BIOLOGICAL MICROSCOPE

Mod. BIO2 binocular / trinocular

DIN160mm optics

USER MANUAL

Filename: Bel Photonics BIO2_User manual_REV1.5.doc

Bel Engineering srl
Electronic precision balances and scientific instruments
Via Venezia Giulia 1, 20052 Monza (MI) Italia
tel:+39 039 2006102/2005302 fax: +39 039 2006082
e.mail: info@belengineering.com www.belengineering.com

The model BIO2 biological microscope is equipped with a set of achromatic (or semiplan or plan-achromatic) objectives and 10x (optional 16x) wide field eyepieces. The observer can get the clear image in the wide field. It's suitable for scientific research, medical health work and teaching demonstration in the colleges.

I . SPECIFICATIONS

1.Eyepieces

Type	Magnification	Focus(mm)	Field(mm)	Remark
Wide field eyepiece	10X	25	Φ18	
Plan eyepiece	16X	15.6	Φ11	**Optional**

2.Objectives

Type	Magnification	Numerical aperture	Working distance (mm)
Achromatic	4X	0.1	37.4
	10X	0.25	6.6
	40X	0.65	0.64
	100X (oil)	1.25	0.19
Plan achromatic	4X	0.1	17.9
	10X	0.25	8.8
	40X	0.65	0.56
	100X (oil)	1.25	0.33

3.Total Magnification

Total Magnification: Objectives / Eyepieces	4X	10X	40X	100X
10X	40X	100X	400X	1000X
16X	64X	160X	640X	1600X

4.Condenser numerical aperture: NA=1.25.

5.Stage cross travel range: longitudinal 35mm traverse 75mm.

6.Interpupillary distance adjustment range: from 55mm to 75mm.

7.Light sources :
6V 20W (optional 30W) halogen lamp, brightness can be adjusted.
AC/DC adapter: output 6V 5A

8. Collector with diaphram for Koehler illumination

9. Nosepiece inward tilted. Macro and micrometric focus regulations (step 0,002 mm) with coaxial knobs. Friction and height limit adjustable

10.Anti-fungus.

Electrical and physical Specifications:

Power supply	External switching, 100-230 V, 50-60 Hz
Output	6V
Max power absorbed	35 Watt

Dimensions (mm) (LxPxH)	195x320x400
weight	6 Kg

II . COMPONENTS

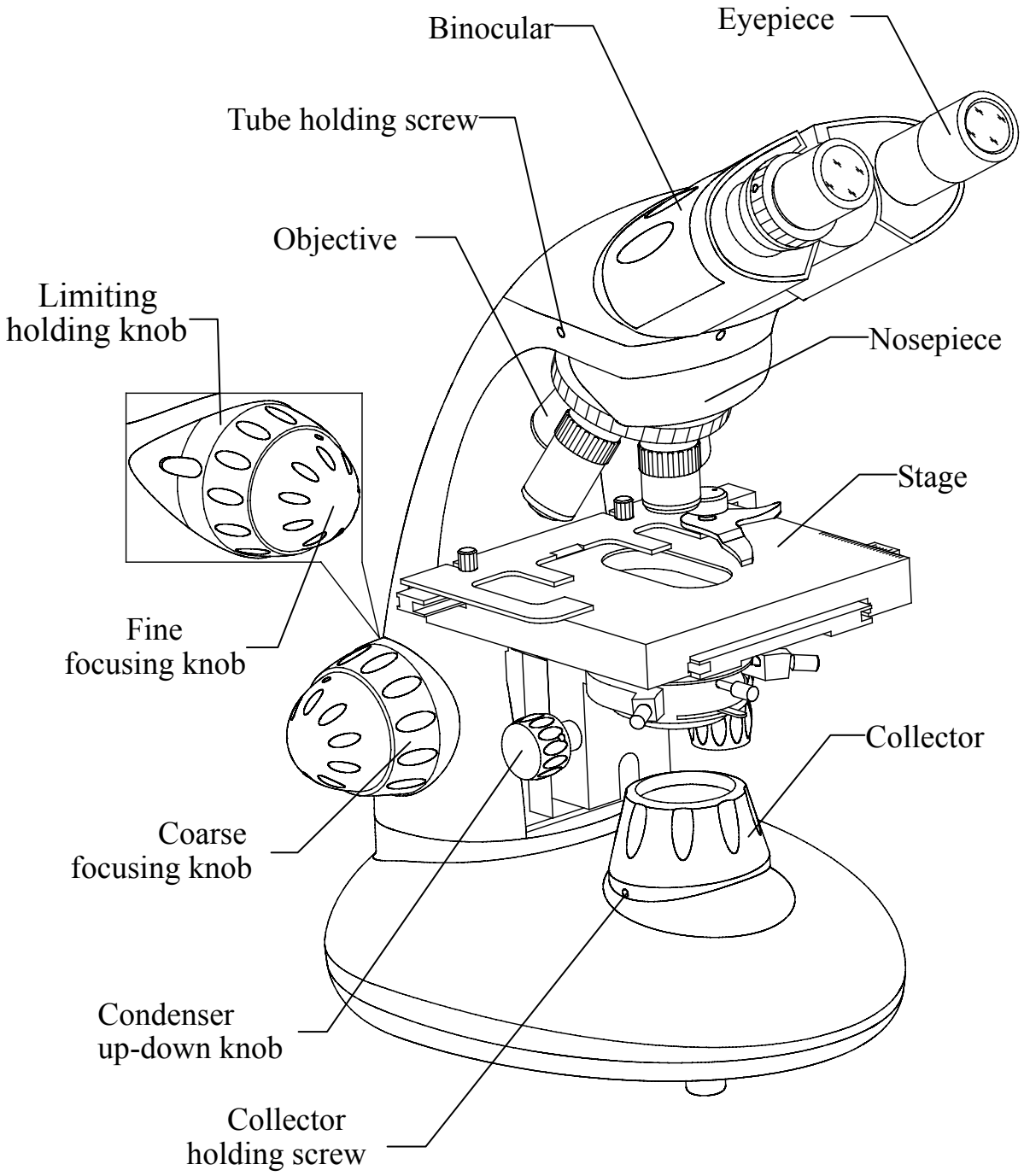


Fig.1

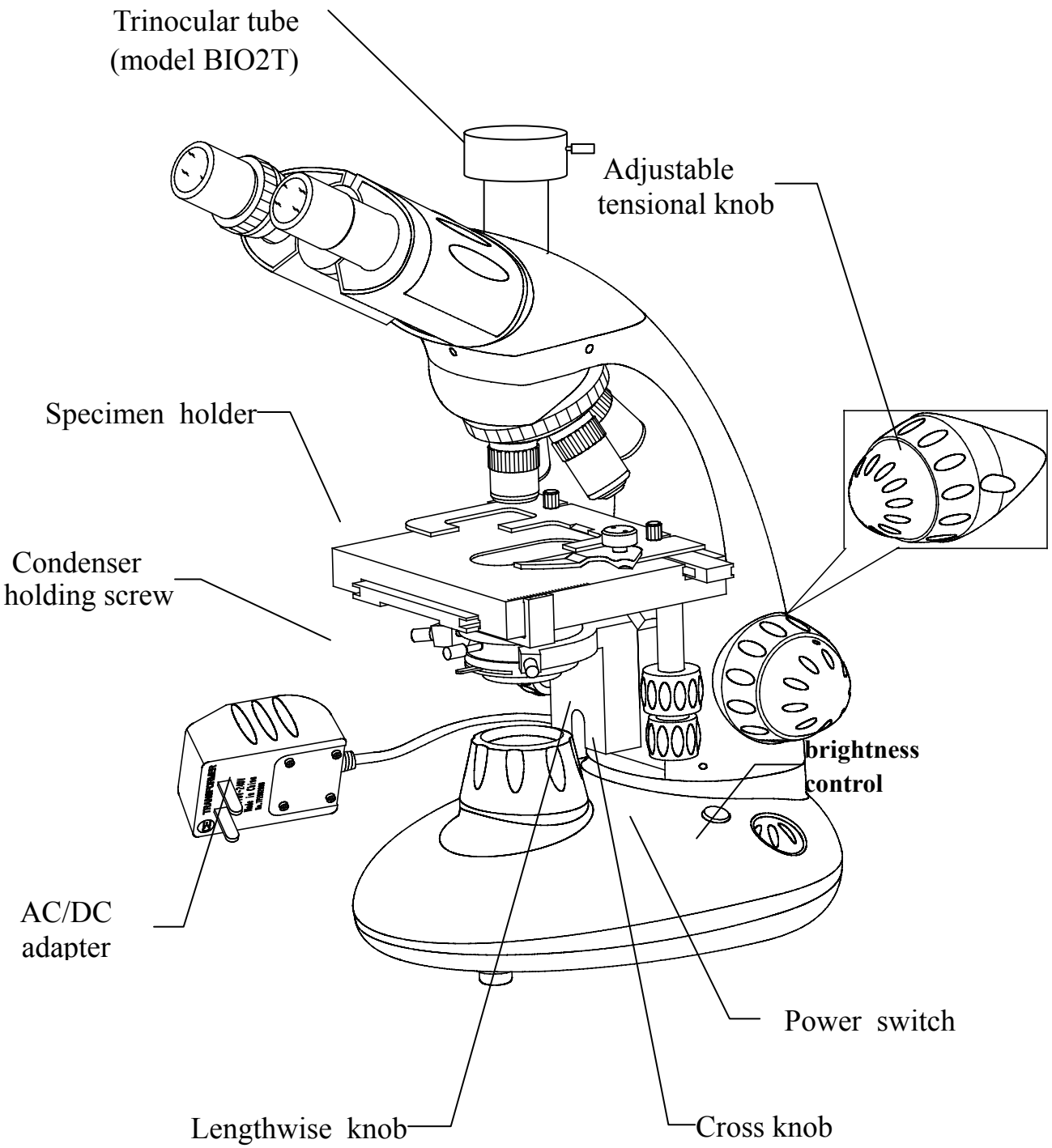


Fig.2

III . INSTALLATION

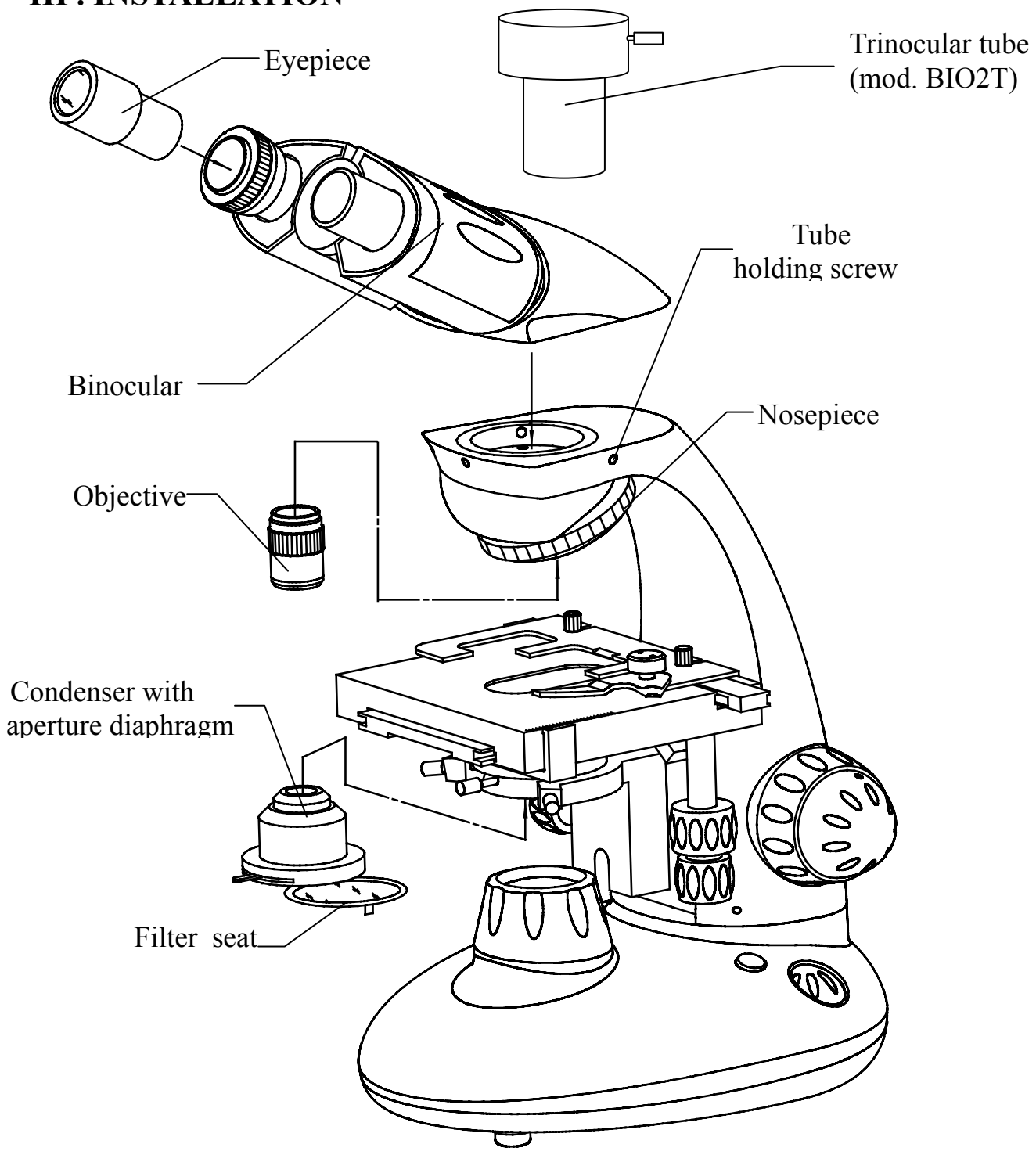


Fig.3

IV . MICROSCOPE OPERATIONS

1.Adjustment of interpupillary distance

Put the specimen on the stage and ring the specimen into exact focus. Adjust the interpupillary distance of binocular until the right-left field of view can be composed one. (See Fig.4)

2.Adjustment of diopter

Put the specimen on the stage. Turn the 40X objective to working position. Firstly, observe at right tube with right eye, adjust coarse-fine focusing knob to image clearly. Secondly, observe at left tube with left eye, adjust the diopter control 1 to image clearly.

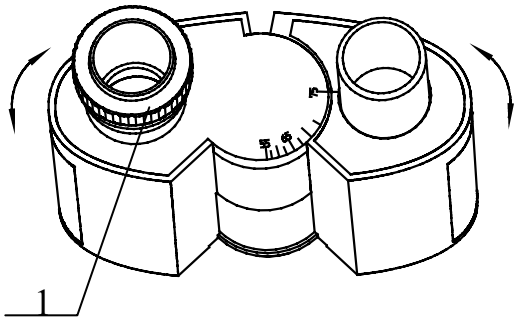


Fig.4

3.Switching and luminosity regulation

With reference to figure 5: press the switching button 1 and regulate the luminosity control until the image is enough clear.

Note: Do not leave into the maximum luminosity position the light control since it may reduce the lamp life.

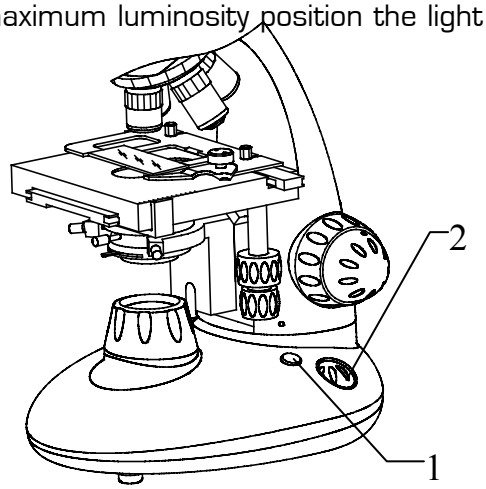


Fig.5

4. Coarse and fine focusing.

The instrument uses coaxial coarse/fine focusing mechanism. With reference to figure 6: the knob 3a is for macrometric focus, the knob 3 for the fine focus.. – After positioning the specimen onto the stage, first act on the coarse focus knob to get near the focalization plane, then optimize the focus of the image through the fine focus knob.

The lever 4 is for adjusting the tension of the coarse focusing knob to prevent the stage from naturally sliding down; regulate this according to your preferences and requirements. The lever 5 is the limiting lever and prevents accidental specimen-objective contact; unblock the lever, bring the specimen stage to a end of stroke position suitable for your requirements and then block again the lever.

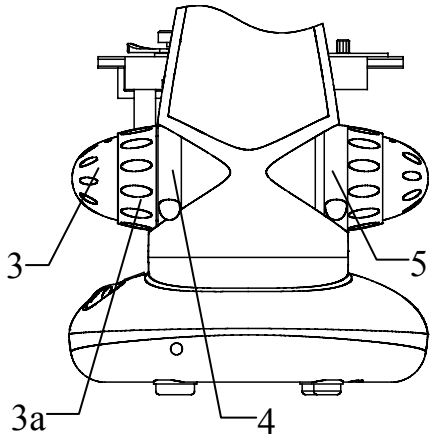


Fig.6

5. Condenser positioning

With reference to figure 7: the condenser can be displaced up and down acting on the knob 6. It can also be easily removed from its support unscrewing its central holding screw. The side screws 9 allow the centering of the position of condenser (see section V.a). The opening of the condenser's aperture diaphragm can be regulated acting on the lever 7, rotating this to the right and to the left. Regulating the opening of the aperture diaphragm you can obtain an appropriate contrast (see section V.a). The filter seat 8 allows the placement of color round filter in the optical light path.

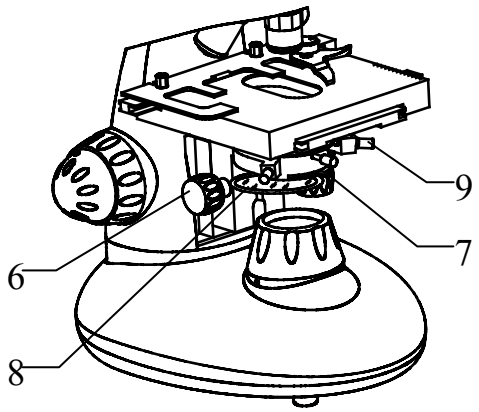


Fig.7

6.Specimen stage

With reference to figure 8: the clamp 10 on the specimen plane is used for holding down the specimen 11. Knobs 12 and 13 regulate the position of specimen stage along longitudinal and transversal directions.

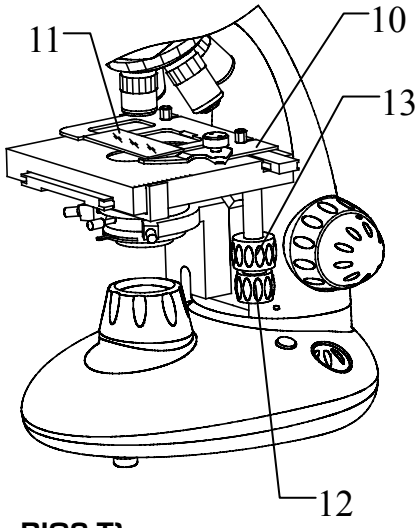


Fig.8

7.Trinocular tube (only for models BIO2-T)

With reference to figure 9: trinocular tube 15 allows to attach, through the optional adapters, both reflex cameras and hi-resolution CCD and CMOS cameras. Through the screw 16 remove the protection cap and then, through the correct adapters with C-mount thread, attach your camera.
For 1/3" sensor cameras it is advisable to use 0,4X C-mount adapter.

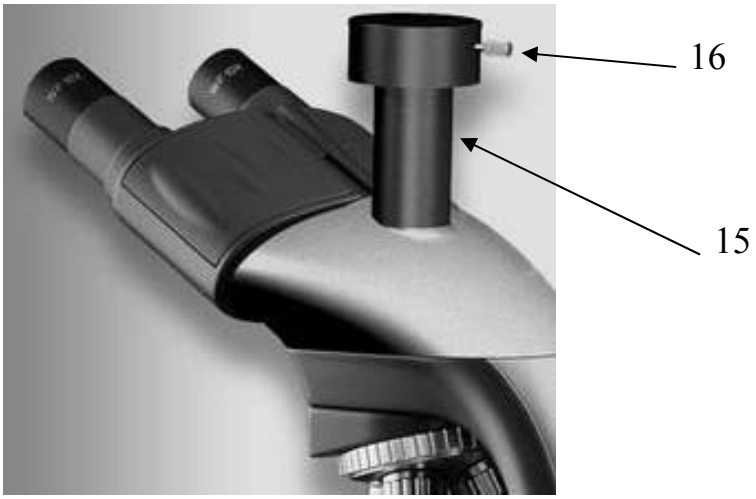
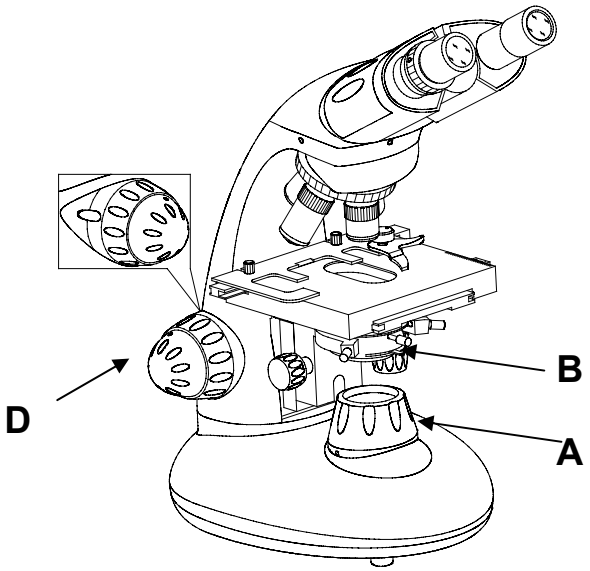


Fig.9

V. GETTING READY FOR OBSERVATION

a) PROCEDURE TO SET UP THE MICROSCOPE FOR KOEHLER ILLUMINATION



1. Switch on the microscope through the switching button placed on the base of microscope, check that light reaches correctly the objectives.

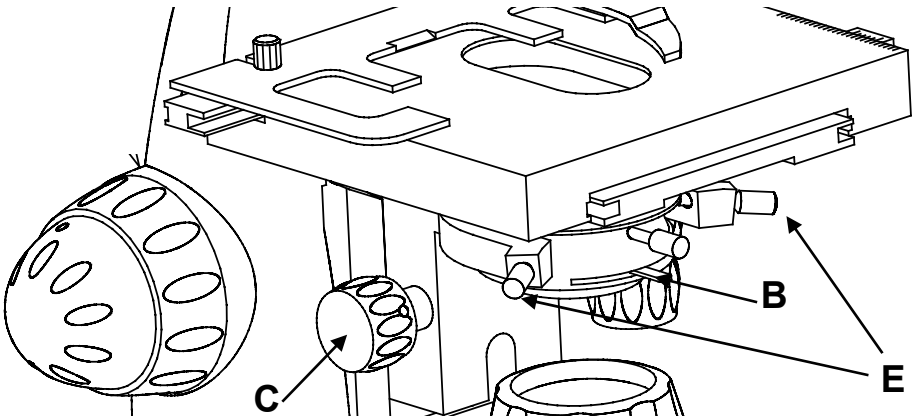
2. Select objective 10X.

3. Completely open the diaphragm (A) of the illuminator and the diaphragm of the condenser (B).

4. If the condenser is equipped with the additional lens (swing lens) or if a round filter (diffusion filter) is placed in the filter seat of the condenser, rotate this out and take care that the swing lens or the filter seat with filter is completely removed from the optical path.

5. Take a specimen and place it on the specimen stage.

6. Watching in the eyepieces, use the focusing knobs (D) to move the specimen stage up and down until you obtain a clear image of the specimen. It may happen that the final image is not perfect since the optimization process isn't finished yet.



7. Now close the field diaphragm (A) of the illuminator about half of its total aperture and, through the appropriate side knob (C), regulate the height of condenser until the image of the contour (or part of it) of the field diaphragm with its sheets can be observed clearly, like in fig.10.

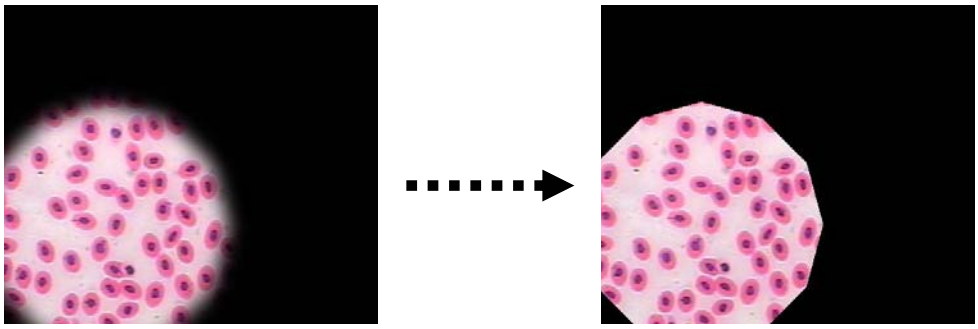


Fig.10

8. If the image of field diaphragm is not centered in the field of view, proceed to its centering acting on the appropriate side condenser centering screws (E) until the image of field diaphragm is brought into the center of the field of view, like in fig.11.

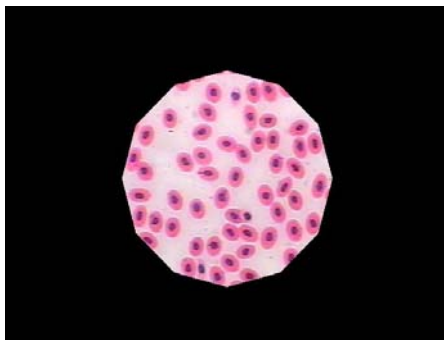


Fig.11

9. At this point, to fine adjust the centering of the condenser, open the illuminator field diaphragm (A) up to the contour of field of view and verify that the dark edge all around is equidistant from the edge of the field of view. Act on the appropriate centering screw until you obtain the best result.

10. Now open completely the illuminator field diaphragm (A) so that its sheets are not anymore visible in the field of view. The condenser is now centered and at the correct working height and it is not necessary to center it again subsequently (unless that some changes are made on the condenser position).

The microscope is now correctly set to work with the best illumination on the specimen (Köehler illumination).

11. To finish illumination optimization, it is advisable to regulate the condenser aperture diaphragm (B) to obtain the best resolution and the best image contrast for the magnification selected. At this point you must close the condenser diaphragm, which was completely open at the beginning. However it must not be never completely closed since diffraction effects may reduce resolution of image details.

Adjusting the condenser diaphragm you can find the best compromise between resolution, contrast and depth of field for the selected objective.
When another objective is selected, you should always adapt the condenser aperture diaphragm. In particular, the more you go towards higher magnifications the more you must close the condenser's diaphragm; this is done to permit that light cone coming out from condenser can fit at the best the numerical aperture of the selected objective.
To find the best regulation for every objective of the microscope, it is enough to watch the specimen image and, as well, close the condenser's diaphragm until the image starts becoming a little darker and also richer in contrast. However it is advisable not to close the diaphragm more than 1/3 of its total aperture to avoid that diffraction effects may reduce the resolution and then defocus fine details of the image or introduce artifacts on the image.

With these regulations, you obtain the best compromise among resolution, contrast and depth of field for the selected objective.

It is advisable to repeat procedure for Koehler illumination and contrast optimization every time you start using your microscope, in order to achieve the best observation results.

b) USE OF IMMERSION LIQUIDS WITH 100X OBJECTIVE

The 100X objective with numerical aperture 1,25 must be used with the immersion oil, in order to achieve the optical performance for which the objective was designed.
Take the oil bottle supplied with the microscope (use only the oil supplied or one of same chemical characteristics) and place one drop upon the specimen (trying to avoid air bubbles). At this point, bring the 100X objective, put into the work position and make the frontal lens of the objective to adhere with the oil drop; thus creating an uniform region formed by specimen, oil and 100X objective frontal lens.

c) INSTALLATION OF DEVICES WITH C MOUNT INTO MICROSCOPE TRINOCULAR TUBE (for Mod. BIO2-T Trinocular)

With reference to FIG.12

To effect this operation it is necessary the adapter with thread for C mount (optional)

Unscrew the screw that holds the protection cap of trinocular tube and remove the cap. Screw the C mount adapter into the device (camera or CCD sensor) you want to use. Now put the device with the adapter over the trinocular tube and fix it with the screw.

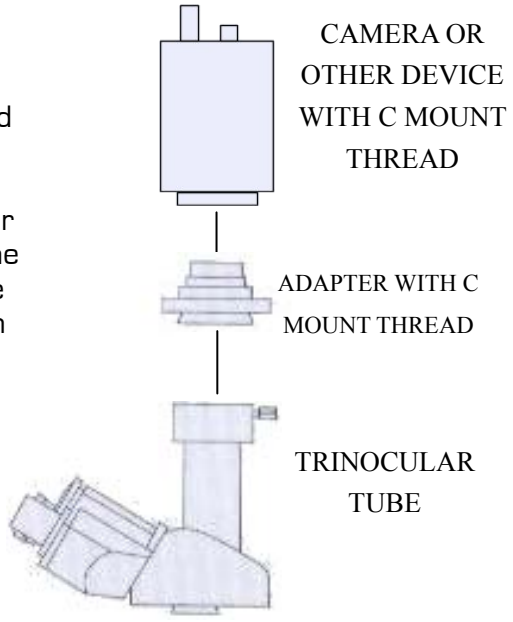


Fig. 12

VII. HALOGEN LAMP REPLACEMENT

With reference to Fig.13:

1) Switch off the microscope power supply.

2) Tilt the microscope, loose the screw 3 fixing the lamp base board 4 in the middle part of the bottom of base. Open the lamp base board 4.

3) Remove the old lamp 1 from its support 2.

4) Insert the new lamp in its support 2, handling it carefully, using gloves or a piece of paper to avoid touching it directly with fingertips (direct contact with skin can deteriorate the performance of the illuminator and shorten the life of the lamp).

5) Put back the base board 4 and fix it with screw 3.

6) Once placed you must center the lamp in its housing to have the maximum light entering the illuminator and so a clearer image. To do this, insert the power supply and switch on the microscope. Rotate the 4X objective in working position, align the condenser and check that light path is correct. Look in the field of view if the light is decentered, then unscrew the screw 5 and act on it to shift the position of the lamp. Center the lamp and then tighten again the screw.

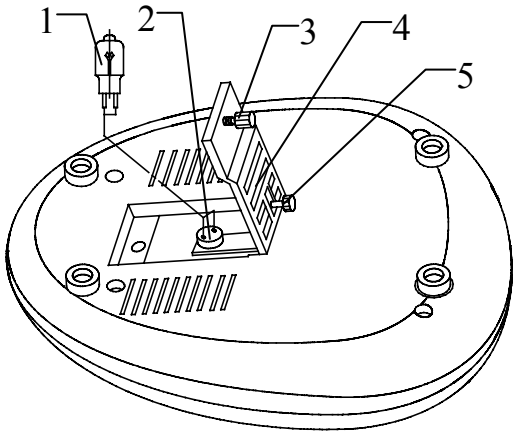


Fig.13

VIII. Maintenance

1. Clean the lenses

Sweep the lens by lens tissue or soft fabric immersed with mixed liquid of alcohol/ether or diethyl benzene.

2. Cleaning of painted parts

The dust on the painted parts can be removed by gauze, for the grease spots, the gauze immersed slightly with aviation gasoline is recommended. Do not use organic solvents such as alcohol, ether or other thinner etc, for cleaning the pointed parts or plastic components.

3. Avoid disassembling the microscope

Microscopes are precise instrument, do not disassemble it casually since it may cause serious damage to its performance.

4. Being not used

Cover the microscope with organic glass or polyethylene and places where there is dry and modules. Suggest that storage all objectives and eyepieces in closed container with drying agent.

VIII. PROBLEMS AND SOLUTIONS

TYPE OF PROBLEM	PROBLEM		SOLUTION
A. Lamp not working	1	Check plug is well connected	Plug properly
	2	Check lamp is not broken	Change lamp
B. Something in the field of view	1	Check that ABBE condenser is not out of optical path	Place the Abbe condenser in center of optical path
	2	Check if filter-seat is positioned properly	Put the filter seat in right position
	3	Check if additional lens (in models where this lens is present) of condenser is positioned properly	Insert completely the lens or remove it completely from optical path
C. Images are not visualized when acting on focus			See section "**IV. MICROSCOPE OPERATIONS** " and follow instrunctions
D. Image not clear on focus plane	Check that eyepieces, condenser and illuminator do not have dust		Read section "**VII.MAINTENANCE**"; and follow instructions. If lenses have been damaged please contact us in order to repair the microscope.

DOCUMENTAZIONE TECNICA N° 1, rev. 1.2 , data: 08 Febbraio 2006

Nomefile: BIOVIDEO DOCUMENTAZIONE TECNICA N.1 Rev1.2.doc

EC Declaration of conformity

According to the Directives 73/23/EEC and 89/366/EEC

CE

We : **BEL Engineering S.r.l.**
Via Venezia Giulia,1
20052 Monza (MI) - ITALY

Hereby declare that the product : **Biological Microscope model. BIOVIDEO**

Manufactured by : **BEL Engineering S.r.l.**
Via Venezia Giulia,1
20052 Monza (MI) – ITALY
www.belengineering.com

Complies with the essential requirements of the directives 73/23/EEC and 89/336/EEC as modified by Directives 93/68/EEC and 92/31/EEC, when used for its intended purpose.

The product is made in accordance with the followings standards:

EMC std.:

- **EN 61326:97 + A1:98 + A2:01 + A3:03**
- **EN 61000-3-2:00+ A2 :05**
- **EN 61000-3-3:95+ A1:01**

SAFETY std.:

- **EN 61010-1:01**

Technical documentation kept by : **BEL Engineering S.r.l.**

Place and date : **Monza (MI), 08-02-2006**

Responsible person : **Dr.Marco Bonomo**

e-mail: **info@belengineering.com** Tel. : **+39 039 2006102**

Signature: Date.: 08 Feb. 2

Nemko SpA
13 MAR 2006
EMC Competent Body
APPROVED

BEL ENGINEERING

Bel Engineering srl
Bilance elettroniche di precisione e strumentazione scientifica

Via Venezia Giulia 1, 20052 Monza (MI) Italia
tel:+39 039 2006102/2005302 fax: +39 039 2006082
info@belengineering.com www.belengineering.com

Worldwide Market Access Nemko

CERTIFICATE No. 42304Rev.1
According to Art. 10 clause 2 of Electromagnetic Compatibility Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC

CERTIFICATO N°42304Rev.1
In accordo all'Art. 10 paragrafo 2 della Direttiva Compatibilità Elettromagnetica 89/336/EEC come modificata da 92/31/EEC e da 93/68/EEC (recepimento italiano D.L. n. 615 del 12 Novembre1996)

Equipment *Apparato*	**LABORATORY BIOLOGICAL MICROSCOPE**
Applicant *Richiedente*	BEL Engineering S.r.l. Via Venezia Giulia, 1 20052 Monza (MI) Italia
Manufacturer *Costruttore*	BEL Engineering S.r.l. Via Venezia Giulia, 1 20052 Monza (MI) Italia
Model/type *Modello / Tipo*	**BIOVIDEO**
Ratings *Dati tecnici*	100-240 Vac, 50-60Hz
Additional information *Informazioni aggiuntive*	---
Variants *Varianti*	BIO2; L3000; L135; L1600; L2000; XDS; XTL; XTC; XTX
Certificate referred to TCF *Certificato riferito al TCF*	No.: 01 Issued by/Redatto da: BEL Engineering S.r.l. Rev. No./ Rev. n°: Rev1.2 Date of issue/Data di emissione: 08 February 2006 Pages/Totale pagine: 256

THE A.M. EQUIPMENT COMPLIES WITH THE REQUIREMENTS OF THE COUNCIL DIRECTIVE 89/336/EEC as amended by 92/31/EEC and 93/68/EEC.

IL SOPRA INDICATO DISPOSITIVO SODDISFA I REQUISITI DELLA DIRETTIVA 89/336/EEC COME MODIFICATA DA 92/31/EEC E DA 93/68/EEC

The certificate is valid 10 years provided that all signed certification conditions are complied with, and that modification to product or TCF is notified to Nemko SpA for acceptance prior to implementation. The validity time may be reduced in case new standards are made applicable.
Il certificato è valido per 10 anni, sempre che tutte le condizioni di certificazione siano soddisfatte, e che qualsiasi modifica al prodotto o al TCF sia notificata a Nemko S.p.A. per accettazione prima dell'implementazione. Il tempo di validità potrà essere ridotto nel caso in cui nuove norme diventassero applicabili.

Date of issue: **2006-03-15**
Data di emissione:

Nemko S.p.A.
Certification Dpt.
.....
Alberto Reati

This document is composed by 1 page
Questo documento è composto da 1 pagina

Doc.:C104 Rev.: 5 Date: 2006-03-14 Pag.: 1/1

Nemko Spa
Via Trento e Trieste, 116
I - 20046 Biassono (MI)

T +39 03922012.01 r.a.
F +39 0392753240

www.nemko.com
www.nemko.it