

bScope

for large samples



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1. Introduction

Thank you for purchasing the Euromex bScope

The BS.4053-PLMRI and BS.4053-PLMRI-BD microscopes have been developed specifically for the observation of surface structures and geometries of large workpieces in material science. Designed with advanced IOS optics and a modular construction, the microscopes allow both polarization and brightfield/darkfield observation (depending on the model). The vertical adjustment unit enables smooth handling of samples of different thicknesses, while the precise X-Y mechanical stage allows fast and accurate navigation across the specimen. With their stable focusing system and robust construction these microscopes are ideally suited for the inspection of precision parts, integrated circuits, metallurgical samples, and packaging materials

- 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 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

2.5 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. Alcohol may cause discoloration
- 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, dampened 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

2.6 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 range 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

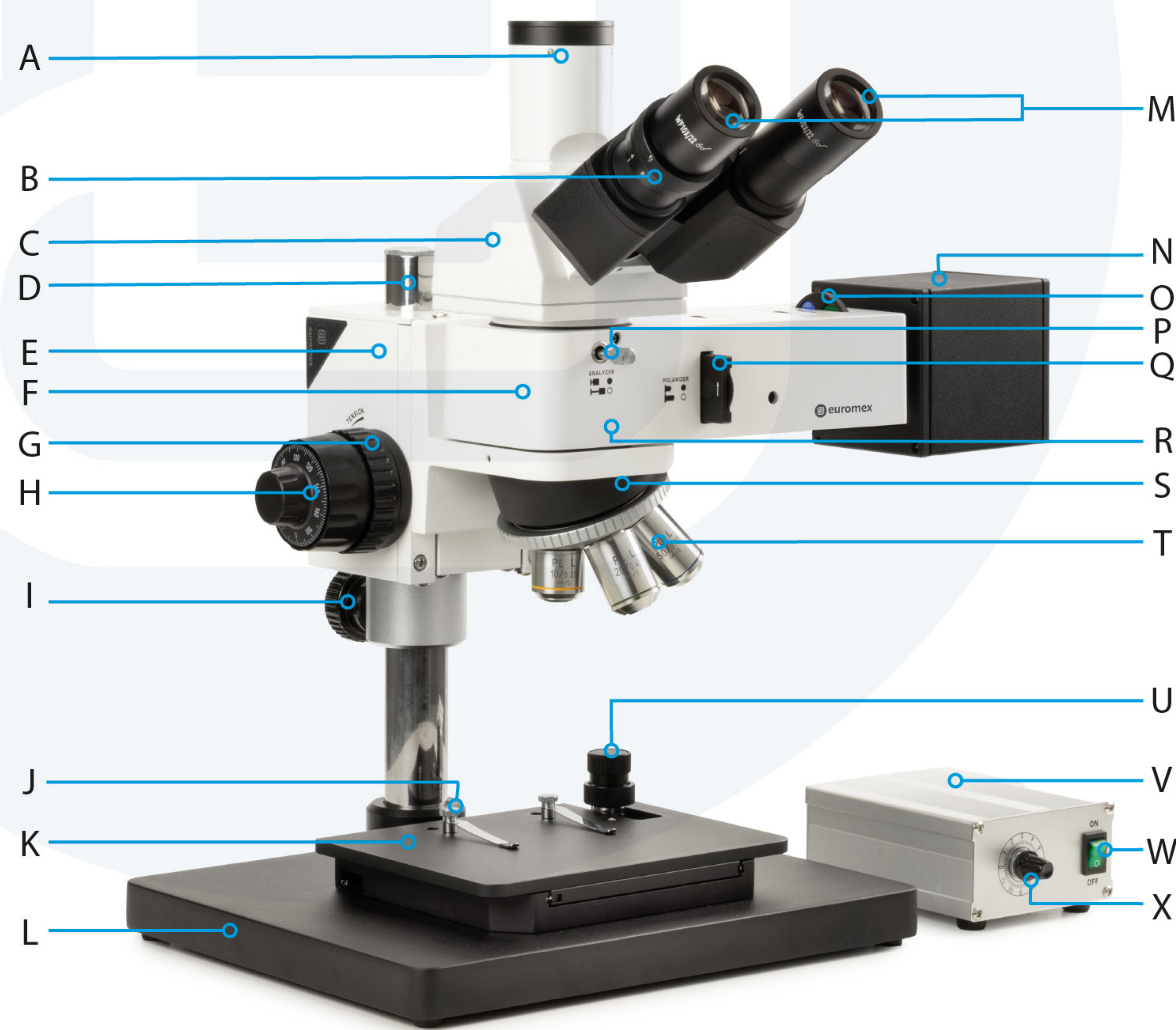
Moving and assembling

- 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 and installation

3.1 Components

The microscope contains the following parts:
Reflected illuminator, lamp house, power supply unit, main body with pre-installed objectives, trinocular head, eyepieces (2 pcs), spare lamp fuse, spring clips, tools



A.	Photo tube
B.	Diopter adjustment
C.	Trinocular head
D.	Pillar
E.	Vertical adjustment unit
F.	Illuminator unit
G.	Tension control
H.	Coarse and fine controls
I.	Safety ring
J.	Object clamps
K.	X-Y Stage
L.	Base

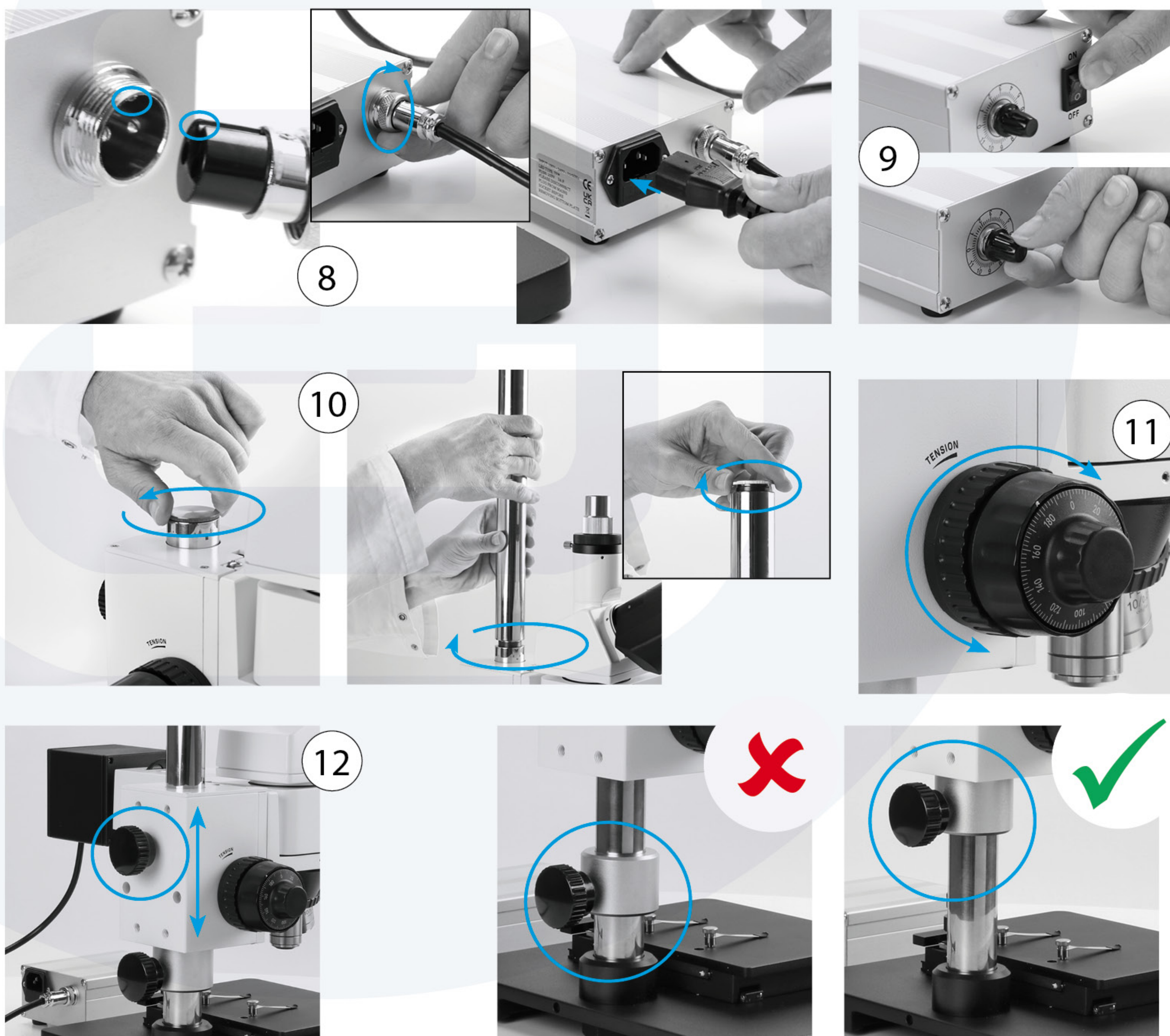
M.	Eyepieces
N.	Lamp house
O.	Filter wheel
P.	Analyzer
Q.	Polarizer
R.	Switch BF/DF (only with BS.4053-PLMRi-BD)
S.	Nosepiece
T.	Objectives
U.	X-Y control of stage
V.	Power supply
W.	On/off button
X.	light intensity control knob

3.2 Installation



1. Place the main body on a stable workbench
2. Make sure the screw is retracted and protection removed before attaching the illuminator
3. Attaching the illuminator

4. Installing the trinocular head
5. Insert the eyepieces into the eyepiece tubes
6. Attach camera adapter
7. Attach lamp house



8. Connect the power supply cables

9. The power button and the light intensity control knob

10. Attaching the pole extension

11. If the focusing is too hard or too light, turn the TENSION dial

12. How to adjust the height of the microscope

4. Operation

4.1 Centering the field diaphragm (13)

1. Put the 10x objective into the optical path
2. Open the aperture diaphragm (A) and close the field diaphragm (B) until a light spot appears in the field of view
3. If the light spot is not centered, correct this by using the supplied Allen (C)
4. Open the field diaphragm (B) until the specimen image fills the field of view



4.2 Using filters (13)

A filter wheel in the illumination system (D) holds yellow, green, and blue filters,

a ground glass diffuser, and a clear through-hole position

- Rotate the filter wheel to select the desired filter
- The filters allow adjustment of image contrast, brightness, or background color
- Use the clear through-hole position for maximum light transmission



4.3 Operating the stage (14)

- The X-axis knob controls left-right movement (travel range 35 mm)
 - The Y-axis knob controls forward-backward movement (travel range 30 mm).
- Use both knobs together for precise positioning

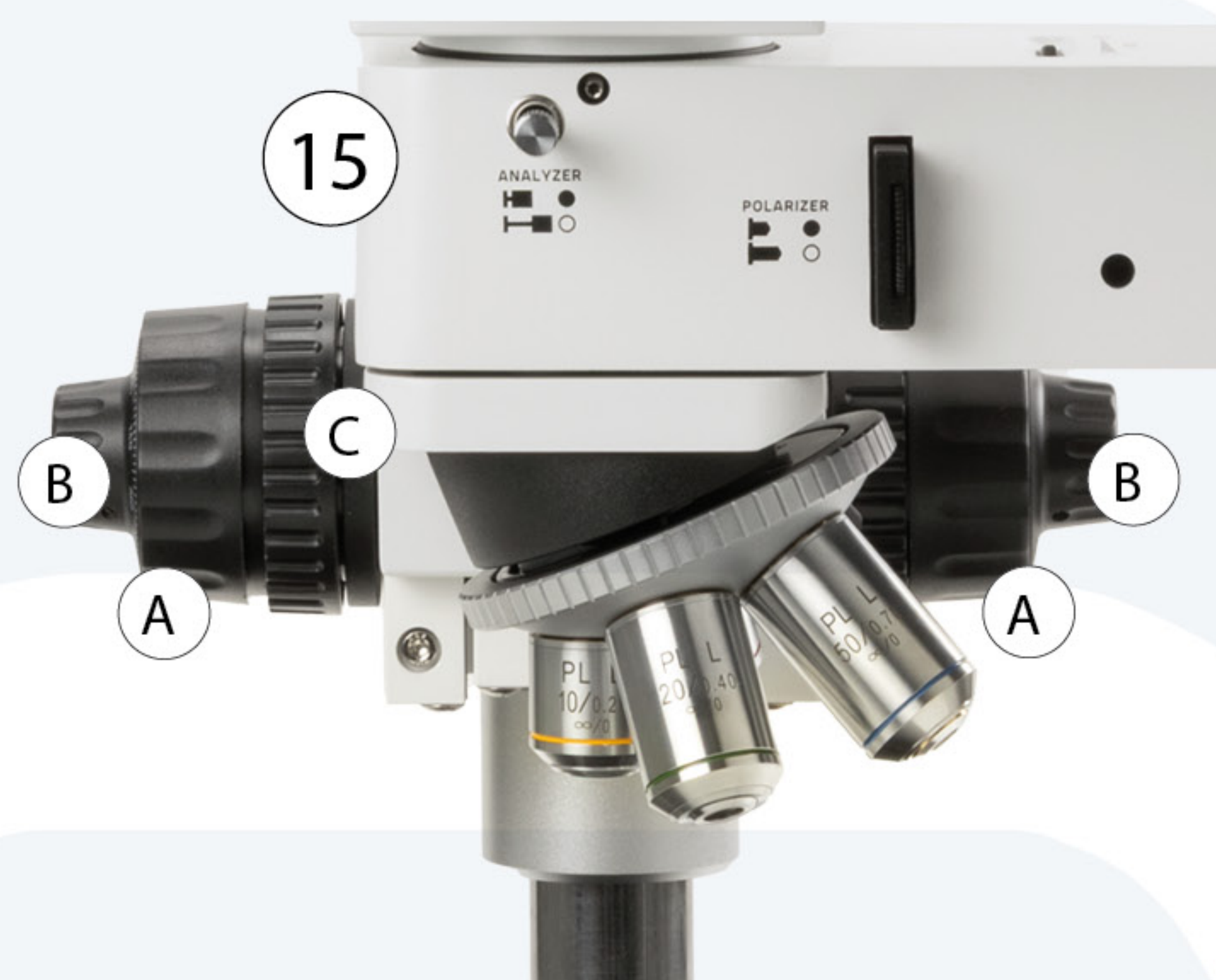
4.4 Placing the specimen

1. Place the metallurgical specimen or sample on the stage and secure it with the spring clips, if needed
2. Use the X-Y control knobs to move the stage until the desired observation area is under the objective

4.5 Focusing (15)

The microscope uses a coaxial coarse and fine focusing system with adjustable tension

1. Select the 10x objective
2. Use either one or both coarse adjustment knobs (A) to bring the specimen roughly into focus
3. Refine the image using either one or both fine adjustment knobs (B)
4. For higher magnifications, only use the fine adjustment knobs
5. Adjust the coarse focus tension with the tension control (C) if the microscope lowers of its own accord



Caution:

Avoid forcing the knobs to their limit to prevent damage

4.6 Eyepieces

Using a binocular (or trinocular) tube is less tiring for the eyes than a monocular tube. In order to obtain a smooth “compound” image, we recommend you to go through the below steps

4.6.1 The interpupillary distance (16)

The correct interpupillary distance is reached when one round image is seen in the field of view (see image below). This distance can be set by either pulling the tubes towards each other or pulling them away from each other. This distance is different for each observer and thus should be set individually. When more users are working with the microscope it is recommended to remember your interpupillary distance for a quick set-up during new microscopy sessions. The bScope's swiveling eyepiece tube can be rotated 360°. You can select corresponding eye point height according to your own preference



4.6.2 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

4.6.3 Adjusting the diopter

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 an 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 “-” until the selected area gets 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 “-” until the selected area on your specimen gets the optimal sharpness
- Repeat for your non-dominant eye, and with the second diopter

Verification:

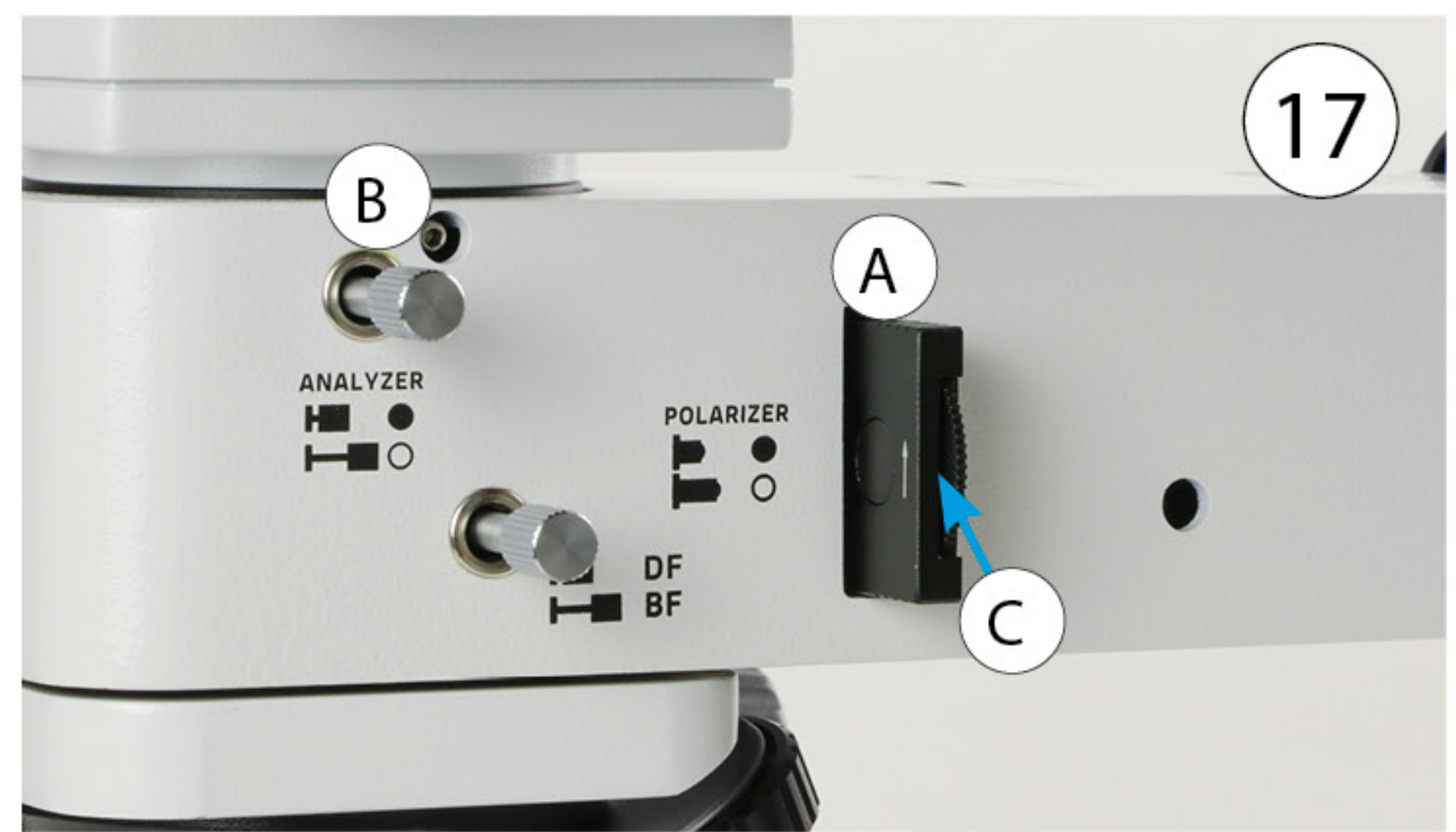
- Take your eyes from the eyepieces and look for 2 seconds to a far point in the room in order to “reset” your eyes
- Look again into the eyepieces. If the adjustment is not good, repeat the operation till you reach the same sharpness for the 10x and 40x objective without touching the coarse and micrometric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

This procedure should be followed by each individual user. When more users are working on the same microscope it is recommended to remember your own diopter setting for a quick set-up during new microscopy sessions

4.7 Polarization (17)

Polarized light observation is used to detect birefringent materials such as crystals, polymers, and geological samples

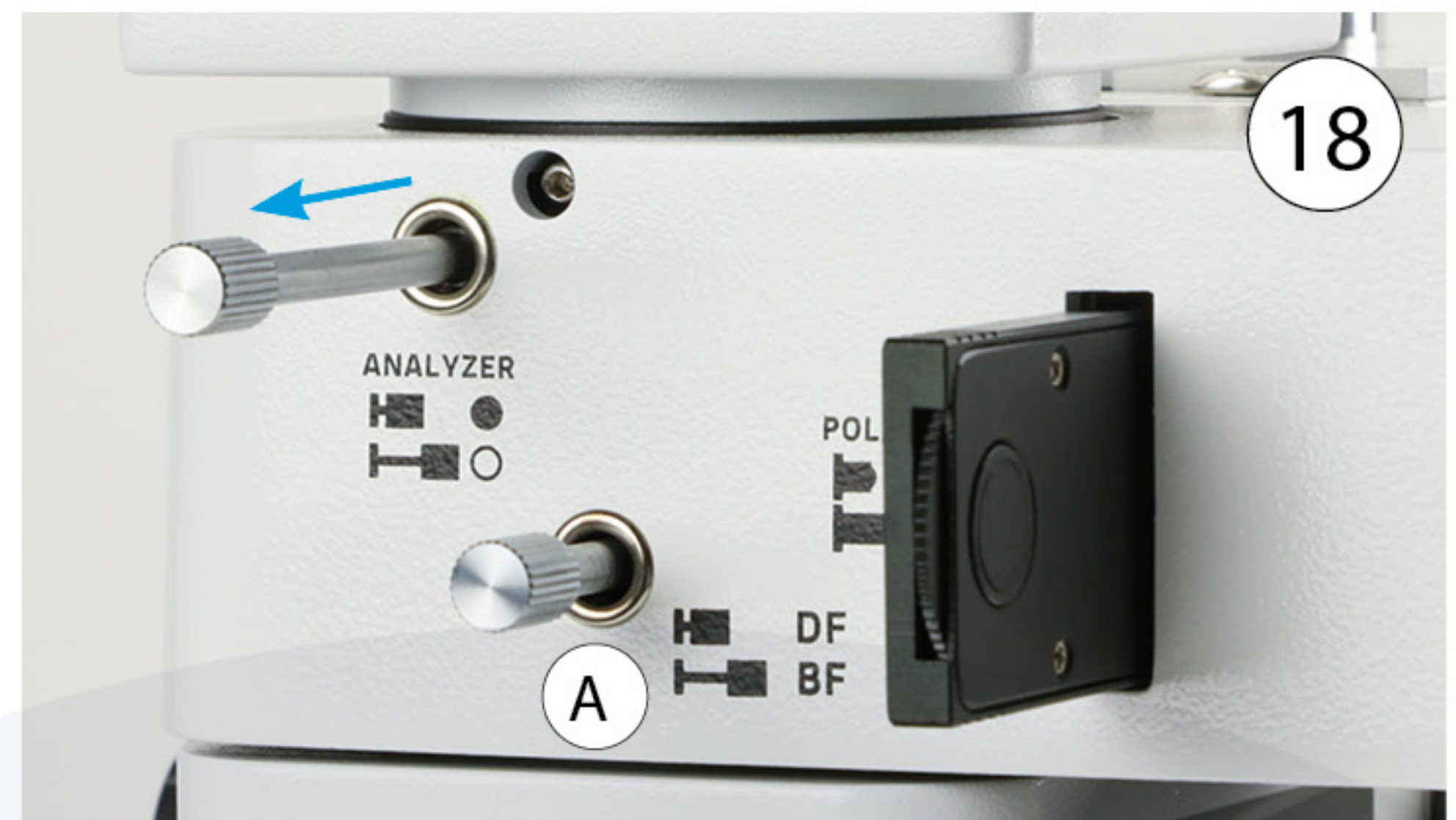
1. Insert the polarizer (A) into the illuminator slot
2. Push the analyzer rod in the optical path
3. When the polarizer and analyzer are crossed at 90°, the field of view will appear dark
4. Rotate the polarizer (C) to analyze birefringent effects in the specimen



4.8 Darkfield operation (BD model) (18)

The BS.4053-PLMRI-BD model supports both brightfield and darkfield observation

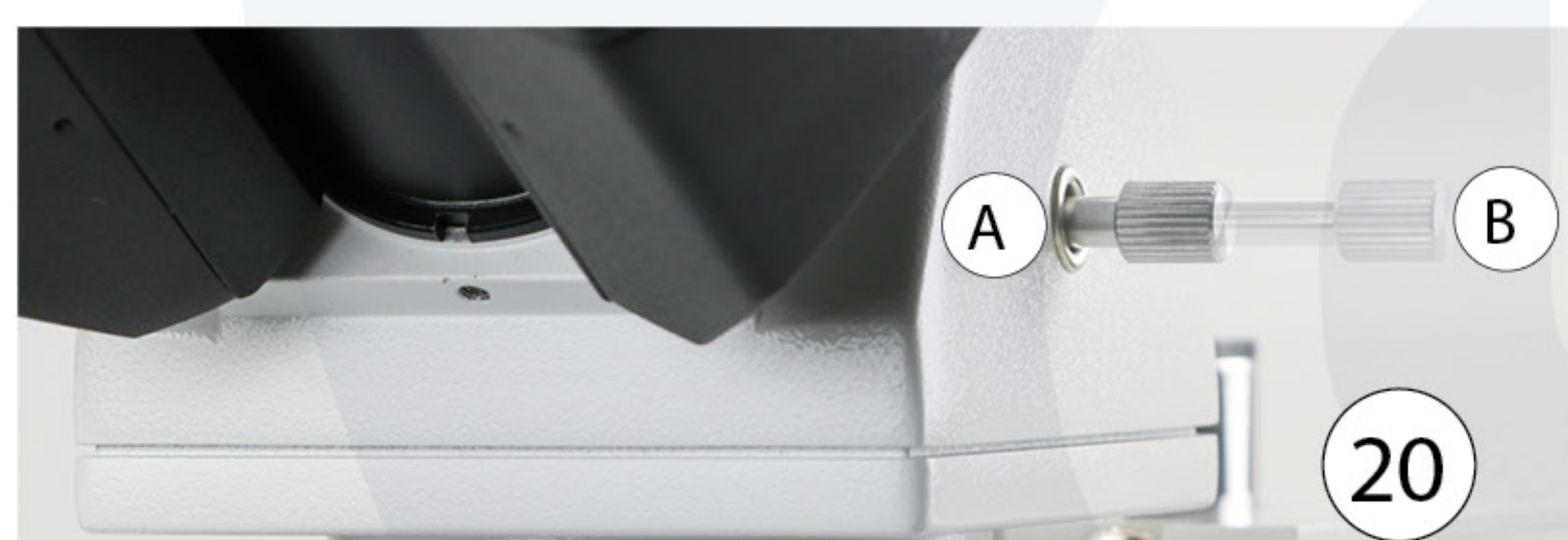
1. Move the brightfield/darkfield switching lever to the darkfield position
2. Ensure the analyzer and polarizer are removed from the optical path
3. Fully open the field and aperture diaphragms
4. Place the specimen on the stage and focus in brightfield first if necessary
5. Switch to darkfield to observe scattered light from the specimen



4.9 Trinocular head and photography

The trinocular head allows switching between visual observation and camera imaging

1. Remove the dust cap from the photo port and mount the camera adapter (A), C-mount adapter and camera (19)
2. Use the push-pull lever to switch between eyepiece observation (20, A) and camera output (B)
3. To adjust parfocality
 - Focus while looking through the eyepieces
 - Switch to camera mode, turn up the ring (B)
 - Focus, using tube C
 - Then turn ring B back down to fixate focus



5. Maintenance and cleaning

Always place the dust cover over your bScope microscope after use. Always keep the eyepiece and objectives mounted on the microscope to avoid dust entering the instrument

5.1 Cleaning the optics

When the eyepiece lens or front lens of the 10x or S40x objective are dirty, they can be cleaned by wiping a piece of lens paper over the surface (circular movements). When this does not help put a drop of alcohol on the lens paper and wipe it. **Never put xylol or alcohol directly on the lens!** Please note that Euromex offers a special microscope cleaning kit: PB.5275.

It is not necessary – and not recommended – to clean the lens surfaces at the inner side of the objectives. Sometimes dust can be removed with high pressured air. There will never be dust in the objectives if the objectives are not removed from the revolving nosepiece



Caution

Cleaning cloths containing plastic fibers can damage the coating of the lenses!

5.2 Maintenance of the stand

Dust can be removed with a brush. In case the stand or table is really dirty then you can clean the surface with a non-aggressive cleaning product. All moving parts like the height adjustment or the coaxial course and fine adjustment contain ball bearings that are not dust sensitive. With a drop of sewing-machine oil you can lubricate the bearing can be lubricated

5.3 Replacing the fuse

To change the fuse, please follow these procedures below (21):

4. Disconnect the power cord
5. Remove the fuse holder with screwdriver
6. Replace with the correct fuse type
7. Reconnect power and test

Note: The fuse may blow in order to protect internal damage to the microscope. And in most cases, replacing the fuse with the correct voltage will resolve the issue. However, should you encounter a blown fuse frequently, please contact your distributor for further assistance

Fuse specification: 250V, 3A

