fixate the samples on the stage with help of the object holder.

Observation Steps



10.2 (Pre-) focussing

When you are observing an object, you must have the correct distance to the objective to achieve a sharp image.
In order to find this distance at the beginning (without other default settings of the microscope) place the objective with the lowest magnification in the beam path, look through the right eyepiece with the right eye and turn it slowly using the coarse adjustment knob.



The simplest way of doing this would be to first raise the nosepiece (using the coarse adjustment knob) to the top position and then lower it slowly. As soon as an image is recognisable (no matter how sharp), then you should only adjust the focus using the fine adjustment knob.

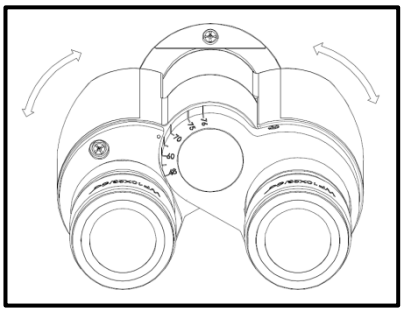
Adjusting the torque of the coarse and fine adjustment knob

Next to the left adjustment wheel for the coarse and fine adjustment knob there is a ring (*see illustration [1]*) which you can use to alter the torque of these wheels. Turning it in a clockwise direction reduces the torque and turning it in an anti-clockwise direction increases it.
On one hand, this function can help to make it easier to adjust the focus and on the other hand it can prevent the nosepiece from slipping down unintentionally.

Important:

In order to avoid damaging to the focussing system, the left and right adjustment wheels for the coarse and fine adjustment knob must never be rotated at the same time in opposite directions.

10.3 Adjusting the interpupillary distance



With binocular viewing, the interpupillary distance must be adjusted accurately for each user, in order to achieve a clear image of the object.
While you are looking through the eyepieces, use your hands to hold the righthand and lefthand tube housing firmly. By pulling them apart or pushing them together, you can either increase or reduce the interpupillary distance *(see illustration)*. As soon as the field of views of the lefthand and righthand eyepieces completely overlap each other, i.e., they combine to form a circular image, then the interpupillary distance is set correctly.

10.4 Dioptre adjustment

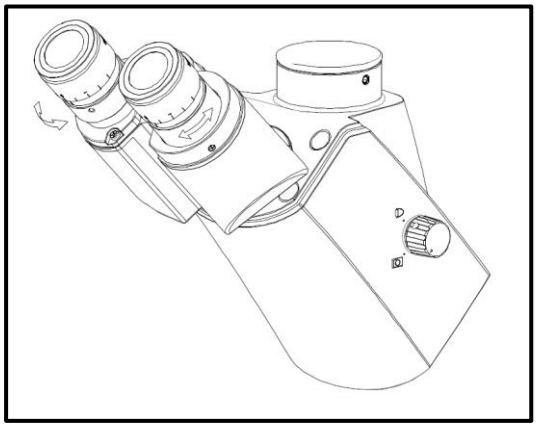
The eye strengths of each eye of the microscope user can often be slightly different, which in daily life has no consequences. But when using a microscope this can cause problems in achieving precise focussing.

You can use a mechanism on both tube connectors (dioptre adjustment rings) to compensate for this as follows.

1. Put the right dioptre adjustment ring to position 0.

2. Look through the right eyepiece with the right eye and bring the object into focus by using the coarse and fine adjustment knob.

3. Then look through the left eyepiece with the left eye and use the lefthand dioptre adjustment ring to focus the image.
   To do this, you just need to turn the ring in both directions *(see illustration)*, to find out where the image is at its most focussed.



10.5 Adjusting the magnification

After prefocussing has been carried out using the objective with the lowest magnification *(see section 5.2)* you can then adjust the overall magnification using the nosepiece, as necessary. By turning the nosepiece you can bring any one of the four other objectives into the beam path.

When adjusting the nosepiece, you must take the following points into account:

- The required objective must be properly locked in place at all times.

- The nosepiece should not be rotated by holding individual objectives, you should use the silver ring above the objectives.

- When rotating the nosepiece you must always make sure that the objective which is about to be positioned in the beam path does not touch the object holder. This can lead to significant damage to the objective lens.
  We recommend that you always check from the side to make sure that there is sufficient leeway. If this should not be the case, the nosepiece must be lowered accordingly.

If you have focussed the object to be observed for a specific magnification, then if you select the objective with the next greatest magnification, the object will be slightly out of focus. Use the fine adjustment knob to make a slight adjustment and restore the focus.

10.6 Using eye cups

The eye cups supplied with the microscope can basically be used at all times, as they screen out intrusive light, which is reflected from light sources from the environment onto the eyepiece, and the result is better image quality.

But primarily, if eyepieces with a high eye point (particularly suitable for those who wear glasses) are used, then it may also be useful for users who don't wear glasses, to fit the eye cups to the eyepieces.

These special eyepieces are also called High Eye Point eyepieces. They can be identified by the glasses symbol on the side. They are also marked in the item description by an additional "H" (example: HSWF 10x Ø 23 mm).

When fitting the eye cups, make sure that the dioptre setting is not moved. We would therefore advise that you hold the dioptre compensation ring on an eyepiece with one hand while you fit the eye cup with the other.

Before using the microscope, users who wear glasses must remove the eye cups, which you may find on High Eye Point eyepieces.

As the eye cups are made of rubber, you must be aware that when you are using them, they can become slightly dirty through grease residues. In order to maintain hygiene, we would therefore recommend that you clean the eye cups regularly (e.g. with a damp cloth).



Eye cups



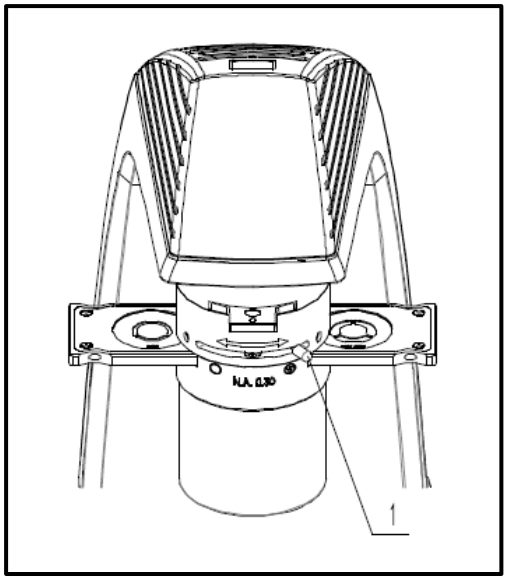
High Eye Point eyepiece
(identified by the glasses symbol)

10.7 Adjusting the illumination

To make sure that perfect image results are achieved during microscopic observation, it is important that the direction of light of the microscope is optimised. The following components of the transmitted illumination can be adjusted according to the application requirements.

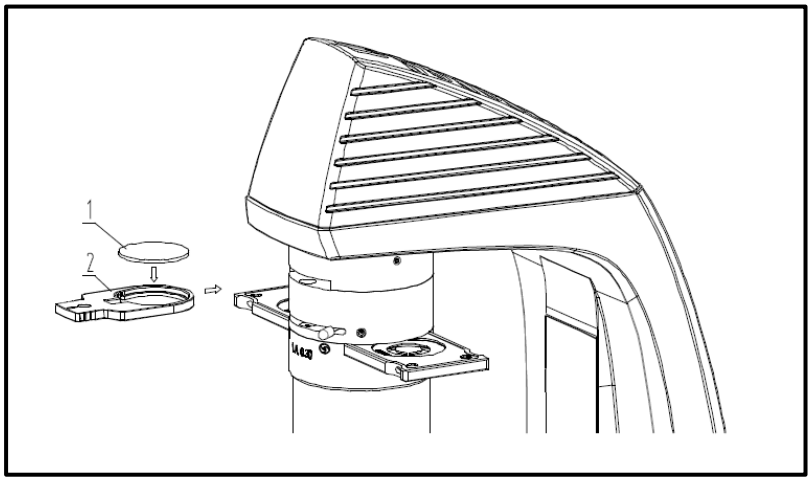
Aperture diaphragm

The aperture diaphragm is used to find the very best compromise between contrast and resolution for the microscopic image.
To open and close this diaphragm you have to operate the lever [1] located at the condenser.



Colour filter

The colour filter slide has one round aperture [2]. If needed, the supplied blue filter [1] has to be inserted into this aperture. Subsequently the filter slide must be put into the slot on the top of the condenser.

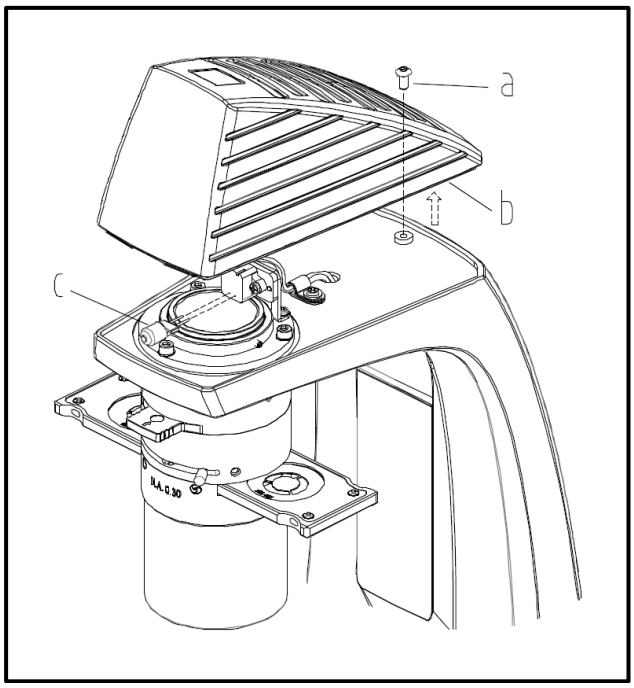


11 Lamp replacement

11.1 Changing the bulb (halogen lamp)

You must not attempt to change the bulb immediately after the microscope has been used, as the bulb will still be hot and so there is a risk that the user could be burnt. Before changing the bulb the device must be switched off and unplugged.
To change the bulb the cover of the lamp housing [b] needs to be removed. Therefore you previously have to loosen the appropriate fastening screw [a]. Now the defective bulb can be pulled out of the socket and be replaced with a new one [c]. We recommend that here you should also test again, to check that heat is no longer being produced. After the cover has been reattached and fixated, the bulb replacement procedure is complete.

Important:
When fitting the new bulb into the socket, it must only be handled with sterile gloves or using the bulb packaging film. Grease and dust residue can have a negative effect on the light quality and service life.



11.2 Changing the bulb (LED lamp)

The devices of the OCM 162, OCM 167 and OCM 168 are equipped with LEDs.
Due to the long service life of LED illumination, regular lamp replacement will not be necessary with these microscopes.
Problems with the lighting would therefore in most cases have defects in the electrical system as the cause. In such a case, our technical service can help.

12 Using optional accessories

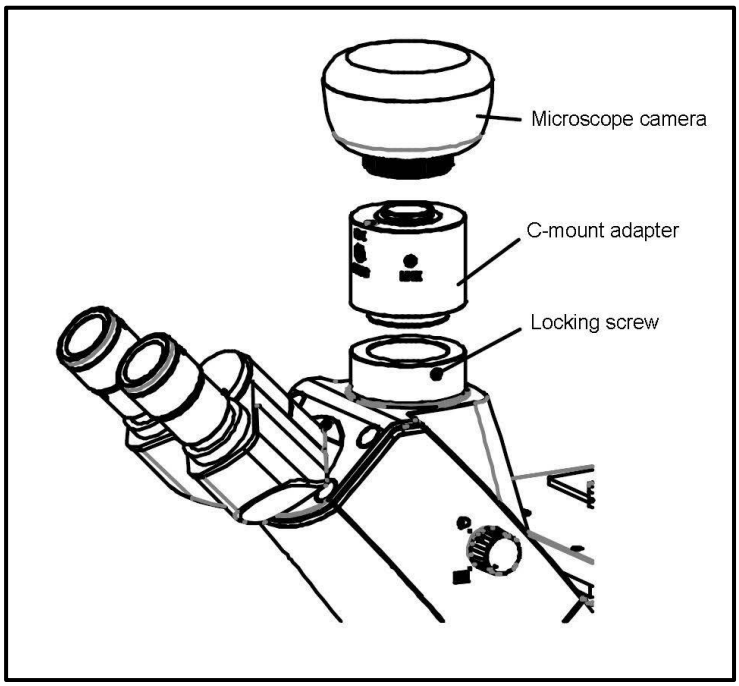
12.1 Camera connection

Due to the trinocular tube it is possible to connect microscope cameras to the device, in order to digitally record images or sequences of images of an object being observed.

After the plastic cover has been removed from the camera adapter connector on the top of the microscope head, then a suitable adapter must be fitted.
In general there are two C-mount adapters available for this (1x and 0.5x magnification, *see Chapter 3 Features*). After fitting one of these adapters it can be fixed with the locking screw. A camera which has a C-mount thread is then screwed on top of the adapter.

We recommend that you first adjust the field of view using the eyepieces on the device for the existing requirements, and then carry out the observation using the microscope camera (i.e. using the PC screen which is connected).
To do this, the trinocular wheel on the righthand side of the microscope head must be set to the position “Camera”. The light from the microscope lighting is deflected so that it is completely in the beam path for the camera, which causes a dark field of view in the eyepieces. This means that it is not possible to simultaneously observe by the eyepieces and PC screen.

For C-mount adapters, which have their own integrated magnification, the image which is shown on the camera connected to the device can often have a different level of focus compared with the image on the eyepiece.
In order to be able to bring both images into focus, the focus can be adjusted by those adapters.



12.2 Phase-contrast units

The standardly supplied phase contrast unit of the microscopes of the series OCM-1 consists of a PH objective (20x), a PH slide, a centring telescope and a green filter. Optionally PH objectives with a magnification of 10x or 40x are available.
To use this, you need to place the PH objective into the beam path and push the PH slide (the writing facing up) into the appropriate slot on the condenser.
The slide must be placed in a way that the one of the three snap in positions, which suites the objective magnification, is located in the beam path.

A PH objective has a PH ring in its lens system, just like the individual positions of the PH slides. Due to their size on one hand and their positioning on the other, the two related rings must be aligned to one another in the beam path. The position of the ring in the objectives cannot be altered, that of the rings in the condenser disc however can be.

In case of a not optimum positioning of one of the ring pairs, the adjustment needs to be carried out as follows.

a. First adjust the microscope using bright field mode.

b. Move the PH slide to the required position (e.g. “20x”).

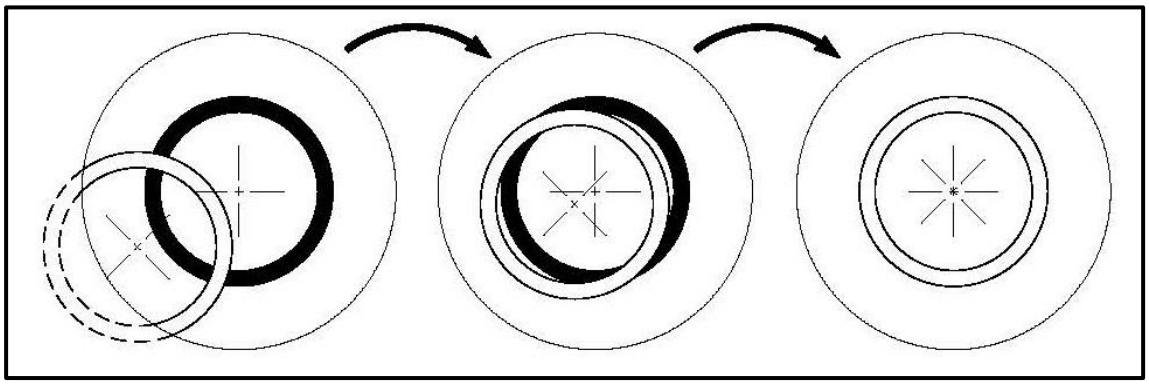
c. Open the aperture diaphragm on the condenser to its maximum (slider to the left).

d. Bring the relevant PH objective (e.g. 20x) into the beam path.

e. Place the centring telescope onto one of the two tube connectors, in place of a standard eyepiece.

f. Undo the fixing screw of the centring telescope and pull out (move) the front part of the telescope, so that you can focus both phase rings in the field of view. Then retighten the screws.

In the field of view you will now see the image of a white (PH slide) and a black (PH objective) ring. The black one is central and the white one possibly is pushed to one side *(see left illustration)*.



g. On the side of the PH slide, facing towards the user, there is always a thread directly to the left and the right of the condenser housing. In each thread there is an adjusting screw.
In both threads you now must insert an Allen screw driver (red), in order to engage them. Then by turning the screws and at the same time watching the rings through the centring telescope, move the white ring to the centre *(see central illustration)*.

h. As soon as both the rings overlap each other *(see right illustration)* the adjustment is successfully completed and can also be carried out for the pairs of rings of the other magnifications.

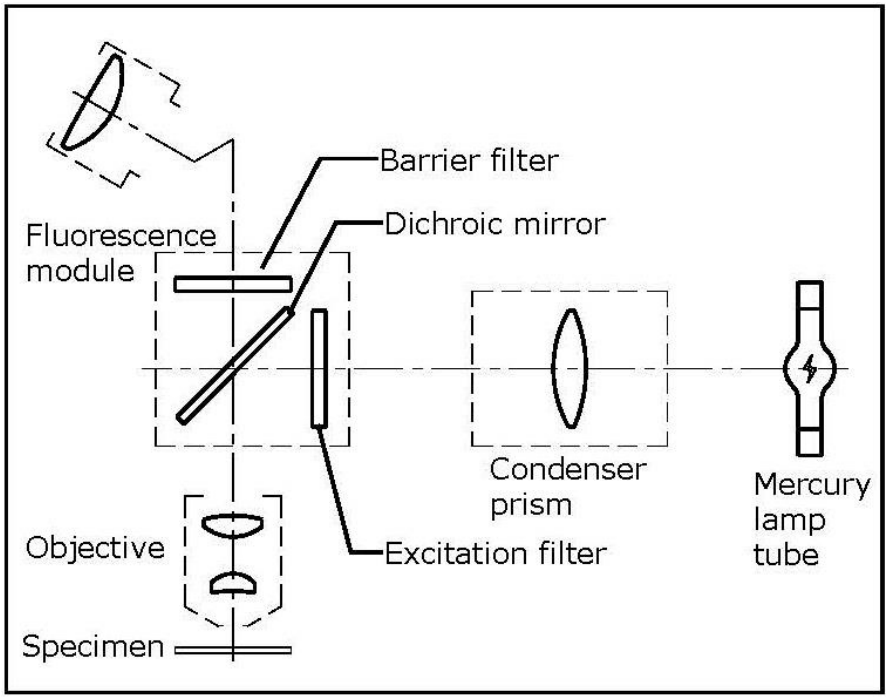
i. After the adjustment, the centring telescope must be replaced by the standard eyepiece, so that you are able to observe the object on the specimen stage in phase contrast mode.

Depending on the preferences of the user, using a green filter can produce a more effective and pleasant image. To achieve this, the green filter must be inserted into the colour filter slide.

12.3 Fluorescence reflected light unit OCM 165 / 166 / 167 / 168

There are samples, which can be excited by light beams and thereby show emissions, which have different wave lengths than the previous excitation beams. The wave length of the emission is always bigger than the wave length of the excitation (Stokes shift). This process is called fluorescence and can serve as the base of a microscopic contrasting method. For the most common way to realise this, an upright light microscope is extended by a fluorescence reflected light unit.

Principle



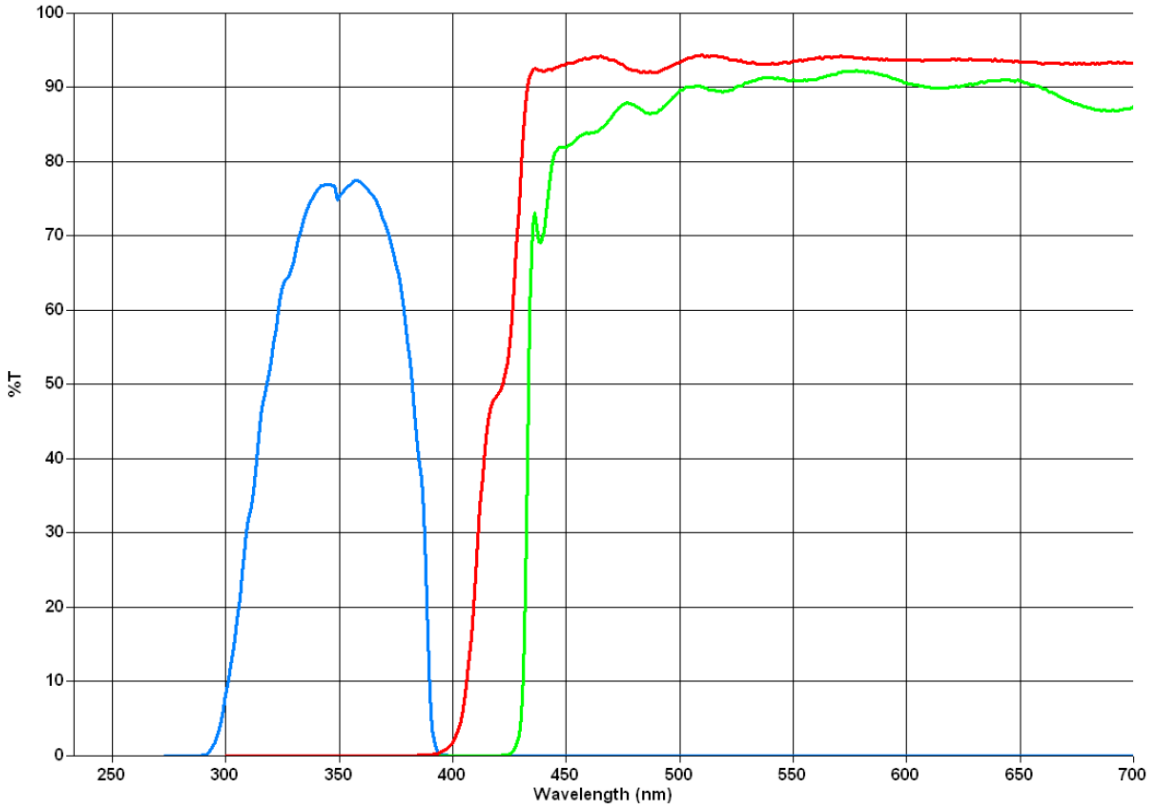
Depending on the sample there is an excitation light needed, that is contained in the spectrum of the light source (HBO or LED). The excitation filter is only permeable for the according wave length. After that the excitation light hits a dichroic mirror, which reflects it towards the objective and the sample. After the sample absorbed the excitation light, the emission of the fluorescent light occurs (with a bigger wave length than the excitation light). The part of the fluorescent light, which is beamed into the objective, can pass the dichroic mirror. The dichroic mirror additionally prevents the remaining part of the excitation light from advancing towards the eyepieces. The barrier filter finally eliminates all wave ranges out of the beam path not belonging to the observed fluorescence. Thus the resulting image is just developed by the fluorescent light emitted from the sample.

Overview of wave lengths for excitation and emission per excitation filter

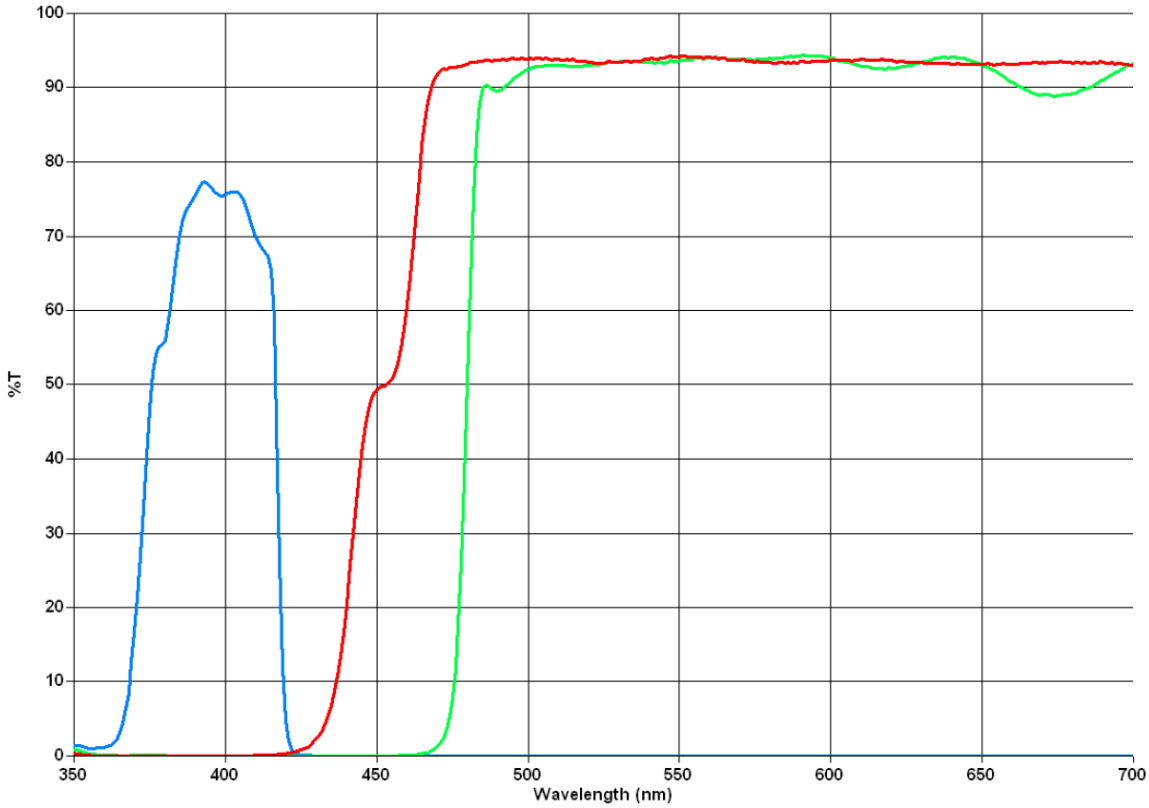
UV	Wavelength range for excitation:	330-380nm
	Wavelength range for emission:	435nm
V	Wavelength range for excitation:	380-420nm
	Wavelength range for emission:	460nm
B	Wavelength range for excitation:	420-490nm
	Wavelength range for emission:	520nm
G	Wavelength range for excitation:	500-550nm
	Wavelength range for emission:	590nm

Blue line: Wave length excitation
Green line: Wave length emission

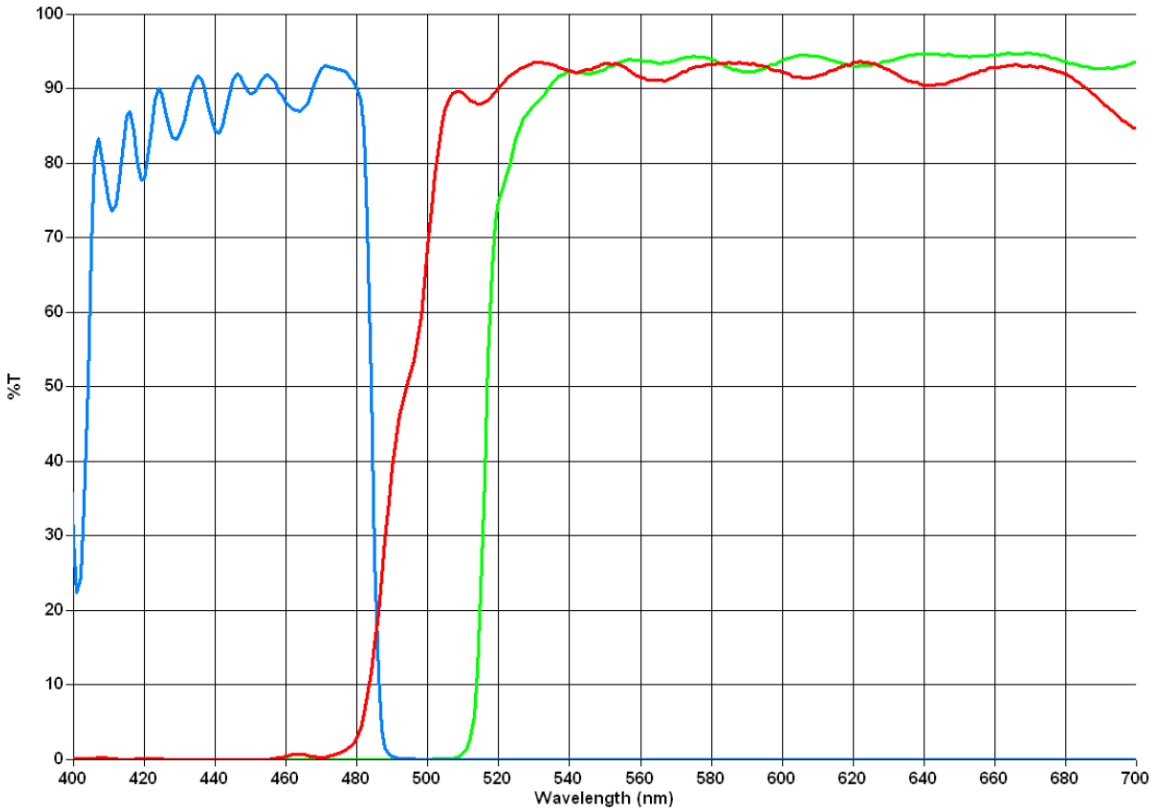
U:



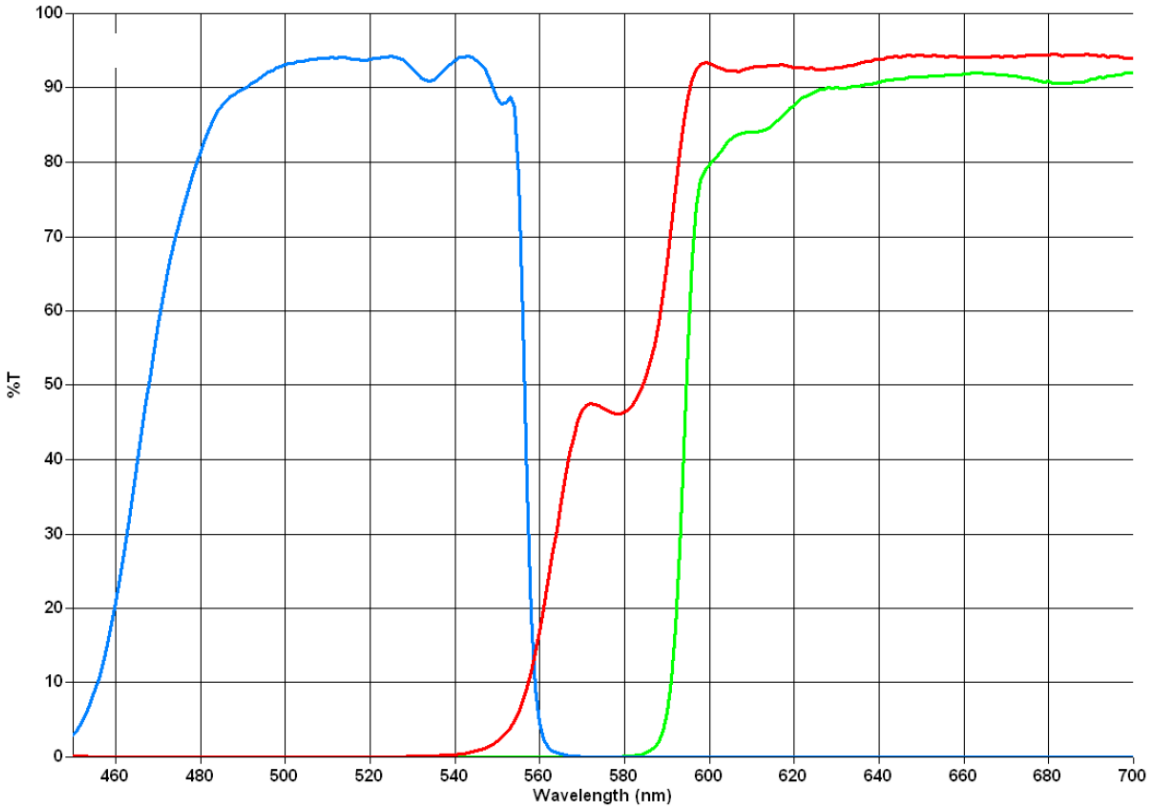
V:


100
90
80
70
60
50
40
30
20
10
0
%T
350
400
450
500
550
600
650
700
Wavelength (nm)

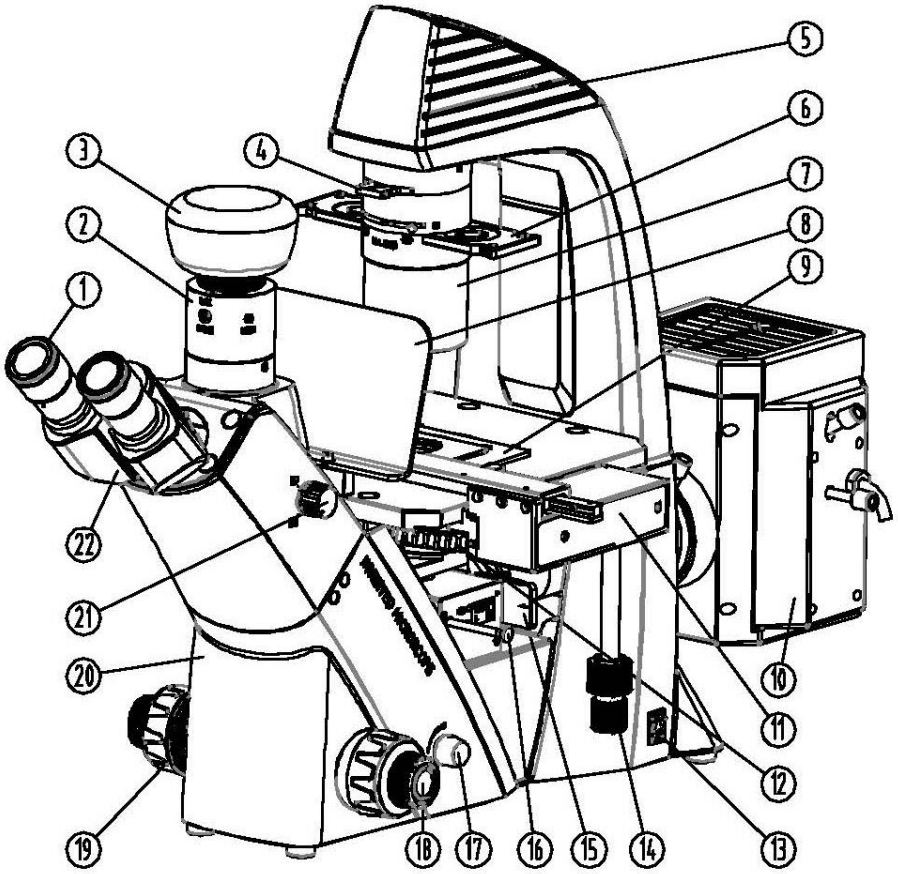
B:


100
90
80
70
60
50
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30
20
10
0
%T
400
420
440
460
480
500
520
540
560
580
600
620
640
660
680
700
Wavelength (nm)

G:

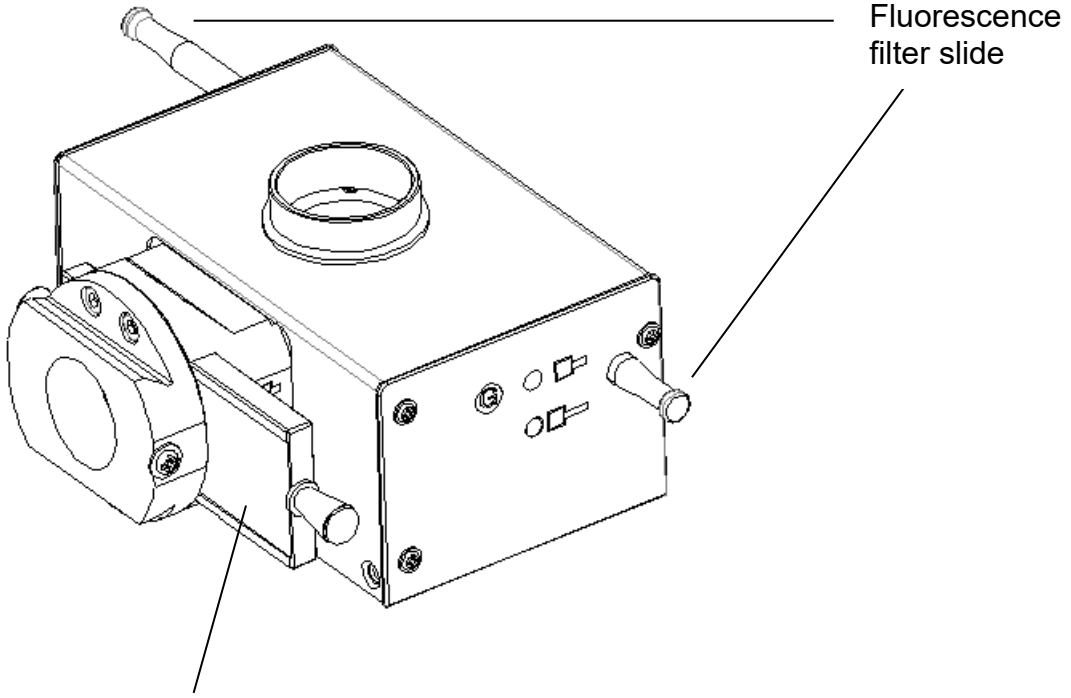

100
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20
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580
600
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640
660
680
700
Wavelength (nm)

Nomenclature

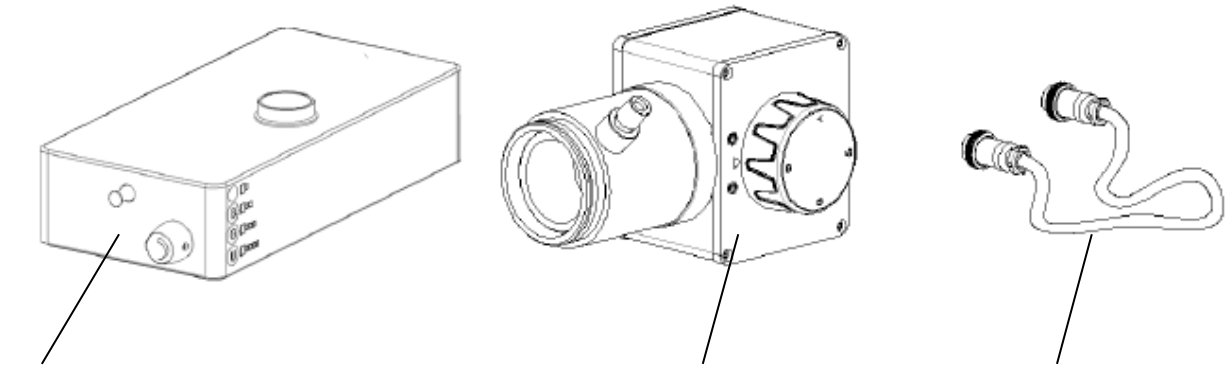


1) Eyepiece
2) C mount adapter
3) Microscope camera
4) Colour filter slide
5) Lamp housing - Transmitted illumination
6) Phase contrast slide
7) Condenser
8) UV protective cover
9) Object holder
10) Lamp housing - Reflected light unit
11) Attached mechanical stage
12) Nosepiece
13) Main switch
14) Control wheel for attached mechanical stage
15) Beam path lock
16) Fluorescence filter slide
17) Dimmer
18) Coarse and fine adjustment
19) Torque adjustment
20) Microscope body
21) Trinocular toggle wheel
22) Microscope head / Tube

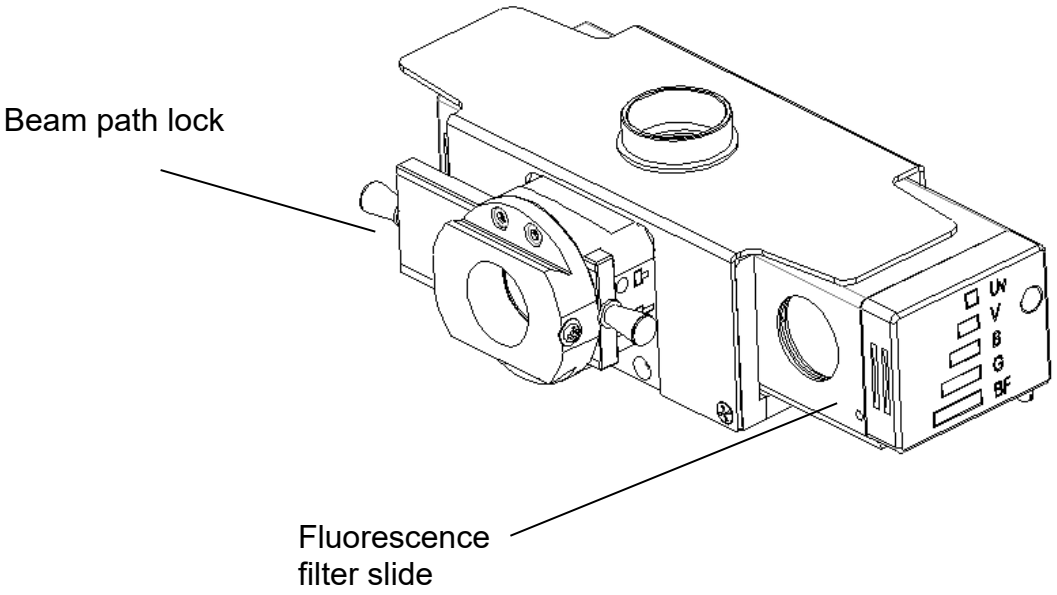
Nomenclature OCM 165 (FL filter unit B / G)



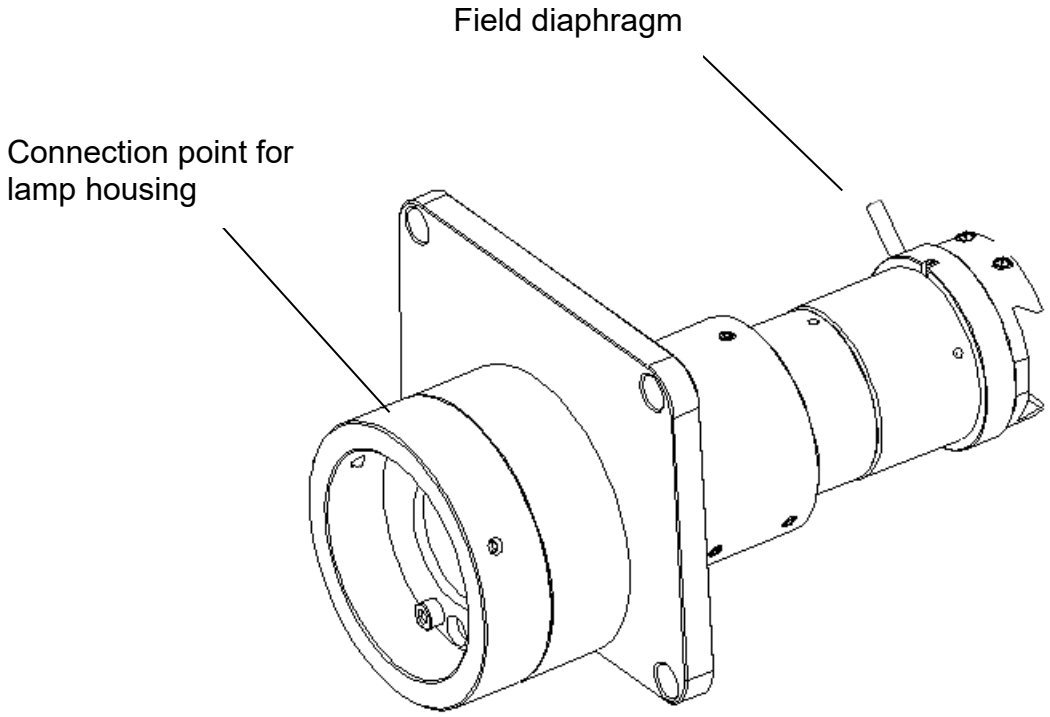
Nomenclature OCM 167 (FL filter unit B /G) / OCM 168 (FL-filter unit B /G / V / UV) with lamp housing



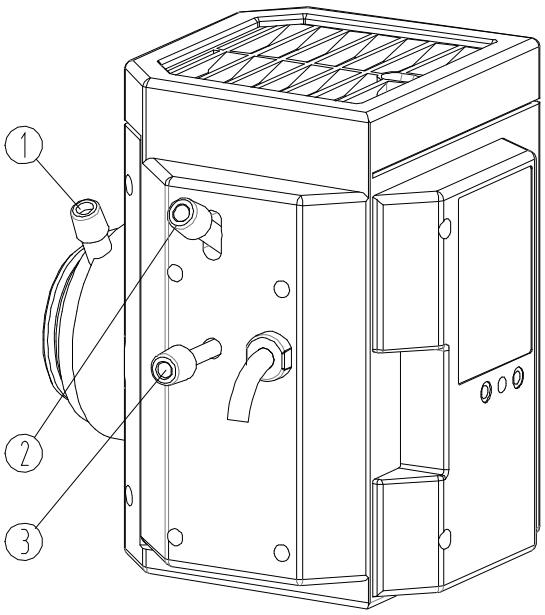
Nomenclature (FL filter unit B /G / V / UV: OCM 166)



Nomenclature (FL unit middle part: OCM 165 / 166 / 167 / 168)



Nomenclature (FL HBO lamp housing: OCM 165 / 166)



✧ Main Parameter

Input Voltage : AC110～240V,50/60Hz

Output Voltage: DC18V~40V Maximum

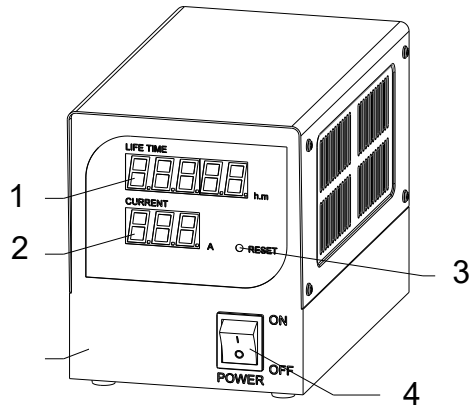
Stable Output Current: 3.6A～4.9A

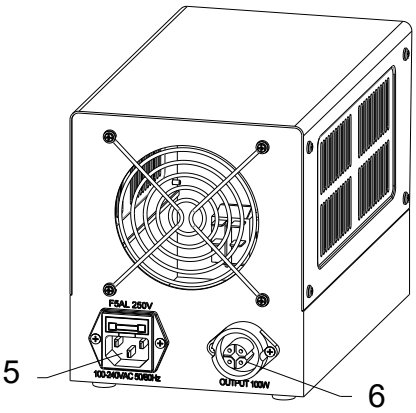
Start Stable time: 2 minutes

1) Condenser Adjusting Knob
2) Vertical Adjusting Knob for Mercury lamp
3) Horizontal Adjusting Knob for Mercury lamp

:

Nomenclature (Power supply unit for HBO lamp: OCM 165 / 166)

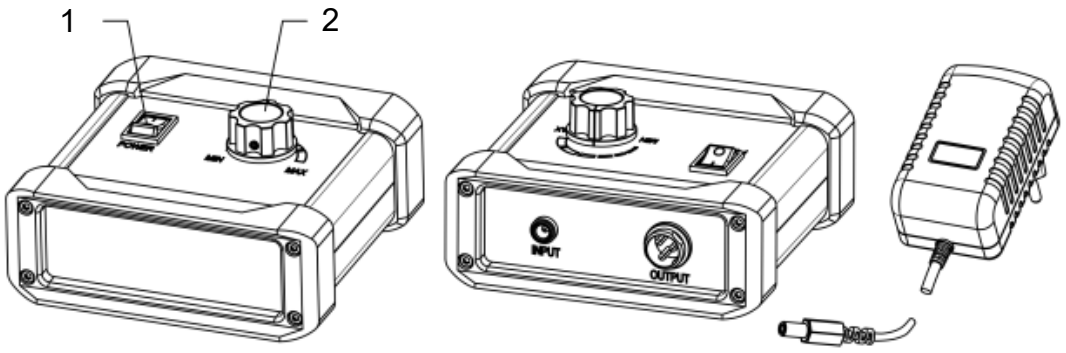




Front Side Back Side

1) Timer
2) Current
3) Reset
4) Power Switch
5) Input Power Socket
6) Output Socket

Nomenclature (Power supply unit for LED lamp: OCM 167 / 168)



5W LED Power Box(front) DC Input LED Power Box(back) DC Input LED Power Cable

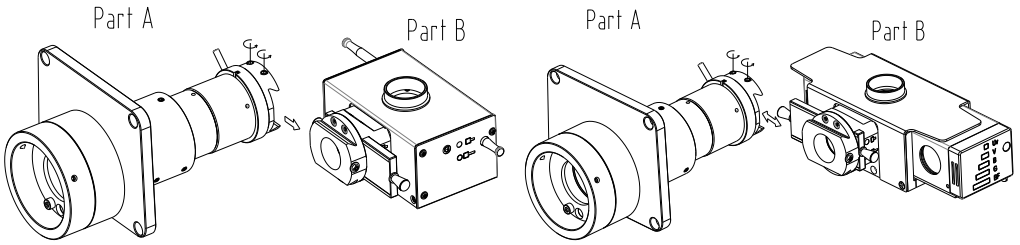
1) ON/OFF switch
2) Dimmer

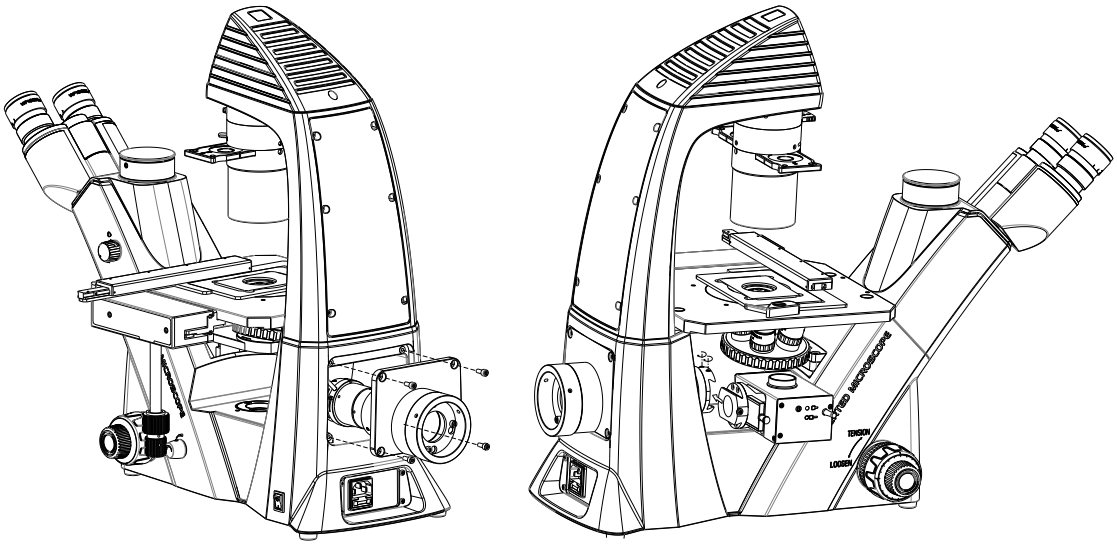
12.3.1 Assembly and operation HBO versions: OCM 165 and OCM 166

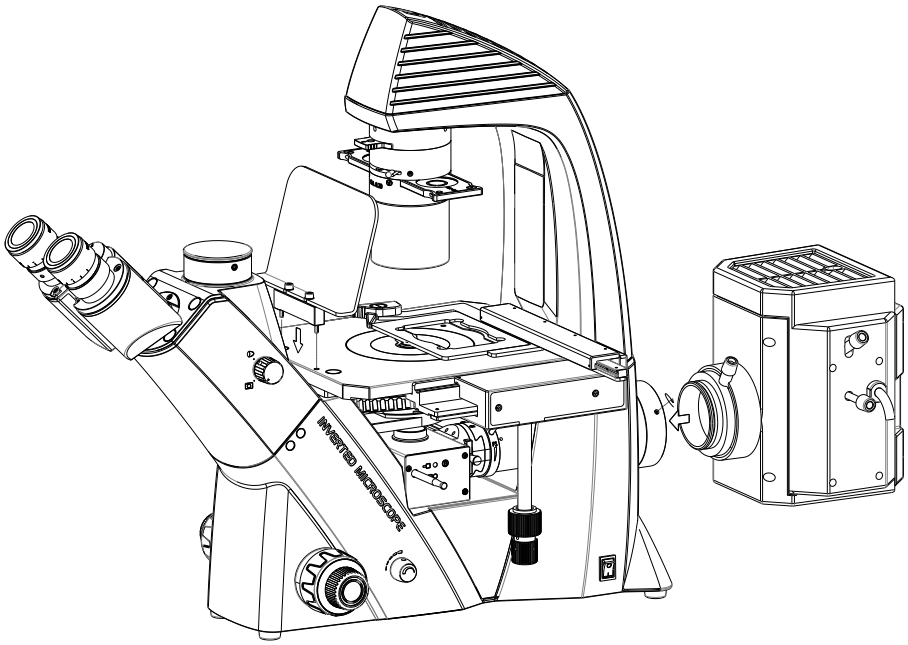
Assembly

In order to put the fluorescence reflected light unit into operation, the following steps have to be carried out.

1. The main body of the FL unit is already firmly connected with the microscope housing and towers above the rear side of the microscope.
2. On this point the lamp housing must be mounted by help of two Allen screws.
3. Install the connecting cable between lamp housing and power supply unit.
4. Establish the power supply by attaching the mains cable.
5. Put the UV protective cover on the front edge of the stage.
6. Insert the slide for the beam path lock into the appropriate slot.
7. Prior to the first use of the FL unit you need to mount the HBO lamp to the inside of the of the lamp housing.
8. For this procedure please refer to "Lamp replacement"
   (Remove the mounted lamp dummy in advance)







Operation

Before you use the reflected light unit for special fluorescence applications, it will be favourable to adjust the microscope in the bright field mode. This includes the placing of the sample, adjusting the interpupillary distance, pre-focussing, dioptre adjustment, etc. After that you can go on with the usage of the fluorescence reflected light unit.

1. When using a HBO lamp at first there must be ensured, that the beam path lock has been activated (place the slide accordingly).
2. Establish the power supply.
3. Press the main switch. If existing, you have to press the ignition after that in order to illuminate the lamp. It lasts about 15 minutes until the lamp has gained a maximum and stable illuminating power.
4. After placing the sample, you can bring the needed objective into the beam path.
5. Set the required position of the FL filter slide.

   OCM 165: Select between Blue and Green
   OCM 166: Select between Blue, Green, Violet and Ultraviolet

6. Now the beam path lock can be deactivated (place the slide accordingly).
7. Start the observation.

Control elements for illumination

The following control elements for the illumination play a role within the fluorescence microscopy:

- Field diaphragm, condenser:
  Optimisation of the contrast and the light yield

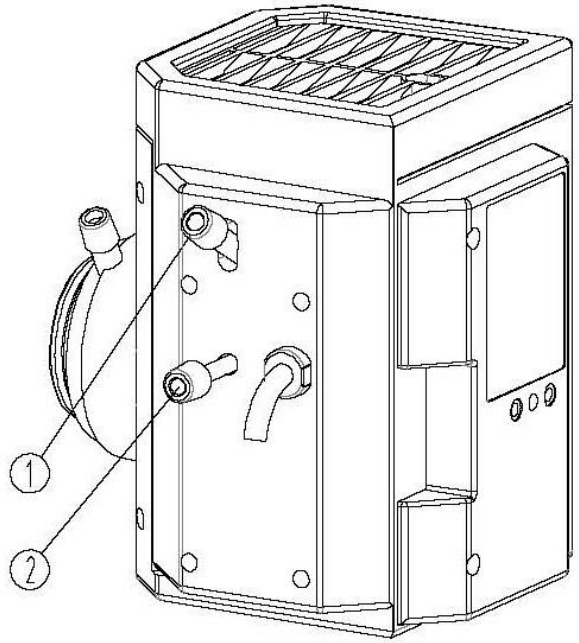


Important warnings for the usage of a HBO lamp

- During operation the lamp is showing a strong heat development. It should be avoided to come into contact with the lamp housing while and after some time of running the reflected light unit.
- The lamp must not in any circumstances be switched off during the pre-heating. It could cause a significant reduction of the lamps life time.
- Equally the lamp must not be switched on directly after a switch-off process.
- When pausing the observation you should always activate the beam path lock in order to interrupt the light beam. The light spectrum of the HBO lamp often can be harmful for microbes.
- Never look inside the eyepieces when the beam path is opened (by slide for the beam path lock) and there is set no FL filter inside the beam path (both levers pulled out) at the same time. There is the risk of blinding.
- A HBO lamp has a certain life time. The closer you push it to its limit, the bigger the risk of an explosion of the lamp and setting free of toxic mercury vapour. This must be avoided at all costs.
  The following devices can provide information about the necessity of a lamp replacement (This applies for 100W HBO lamps):
  - Ampere meter on the power supply unit
    As soon as the amperage exceeds or falls below a range of 4.0 A – 6.0 A → lamp replacement recommended
  - Life time display on the power supply unit
    As soon as 100 h are reached
    → lamp replacement highly recommended
  - Before starting the operation with a new bulb, press the “Reset” button on the power supply next to the Ampere meter with a thin pin shaped tool.

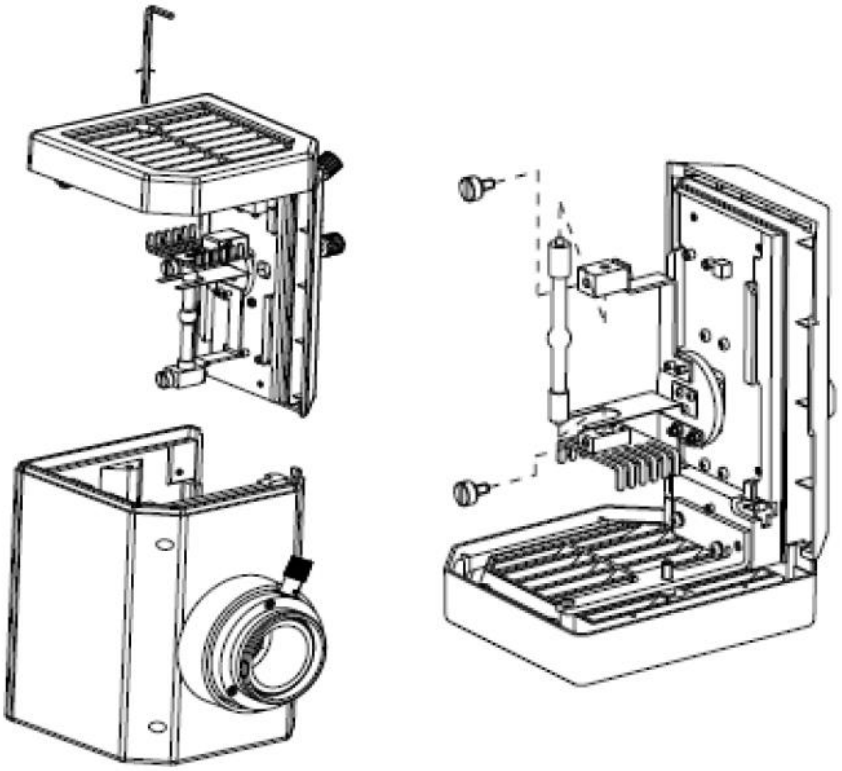
Centring the lamp (HBO)

When running the HBO lamp for a long time there is the possibility, that the holder of the lamp is moving out of its centre due to the strong heat development. This circumstance has to be corrected when it appears, because therefore the field of view is no longer equally illuminated.
In this case you need to operate the centring screw for vertical positioning [1] as well as the centring screw for horizontal positioning [2] accordingly, in order to set again the optimum light direction.



Changing the lamp (HBO) (*see figure on the next page*)

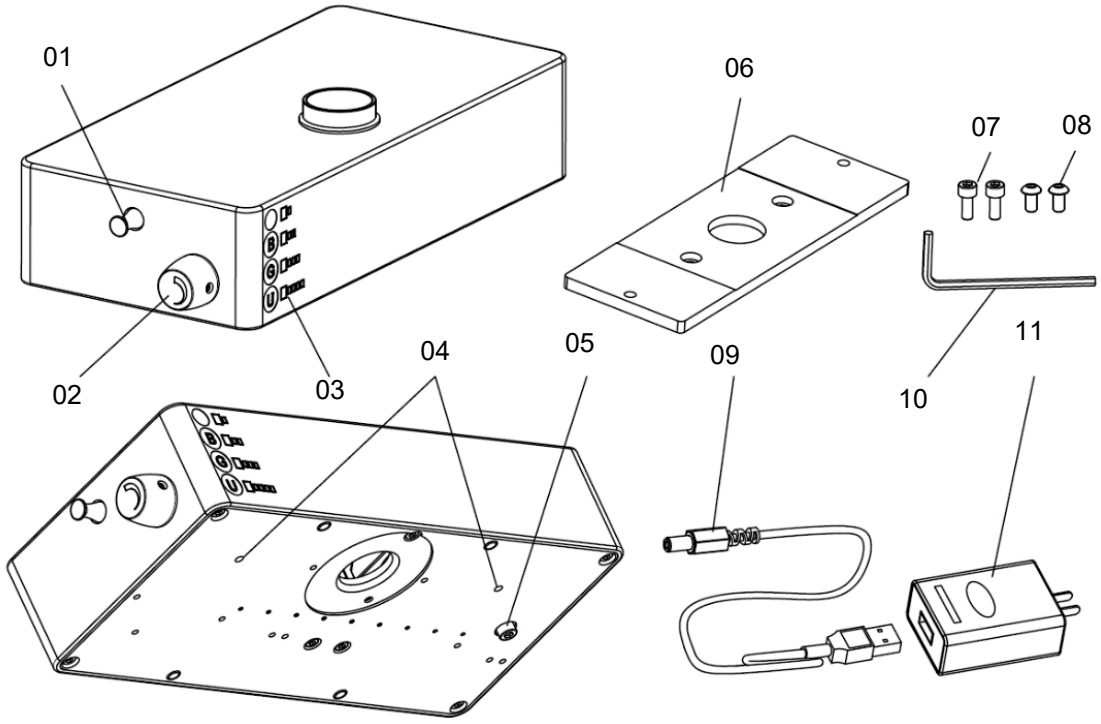
1. Disconnect the FL reflected light unit from the power supply.
2. Check if the lamp housing has cooled down.
3. Loosen the screw for the cover of the lamp housing (only when it is cool).
4. Carefully remove the cover along with the lamp mounting from the rest of the housing and put it, with the top facing down, onto a working surface.
5. Loosen the two fixing screws for the HBO lamp.
6. Replace the old lamp by a new one.
7. Tighten the fixing screws again.
8. Reattach the cover along with the lamp mounting and fix it with the screw.



The new installed spare lamp may under no circumstances be touched with naked hands. Impurities will benefit the risk of explosion during operation.
If there should be nevertheless impurities, the lamp has to be cleaned. We recommend for this purpose to use a lint-free cloth soaked with an ether alcohol mixture (Proportion: 70/30).

12.3.2 Assembly and operation LED versions: OCM 167 and OCM 168

Parts Name



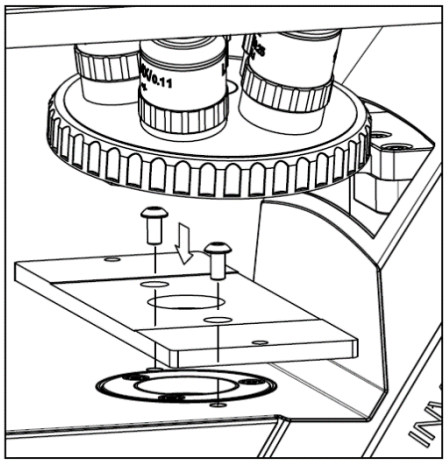
01-Changeover lever
02- Brightness adjustment knob with switch
03- Filter identifier
04- Mounting bolt
05- Stop screw（For transpotation）
06- Junction plate
07-08 M4 Round head hexagonal screw
09- Power line
10-3mm allen wrench
11- Power Adapter

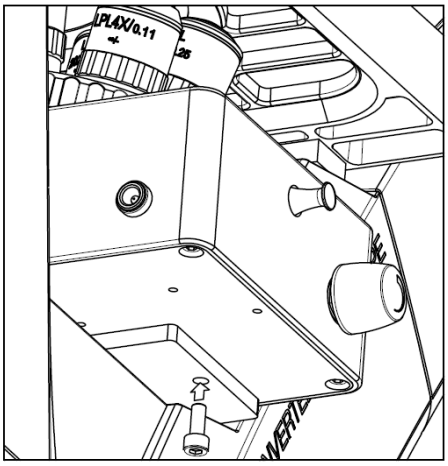
Assembly

The installation of the LED fluorescent unit should be carried out after completing installation of the main machine.

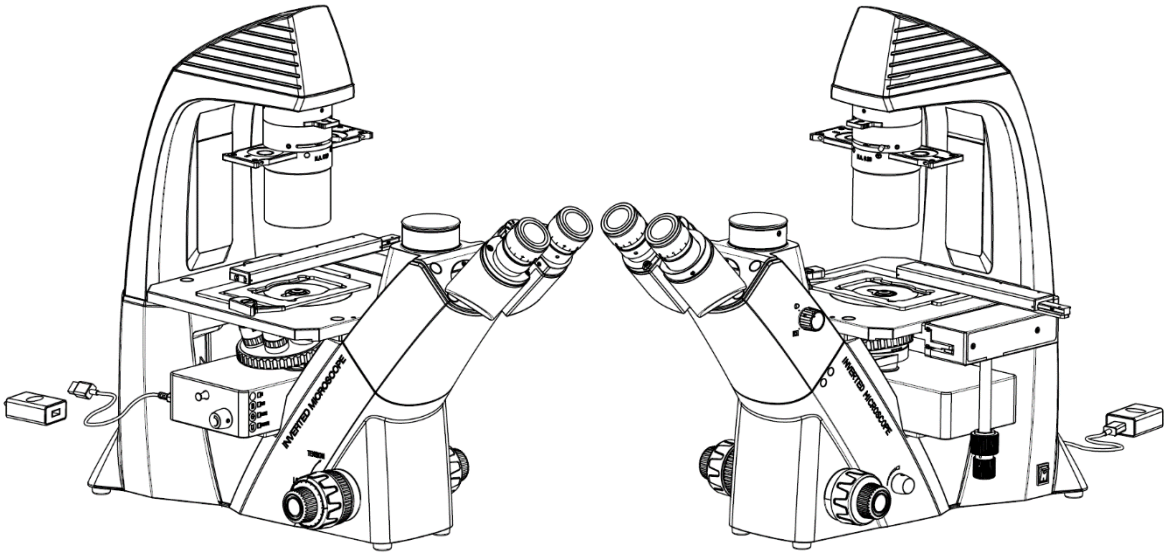
1. Take out the fluorescent unit and junction plate,screw and wrench from the package and check.
2. Remove the overflow tray if it is be installed on main machine.
3. Rotate the coarse focusing knob to raise the nosepiece to the highest level for easy installation.
4. Take out the junction plate (6) and connect then (8) two round head hexagonal screw M4 to the latch holes of original overflow tray with allen wrench (10).
5. With allen wrench (10) to remove the stop screw (5) on the bottom of the device.
6. Carefully put the fluorescent unit on the junction plate (6) from under the nosepiece and align the holes. Please attention the installation direction,

changeover lever (1) and dimming knob with switch (2) are located on the left side.





7. With allen wrench (10) to connect round head hexagonal screw and M4 mounting bolt.

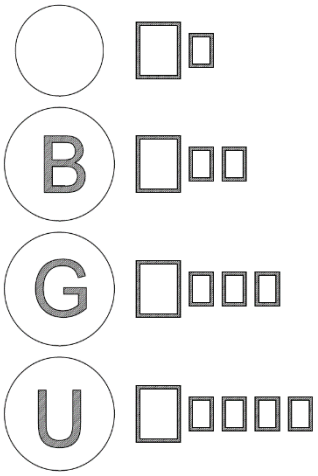


During installation process,the orientation of the junction plate and fluorescent unit should be stable as far as possible.

8. Connect power line (9) with power adapter (11)， and then insert another round plug end into the rear socket of the fluorescent unit.
9. When the brightness adjustment knob (2) is off, insert the power adapter (11) into the indoor power socket.
10. Rotate the brightness adjustment knob (2) to turn on the power,turn the 10X objective into the optical path,and place the required fluorescence module into the optical path with changeover lever (1).

Attention Matters

1. Fluorescence unit with four modules, maximum 3 goups filters can be installed, the rest is empty for bright field .
2. There is a filter position identifier on the left front of the fluorescence unit, without any identifier on the top, the changeover lever (1) emerges the shortest ,which means bright field , the following positions are affixed with corresponding group identification according to user configuration requirements.



Operation

Before you use the reflected light unit for special fluorescence applications, it will be favourable to adjust the microscope in the bright field mode. This includes the placing of the sample, adjusting the interpupillary distance, pre-focussing, dioptre adjustment, etc. After that you can go on with the usage of the fluorescence reflected light unit.

1. When using the UV LED lamp, at first there must be ensured, that the beam path lock has been activated (place the slide accordingly).
2. Establish the power supply.
3. Press the main switch.
4. After placing the sample, you can bring the needed objective into the beam path.
5. Set the required positions of the FL filter slide and the LED lamp slide (OCM 167) / wheel (OCM 168).

   OCM 167: Select between Blue and Green
   OCM 168: Select between Blue, Green, Violet and Ultraviolet

   The color of the selected filter must always be matching the color of the selected LED lamp.
6. Now the beam path lock can be deactivated (place the slide accordingly).
7. Start the observation.

Control elements for illumination

The following control elements for the illumination play a role within the fluorescence microscopy:

- Field diaphragm, condenser:
  Optimisation of the contrast and the light yield

13 Troubleshooting

Problem	Possible causes
The bulb does not light	The mains plug is not correctly plugged in
	There is no power at the socket
	Defective bulb
The bulb blows immediately	The specified bulb has not been used
The field of view is dark	The aperture diaphragm and/or field diaphragm are not opened wide enough
	The selector switch for the beam path is set to “Camera”
	The condenser is not correctly centred
You cannot adjust the brightness	The brightness control has been set incorrectly
	The condenser has not been correctly centred
The field of view is dark or is not correctly illuminated	The objective is not positioned correctly on the beam path
	The selector switch for the beam path is between two settings
	The nosepiece is not correctly fitted
	An objective is being used which doesn’t match the lighting area of the condenser
	The condenser has not been correctly centred
	The field diaphragm is closed too tightly
	The bulb is not correctly fitted
The field of view of one eye does not match that of the other eye	The interpupillary distance is not correctly adjusted
	Dioptre setting has not been carried out correctly
	Different eyepieces are used for the righthand and lefthand side
	The eyes are not used to using a microscope

Problem	Possible causes
Blurred details Bad image Bad contrast Vignetted field of view	The aperture diaphragm is not opened wide enough
	The objective does not belong to this microscope
	The front lens of the objective is dirty
	The condenser is not correctly centred
	Dirt / dust on the objective
	Dirt /dust on the front lens of the condenser
Dirt or dust in the field of view	Dirt / dust on the eyepieces
	Dirt / dust on the front lens of the condenser
	Dirt / dust on the object
One side of the image is blurred	The stage was not correctly fitted
	The objective is not positioned correctly on the beam path
	The nosepiece is not correctly fitted
The image flickers	The nosepiece is not correctly fitted
	The objective is not positioned correctly on the beam path
	The condenser has not been correctly centred
The coarse adjustment knob is difficult to turn	The rotational resistance brake is too tight
	The angle table is blocked by a solid body
The stage moves down on its own The fine adjustment knob moves on its own	The rotational resistance brake is not tight enough
When you move the table, the image becomes blurred	The stage was not correctly fitted

14 Power supply

14.1 Mains connection



The microscope may only be connected to the mains supply if the information on the microscope (sticker) and the local mains voltage are identical.



Important:

- - Check the mains cable for damage before commissioning
- - Ensure that the power supply unit does not come into contact with liquids
- - The mains plug must be accessible at all times.

15 Further information

The illustrations may differ slightly from the product.

The descriptions and illustrations in this user manual are subject to change without notice. Further developments on the device may lead to these changes.



All language versions contain a non-binding translation.
The original German document is the binding version.