Achios-X inverso

euromex microscopes holland

user manual

v.626291

Contents

Introduction

Thank you for purchasing the Euromex Achios-X Inverso. The Euromex Achios-X Inverso microscopes are developed for use in the life science sector. Specific attention to production methods resulted also in an excellent price/performance ratio. Please read this manual carefully before using this product to ensure correct and safe usage

- The content of this manual is subject to change without notice
- The appearance of the actual product can differ from the models described in this manual
- Not all equipment mentioned in this manual has to be part of the set you have purchased
- All optics are anti-fungus treated and anti-reflection coated for maximum light throughput

2. General safety instructions

Intended use: a non-medical device

This device is intended for general observation of cells and tissues, with transmitted/reflected illumination and with the specimen fixed on a slide

2.1 Suffocation hazard

The packaging can contain protective plastic bags without perforations, as well as dust protection bags that could be pulled over the head of a child. To avoid danger of suffocation:

- Keep the bags away from babies and children
- Tie a knot in plastic bags before throwing them out
- Plastic bags should be stored out of reach of children
- The installation and use of this product must always be supervised by a qualified adult

2.2 Dangers associated with the operation

- Improper use could result in injury, malfunction or damage to property. It must be ensured that the operator informs every user of existing hazards
- Danger of electrocution. Disconnect the power to the entire lighting system before installing, adding or changing any component
- Not to be used in corrosive or explosive environments
- Avoid direct exposure of eyes to the collimated light beam or direct light from the light guides or fibres
- To avoid a hazard to children, account for all parts and keep all packing materials in a safe place

2.3 Photobiological safety LED, important safety instructions

- Avoid direct eye exposure to any LED light source while switched on
- Before looking through the eyepieces of the device, lower the intensity of the LED illumination
- Avoid long and high-intensity exposure to LED light because this may cause acute damage to the retina of the eye

2.4 Photobiological safety instructions fluorescence light sources

- Fluorescent light sources - such as HBO mercury vapor lamps or LED - can be harmful to human eyes, especially ultraviolet and violet light
- Therefore, always mount and use the orange protection shield, supplied with the fluorescence attachments, when applicable
- Operators must close the shutter of the fluorescence attachment, equipped with an HBO mercury vapor illumination, or switch off the LED for fluorescence, when observation of the sample is postponed for a longer time
- Avoid direct exposure of the eye to any fluorescent light source while switched on
- Before looking through the eyepieces of the device, lower the intensity of the LED for fluorescence illumination
- Avoid long and high-intensity exposure to LED light because this can cause acute damage to the retina of the eye
- Mercury vapor lamps ***must*** be replaced when reaching a maximum of 200 hours (due to explosion hazard) and properly disposed of, in accordance with local regulation. When replacing the lamp, safety goggles must be used
- Mercury vapor lamps are always under high pressure, even when cool. When turning on a mercury light bulb, it needs to stay on for at least 15 minutes before switching it off. Do not switch it on again for at least 30 minutes, so it has plenty of time to cool down. In the event of a broken bulb, immediately vacate the area for at least 30 minutes before returning

2.5 Prevention of biological and infectious hazards

Infectious, bacterial or viral biohazard substances under observation may be a risk to the health of humans and other living organisms. Special precautions should be taken during in vitro medical procedures:

- **Biological hazards**: keep a logbook of all the biological substances or pathogenic microorganisms that were under observation with the device and show it to everybody before they use the device or before they do some maintenance work on the device! Agents can be bacterial, spores, enveloped or non-enveloped virus particles, fungi or protozoa
- **Contamination hazard:**
  - A sample that is properly enclosed with a cover glass never comes in direct contact with the device parts. In that case prevention of contamination lies in the handling of the slides; as long as the slides are decontaminated before use and are undamaged and treated normally, there is virtually zero risk of contamination
  - A sample that is mounted on a slide without cover glass, can come in contact with components of the device and may be a hazard to humans and/or the environment. Therefore, check the device and accessories on possible contaminations. Clean the device's surfaces and its components as thoroughly as possible. Should you identify a possible contamination, inform the local responsible person in your organisation
  - Operators could be contaminated from other activities and cross-contaminate components of the device. Therefore, check the device and accessories on possible contaminations. Clean the device's surfaces and its components as thoroughly as possible. Should you identify a possible contamination, inform the local responsible person in your organisation. it is recommended to wear sterile gloves when preparing the slides and handling the device in order to reduce contamination by the operator
- **Infection hazard:** direct contact with the focusing knobs, stage adjustments, stage and eyepieces/tubes of the device can be a potential source of bacterial and/or viral infections. The risk can be limited by using personal eyeshades or eyepieces. You can also use personal protections such as operation gloves and/or safety goggles, which should be changed frequently to minimize the risk
- **Disinfectant hazards:** before cleaning or disinfecting, check if the room is adequately ventilated. If not, wear respiratory protective gear. Exposure to chemicals and aerosols can harm human eyes, skin and respiratory system. Do not inhale vapours. During disinfection, do not eat, drink or smoke. Used disinfectants must be disposed of according to local or national regulations for health and safety

2.6 Disinfection and decontamination:

- Exterior casing and mechanical surfaces must be wiped with a clean cloth, dampened with a disinfectant
- Soft plastic parts and rubber surfaces can be cleaned by gently wiping a clean cloth, dampened with a disinfectant. Discoloration can occur if alcohol is used
- The front lens of eyepieces and objectives are sensitive to chemicals. We recommend not to use aggressive disinfectants but to use lens paper or a soft fibre-free tissue, damped in cleaning solution. Cotton swabs may also be used. We recommend you use personal eyepieces without eyeshades in order to minimize risk
- Never immerse or dip the eyepiece or objective into a disinfectant liquid! This will damage the component
- Never use abrasive compounds or cleaners that may damage and scratch optical coatings
- Properly clean and disinfect all possible contaminated surfaces of the device or contaminated accessories before storing for future use. Disinfection procedures must be effective and appropriate
- Leave the disinfectant on the surface for the required exposure time, as specified by the manufacturer. If the disinfectant evaporates before the full exposure time, reapply disinfectant on the surface
- For disinfection against bacteria, use a 70% aqueous solution of isopropanol (isopropyl alcohol) and apply for at least 30 seconds. Against viruses, we recommend to refer to specific alcohol or non-alcohol based disinfection products for laboratories

Before returning a device for repair or maintenance through a Euromex dealer, an RMA (return authorization form) together with a decontamination statement must be filled in! This document - available from Euromex for any reseller- must be shipped together with the device at all times

Handle with care

- This product is a high quality optical instrument. Delicate handling is required
- Avoid subjecting it to sudden shocks and impacts
- Impacts, even small ones, can affect the precision of the instrument

Handling the LED

Note: Always disconnect the power cord from your device before handling the LED bulb and power unit and allow the system to cool down approximately 35 minutes to avoid burns

- Never touch the LED with your bare hands
- Dirt or fingerprints will reduce the life span and can result in uneven illumination, lowering the optical performance
- Use only original Euromex replacement LEDs
- The use of other products may cause malfunctions and will void warranty
- During use of the device, the power unit will get hot; never touch it while in operation and allow the system to cool down approximately 35 minutes to avoid burns

Dirt on the lenses

- Dirt on or inside the optical components, such as eyepieces, lenses, etc., affects the image quality of your system negatively
- Always try to prevent your device from getting dirty by using the dust cover, prevent leaving fingerprints on the lenses and clean the outer surface of the lens regularly
- Cleaning optical components is a delicate matter. Please, read the cleaning instructions further on in this manual

2.7 Environment, storage and use

- This product is a precision instrument and it should be used in a proper environment for optimal use
- Install your product indoors on a stable, vibration-free and level surface in order to prevent this instrument to fall thereby harming the operator
- Do not place the product in direct sunlight
- The ambient temperature should be between 5 to +40°C and humidity should be within 50% and 80%
- Although the system is anti-mold treated, installing this product in a hot, humid location may still result in the formation of mold or condensation on lenses, impairing performance or causing malfunctions
- Never turn the right and left focus knobs in opposite directions at the same time or turn the coarse focus knob past its farthest point as this will damage this product
- Never use undue force when turning the knobs
- Make sure that the device can dissipate its heat (fire hazard)
- Keep the device away from walls and obstructions for at least approximately 15 cm
- Never turn the device on when the dust cover is in place or when items are placed on the device
- Keep flammable fluids, fabric, etc. well out of the way

Disconnect power

Always disconnect your device from power before doing any maintenance, cleaning, assembling or replacing LEDs to prevent electric shocks

Prevent contact with water and other fluids

Never allow water or other fluids to come in contact with your device, this can cause short-circuiting your device, causing malfunction and damage to your system

Moving and assembling

- This device is a relatively heavy system, consider this when moving and installing the system
- Always lift the device by holding the main body and base of the device
- Never lift or move the device by its focusing knobs, stage or head
- When needed, move the device with two persons instead of one

3. Components

3.1 Components model A (AI.40xx, phase contrast)

A. Display
B. Lamp house
C. Köhler iris
D. Shutter
E. Filterholders
F. Condenser centering screws
G. Condenser focus knob
H. Condenser fixing screw
I. Condenser iris
J. Phase contrast slider
K. Condenser
L. Handle (not visible)
M. Universal cell culture dish holder
N. X/Y stage
O. Slot for 3D relief slider
P. X/Y Stage adjustment
Q. Coarse and fine focusing knobs
R. Tension setting
S. Handle
T. Power input and fuses
U. Ergonomic binocular head
V. Eyepieces
W. Display control/illumination adjustment
X. Power button
Y. Nosepiece with objectives
Z. Photo port

3.2 Components model B (AI.10xx, phase contrast)

- **A.** Display
- **B.** Lamp house
- **C.** Köhler iris
- **D.** Condenser fixing screw
- **E.** Phase contrast slider
- **F.** Condenser
- **G.** Handle (not visible)
- **H.** Universal cell culture dish holder
- **I.** X/Y stage
- **J.** Slot for 3D relief slider
- **K.** X/Y Stage adjustment
- **L.** Coarse and fine focusing knobs
- **M.** Tension setting
- **N.** Handle
- **O.** Power input and fuses
- **P.** Binocular head
- **Q.** Eyepieces
- **R.** Display control/illumination adjustment
- **S.** Power button
- **T.** Nosepiece with objectives
- **U.** Photo port

3.3 Components model C (AI.40xx, fluorescence)

C

- **A.** Display
- **B.** Lamp house
- **C.** Köhler iris
- **D.** Shutter
- **E.** Filterholders
- **F.** Condenser centering screws
- **G.** Condenser focus knob
- **H.** Condenser fixing screw
- **I.** Condenser iris
- **J.** Phase contrast slider
- **K.** Condenser
- **L.** Handle (not visible)
- **M.** Universal cell culture dish holder
- **N.** X/Y stage
- **O.** Slot for 3D relief slider
- **P.** X/Y Stage adjustment
- **Q.** Coarse and fine focusing knobs
- **R.** Tension setting
- **S.** Handle
- **T.** Power input and fuses
- **U.** Ergonomic binocular head
- **V.** Eyepieces
- **W.** Display control/illumination adjustment
- **X.** Power button
- **Y.** Nosepiece with objectives
- **Z.** Photo port

- **1.** Fluorescence filter block changer
- **2.** Fluorescence light unit
- **3.** Protection shield
- **4.** Access to filter block turret

3.4 Components model D (AI.30xx, fluorescence)

A. Display
B. Lamp house
C. Köhler iris
D. Condenser fixing screw
E. Phase contrast slider
F. Condenser
G. Handle (not visible)
H. Universal cell culture dish holder
I. X/Y stage
J. Slot for 3D relief slider
K. X/Y Stage adjustment
L. Coarse and fine focusing knobs
M. Tension setting
N. Handle
O. Power indicator
P. Binocular head
Q. Eyepieces
R. Display control/illumination adjustment
S. Power button
T. Nosepiece with objectives
U. Photo port

1. Fluorescence filter block changer
2. Fluorescence light unit
3. Protection shield
4. Access to filter block turret

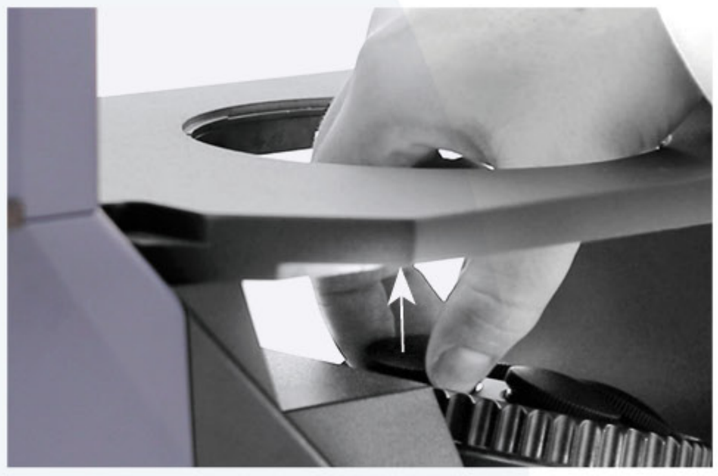
4. Setup all models A and C

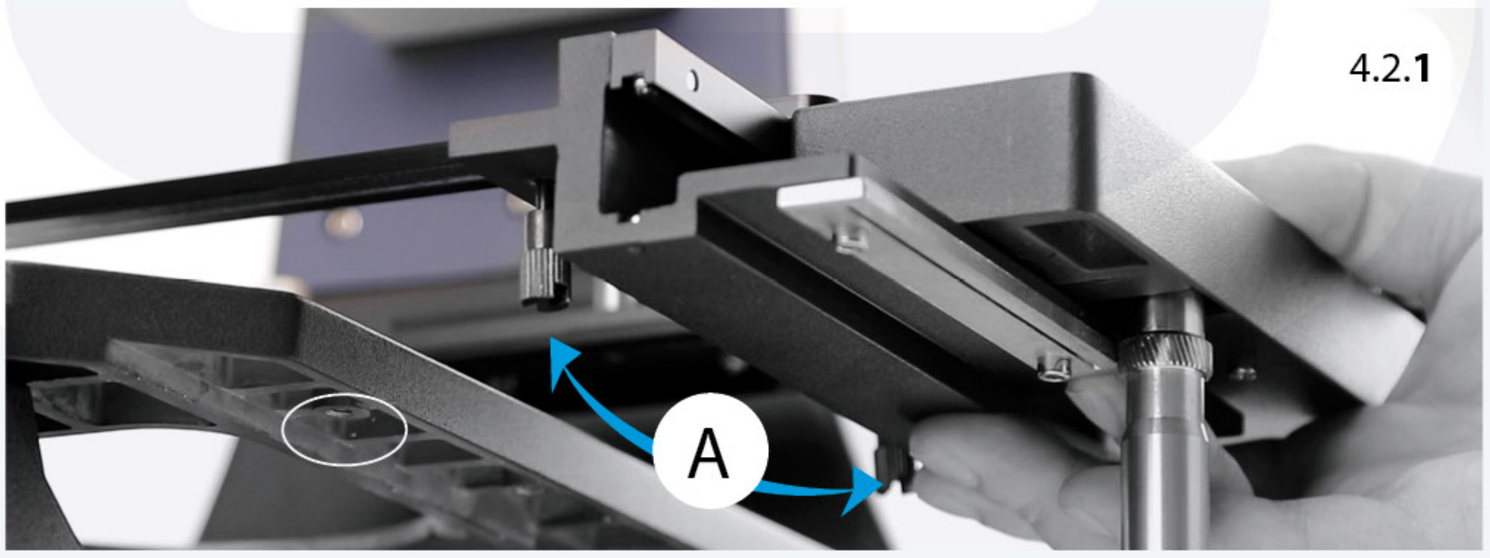
The installation is shown on a AI.4058-PLFi, since basically the installation of all the models is similar. If there are significant discrepancies, they will be pointed out to you

4.1 Mounting the obejctives

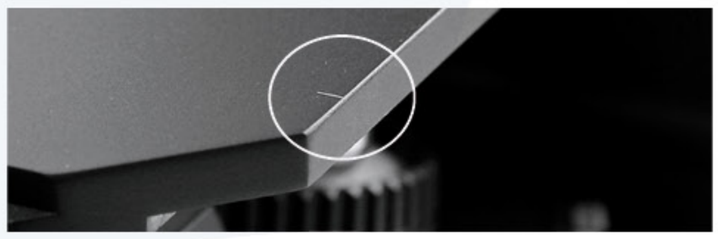
- Connect the microscope to a grounded powersupply (T, model C)
- Turn the power switch on (X, model C)
- Remove dust cap of the objective hole that is in the light path.

  The display shows which objective has been preinstalled, this can always be changed
- Mount the objective
- Turn the nosepiece until it clicks in place, remove dust cap and mount the objective shown in the display
- Mount all objectives in this way

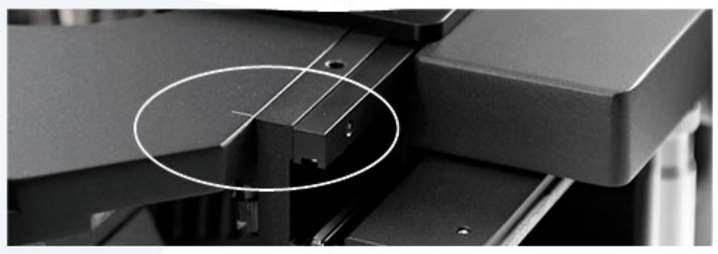




4.2.**1**



4.2.**2**



4.2.**3**

4.2 Attaching the X/Y stage

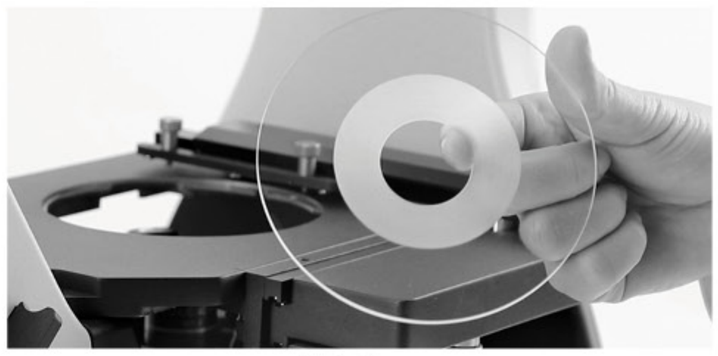
- Place the X/Y stage on the plain stage as show above (1)
- Note the marking (2) on top of the plain stage and align it with the X/Y stage (3)
- Use screws (1A) to secure the X/Y stage

4.3.**1**

4.3 Removing/replacing the universal holder

in order to place a glass plate

- Unscrew both screws holdng the universal holder and remove it by lifting the part holding the screws (1)
- Place the glass plate (2) making sure the frosted side is facing down (preventing the objectives from coming in contact with it)
- Replace the part you removed earlier, noting the holes for the screws (3)

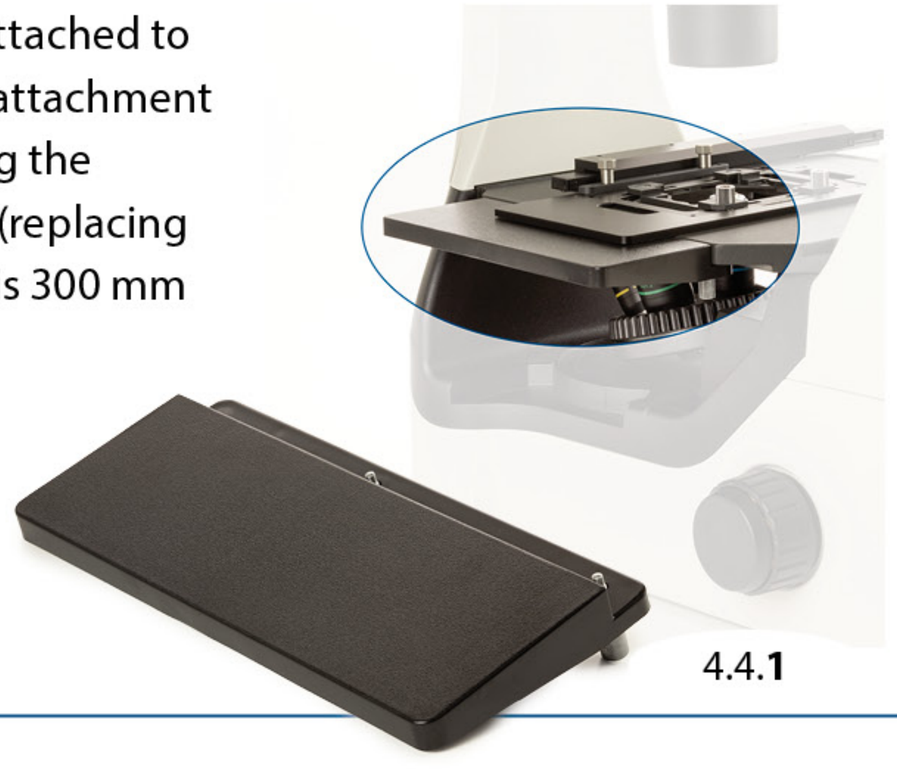


4.3.**2**

4.3.**3**

4.4 Stage extension plates

Stage extension plates (1) are attached to the plain stage similarly to the attachment of the X/Y stage. After attaching the extension plates on both sides (replacing the X/Y stage) the stage width is 300 mm



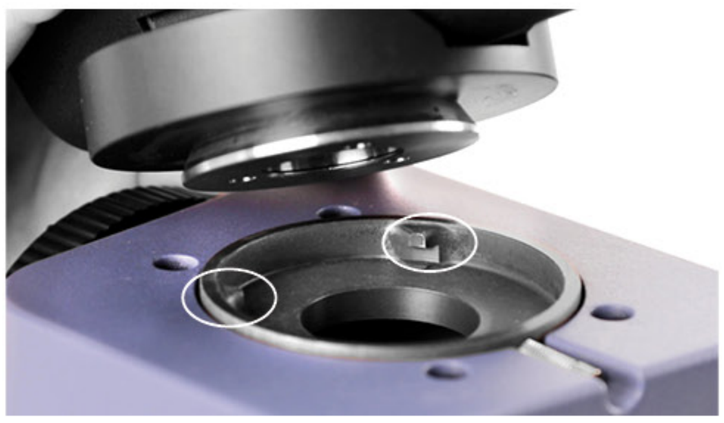
4.4.**1**

4.5 Attaching the head

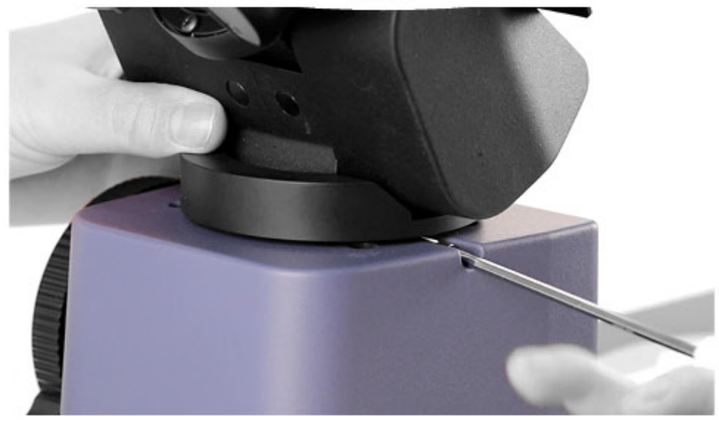
- Remove the dust cap (1)
- Make sure the screw is fully retracted
- Slide the head in its place under the lugs (2)
- Fix the head with the Allen key (3)

4.5.**1**

4.5.**2**



4.5.**3**



4.6 Inserting the eyepieces

- Remove the dust caps by unlocking them with a small Allen key (1)
- Slide the eyepieces in (2)
- Lock them when required (3)

4.6.**1**

4.6.**2**

4.6.**3**

4.7 Placing the condenser

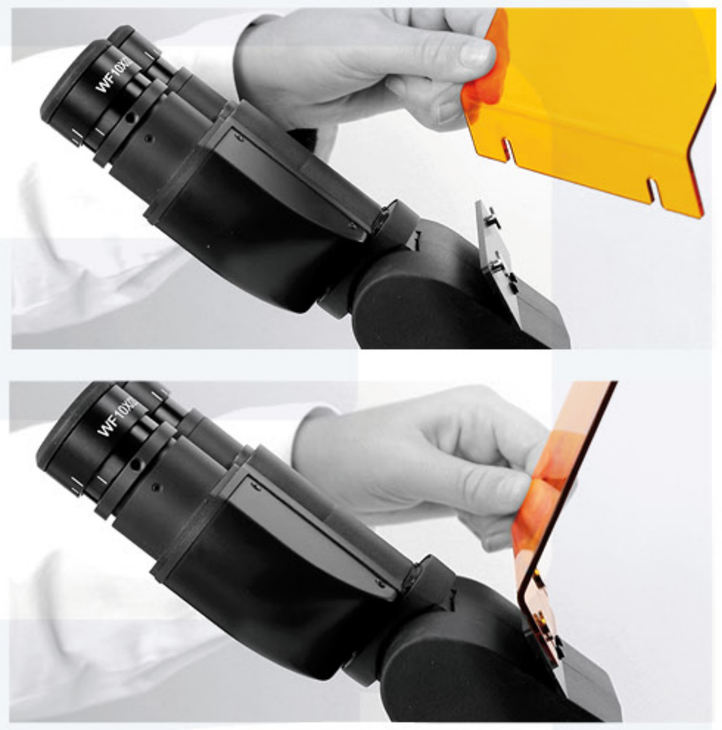
- Gently slide the condenser away from you. Note the lug that needs to fit in the indentation (1)
- Secure the screw (2)

4.7.**1**

4.7.**2**

4.8 Placing the protection shield

- Slide the shield in its place (1) (only for fluorescence models)



4.8.**1**

5. Operation

5.1 Turning the power on

(model C, component X)

Turn the main switch on the back of the microscope body to "-" (on)

5.2 Adjusting the illumination brightness

(model C, component W)

Turn the potentiometer counter clockwise to dim the light, and clockwise to increase it. This potentiometer is also used to operate the Smart Light Control

5.3 Placement of specimen

1. A specimen can be placed directly on the glass plate (optional) inserted in the plain stage
2. Standard insert for placing various sizes of petri dishes (AI.9569)
3. MultiWell plate holder (AI.9517, optional)
4. Petri dish holder (90 mm, AI.9590, optional)
5. Slide holder (AI.9554, optional, to be used togeher with the AI.9554). Be sure to place the slide upside down into the holder
6. Petri dish holder (35 mm, AI.9535, optional, to be used togeher with the AI.9554)

5.3.**1**

5.3.**2**

The X/Y stage adjustment handle (P, model X) can be used to move your specimen, except when the specimen is placed directly on the plain stage (as in 1)

Caution: Be careful when changing the objective. It may collide with the specimen, because of the short working distance of specimen observation

5.3.**3**

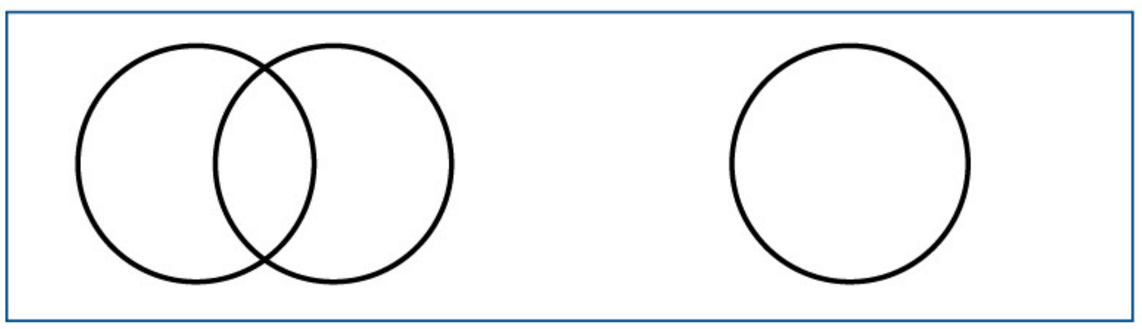
5.3.**5**

5.3.**6**

5.3.**4**

5.4 Adjusting the interpupillary distance

By rotating the binocular part while looking through the eyepieces, adjust the distance between the eyepieces so that the right and left view fields overlap to a single image from eyepieces



Field of view before adjustment

Field of view after adjustment

5.5 Diopter adjustment of the eyepieces

In order to compensate for human eye differences, distortion, thickness differences in cover glasses and tune for the best parfocality between objectives, one can use the diopter to do so. Take a good prepared slide for your reference:

- Set (both) the diopter adjustments of the eyepieces to "0"
- Select the 10x objective, look for a interesting area on the specimen and focus on this area
- Select the 40x objective and focus on the specimen

⚠ ***Warning:*** don't change the coarse and fine adjustment anymore

- With your dominant eye open (close your other eye), rotate the diopter adjustment from "+" to "–" untill the selected area get as sharp as possible
- If during this operation the image becomes unsharp, take your eyes from the eyepieces and turn the diopter adjustment, without looking into the eyepieces, a few divisions back from "-" to "+" .
- Look into the eyepiece again and turn the diopter adjustment from '+' to '-' untill the selected area on your specimen gets the optimal sharpness
- Repeat for your non-dominant eye, and with the second diopter

Verification:

- Take your eyes from the eyepieces and look for 2 seconds to a far point in the room in order to "reset" your eyes
- Look again into the eyepieces. If the adjustment is not good, repeat the operation till you reach the same sharpness for the 10x and 40x objective without touching the coarse and micrometric adjustments

5.6 The correct eye point

The eye point is the distance from the eyepiece to the user's pupil. To obtain the correct eye point, move the eyes towards the eyepieces until a sharp image is reached at a full field of view

5.7 Focus friction control

In the event the nosepiece lowers by itself, or focusing is too heavy the friction needs to be adjusted

- Too light (the nosepiece may lower itself on its own accord) turn the innermost dial counterclockwise
- Too heavy (you may experience difficulty focusing) turn clockwise

⚠ ***Note***: Never attempt the following operations, as they might result in product malfunction:

- Rotating the left and right focus knobs in opposite directions
- Rotating the coarse and fine focus knobs past their limit

5.8 Centering the condenser

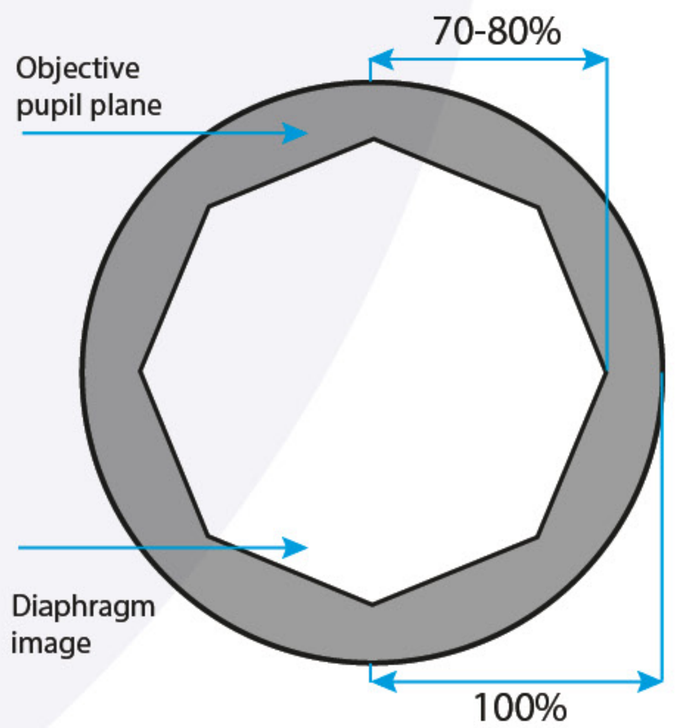
(for model A and C)

1. Move the condenser to the lowest position (1)
2. Focus on a specimen using the smallest objective (e.g. 4x or 10x objective)
3. Close the Köhler diaphragm (3)
4. Focus on the diaphragm (4) using the condenser knob (1)
5. Open the Köhler diaphragm (5) until the image of the diaphragm is close to the edges (5b)

6. With the two screws (6) move the Köhler diaphragm into the center of the field of view (6b)
7. If necessary, finetune and move the Köhler diaphragm into the center with the two screws
8. Open the Köhler diaphragm until it just disappears from the field of view (7)
9. The condenser has been centered properly

5.9 Adjusting the transmitted illumination Köhler diaphragm

- Insert a centering telescope in the eyepiece tube, adjust the focal length, and view the objective pupil plane (a bright circle) and the diaphragm image
- Adjust the aperture diaphragm in a way that the size of the diaphragm image is 70-80% of the size of the objective pupil plane.
- The aperture diaphragm is designed for the adjustment of numerical aperture, not the light intensity. The aperture diaphragm should be set to individual preference but typically, adjusting the aperture to 70% to 80% of the pupil of the objective will result in an appropriate contrast and a favorable image



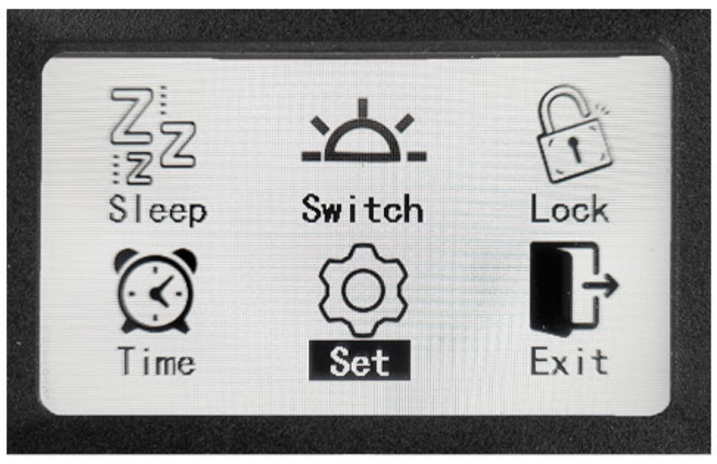
5.10 Operating the LCD display

5.10.1 LCD screen function setting and adjustment

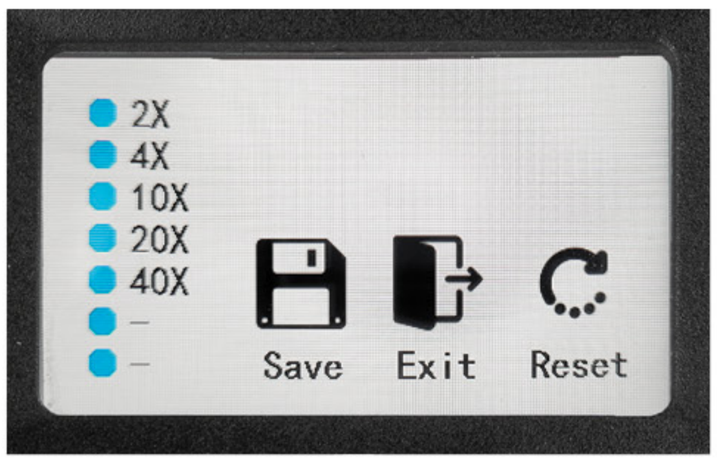
- Press and hold the dial/switch for 3 seconds to enter the function setting interface (1)
- Switch functions by turning the dial/switch up or down, and click to select the function

5.10.2 Adjusting the display

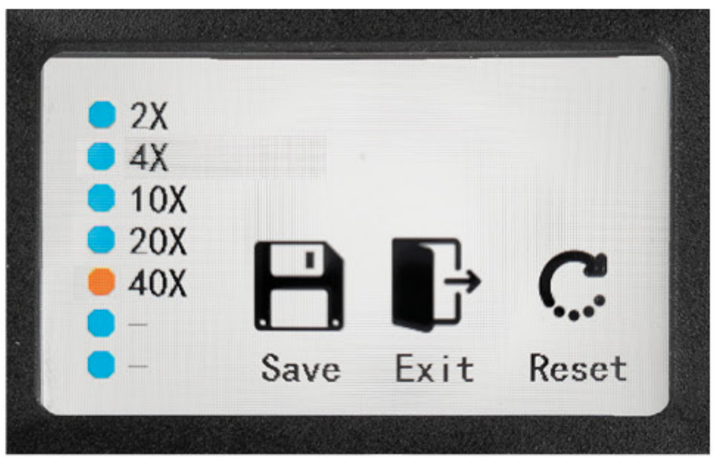
- Changing of the settings is done with the dial/switch on the side of the body, which is either turned, pushed or pushed and held
- Press the dial/switch, until menu is shown (1). Turn it to select "Set" and press again (2)
- Turn dial/switch to select 40x (3) and press (4)
- Turn the dial/switch to select "60" (5) and press (6)
- Turn the dial/switch to select "Save" (7)
- Turn dial/switch to "Exit" to exit "Set"



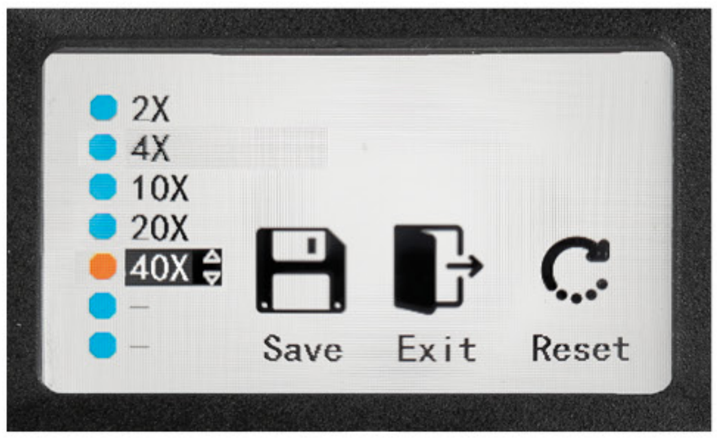
5.10.2.**1**



5.10.2.**2**

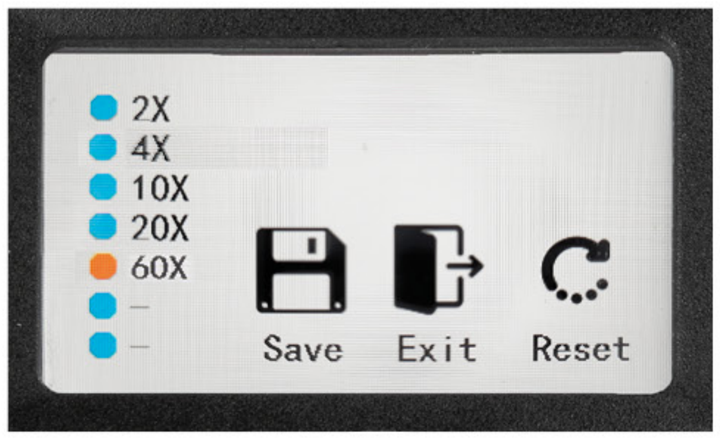


5.10.2.**3**



5.10.2.**4**

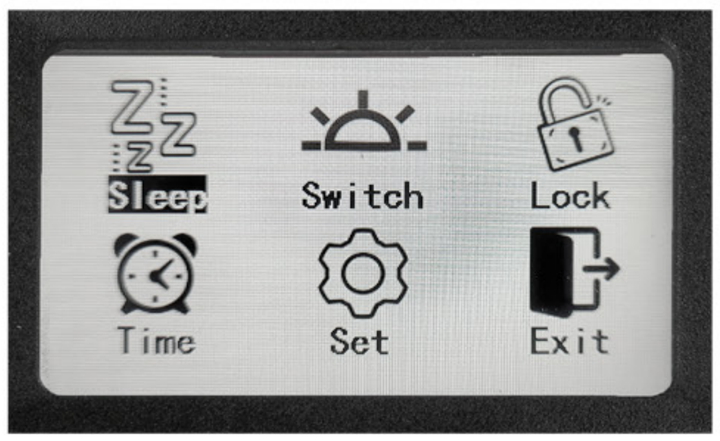
5.10.2.**5**



5.10.2.**6**

5.10.2.**7**

5.10.2.**8**



5.10.3.**1**

5.10.3 Sleep

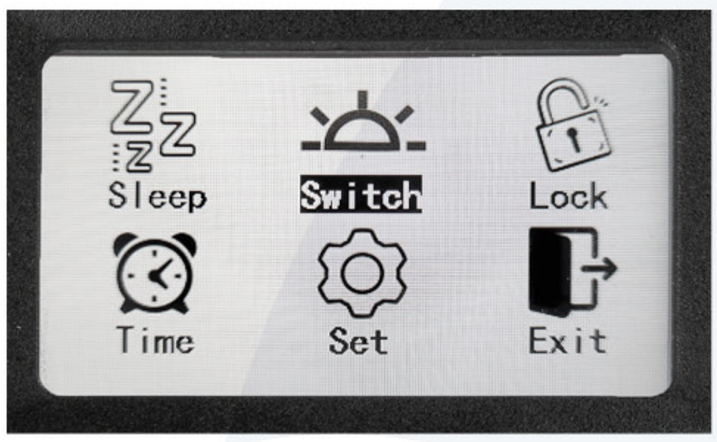
- Press the dial/switch, until menu is shown. Select "Sleep" by rotating the dial/switch (1), click to enter the sleep state, and "SLEEP" will be displayed (2)
- Click the dial/switch again to release the sleep state, and the "SLEEP" on the display disappears, showing normal working mode

5.10.3.**2**

5.10.4 Switch

Only for Achios-X Inverso fluorescence

- Press the dial/switch, until menu is shown. Select "Switch" by rotating the dial/switch (1)
- Notice how the icon for transmitted and incident illumination changes (2, 3)



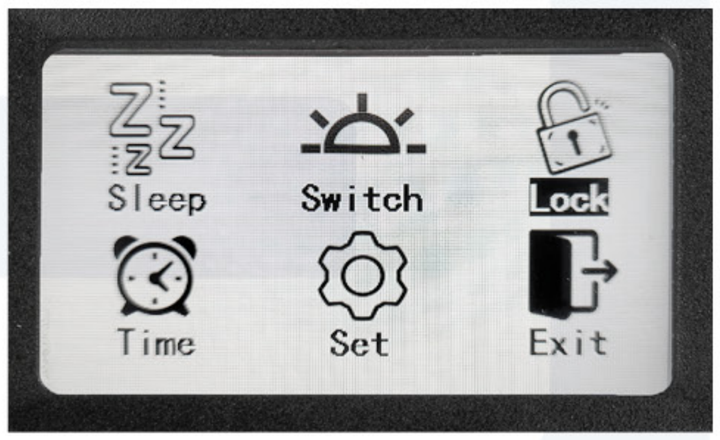
5.10.4.**1**

5.10.4.**2**

5.10.4.**3**

5.10.5 Light intensity lock

- Press the dial/switch, until menu is shown. Select "Lock" by rotating the dial/switch (1), click to enter the lock state, and the LCD screen displays "LOCK" (2)
- In this state, when turning to another objective, the brightness automatically changes to the corresponding objective's brightness, but the dial/switch is still inoperative
- Press and hold the dial/switch for 3 seconds to enter the function setting interface. Rotate it to select the Lock function and click to release the lock function. "LOCK" on the screen disappears

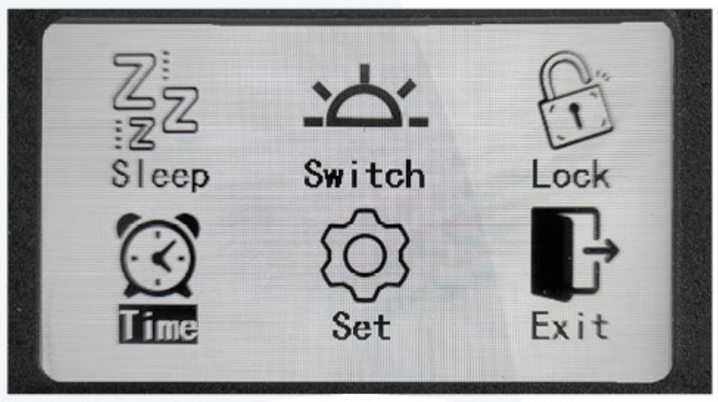


5.10.5.**1**

5.10.5.**2**

5.10.6 Automatic shut down

- Select "Time" in the menu, click to enter the time setting state (1). Turning the dial/switch can achieve an increase or decrease in time, with a score grid value of 5 minutes. Up to 8 hours can be set. In this example the microscope is set to shut down after 15 minutes
- After setting the desired time; the setting is successful when the time number jumps three times, then stops jumping. Time begins to decrease after one minute



5.10.6.**1**

5.10.6.**2**

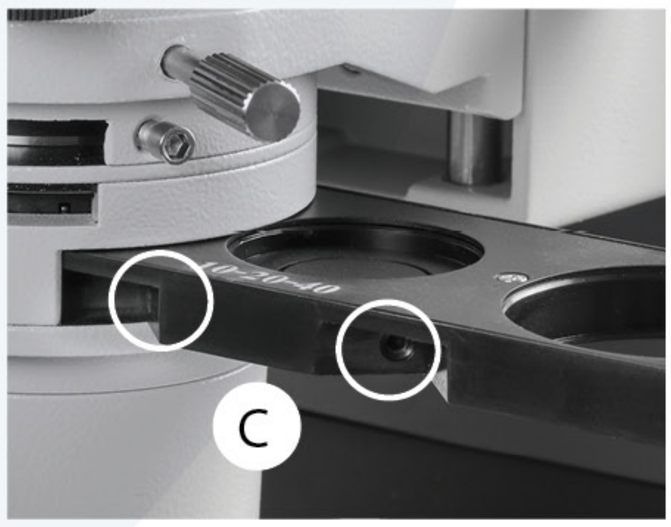
6. Phase contrast

6.1.**1**

6.1 Components

Phase contrast microscopy requires phase contrast objectives and phase contrast slider (1)

- **A.** Annular diaphragm (1A)
- **B.** Hollow (empty) position (1B)
- **C.** Allen screws for centering (2C)



6.1.**2**

6.2 Centering the phase contrast annuli

- The magnification of a phase contrast objective should match the condenser phase contrast mark ''4'' for 4x objective, ''10-20-40'' for the 10x, 20x or 40x objective
- Follow the steps below:
  - Make sure the transmitted illumination is selected (See "5.10.4 Switch")
  - Put a sample on the stage and focus
  - Remove the sample and don't change the focus
  - Take out the eyepiece and insert the centering telescope into the eyepiece tube (1)
  - Observe through the centering telescope and focus the telescope on the phase annulus by turning the eyepiece (2)
  - Keep observing through the centering telescope and adjust the position of the phase contrast ring by using two 1.5 mm hexagon tools

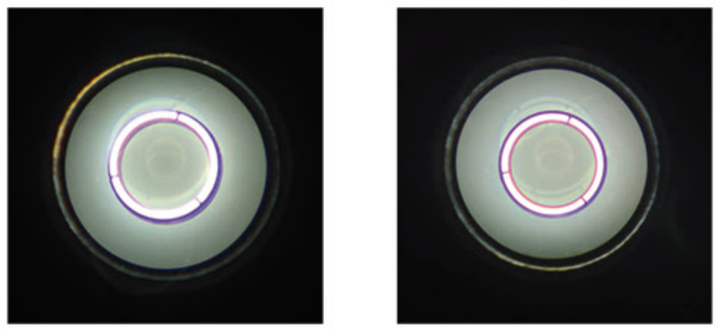
Note: Don't insert and turn the two tools at the same time but one by one until the two rings are overlapping each other (3 and 4)

6.2.**1**

6.2.**2**

6.2.**3**

- The above method also applies to objectives of larger magnification
- If the phase contrast ring is not centered properly, the optimal phase effect can't be obtained
- If after removing or placing a thick sample the image quality decreases, repeat the above steps until the two centers overlap
- If the glass slide or vessel is not flat, for a higher contrast, repeat the above steps to adjust to the two centers overlap



6.2.**4**

7. Emboss contrast

Emboss contrast microscopy is a technique used to enhance the contrast
of a sample in microscopy by simulating the appearance of three-dimensional texture or relief. By modifying the illumination or angle of the light rays and enhancing the contrast between different surfaces in the sample, a "raised" or "embossed" appearance can be achieved. It is especially useful for examining features that are otherwise difficult to distinguish due to low contrast, such as transparent, unstained biological samples

To perform emboss contrast microscopy, an emboss contrast slider must be mounted into the condenser and a second emboss contrast slider must be mounted underneath the head of the microscope (2)

7.1 Emboss contrast slider in condenser

The condenser-side emboss contrast slider is equipped with a sector diaphragm (1A). Attaching a centering telescope to the eyepiece tube enables you to view a sector diaphragm image.
The condenser-side emboss contrast slider replaces the phase contrast slider

7.**1**

7.2 Emboss contrast slider underneath the head

The emboss contrast slider underneath the head has position markings (1B).
For emboss contrast microscopy, insert the slider into the microscope until it matches the magnification of the objective. To switch back to brightfield microscopy, pull out the slider up to the "0" position, and pull out the slider in the condenser to a hollow position

7.**2**

8. Hoffman modulation contrast (HMC)

The Hoffman modulation contrast technique creates a pseudo-three-dimensional effect and enhanced contrast in transparent or low-contrast specimens, without the need for staining, thus maintaining the natural state of the specimen. Particularly effective for non-invasive, live-cell imaging. The technique includes special optical components, like specialized Hofmann objectives, a modulation slit diaphragm slider and a condenser. The microscope's condenser is fitted with a special diaphragm with several slits. These slits are aligned to the direction of the modulation slit in the objective, controlling how light is directed onto the specimen. The slit modulates the intensity of the light across the field of view

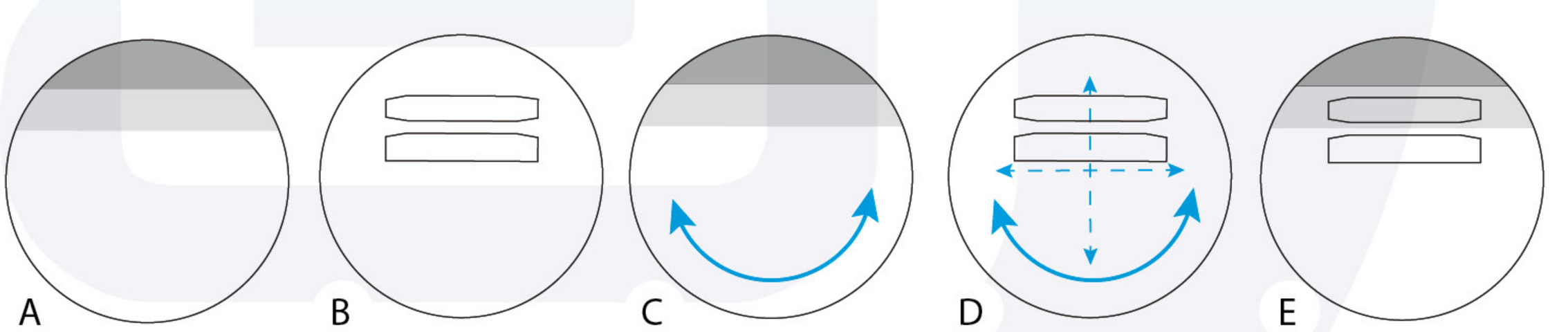
As the light passes through the specimen, the variations in refractive index within the sample cause differential modulation of the light intensity. The objective lens captures the light, with the contrast enhancement due to the modulation creating a three-dimensional, shadowed appearance of the specimen

8.1 Alignment of the Hoffman slits

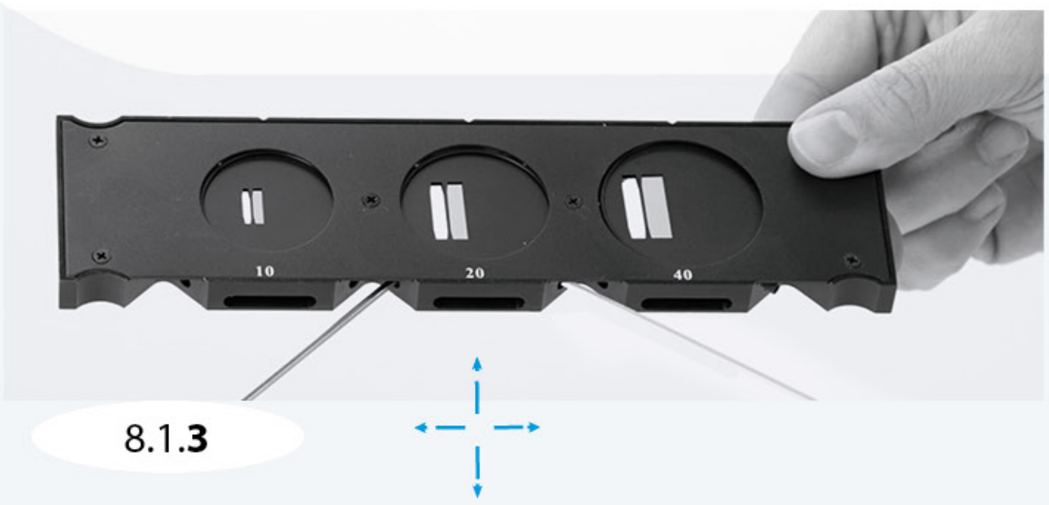
1. Focus the specimen under brightfield contrast
2. Position the Hoffman objective in the optical path (e.g. 10x)
3. Remove one eyepiece and insert the centering telescope
4. Adjust the telescope untill the Hoffman modulation mask comes into focus(2A)
5. Insert the Hoffman slider in the optical path for the corresponding magnification of the objective (e.g. 10x)

6. Open the iris diaphragm of the condenser completely and focus with the condenser height untill the slits come into focus (2B)
7. Both the objective Hoffman modulation mask and slits can be observed simultaneously
8. The position of the Hoffman objective modulation mask can be rotated using the objective adjustment ring (1 and 2C)
9. The position of the slits can be moved slightly (3 and 2D) and rotated (4 and 2D)
10. The desired position of both the slits and the modulation mask is shown in 2E

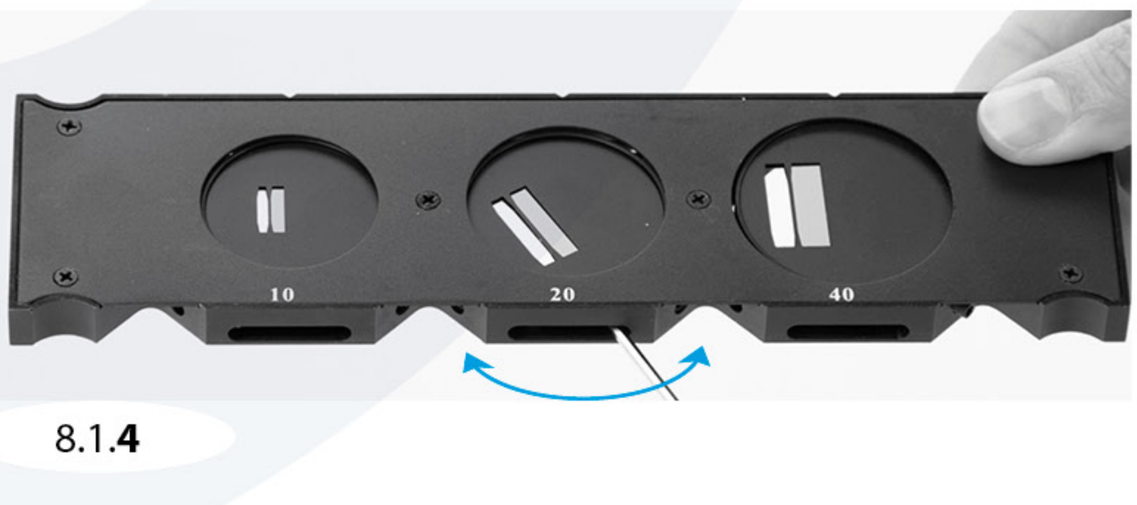
8.1.**1**



8.1.**2**



8.1.**3**



8.1.**4**

9. Fluorescence (episcopic illumination)

- Make sure the Fluorescence LED (incident) illumination is selected (See "5.10.4 Switch")
- To prevent degradation of the sample the fluorescent light can be blocked by the shutter (1)

9.**1**

9.1 Fluorescence cube turret

The fluorescence cube turret (1) allows you to attach up to three filter cubes (each with a built-in dichroic mirror)

9.1.**1**

9.1.1 Filter cube switching unit

- Switch filter cubes by rotating the filter cube turret (1). The turret is accessible from both sides of the microscope, showing the number of the filter cube that is in the optical path
- When the filter cube is switched, the right fluorescence LED unit is switched on automatically
- Fluorescent positions (1 to 3) and a bright-field position - - are alternately allocated to the turret. The turret clicks each time a filter cube is brought to a fluorescent or brightfield position

9.1.1.**1**

9.1.2 placement of the filter cubes

The filter cubes can be found on the left side of the microscope (1)

- Pull the cover out (2)
- Gently slide the filter cube out (3)
- Replace a (new) filter cube in its place (4)

9.1.2.**1**

9.1.2.**2**

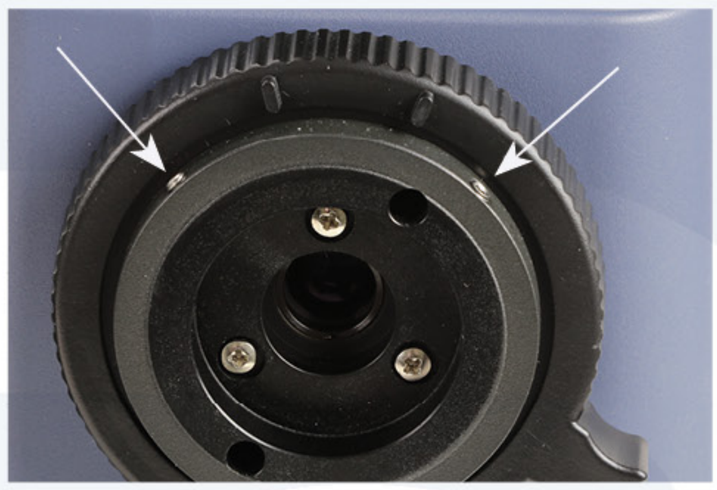
9.1.2.**3**

9.1.2.**4**

10. Camera

10.1 Setup models A and C (AI.40xx)

- Make sure the screws fixating the camera are fully retracted (1)
- Attach the camera to the adapter and insert into the camera port (2)
- Fixate camera, using an Allen screwdriver (2)



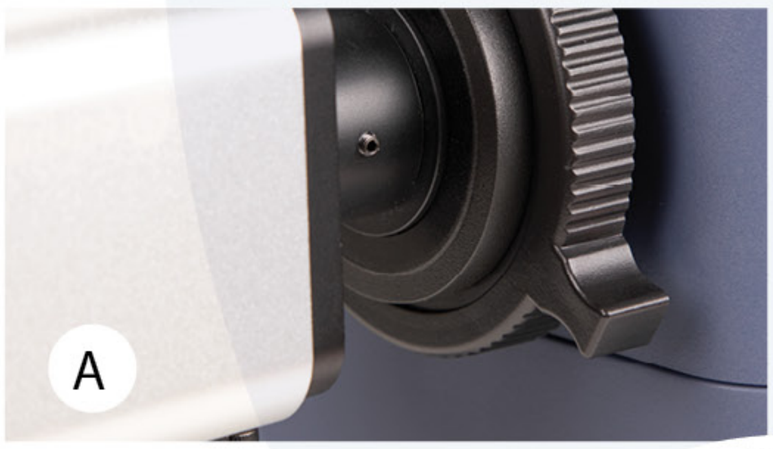
10.1.**1**

10.2 Parfocality models A and C (AI.40xx)

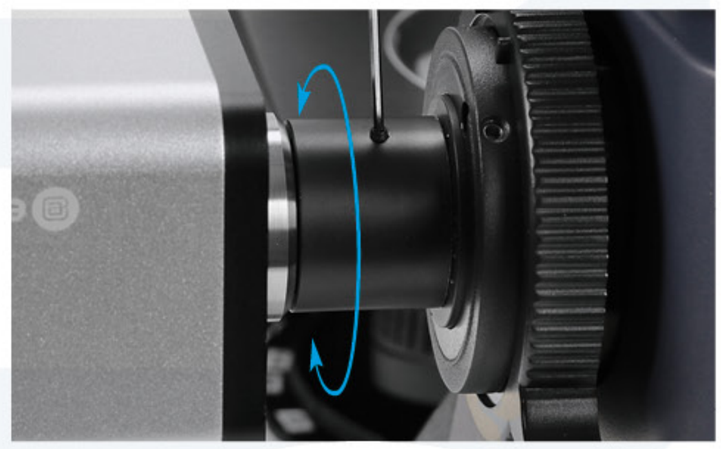
- Make sure the light is directed to the eyepieces (1A)
- Focus on a sample while looking through the eyepieces
- Loosen the screw on the side of the adapter (2)
- Direct the light to the camera (1B)
- Turn the tube while holding the camera, thus focusing the digital image

Note: The parfocality adjustment may differ when using other adapters

10.1.**2**



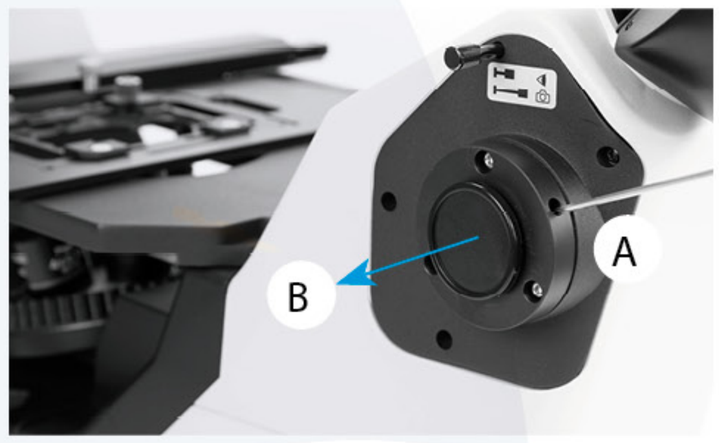
10.2.**1**



10.2.**2**

10.3 Setup models B and D (AI.10xx and AI.30xx)

- Make sure the screw fixating the camera is fully retracted (1A) and remove dust cap (1B)
- Attach the camera to the adapter and insert into the camera port (2)
- Fixate camera, using an Allen screwdriver (2)



10.3.**1**

10.3.**2**

10.4 Parfocality models B and D (AI.10xx and AI.30xx)

- Make sure the light is directed to the eyepieces (1)
- Focus on a sample while looking through the eyepieces
- Direct the light to the camera (2)
- Loosen the screw on the side of the adapter with a small Allen screwdriver (3)
- Turn the tube while holding the camera, thus focusing the digital image

Note: The parfocality adjustment may differ when using other adapters

10.4.**1**

10.4.**2**

10.4.**2**

11. Replacement fuse

- Remove the cover on the back (only the fluorescence models (1)
- Remove and replace the fuse (T250V/500mA), using a flat screwdriver (2, 3
- Replace the cover
- For phase contrast models, remove and replace the fuse (T250V/500mA), using a flat screwdriver (4, 5)

11.**1**

11.**2**

11.**3**

11.**4**

11.**5**

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