# euromex EC.1005 EcoBlue Monocular Microscope User Manual



Contents



## euromex EC.1005 EcoBlue Monocular Microscope

## Introduction

Thank you for purchasing the Euromex BioBlue The Euromex BioBlue type microscopes are developed for use at schools and laboratories. 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

## General safety instructions

**Intended use: a non-medical device**
This microscope is intended for general observation of cells and tissues, with transmitted/reflected illumination and with the specimen fixed on a slide

**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

**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 microscope, 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

**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 microscope and show it to everybody before they use the microscope or before they do some maintenance work on the microscope! 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 microscope 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
- sample that is mounted on a slide without cover glass, can come in contact with components of the microscope and may be a hazard to humans and/or the environment. Therefore, check the microscope and accessories on possible contaminations. Clean the microscope surfaces and its components as thoroughly as possible. Should you identify a possible contamination, inform the local responsible person in your organisation
- Microscope operators could be contaminated from other activities and cross-contaminate components of the microscope. Therefore, check the microscope and accessories on possible contaminations. Clean the microscope 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 microscope in order to reduce contamination by the operator
- Infection hazard: direct contact with the focusing knobs, stage adjustments, stage and eyepieces/tubes of the microscope 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

**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 microscope 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 microscope 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 microscope at all times Reference documents:

**World Health Organisation:**
https://www.who.int/ihr/publications/biosafety-video-series/en/

**Robert Koch Institut:**
https://link.springer.com/content/pdf/10.1007/sOO 103-013-1863-6.pdf

**US Centre for Disease Control and prevention**
**https://www.cdc.gov/infectioncontrol/guidelines/disinfection/index.html**

**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 microscope 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 microscope 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 microscope 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

**Model with rechargeable batteries**

- Always disconnect the power cord from the microscope before you replace the rechargeable batteries
- The rechargeable batteries must not be thrown away as regular trash but should be taken to special waste collection sites, according your local or national regulations
- Risk of explosion: when removing the rechargeable batteries, do not throw the batteries into fire or any other heat source
- Do not replace the rechargeable batteries with non-rechargeable batteries
- Avoid extreme environmental conditions and temperatures which could affect the rechargeable batteries and lead to fire, explosion or leakage of hazardous substances
- If the rechargeable batteries have leaked, avoid contact of the chemicals with skin, eyes and mucous membranes
- When in contact with the chemicals, flush the affected areas immediately with plenty of fresh water and seek medical attention

**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 80% and 50%
- 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 microscope system can dissipate its heat (fire hazard)
- Keep the microscope away from walls and obstructions for at least approximately 15 cm
- Never turn the microscope on when the dust cover is in place or when items are placed on the microscope
- Keep flammable fluids, fabrick, etc. well out of the way

**Disconnect power**
Always disconnect your microscope 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 microscope, this can cause short circuiting your

device, causing malfunction and damage to your system

**Moving and assembling**

- This microscope is a relatively heavy system, consider this when moving and installing the system
- Always lift the microscope by holding the main body and base of the microscope
- Never lift or move the microscope by its focusing knobs, stage or head

## Models

The Euromex BioBlue microscopes come with 1 or 2 widefield eyepieces WF10x (0) and semi-plan-objectives, as mentioned in table below

**Please note**: visit www.euromex.com to find the latest updates about the BioBlue models and accessories

| MODELS | Mono | Bino | Trino | Digital | 4/10/40x SMP objectives | S60x SMP objective | S100x SMP objective | Mechanical X-Y stage | LED | NeoLED™ | Köhler illumination[1] | Polarization[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BB.4200 | • | | | | • | | | | • | | | |
| BB.4220 | • | | | | • | | | • | • | | | |
| BB.4240 | • | | | | • | • | | • | • | | | |
| BB.4250 | • | | | | • | | • | • | • | | | |
| BB.4260 | | • | | | • | | • | • | | • | | |
| BB.4260-E | | • | | | • | | • | • | | • | • | |
| BB.4263 | | • | | | • | • | | • | | • | | |
| BB.4243 | | | • | | • | • | | • | | • | | |
| BB.4253 | | | • | | • | | • | • | | • | | |
| BB.4253-E | | | • | | • | | • | • | | • | • | |
| BB.4205 | • | | | • | • | | | | • | | | |
| BB.4225 | • | | | • | • | | | • | • | | | |
| BB.4245 | • | | | • | • | • | | • | • | | | |
| BB.4255 | • | | | • | • | | • | • | • | | | |
| BB.4267 | | • | | • | • | | • | • | | • | | |
| BB.4269 | | • | | • | • | • | | • | | • | | |
| BB.4220-P-HLED | • | | | | • | | | | • | | | • |
| BB.4240-P-HLED | • | | | | • | • | | | • | | | • |
| BB.4261-P-HLED | | • | | | • | | | | | • | | • |
| BB.4263-P-HLED | | • | | | • | • | | | | • | | • |
| BB.4260-P-HLED | | • | | | • | | • | | | • | | • |
| BB.4241-P-HLED | | | • | | • | | | | | • | | • |
| BB.4243-P-HLED | | | • | | • | • | | | | • | | • |
| BB.4253-P-HLED | | | • | | • | | • | | | • | | • |

1. EVO models are supplied with WF 1 Ox/20 mm eyepieces and Kohler NeoLED(tm) illumination
2. Polarization models are supplied with H-LED illumination – the light spectrum is very similar to the halogen illumination -and an eyepiece with crosshairs for centering. 20 W halogen illumination is also available for polarization models on special request

The S40x and S100x objectives are equipped with a spring mount, to prevent damage to the front lens and the slide. The Numeric Aperture – N.A. – of the objective is an indication for the resolving power of the objective. The total magnification can be calculated by multiplying the magnification of the eyepiece with the magnification of the objective. The magnifications are displayed in the table below:

| | | |
|---|---|---|
| .. .<br>10x | 4x | ..<br>40x |
| 10x | 10x | 100x |
| 10x | 40x | 400x |
| 10x | 60x | 600x |
| 10x | 100x | 1000x |

### Components of the microscope

The names of the several parts are listed below and are indicated in the picture of the BB.4243:

| | | | |
|---|---|---|---|
| A | Trinocular tube | I | Eyepiece(s) |
| B | Camera focus adjustment ring | J | Dioptric adjustment(bino/t rino type) |
| C | Standarm | **K** | Tube (mono /b ino / trino 360'rotatable) |
| D | Safety device | L | Revolving nosepiece for 4 ob jectives |
| E | Tension adjustment | **M** | Objectives |
| F | Coaxial coarse-and fineadjustment | N | Object stages (mechanical stage or clips) |
| G | On/Off switch(not visible) | 0 | Condenser withirisdiaphragm + filterholder |
| H | Lightintensity control | p | Coaxial stage controls |
| | | Q | Lamp housing |

### Preparing the BioBlue microscope for use

Carefully remove the items from its packaging and place them on a flat, firm surface. Please do not expose the microscope to direct sunlight, high temperatures, damp, dust or acute shakes. Make sure the table or surface is flat and horizontal When moving the microscope, use the left hand to hold the transport handle and hold the base of the microscope with the right hand

**Caution!** Hold the microscope at the top of the stand arm when it is moved. Holding the microscope by its stage or focusing knobs will damage the microscope

**Caution!** If the bacterial solution or water splashes over the stage, objective or head, pull out the power cord immediately and dry the microscope

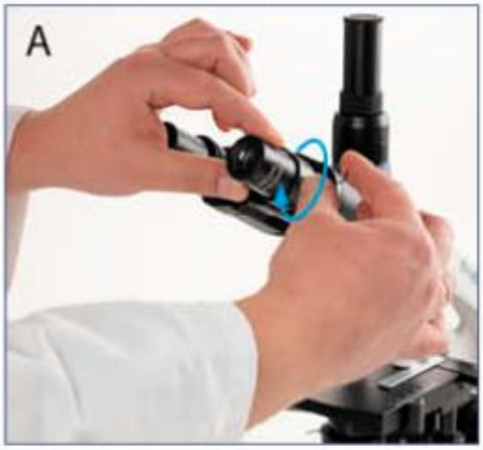
**Assembling steps**
Euromex Microscopen BV always tries to keep the number of assembly steps for its customers as low as possible but in some cases there are some steps to be taken. The steps mentioned below are often not necessary but described for your convenience nonetheless

**Mounting the objectives**

- Rotate the coarse focusing knob to lower the stage to its lowest position
- Install the objectives into the objective nose piece from the lowest magnification to the highest in a clockwise direction from the rear side of the microscope. When using the microscope, start using the low magnification objective (4X or 10X} to bring your specimen into focus and then continue with a high magnification objective to observe

**Placing the eyepieces**

- Remove the cover of the eyepiece tube
- Insert the eyepiece into the eyepiece tube
- Lock the eyepieces with an Allen wrench





**Locking the eyepieces**
To lock the eyepieces in binocular models, please find the screw as indicated in picture (A}. Please note that the location can be slightly rotated from model to model. For monocular models, please find the right position of screw as indicated in picture (B)

**The eyeshades (optional)**
The eyepieces can be equipped with optional rubber eyeshades. These prevent damage to the lens and stray light. The eyeshade can simply be slipped over the eyepiece

**Connecting the power cord**
The BioBlue microscopes support a wide range of operating voltages: from 100 to 240V. Please use a grounded power connection

- Make sure the power switch is off before connecting
- Insert the connector of the power cord into the Bio Blue power socket and make sure it connects well
- Insert the other connector into the mains socket and make sure it connects well

Do not bend or twist the power cord. it may get damaged. Use the power cord that is supplied by Euromex. If it is lost or damaged, choose one with the same specifications

## Operation

**Setting up the illumination:**
For optimal contrast and resolution one should follow the below procedure:

- Place a specimen on the object stage and focus using the 4x objective, with a fully opened iris diaphragm
- Turn light intensity to lowest position, then look through the eyepiece(s} and turn up to a comfortable light intensity level
- Turn the condenser in the highest position
- Close the iris diaphragm, until it is just visible on the edge of the field of view

The microscope is properly set for use with the 4x objective. For each other magnification in brightfield use, this procedure should be repeated to ensure the best balance between contrast and resolution

**Caution:**
The maximum light intensity when using the 4x and 10x may cause damage to the eyes!

**Placing the specimen slide**

On the BB.4200 the slide is placed beneath the object clips. On the other models into the clamp of the mechanical stage (N) where it can be moved with precision into X- and Y- directions

- Push the arm of the specimen holder backwards
- Release the arm slowly clamping the slide with the cover glass facing up
- Rotating the X and Y-axis knob will move the specimen to the center for alignment with the center of the objective

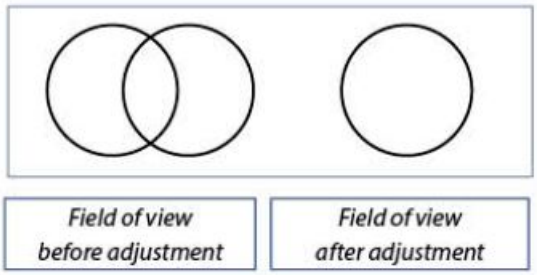
**Focusing and slide protection**

- Select the 4x objective and make sure that it is placed correctly in the optical path
- Move the stage to the top by using the coarse adjustment knob and focus till the image appears
- Rotate the fine focusing knob to bring the image into focus
- When you focus with a Sl0Ox objective, you need to lock the slide protection handle. The slide protection handle protects the slide by limiting the travel range of the mechanical stage. This way the objective will not touch or reak your slides


**Adjusting the focusing tension**
The tension of the focusing knobs can be adjusted. You can set it from light to heavy according to your own preference. Please note that when the specimen leaves the focus plane after focusing or the stage declines out of its own, then you need to adjust the tension To tighten the focusing knob (more heavy), rotate the tension adjustment ring counter-clockwise; to loosen it, turn it in the clockwise direction

**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 steps below

**The interpupillary distance**
Focus tension 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 pushing 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 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

**Adjusting the diopter**

- Set diopter adjustment ring to zero
- Close the left eye and focus the right tube by adjusting the coarse- and fine adjustment knobs
- Close the right eye and focus the left tube with the diopter adjustment ring

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

**Abbe condenser**
Beneath the object stage an Abbe condenser N.A. 1.25 is mounted. The condenser can be adjusted in height by moving the lever beneath the mechanical stage. By adjusting the condenser you can focus the light on the specimen for an optimized contrast. The condenser is factory pre-centered. If needed, the following procedure can be followed to center the condenser

1. Move the condenser to its highest position
2. Select the l0x objective and place it into the light path and focus on the specimen
3. Rotate the field diaphragm adjustment ring to put the field diaphragm to the smallest position
4. Adjust the condenser to get the sharpest image
5. Adjust the center adjustment screw and center the image in the field of view
6. Open the field diaphragm gradually
7. The condenser is centered correctly if the image remains in the center when you open the field diaphragm

**The field (Kohler) diaphragm for BioBlue EVO models**
By limiting the diameter of the beam entering the condenser, the field diaphragm can prevent stray light and increase the image contrast. When the image is right on the edge of the field of view, the objective shows the best performance and obtains the clearest image. The diaphragm is factory pre-centered

**Adjusting the aperture diaphragm**

1. The aperture diaphragm is used to select the numerical aperture of the illumination. When the N.A. of the illumination matches with the N.A. of the objective, you get the highest possible resolution, depth offield and contrast
2. When contrast is low, rotate the diaphragm adjustment ring to 70%-80% of the N.A. of objective. This will improve the contrast of the image. The diaphragm is factory pre-centered

**Use of the S1 00x oil-immersion objective**
Some BioBlue microscopes are equipped with an S100x N.A. 1.25 oil immersion objective. Please follow the instructions below on how to use this objective:

1. Remove the dust protection cap from the revolving nosepiece to mount the S100x objective
2. Focus the image with the S40x objective
3. Lock the slide protection handle
4. Turn the revolving nosepiece so that the S100x objective almost reaches the dick-stop
5. Put a small drop of immersion oil on the center of the slide (always use Euromex Immersion oil)
6. Now turn the S 100x objective so that you feel the click stop
7. The front lens is in contact with the immersion oil
8. Look through the eyepiece and focus on the image with the fine adjustment knobs

9. The distance between the lens of the objective and the slide is very small!
10. In case there are small bubbles visible, turn the S100x objective a couple of times from left to right so that the front of the objective moves in the oil and the bubbles will disappear
11. After using the 5100x objective, loosen the slide protection handle and turn the table with the course adjustment knobs downwards until the front lens no longer touches the oil. Clean the front lens of the S100x objective
12. Always clean the front lens of the S100xobjective with a piece of lens paper that is moistened with a drop of isopropanol. We recommend using Euromex lens paper and isopropanol

**Caution**

- Never put a drop of xylol or alcohol directly on the lens of the objective. It may enter the objective and dissolve the glue that holds the lenses!
- Avoid oil contact with any of the other objectives!

It is not necessary -and not recommended – to clean the lens surfaces at the inside 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**
W Cleaning cloths containing plastic fibers may damage the coating of the lenses!

**Maintenance of the stand**
Oust can be removed with a brush. In case the stand or table is really dirty you can clean the surface with a non-aggressive cleaning agent 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

- Remove the small lid out of the bottom cover of the microscope
- Place the batteries and put the lid back into place

## Digital models and cameras


Digital models are equipped with a build in digital camera. Connect the supplied USB cable to the camera and

follow the dedicated software manual for use. The LED which is placed beside the USB port will start to blink when activated in the software Digital cameras are designed to be used on the photo port of the microscope head. It is also possible to use the digital camera in combination with a binocular head, monocular head or discussion head. To use the camera on a monocular, binocular or discussion head, you can simple remove the eyepiece[1] and then place the camera with mounted c-mount adapter into the eyepiece tube[2]. Focus the digital image with the coarse and fine controls of the microscope For trinocular models, slide the camera with mounted c-mount adapter into the 23,2 mm tube of the photo port. Take an easy-to-view specimen and focus on the specimen through the microscope's eyepieces. For focusing the camera, slowly move tube (A) up and down while watching at the screen till the camera view is in focus Follow the manual that comes with the camera for camera operation


**Polarization models**
A microscope for polarization consists of a standard optical microscope but with two polarization filters. One filter is positioned between the illumination of the microscope and the condenser of the microscope and one filter between the specimen and the eyepieces of the microscope Polarization filters used in microscopes are thin-film linear polarizers and are made from a glass substrate on which a special optical coating is applied Only light waves that vibrate in the same propagation plane pass the filter. All other light rays that vibrate in another plane don't pass the polarizer. Two perpendicular positioned (crossed) polarizers result in the nearly complete extinction of the light Anisotropic inorganic material has directionally depending properties. Microscopes for polarization can be used to identify crystalline materials (minerals), fibers like asbestos, amyloids, collagens, determine the orientation of crystals etc

**Models**
The BioBlue-POL microscopes come with 1 or 2 widefield eyepieces WF10x (0) and semi-plan-objectives, as mentioned in the table below

**Please note:** visit www.euromex.com to find the latest updates about the Bio Blue models and accessories

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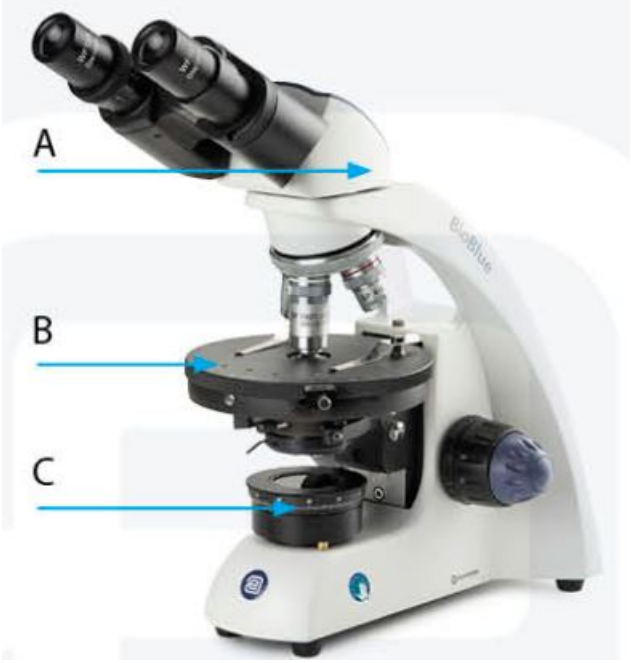
|---|---|---|---|---|---|---|---|---|---|---|
| 88.4220 -P-LED | | | | | | | | | | |
| 88.4240 -P- LED | | | | | | | | | | |
| 88.4261 -P-LED | | | | | | | | | | |
| 88.4263 -P-LED | | | | | | | | | | |
| 88.4260 -P-LED | | | | | | | | | | |
| 88.42 4 1-P- LE D | | | | | | | | | | |
| 88.4243 -P-LED | | | | | | | | | | |
| 88.4253 -P-LED | | | | | | | | | | |

Polarization models are supplied with H-LED illumination – the light spectrum is very similar to the halogen illumination – and an eyepiece with crosshairs for centering. 20 W halogen illumination is also available for polarization models on special request

**Components**
Hereunder you can find the specific components of the microscope for polarization




1. Equipped with analyzer, mounted in a slider under the head {on the back of the microscope)
2. Round graduated stage
3. 360° Rotatable, graduated polarizer on the lamp house

**Illumination Euromex BioBlue-POL serie**
The models for polarization are supplied with H-LED illumination for correct color rendering {very similar to the halogen light spectrum) The HLED illumination of the BioBlue-POL is equipped with rechargeable batteries. Fully charged batteries last about 60 hours. The full charging time is approx. 10 hours. Before first use the batteries need to be fully charged. Connect the cable to the mains socket 20 W halogen illumination is also available for polarization models on special request The illumination has the following specifications:

**Using the polarized illumination**
For the BioBlue-POL models:

- Switch on the illumination of the microscope, position the prepared sample on the rotating stage
- Check if the polarizer (C) is in place above the illumination of the microscope
- Check if the analyzer (A) is also positioned in the optical path
- Turn the polarizer (C) till maximum extinction of the light is obtained
- Put the sample on the stage. Polarization sensitive material can be observed in terms of colors
- Center the region of interest
- By turning the rotating stage and by observation of the color changes and angles, one can identify the material
- Without polarizers one can work in brightfield

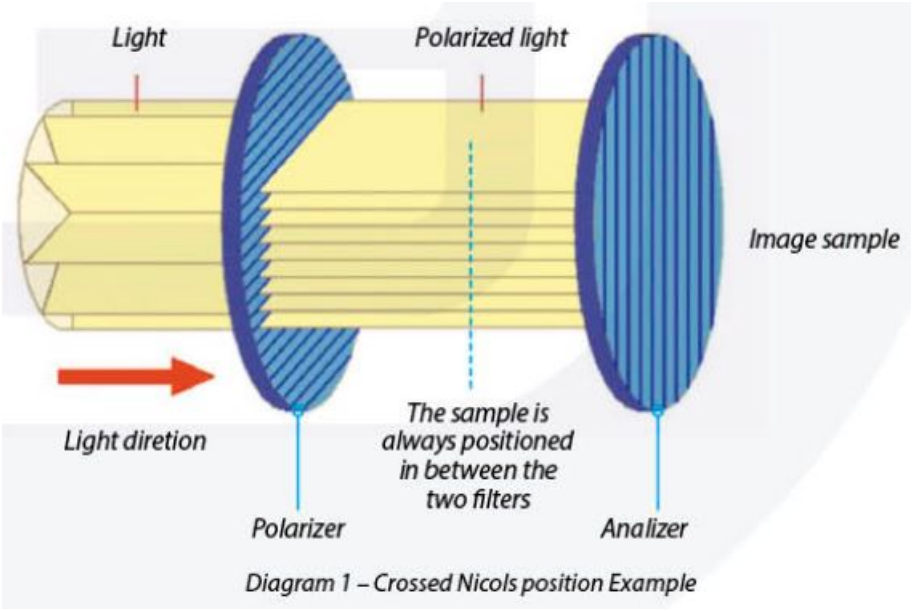


Diagram 1 – Crossed Nicols position Example

**Please note**: visit www.euromex.com to find the latest updates about the BioBlue models and accessories

## Documents / Resources

| | |
|---|---|
|  | euromex EC.1005 EcoBlue Monocular Microscope [pdf] User Manual<br>EC.1005, EcoBlue Monocular Microscope, EC.1005 EcoBlue Monocular Microscope |
|  | euromex EC.1005 EcoBlue Monocular Microscope [pdf] User Manual<br>EC.1005, EcoBlue Monocular Microscope |