

**INVI**

**INVI**  
**INVERTED BIOLOGICAL MICROSCOPE**

**Magnus**

**INSTRUCTIONS**

This instruction manual is for the Magnus Biological Microscope Model INVI. To ensure the safety, obtain optimum performance, and familiarize yourself fully with the use of this microscope, we recommend you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

<b>INDEX</b>	<b>Pg. nos.</b>
Technical specifications	1~2
Illustrations	3
INVI Inverted Microscope – An Introduction & Applications	4
Comparison between Upright & Inverted Microscope	5
Safety Note	6
Maintenance	7
Installing steps	
Step 1) Installing the Condenser Illumination Unit	8
Step 2) Installing and replacing the lamp	9
Step 3) Installing & Using Filters	10
Step 4) Mounting the Objectives onto Revolving Nosepiece & LWD Objectives Specifications	11~12
Step 5) Installing the Stage Extension plate, Stage Inserted Plate and the mechanical Stage	13
Step 6) Connecting the Power Cord & Replacing the Fuse	14
Step 7) Operating the Adjustments of Microscope	15
Step 8) Stage & Setting the Specimen	16
Step 9) Installing the Eyepieces	17
Step 10) The Viewing	18
Step 11) Switching the Light Path	19
Step 12) Using the Aperture Diaphragm	20
Step 13) Phase Contrast Installing And Viewing	21~22
Step 14) Imaging System (Optional)	23~24
Trouble Shooting	24 ~ 27

INVI

# Specifications

## Highlights

**Long Working Distance (LWD), Plan Infinity Optics**

**Pre-Centered Phase Annulus**

**Trinocular Port in Standard Unit**

**Excellent Field Flatness**

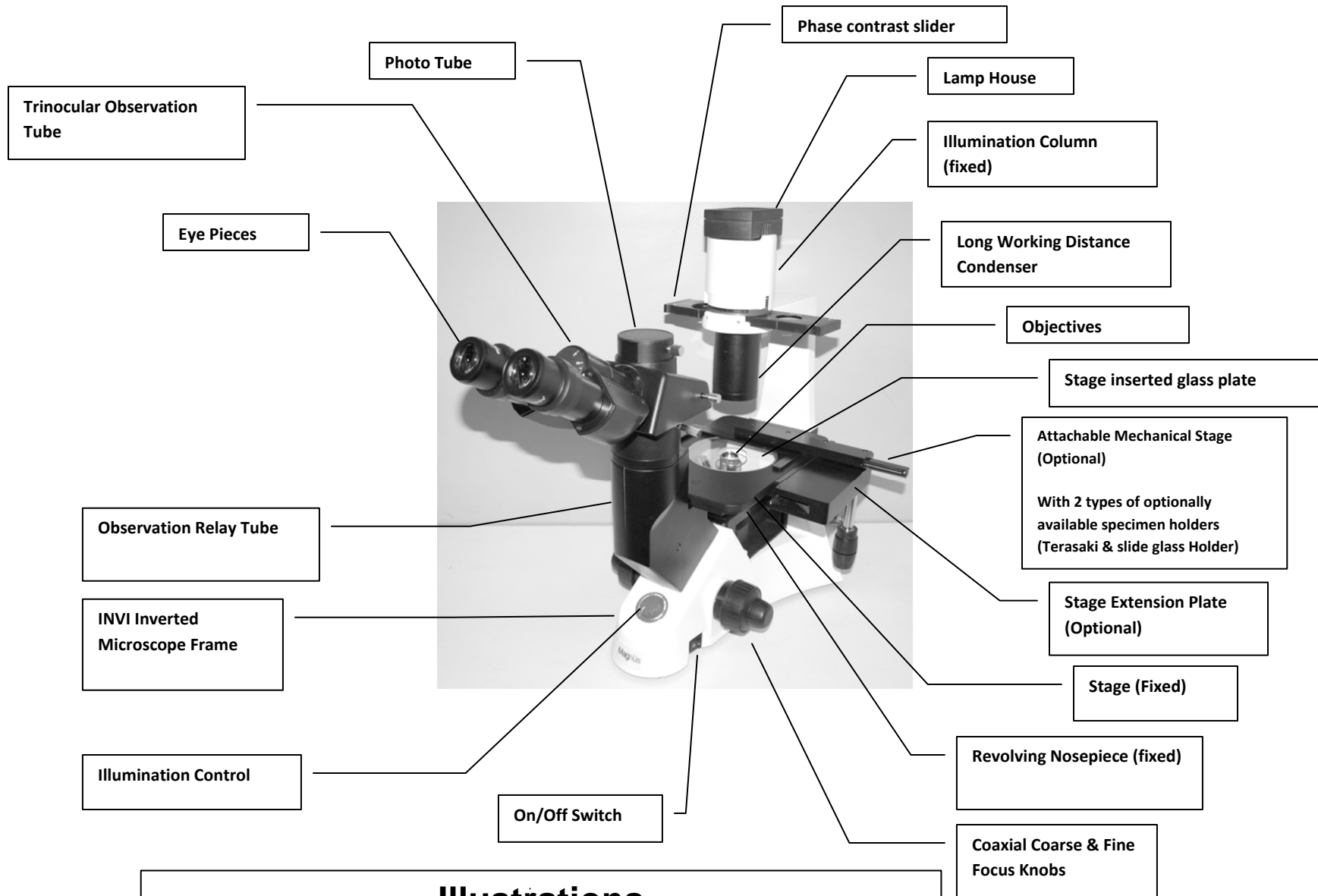
Viewing Head	Trinocular Head Inclined at 30°~ Interpupillary 48 - 75mm	
Eyepiece	High-point, Extra Wide Field Eyepiece EW10x/22	
Objective	LWD Plan Infinity Objective	4X/0.1 WD 18mm 40X/0.6 WD 2.6mm (Cover Glass 1.2mm)
	LWD Plan Infinity Phase Objective	PH10X/0.25 WD 10mm PH20X/0.4 WD 5.1mm
Nosepiece	Quintuple Nosepiece	
Condenser	ELWD Condenser NA 0.3, LWD72mm, (without condenser 150mm)	

## INVI

Phase Annulus	10X-20X Phase Annulus Plate
Stage	Plain Stage 160 x 250mm
	Glass Insert
	Auxiliary Stage 70 x 180mm
Focusing	Coaxial Coarse and Fine Adjustment Coaxial Stroke: 37.7mm per Rotation, Fine Stroke: 0.2mm per Rotation
Illumination	Halogen Lamp 6 V30 W
Filter	Blue, Green and Frosted Glass, 45mm dia
Optional Items	PH40X/0.6 WD2.6mm (Cover Glass 1.2mm) Phase Contrast Objective
	Attachable Mechanical Stage, X-V Co-axial Control, Moving Range 120 x 78 mm
	Terasaki Holder, 38mm dia Petri Dish Holder, 54mm dia Slide Glass Holder
	Warm Plate
	Digital Camera / MIPS (Micro Image Projection System) Attachment
	Time Lapse Recording System

- Specifications are subject to change without any notice

# INVI



## Illustrations

Identifies the various components for 'INVI' INVERTED BIOLOGICAL MICROSCOPE

Thanks! For becoming the proud owner of Magnus  
'INVI' Inverted Biological Microscope

### INVI Inverted Microscope – An Introduction & Applications:

An inverted microscope is upside down compared to a conventional upright microscope

As a result, one is looking up through the bottom of whatever is holding the specimen and is sitting on the stage rather than looking at the specimen from the top, typically through a cover glass, as on a conventional upright microscope.

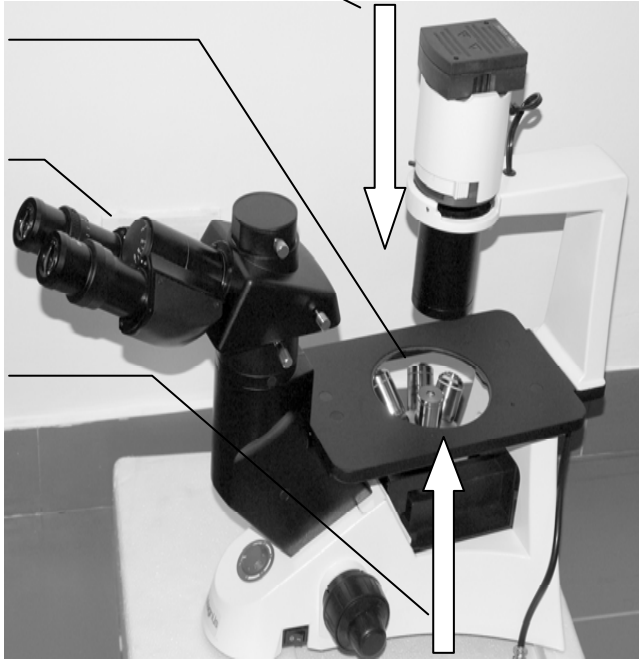
The major advantages for the Inverted microscopes are for observing living micro-organisms and tissues.

The light source and condenser are on the top above the stage pointing down.

A specimen is placed on top of the stage

The Observation tube is in the standard position pointing at a conventional viewing angle

The objectives and nosepiece are below the stage pointing up.





**In upright light microscope the specimen is placed on a glass slide under a cover slip.**

**This specimen is a small sample from the culture and placing it in the artificial environment created by the slide and cover slip.**

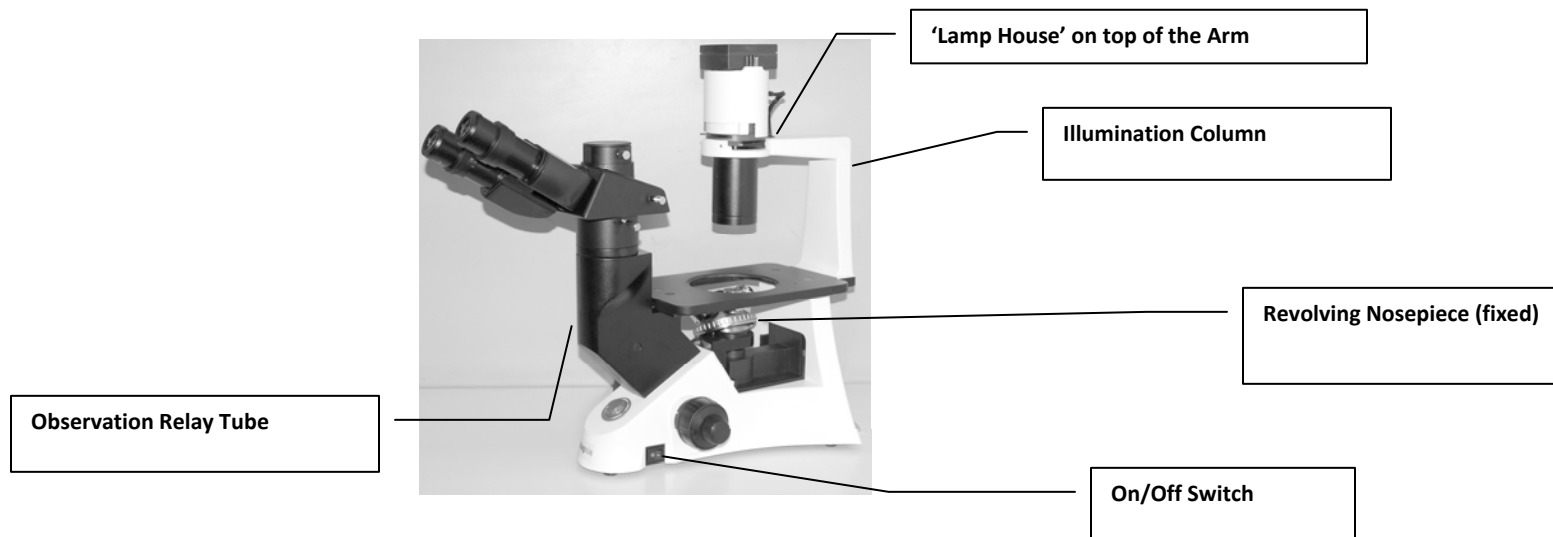
**Due to quick change in temperature and Oxygen, the sample will quickly dry out. The evaporation may change the salinity of the sample frequently. These changes impose severe stress on microorganisms that can affect their behavior and/or kill them in a short time.**

**In the Inverted microscopes the microorganisms can be observed in a large container under more natural conditions. Because of its configuration, the entire culture or large sample in a Petri dish can be observed under more natural and less stressed conditions.**

**Such a sample may sustain life over a much longer period. The cover of the container slows evaporation greatly while at the same time allowing some gas exchange. The larger quantity of water is less subject to quick temperature changes although obviously, if stored in a room, the water will acquire the room's temperature**

## Safety Note

1. Install the microscope on a sturdy, level table. When transporting the microscope, be sure to keep it horizontal by holding it from the root of the observation relay tube and the illumination column. Be sure to remove the specimen since it may fall.
2. After using the instrument, please clean the parts coming in contact with the specimen accompanied with a potential of infection.
3. If the bacterium solution or the water splash to the stage, objective or viewing tube, pull out the power cord at once and wipe up the microscope to avoid the damage of the instrument.
4. When working, the lamp house on the top of the arm will become very hot, be sure there have enough room around the lamp house (especially the top) to cool.
5. Before replacing the lamp bulb or fuse, please switch off the illuminator to 'off position' (in fig.) & cut off the power. Please replace the bulb after it cool down completely. (Specified: High intensity halogen lamp: 6V30W).
6. Earth the instrument for electrical safety performance & to prevent the lighting strike.
7. For product safety performance, please use the Power cord supplied with the instrument.
8. Do not use the instrument where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations to avoid it to sudden or severe impact. Please handle the microscope with care due to a precision instrument.

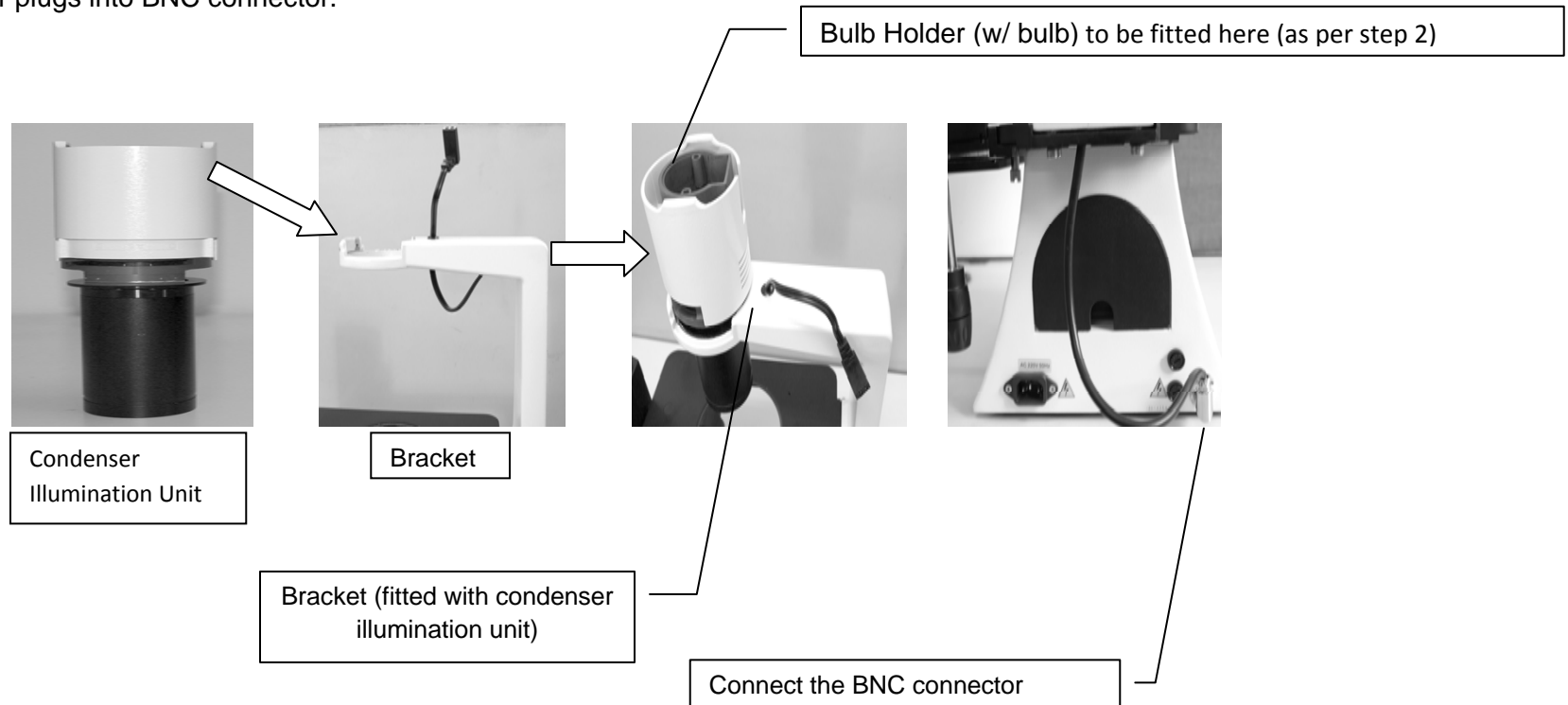


## Maintenance

1. Use the commercially available blower to clean the lenses and other glass components, and wipe gently using a piece of cleaning paper. Use cleaning paper slightly moistened with commercially available absolute alcohol for cleaning the lens if stained with fingerprints or oil smudges.
2. Please use the absolute alcohol very carefully due to highly flammable (keep it away from the flames, heat or potential sources of electrical sparks. Please remember to use it only in a well-ventilated room.
3. Don't use absolute alcohol or any other organic solvent to wipe the non-optical elements, If you need to clean, use the neutral detergent.
4. Do not disassemble any parts from the microscope. That will affect the function or decline the performance of the microscope.
5. If haven't mounted the objective, please cover the dust cap to prevent the dust and the splashed liquid of the tissue culture entering the inside.
6. When not using, remember to cover up the microscope with the dust cover. And make sure the lamp cools down enough before you close.

## Installing steps

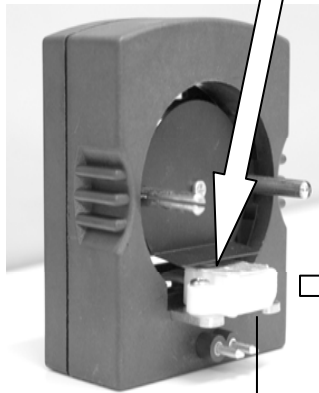
**Step 1: INSTALLING THE CONDENSER ILLUMINATION UNIT:** Insert the **Condenser Illumination Unit** into the bracket gently as shown in fig., then screw down the bit in the hole with the supplied hexagon spanner. Insert BNC connector plugs into BNC connector.



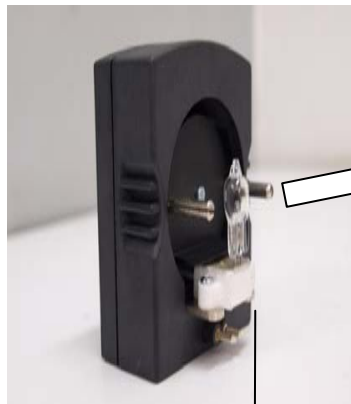
**STEP 2: Installing and replacing the lamp:** Fix the halogen bulb in to the **bulb holder** gently & carefully to avoid damage to bulb. Hold the bulb using with any tissue paper to avoid finger prints on bulb. Please make sure that the power is cut-off during bulb fixing or replacement. Please use the specified halogen lamp 6V30W. Push the bulb holder into the illumination unit gently.



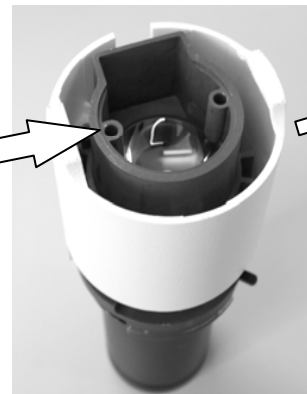
Bulb 6V30W Halogen



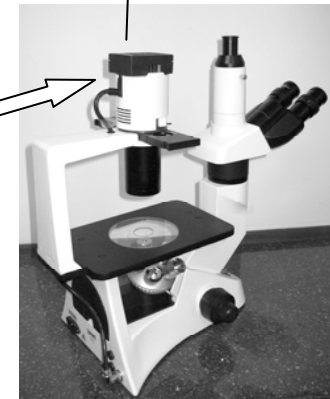
Bulb Holder (w/o bulb)



Bulb Holder (w/ bulb)



Condenser  
Illumination Unit

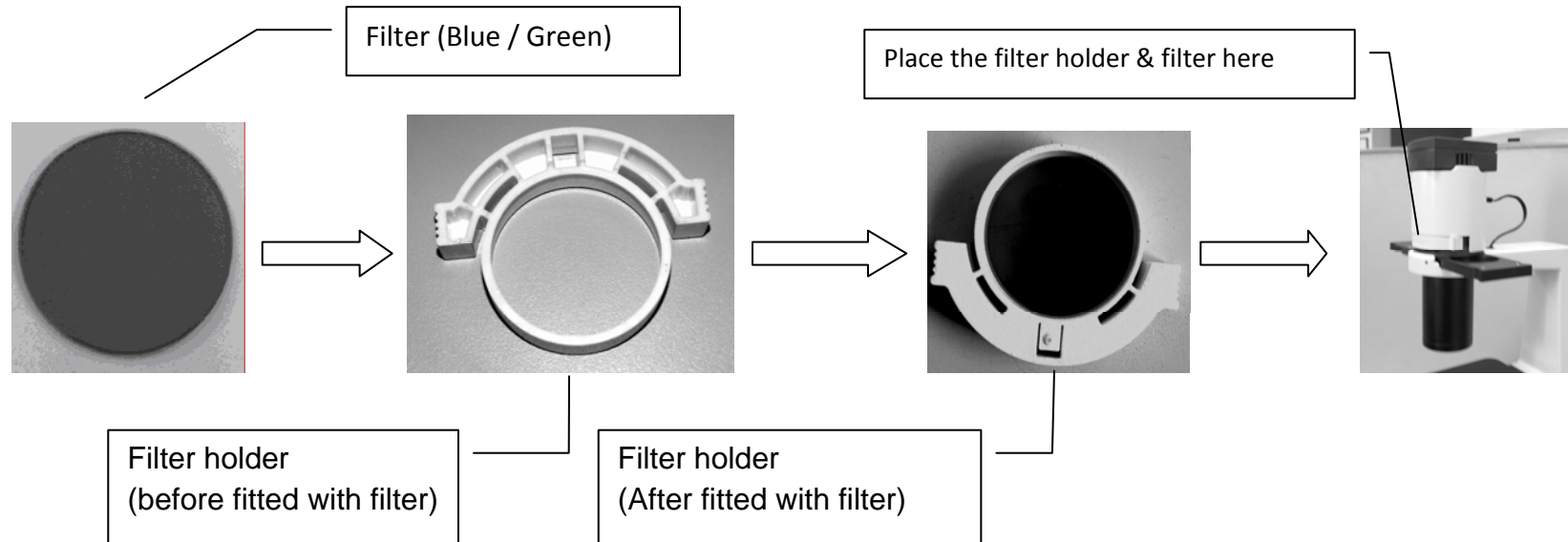


Bulb Holder (w/ bulb) fitted to  
the illumination unit

### STEP 3: Installing & Using Filters:

Select the appropriate filters according to your need

Filter	Applications
Green	Single contrast color filter (green) (used for the phase contrast microscopy)
Blue	Color temperature transit filter (blue) (used for Bright field observation and Microphotography)

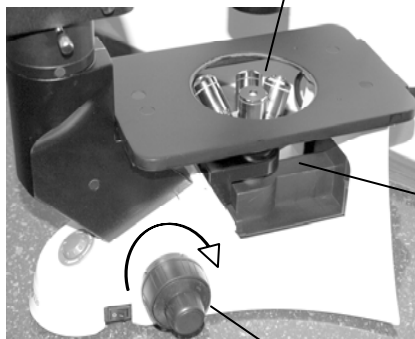


## Step 4: Mount the objectives onto revolving nosepiece

Turn the coarse focusing knob like the figure show till the nosepiece get to its lowest position. Mount objectives onto revolving nosepiece like this way will make the change of magnification to be very easy in using. The best magnification sequence is low to high. When replacing the objective, slowly turn the nosepiece until you hear “clicked” that means the objective enter into the right position-center of the light path.

**Precautions:** Clean the objectives regularly; the objectives used in the inverted microscopes are very sensitive about dust. Do cover the entire unused hole with turret dust caps, to prevent the dust and contamination entering inside. When operating, use the low magnification objective (4x or 10x) to replace the higher magnification if necessary

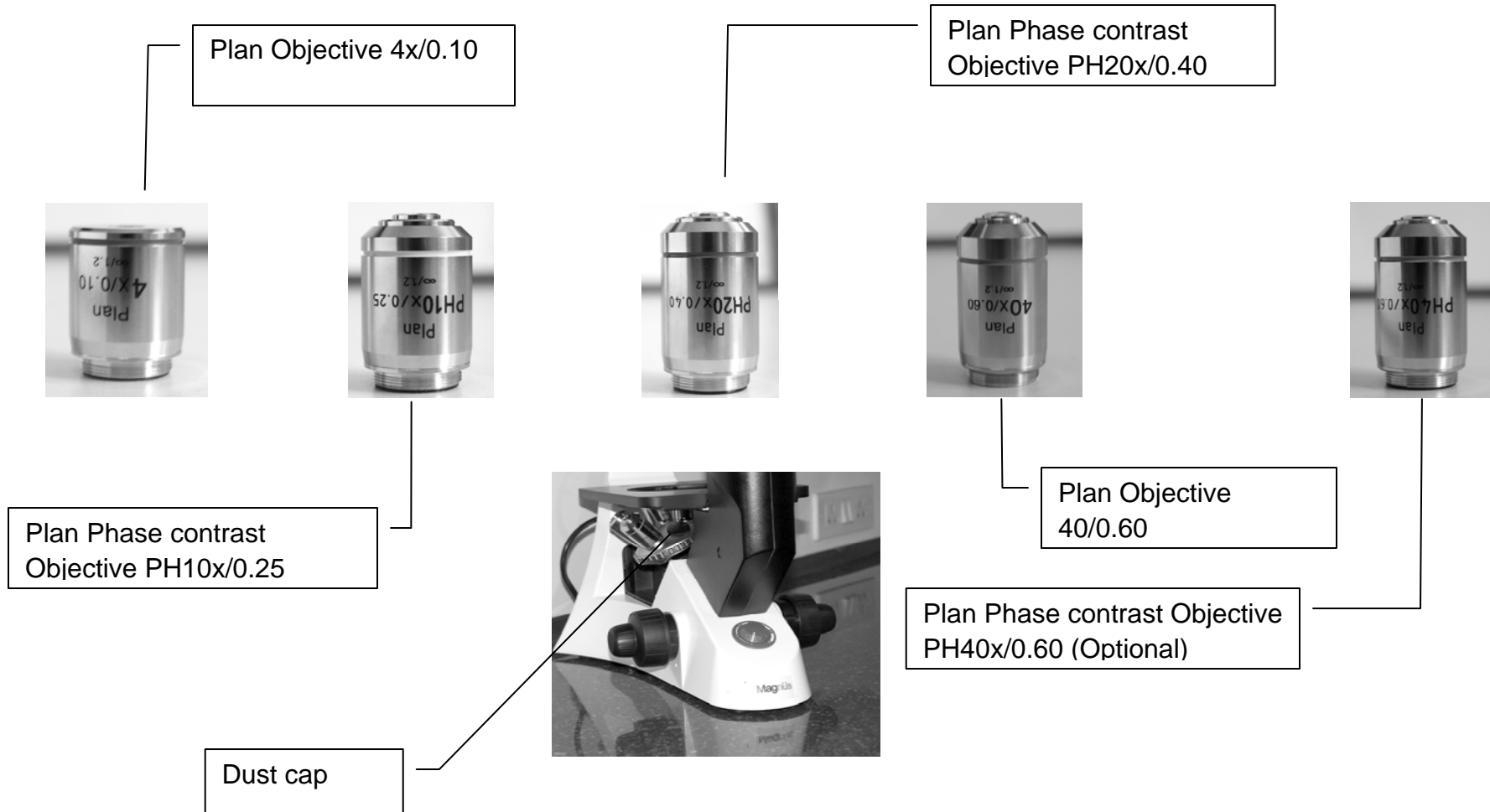
Plan Infinity (Standard) Objectives 4x, 10x (PH), 20x (Ph), 40x,  
Plan Infinity (Optional) Objective 40x (Ph)



Mount the Objectives onto revolving nosepiece

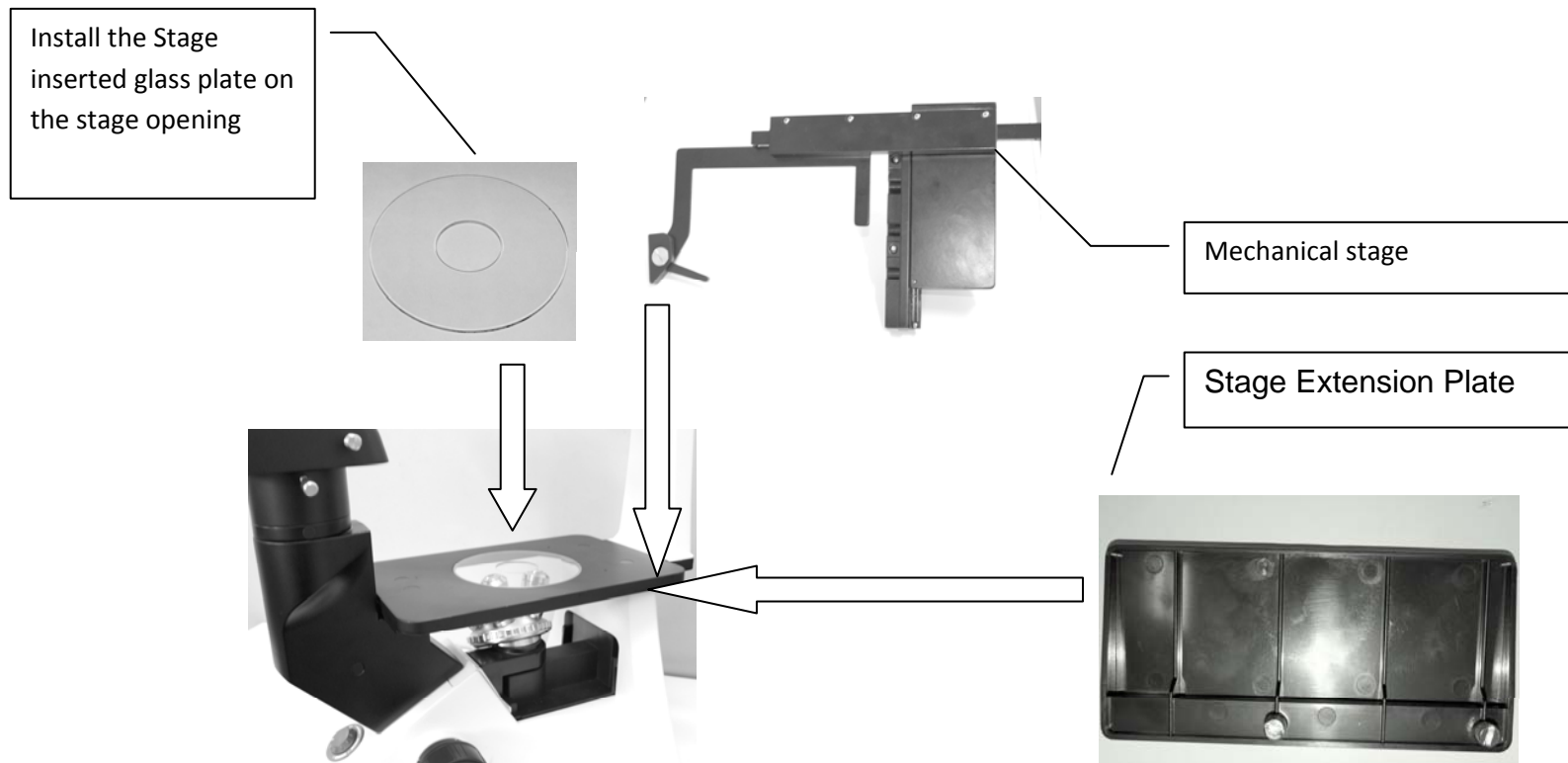
Turn the coarse focusing knob till the nosepiece get to its lowest position for easy mounting of objectives

### LWD Objectives specifications:



## Step 5: Installing the stage Extension plate, Stage Inserted Plate and the mechanical Stage

Stage extension plate can be installed in either side of the stage to enlarge the work surface. Mount it on the stage from right or left below, screwing down it until it stays hard. But the mechanical stage can't be installed together. The mechanical stage will be installed (like the way stage extension plate) in the right side for comfortable adjustment. Install the stage inserted glass plate on to the stage opening.

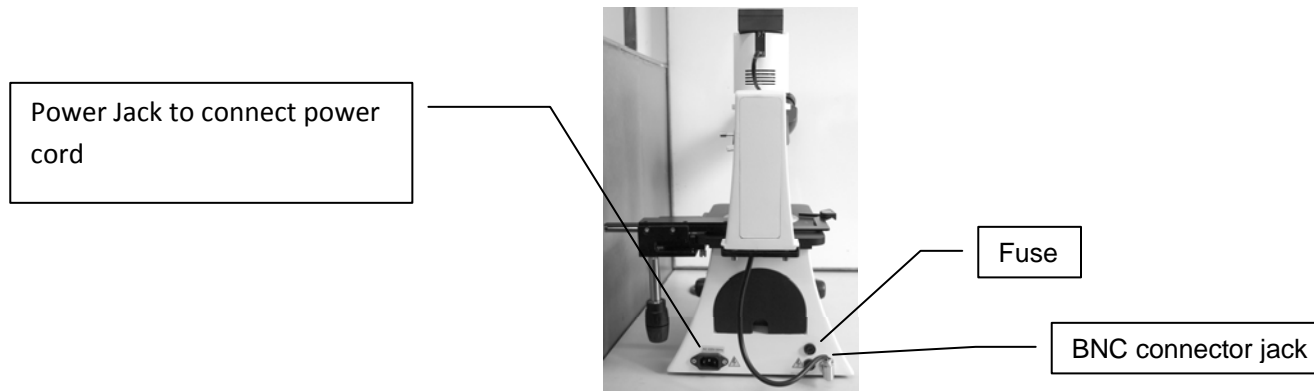


## Step 6: connecting the power cord

Do not bring the power cord to bear a power full stress. When being bent or wrapping, the cable and wires will be broken easily. Turn the main switch to 'off' position before connecting the power cord. Insert the plug into the power jack of the microscope safely. Plug the power cord into the power supply receptacle. Make sure the connection is well. Do use the supplied power cord all the time. If lost or damaged, select same standard cord, please connect the power cord correctly & ensure the instrument is earthen. Insert BNC connector plug into BNC connector jack.

### Replacing the fuse (if required)

Do remember to turn the main switch to the 'off' position before replacing the fuse, and unplug the power cord. Rotate the fuse kit out of the holder & replace a new fuse, then rotate back to holder again. Fuse rating: 250V, 500mA.



## Step 7: Operating the adjustments of Microscope:

### i) Turn-on the lamp

Connect the power; turn on the main switch of the microscope

### ii) Adjustment the brightness

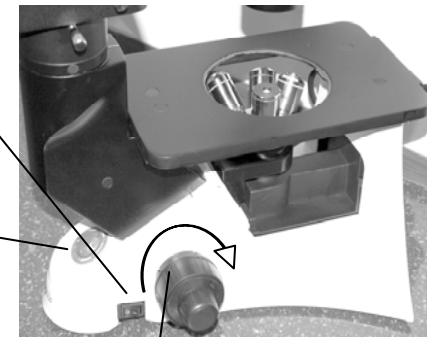
Turn the brightness adjustment knob clockwise, the voltage raise and the brightness strengthen; whereas turning the contra direction, the voltage decline, and the brightness weaken. Using the lamp in low voltage condition, will prolong the service life.

### iii) Adjustment the Tension Adjustment Collar

The tight tension of the coarse focus knob had already adjusted before leaving factory.

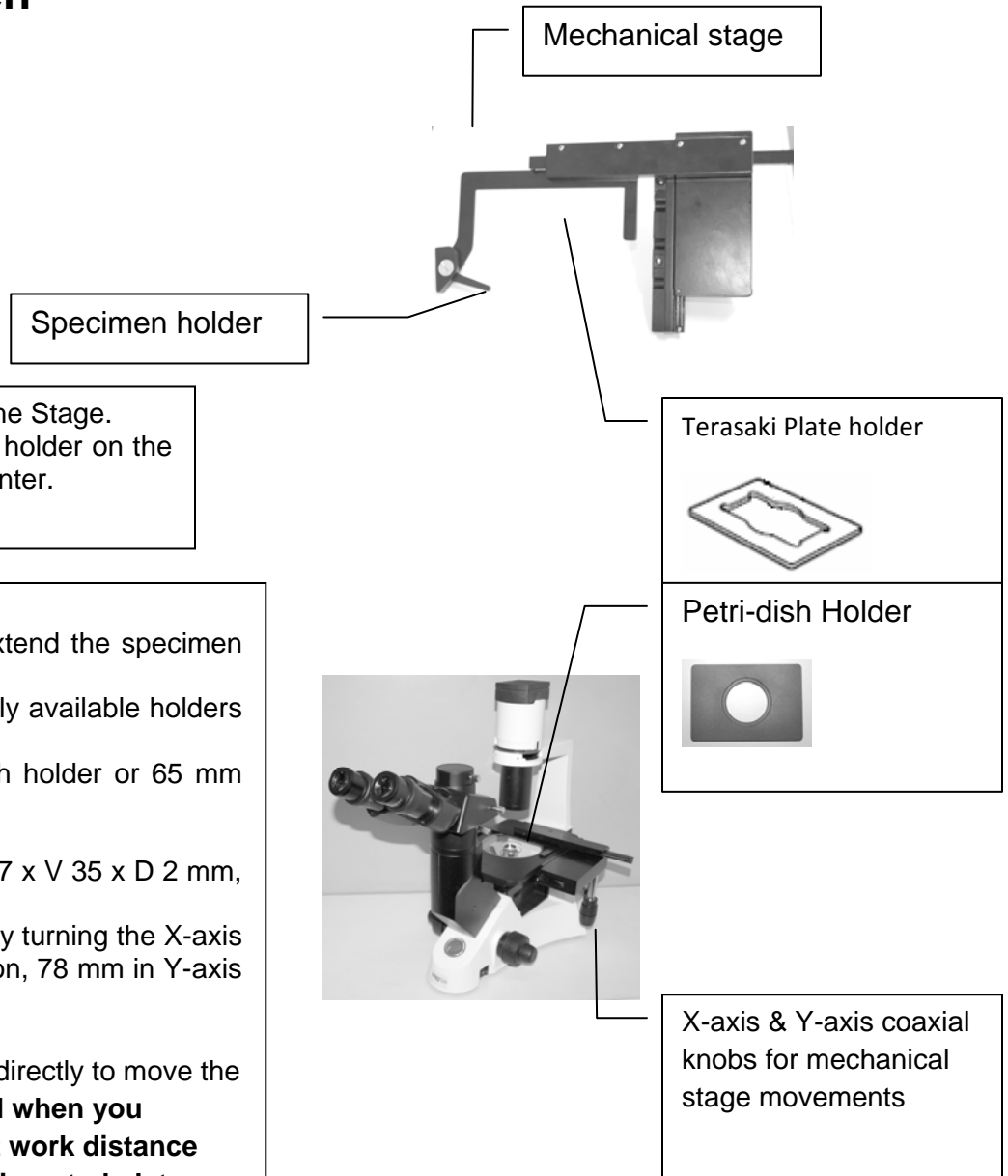
#### How to adjust the tight tension

Turn the tension adjustment collar. While revolving at the direction which shown by the arrowhead on the figure, the tight tension of the coarse focus knob is increasing; and if at the contra direction, the tight tension will decline. If the nosepiece dropped automatically, or the specimen defocused soon even you focus with the fine focus knob. It means the coarse focus knob is too loose; you should screw it down at the direction shown by the arrowhead in the figure.



## Step 8) Stage: Setting the specimen

Set the specimen in the center of the stage



With the INVI, a 35 mm Petri dish can be mounted directly on the Stage.  
**a)** With the INVI, put the optionally available 35 mm Petri dish holder on the stage and mount the 35 mm Petri dish on the opening in the center.  
**b)** To move the Petri dish, slide the entire holder.

### Using the Mechanical Stage

**c)** When using a 96-well or 24-well micro-titer plate, extend the specimen holder to directly hold the micro-titer plate.

**d)** To hold any other type of plate, combine the optionally available holders with the mechanical stage.

**Terasaki holder:** For Terasaki plate, 35 mm Petri dish holder or 65 mm Petri dish.

**Slide glass holder:** For slide glass, 54 mm Petri dish.

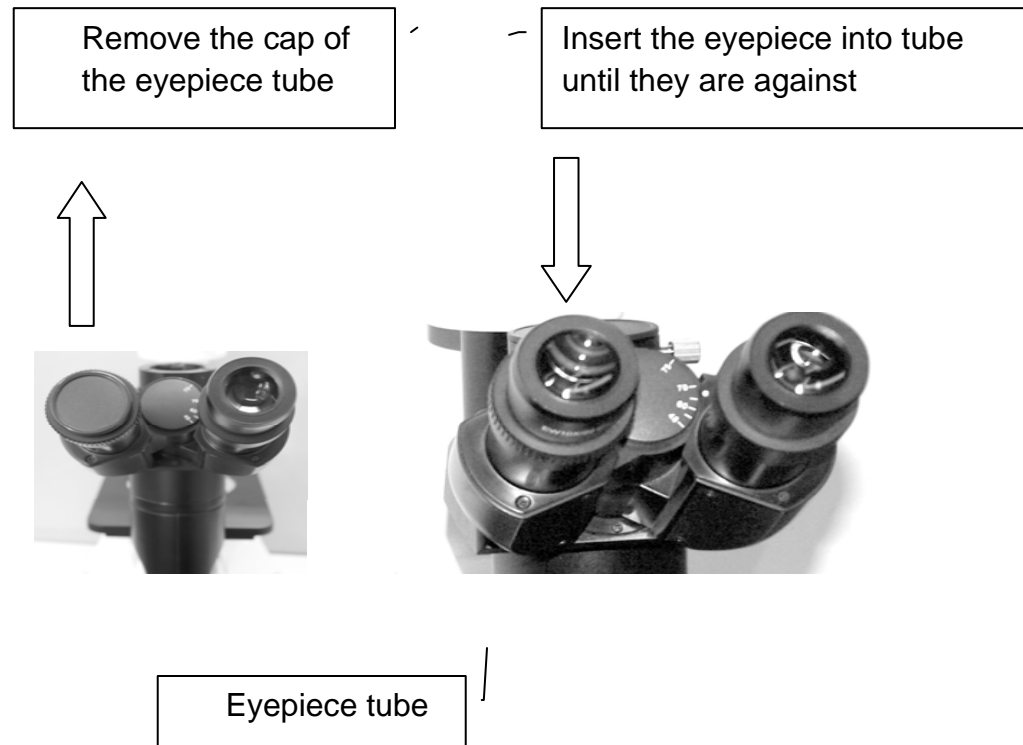
With mounting section dimensions corresponding to H 77 x V 35 x D 2 mm, or for a 60mm Petri dish.

**e)** The specimen can be moved to the desired position by turning the X-axis knob and Y-axis knob (Stroke: 120 mm in X-axis direction, 78 mm in Y-axis direction).

### f) Moving the Specimen

Turn the knob the mechanical stage or use your hands directly to move the specimen to the position you wanted, please. **Be careful when you replace the objective, please, especially after a short work distance observation. Not let the objective to touch the stage inserted plate or the culture dish holder**

## Step 9: Installing the eyepieces

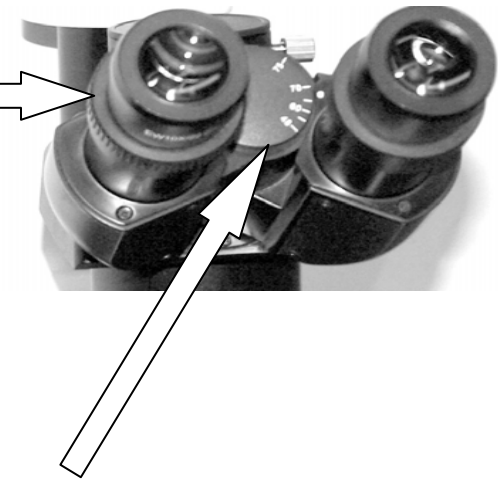


## Step 10) the Viewing Tube

### Adjusting the diopter

Look into the right ocular by your right eye, then revolving the coarse focus knob to focus on the specimen.

Then use your left eye to look into the left ocular. If the image is not sharp, just use the diopter adjustment ring to adjust please. There is  $\pm 5$  diopter in the adjustment ring. The number which the reticule on the eyepiece holder pointed is your eye's diopter graduation.



**Adjustment the interpupillary distance** When observing with two eyes, hold on the left and right prism holder, turn around the axis, adjusting the interpupillary distance until the left right fields of view coincide completely.

**The reticule on the interpupillary distance indicator 3, pointed by the spot (.) on the eyepiece holder shows the scale of the interpupillary distance.** The range of the interpetiolar distance: 48-75mm.

## Step 11) switching the light path

Pulling out the light path selector lever by your Thumb; select the light path you needed.

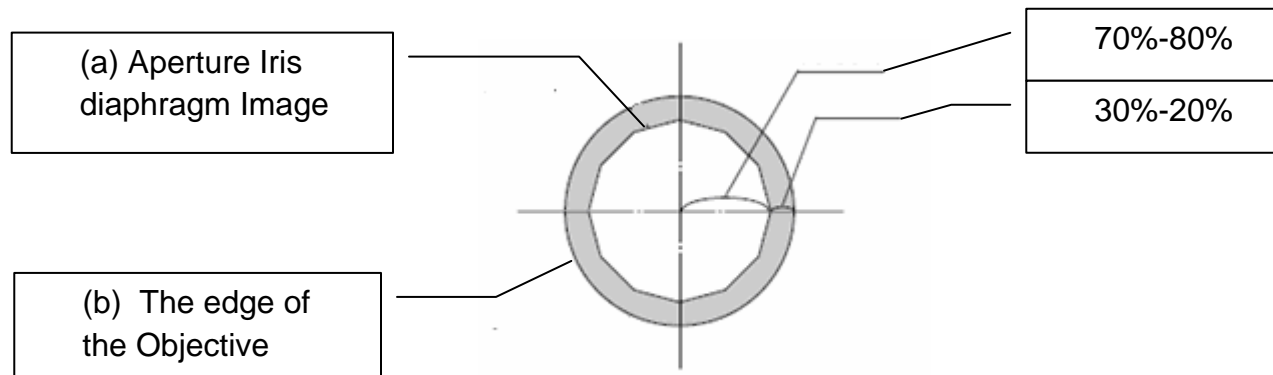
When in the binocular observation, pushing in the lever until you heard a “clicked” whole in video or photography, pulling out the lever until it reached the “clicked” position.



Light path Selector lever	Brightness Proportion	application
Pushing in the lever until it reached the limit position	100%used for Binocular Observation	Binocular Observation
Pulling out The lever Until it Reached the Limit Position	20% used for binocular observation, And 80% used for video or Photography	Binocular Observation, TV, & Microscope or video can be operated simultaneously

## Step 12) using the aperture diaphragm

When in the bright field observation, the aperture diaphragm controls the numerical aperture of the illumination system. Only when the numerical aperture of the objective and the illumination system being matching, you can obtain the higher image resolution and contrast, and the aperture increased depth of field, too.



To recognize the aperture diaphragm, you could remove the eyepiece if necessary. (You also could insert in the centering telescope) then looked into the viewing tube, you might see a field of view like the figure shown. The proportion could be changed by dialing the aperture adjustment lever according your need. (a) is the image of the aperture diaphragm, (2) is the edge of the objective)

Generally, when observing the chromatic specimen, you need to set the size of the condenser aperture diaphragm at 70%-80% of the numerical aperture which is marked on the objective. But if observing the bacterium specimen which is not colored, you could turn the aperture diaphragm lever at the direction of "o" (clockwise).

## Step 13) Phase contrast installing and viewing

### Phase Contrast Slider

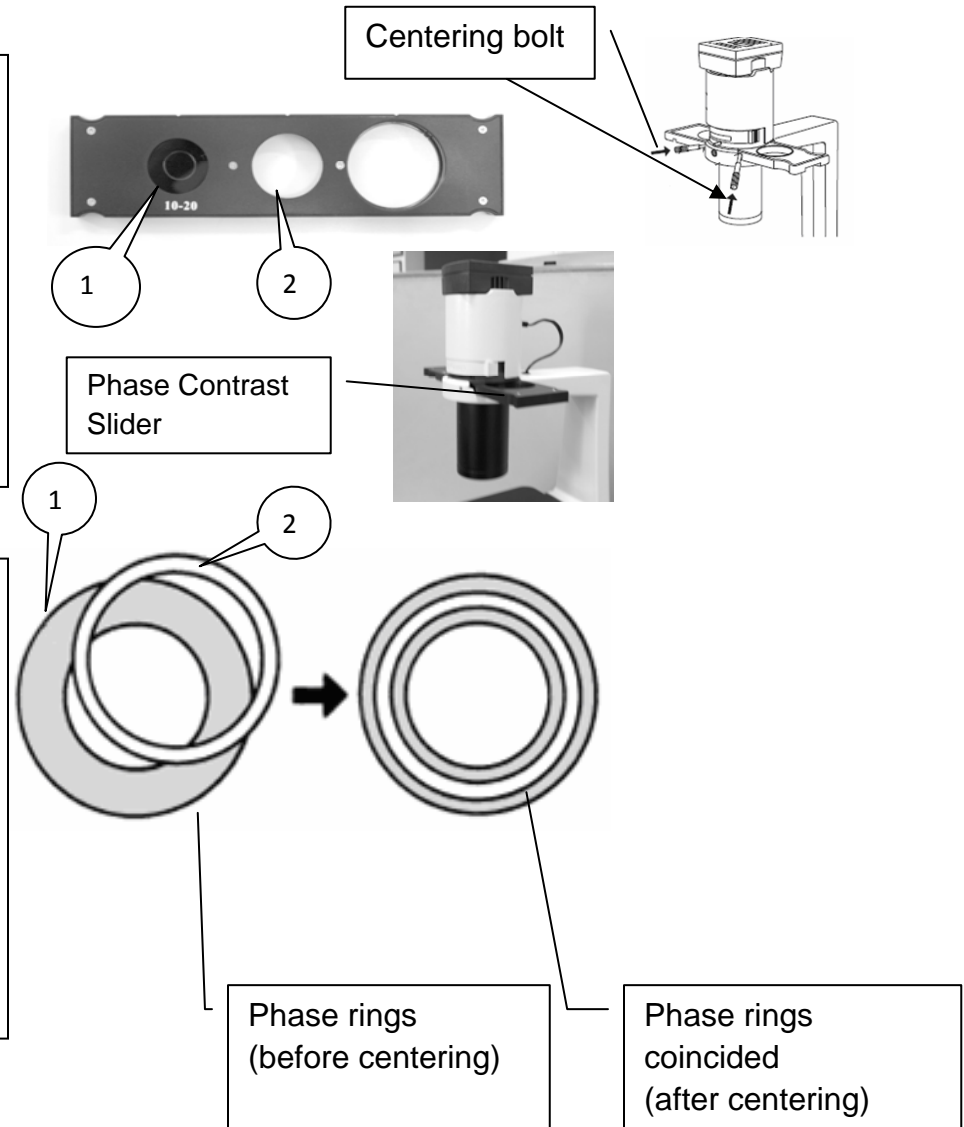
Install the Phase contrast slider to its position (as shown in figure).

**Phase centering:** Place the specimen on the stage and focus it. Take out the eyepiece, replace it with the CT (the centering telescope), and insert it into the viewing tube without diopter adjustment. Make sure the matched phase contrast objective and right ring (in the phase contrast slider) have been in the center of the light path. If the ring is not in the center, you could adjust by the centering bolt. The 10X/20X light ring (1) is worked with the 10X, 20X phase contrast objective, while the opening (2) is used for bright field.

### Phase contrast Centering:

Using the CT to look the ring's image1 and the phase contrast ring's image2 if the light ring's image is not sharp, shift the CT's ocular until you can see a clear image of the light ring2. Adjusting the bolts of the two centering holes in the phase contrast slider by the screwdriver until the light ring center and the phase contrast center are coincided.

The 10X and the 20X phase contrast objective use the same light ring on the phase contrast slider. So you need to check the coincidence of the light ring center and the phase contrast center when changing the objective. If having departure, you ought to center again

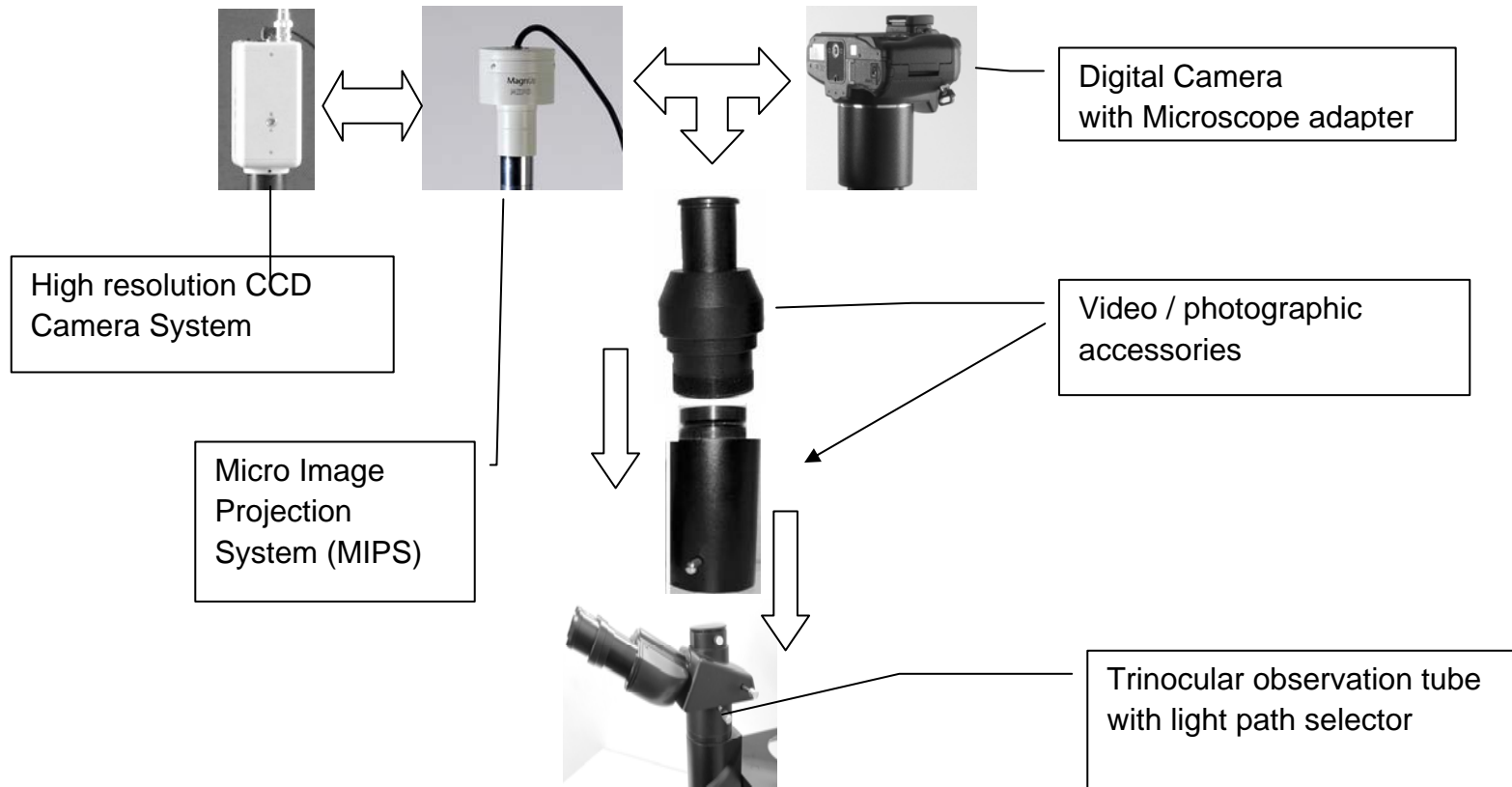


**If the light ring is centering incorrectly**, you will fail to obtain the best Viewing effect of the microscopy. After removing or replacing a thick specimen, the light ring and the phase contrast ring are likely to deviate each other, which will result in a decline of the image contrast. So if happened, please repeat steps as above. If the container or the cover slip which used to place the specimen is not flat, it maybe needs to repeat the centering steps for obtaining a more contrast effect. Please center the light ring by the phase contrast objective, according to the sequence of low to high magnification.

**The centering ring**

Place the specimen on the stagehand focus it. Take out the eyepiece, replace it with the CT (the centering telescope), and inserted it into the viewing tube without diopter adjustment. Make sure the matched phase contrast objective and right ring (in the phase contrast slider) have been in the center of the light path.

### Step 14) Imaging System (Optional):



## Installing the Imaging Systems:

### (CCD camera system or Micro Image Projection System or Digital Camera System)

The optionally available Imaging Systems can be installed on the Trinocular Observation tube of the INVI microscope after installing the video accessories (as given in fig.)

#### Selecting the light path

1. Just used in the trinocular observation pulling out the light path selector lever, until you heard the “clicked”.
2. In the dark specimen observation, you can make the focus by both eyes at first, and then change the light path.

#### Installing the photography set

- A. Loosen the locking bolt on the trinocular viewing tube, and take out the dust cap.
- B. Install the photography accessories into the trinocular port, and screw down the locking bolts.
- C. Inserted the camera duly fitted with microscope on the video / photographic accessories.
  - Before connecting the camera and adapter, remove the camera lens firstly, then connect the lens port with adapter.
  - The camera magnification = objective magnification \* camera lens magnification
  - Please refer the user manual of the camera set to obtain the detailed procedure of using camera.

## 8. Trouble Shooting

Under certain condition, some no fault factors will bring a reversible influence to the instrument's performance. If the problem is happened, please take proper measures according to the following table. If you can't solve the trouble by the supplied methods, please contact with our Service Centre.

# INVI

PROBLEM	REASON	SOLUTION
<b>Optical part:</b>		
The illumination is opening, but the field of view is dark.	The plug of the lamp holder is not connected into the illumination set	Connect them well
	The bulb burnt out	Change a new lamp
	The brightness is too low	Adjust to a proper position
	The color filter is piled too much	Minimize the number of the filters
	Not used the specified bulb	Use the specified halogen Lamp 6V30W
The edge of the field of view has shadow or the brightness is asymmetry	The nosepiece is not in the located position	Turn the nosepiece in to the position where you can hear "clicked"
	The color filter is stopped midway	Insert deeply
	The phase contrast slider is not located on the proper position	Turn the slider in to the "clicked" position
Find dust and stain in the field of view	There are stains on the specimen	Change a clean specimen
	There are stain and dust on the eyepiece	Clean the eyepiece
Appear double image	The size of the aperture diaphragm is too small	Open up the aperture diaphragm
Resolution problems:	The nosepiece is not in the center of the light path	Ensure the nosepiece is turned into the "clicked" position
<ul style="list-style-type: none"> <li>· Image is not sharp;</li> <li>· The contrast is not high;</li> <li>· the detail is not clear;</li> <li>· don't obtain the phase</li> </ul>		
	The aperture diaphragm in the view of field is opened too or large too small	Adjust the aperture diaphragm correctly

# INVI

contrast effect	The lens (condenser, objective, ocular or culture dish become dirty	Clean all
	In the phase contrast observation, the bottom thickness of the culture dish is more than 1.2mm.	Use a the culture dish whose bottom thickness is less than 1.2mm
	Use bright field objective	Change to the phase contrast objective
	The condenser ring is not coincident with the objective phase ring	Adjust the condenser ring to match objective phase ring
	The light ring and the phase contrast kits is not centered	Adjust the bolts to center them
	The objective used is not fit to the phase contrast observation	Please use the compatible objective
	When looking at the edge of the culture dish; the light ring is deviated each other	Move the culture dish until you obtain the phase contrast effect. You can also demount the slider, and adjust the field diaphragm
	The nosepiece is not in the center of the light path	Insure the nosepiece is in the “clicked” position
	The specimen don't place properly	Place the specimen on the stage correctly.
	The optical performance of the culture dish bottom is poor	Please use a regular culture dish
<b>Mechanical Part:</b>		
The coarse focus knob is hard to run	The tension adjustment collar is too tight	Loose it properly
The image can't stay on the focal plane in the process of the observation	The tension adjustment collar is too loose	Tighten properly

## INVI

The image is unfocused	Focus incorrectly	Adjust the focus system.
<b>Viewing tube</b>		
The two eyes' field of view is different	The interpupillar distance is not correct	Adjust the interpupillar distance
	The diopter is not right	Adjust the diopter
<b>Electric Part:</b>		
The Lamp not working	No power supply	check the power cord, and connect them exactly. Also check the fuse.
	The Fuse burn out	Change a new fuse
	The bulb burn out	Change a new bulb
	The installation of the bulb is wrong	Install the bulb correctly
The Bulb burns out in a high frequency	Not used the specified lamp	Use the required
The Brightness is not enough	Not used the specified lamp	Use the required
	The brightness adjustment knob is used wrong	Adjust the brightness adjustment knob in a correct way

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