VAN GUARD®

VAN GUARD

Microscopes

Operation Manual

1400FLi Series

Covering Models:

1482FLi & 1486FLi

Printed in the USA

VGMNL102008-1400FLi

Introduction

Thank you for purchasing this VanGuard Microscope. With the user in mind, VanGuard Microscopes are built from modern designs and should provide a lifetime of reliable performance. We recommend you read this entire manual carefully before setting up and using the instrument.

1400FLi Series Fluorescence Microscopes

The 1400FLi Series infinity corrected fluorescence microscopes are the flagship of the Vanguard microscope line. Combining top performance with highly-advanced features and optics, the 1400FLi Series models produce fluorescence images of the utmost in clarity. Choose from brightfield or phase contrast/brightfield/darkfield.

Viewing Head. Trinocular (Seidentopf) heads rotate 360° and are inclined at 30°. Both models feature interpupillary and dioptric adjustment. The heads feature a sliding main prism (70/30 split) to provide full-time imaging when the vertical tube is in use.

Eyepieces. 10X high eyepoint, widefield with an 18.5mm field of view.

Nosepiece. Quintuple, reversed, ball-bearing nosepiece with high-grade lubricant and positive stops. The nosepiece is reversed (inward-facing) to allow for easier manipulation of slides and to aid in keeping the objectives clean.

Objectives. Plan achromatic, fluorescence objectives come standard on both models. Model 1482FLi features plan achromatic brightfield objectives. Model 1486FLi features plan achromatic phase contrast objectives. All objectives are infinity corrected and are light-reflective coated.

Stage. Delivering a high level of fluid motion control and longevity, the stage measures 160mm x 140mm, and features a removable spring-clip slide holder and a chemical-resistant finish. Motion is controlled by a right-hand, low-position coaxial control and is driven by a rack and pinion system.

Focusing Movement. Coaxial, ultra low-position coarse and fine focus controls feature a 40mm focusing range and are graduated to 2 microns per division. Fitted with tension adjustment and safety autostop.

Condenser. Model 1482FLi comes with a 1.25 N.A. Abbe Condenser. Model 1486FLi comes with a 1.25 N.A. Zernike condenser with phase annulus rings for 10X/20X, 40X and 100X; also has brightfield and darkfield stops. All condensers are mounted on a rack and pinion focusing mechanism and feature spring-loaded centering knobs and an iris diaphragm.

Lower Illumination. 20W variable quartz halogen light source. Comes with blue, green (model 1486FLi only), and dispersion filters.

Upper Illumination. Features a 100W HBO mercury light source mounted to the rear of the microscope and protected by a sturdy, all-metal housing. The lamp is easily focused and centered with the front-mounted lamp viewer. External power supply provides constant, even light and features an electronic timer which automatically logs the amount of time the mercury lamp is in use.

Fluorescence Filters. Features a 3-position (2 filter positions and 1 OFF position), sliding filter cube assembly. Fluorescence models come standard with 2 broadcast filters (blue & green). Custom fluorescence filters available (contact us or your dealer for more details).

Base. Stable 225mm x 160mm base fitted with anti-skid rubber feet.

Body. Cast-metal ergonomic body with stain-resistant enamel finish.

Table of Contents

See included warranty card for more information.

Specifications

1400FLi Microscopes

Viewing Head:	Trinocular	
Viewing Head Type:	Seidentopf	
Head Rotation:	360°	
Head Inclination:	30°	
Sliding Prism:	70/30 Split	
Interpupillary Adjustment:	55-75mm	
Dioptric Adjustment:	-5 to +5	
Eyepiece Magnification:	10X Widefield, High Eyepoint	
Eyepiece Field Diameter:	18.5mm	
Nosepiece:	Quintuple/Reversed	
Fluorescence Objectives:	4X	[0.10 N.A., 17.0mm W.D., 4.5mm F.O.V.]
(Achromatic, Infinity)	10X	[0.25 N.A., 8.0mm W.D., 1.8mm F.O.V.]
	40X	[0.65 N.A., 0.40mm W.D., 0.45mm F.O.V.]
	100X	[1.25 N.A., 0.25mm W.D., 0.18mm F.O.V.]
Brightfield Objectives:	4X	[0.10 N.A., 17.0mm W.D., 4.5mm F.O.V.]
(Plan Achromatic, Infinity)	10X	[0.25 N.A., 8.0mm W.D., 1.8mm F.O.V.]
	40X	[0.65 N.A., 0.40mm W.D., 0.45mm F.O.V.]
	100X	[1.25 N.A., 0.25mm W.D., 0.18mm F.O.V.]
Phase Contrast Objectives:	10X	[0.25 N.A., 8.0mm W.D., 1.8mm F.O.V.]
(Plan Achromatic, Infinity)	20X	[0.40 N.A., 0.50mm W.D., 0.9mm F.O.V.]
	40X	[0.65 N.A., 0.40mm W.D., 0.45mm F.O.V.]
	100X	[1.25 N.A., 0.25mm W.D., 0.18mm F.O.V.]
Fluorescence Filter Cubes:	Blue Broadband [Dichroic: 500nm, Excitation: 430-490nm, Emmision 520nm]	
	Intended Dyes: FITC & Acridine Orange	
	Green Broadband [Dichroic: 570nm, Excitation: 480-550nm, Emmision: 590nm]	
	Intended Dyes: Ethidium Bromide, Propidium Iodide, & TRITC	
Stage Dimensions:	160mm x 140mm	
Stage Motion:	Right-Hand Coaxial Control/Rack & Pinion Drive	
Stage Movement Range:	50 x 75mm	
Focusing Movement:	Coaxial Coarse & Fine Controls/Safety Autostop	
Focusing Range:	40mm	
Focusing Graduation:	2 Microns/Division	
Brightfield Condenser:	1.25 N.A. Abbe Condenser with Iris Diaphragm	
Phase Contrast Condenser:	1.25 N.A. Zernike Condenser with Iris Diaphragm and Brightfield/Darkfield Stops	
Phase Centering Tool:	Telescoping Eyepiece	
Lower Illumination:	20W/6V Variable Quartz Halogen with Köhler Field Diaphragm	
Upper Illumination:	100W HBO Mercury	
Fuses:	0.25A, 250V (2 ea.) [Microscope]	
	8A, 250V (2 ea.) [External Power Supply]	
Voltage:	110V [Standard]; 220V [Optional]	
Base Dimensions:	225mm x 160mm	
Overall Dimensions:	225mm (L) x 160mm (W) x 465mm (H)	
Weight:	10.7kg	

Maintenance

Replacing the Lower Lamp

All Models

1. Before attempting to replace or remove the lamp, UNPLUG THE MICROSCOPE FROM ANY POWER SOURCE AND ALLOW SUFFICIENT TIME FOR THE LAMP TO COOL.
2. Lamp replacement is done by laying the microscope on its back and opening the trap door located on the bottom of the base by pulling on the release knob (see figure 28).

Note: Be careful not to touch the glass lamp when replacing -- use a tissue or other medium to grasp the lamp. This will prevent the oils from your hand from reducing lamp life. If contact is made with the lamp, clean lamp with rubbing alcohol and allow a brief drying period.

3. Once the door is open, the lamp can easily be removed simply by grasping the lamp and pulling it from the fixture (see figure 29).
4. When replacing, insert the new lamp into the same fixture. Make sure that the pins on the lamp slide easily into the slots. You should not have to force the lamp.

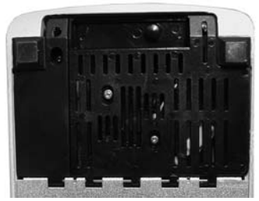


Figure 28

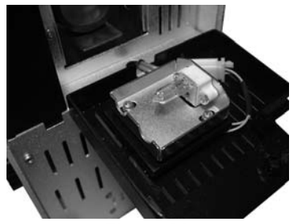


Figure 29

Replacing the Microscope Fuse

All Models

1. If the microscope is plugged in but the lamp is not turning on, the fuses could be blown. To check the fuses, UNPLUG THE MICROSCOPE FROM YOUR POWER SOURCE and remove the 5 screws securing the back panel (see figure 30).
2. Once the screws are removed, carefully pull the rear cover away from the microscope. There is a small circuit board connected to the rear cover that houses the two fuses (see figure 31 - *note: connecting wires removed for clarity*). Avoid pulling on the rear cover hard enough to loosen any of the wires that connect the circuit board to the microscope.
3. To replace the blown fuse(s) (the wire inside is broken, or the glass is blackened) pull the fuse out of it's holder and snap a new fuse in. You might need to use a screwdriver to lever the fuse out, but be careful not to scratch the circuit board.
4. Replace the rear cover and the five screws.

Figure 30

Figure 31

Refer to page 16 (steps 9-10) for instructions on replacing the fuse in the external power supply.

Replacement Lamp (Lower) -- 20W Halogen (Part No. 1400-20WHL)
Replacement Lamp (Upper) -- 100W HBO Mercury (Part No. 1400-100WMLS)
Replacement Fuse (Microscope) -- 0.25A, 250V (Part No. 1400-FS1) [2 required]
Replacement Fuse (External Power Supply) -- 8A, 250V (Part No. 1400-FS4) [2 required]

Maintenance

All Models

The eyepieces and objectives on VanGuard Microscopes are coated. They should never be wiped while dry as any dirt or dust will scratch the coating. The surfaces should either be blown off with an air canister, or blown and cleaned with an air-bulb and camel-hair brush. It is recommended to then use a lens cleaner. Apply with a cotton swab for a minimum of wetting, then wipe the surface clean with a quality lens tissue. Xylene, since it breaks down the bonding material holding the lenses, should never be used as a cleaner. Periodically your VanGuard Microscope should be fully serviced by a qualified service technician.

For information about parts, accessories, or service -- contact your dealer directly or contact VanGuard Microscopes at 1-800-423-8842.

Parts & Accessories

Included Parts:

Model 1482FLi
Trinocular Head (1 ea.)
Stand (1 ea.)
Brightfield Condenser (1 ea.)
Epi-Illumination Assembly (1 ea.)
External Power Supply (1 ea.)
10X High Eyepoint Eyepieces (2 ea.)
4X Infinity Corrected, UV Pass Plan Objective (1 ea.)
10X Infinity Corrected, UV Pass Plan Objective (1 ea.)
40X Infinity Corrected, UV Pass Plan Objective (1 ea.)
100X Infinity Corrected, UV Pass Plan Objective (1 ea.)
UV Shield (1 ea.)
Neutral Filter (1 ea.)
Blue Filter (1 ea.)
External Power Supply Cable (1 ea.)
Power Cord (2 ea.)
100W Mercury Lamp (1 ea.)
Spare 20W Halogen Lamp (1 ea.)
Spare Fuse, 0.25A, 250V (2 ea.) [Microscope]
Spare Fuse, 8A, 250V (2 ea.) [External Power Supply]
Eyecups (2 ea.)
Tension Wrench (1 ea.)
Dust Cover (1 ea.)
Instruction Manual (1 ea.)
Warranty Card (1 ea.)

Model 1486FLi
Trinocular Head (1 ea.)
Stand (1 ea.)
Phase Contrast/Brightfield/Darkfield Condenser (1 ea.)
Phase Contrast Centering Telescope (1 ea.)
Epi-Illumination Assembly (1 ea.)
External Power Supply (1 ea.)
10X High Eyepoint Eyepieces (2 ea.)
10X Plan Phase Objective (1 ea.)
20X Plan Phase Objective (1 ea.)
40X Plan Phase Objective (1 ea.)
100X Plan Phase Objective (1 ea.)
4X Infinity Corrected, UV Pass Plan Objective (1 ea.)
10X Infinity Corrected, UV Pass Plan Objective (1 ea.)
40X Infinity Corrected, UV Pass Plan Objective (1 ea.)
100X Infinity Corrected, UV Pass Plan Objective (1 ea.)
UV Shield (1 ea.)
100W Mercury Lamp (1 ea.)
Halogen Lamp (1 ea.)
Neutral Filter (1 ea.)
Blue Filter (1 ea.)
Green Filter (1 ea.)
External Power Supply Cable (1 ea.)
Power Cord (2 ea.)
Spare Fuse, 0.25A, 250V (2 ea.) [Microscope]
Spare Fuse, 8A, 250V (2 ea.) [External Power Supply]
Eyecups (2 ea.)
Tension Wrench (1 ea.)
Dust Cover (1 ea.)
Instruction Manual (1 ea.)
Warranty Card (1 ea.)

Parts & Accessories

Optional Accessories:

35mm, Video, and Digital Camera Systems:

Part Number:	Description:
1400-CPKNC	35mm Adapters Only (Camera not included)
1400-CVK	Video Camera and Adapter Kit, NTSC Format, 110V
1400-CVK-220	Video Camera and Adapter Kit, NTSC Format, 220V
1400-CVKP	Video Camera and Adapter Kit, PAL Format, 110V
1400-CVKP-220	Video Camera and Adapter Kit, PAL Format, 220V
Call for Part Numbers	Digital Camera and Adapter Kit
Call for Part Numbers	Digital Camera Adapters Only (Camera Not Included)

Other Accessories:

Part Number:	Description:
Call for Part Numbers	Reticles (Grid, Pointer, Crosshair, Scale, Howard Mold Count and Walton & Becket)
Call for Part Numbers	Stage Micrometers
Call for Part Numbers	Eyepieces (15X, 20X)
Call for Part Numbers	Objectives: Plan Achromatic: 4X, 10X, 20X, 40X, 50X (oil), 60X (dry), 100X (oil) Plan Achromatic Phase: 10X, 20X, 40X, 100X (oil)
1200-IOF	Immersion Oil, for Fluorescence, (1/4 oz. Bottle)
1200-IOG	Immersion Oil, Low Viscosity (1/4 oz. Bottle)
1400-KPHi	Phase Contrast Kits (Plan Phase Objectives, Zernike Condenser, and Centering Telescope)
Call for Details	Custom Fluorescence Filters
1200-MLCK	Cleaning Kit (Cleaning Liquid, Camel Hair Blower Brush, Lens Tissue, Cotton Swabs)
1400-PAK	Polarizer & Analyzer

1400-CPKNC 1400-CVK 1400-CDCK

For information about parts, accessories, or service -- contact your dealer directly or contact VanGuard Microscopes at 1-800-423-8842.

Using your 1400i Series Microscope

Fluorescence Viewing

WARNING: Avoid prolonged exposure to unfiltered ultraviolet light.

1. Select the desired magnification by choosing the appropriate objective. It is usually easiest to focus initially by using brightfield or phase contrast.
2. For non-fluorescence operations, it is not necessary to turn off the power supply. Instead move the illumination tube slider into the 1st or "blocked" position.
3. Once the specimen is in place, switch to epi-illumination by moving the illumination tube slider into the 2nd or 3rd "open" position. Select the appropriate filter cube by moving the fluorescence filter slider into the "B" or "G" position. For the blue filter, push the fluorescence filter slider all the way to the left. For the green filter, pull the fluorescence filter slider all the way to the right. The "0" (off) position is located halfway between the blue and green filter cubes.

Position	Color	Excitation	Emission	Intended Dyes
B	blue-green	430-490nm	520nm	FITC, Acridine Orange
G	green-red	480-550nm	590nm	Ethidium Bromide, Propidium Iodide & TRITC

100W HBO Short-Arc Mercury Lamps

The supplied 100W HBO Short-Arc Mercury Lamps have a discharge vessel made of high optical quality quartz glass containing mercury and a noble gas. The special characteristics of HBO lamps are extremely high luminance, strong ultraviolet radiation, good luminous efficacy, and high arc stability.

UV Radiation and Glare

During operation, HBO lamps generate intensive radiation in the ultraviolet and visible range due to the high luminance of the arc. When inadvertently touched, it should be degreased immediately with spirit and a soft, lint-free cloth. Afterwards, gently wipe the quartz envelope until dry.

SAFETY WARNING

HBO lamps should be replaced as soon as the bulb shows advanced blackening, otherwise the risk of the lamp bursting is greatly increased. With normal operation, a lamp burst is very unlikely. In the rare case that an HBO lamp bursts and the mercury is released, it is recommended that all personnel should leave the immediate area **at once**, so that no mercury vapor is inhaled. The area should be thoroughly ventilated for a minimum of 30 minutes.

Using your 1400i Series Microscope

External Power Supply

1. Follow the instructions on page 10 to setup the external power supply.

WARNING: DO NOT attempt to operate the power supply unless the illuminator unit is connected and has a 100W HBO Mercury lamp in place.

2. Activate the power supply by switching on the power switch located on the right side of the power supply face.
3. Allow 10 to 15 minutes for the mercury lamp to stabilize before viewing fluorescence objects through the microscope.
4. The power supply is equipped with a timer to log the total time the mercury lamp is in use. The lamp should be replaced after 100 hours of use. This is very critical for maintaining good illumination and to help prevent the lamp from bursting.
5. Follow the instructions on page 10 to replace the lamp.

NOTE: Allow the lamp to cool for an extended period of time before replacing.

6. After lamp replacement reset the timer by inserting a small pin (paperclip, etc.) into the reset hole located on the front of the power supply face.
7. Although the lamp has a finite service life, it is recommended that it NOT be switched on and off frequently. Doing so can shorten the life of the lamp and the power supply. **Once the power supply is turned off, allow the unit to cool down for at least 15 minutes before powering on again.**
8. To turn off the power supply, move the power switch to the off position.
9. If the external power supply is plugged in but the lamp is not turning on, the fuse could be blown. To replace the fuse, **UNPLUG THE POWER SUPPLY,** then unthread the fuse holders from the rear of the power supply.
10. If a fuse is blown (the wire inside is broken, or the glass is blackened), replace by inserting a new fuse into the fuse holder, then thread the fuse holder back into the power supply by turning in a clockwise direction.

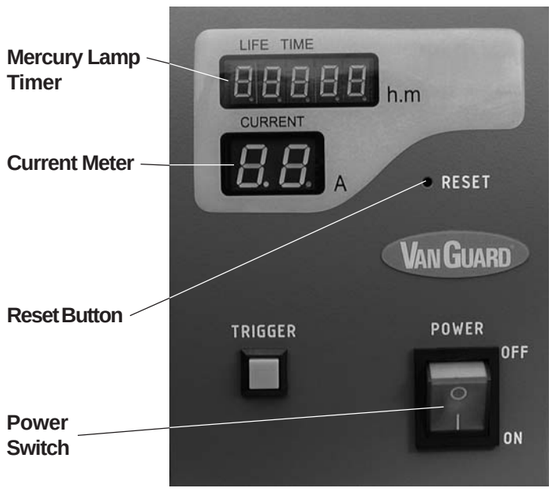


Figure 26

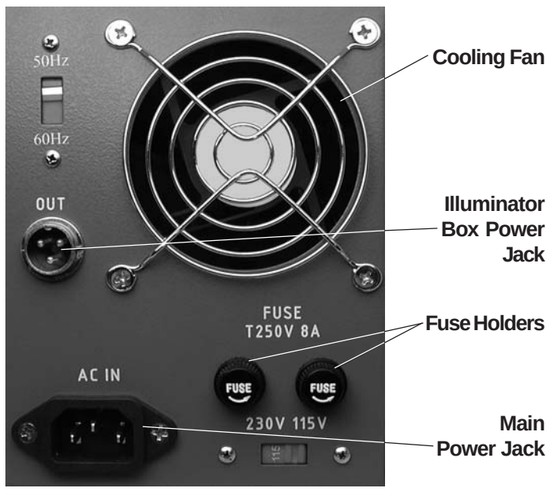
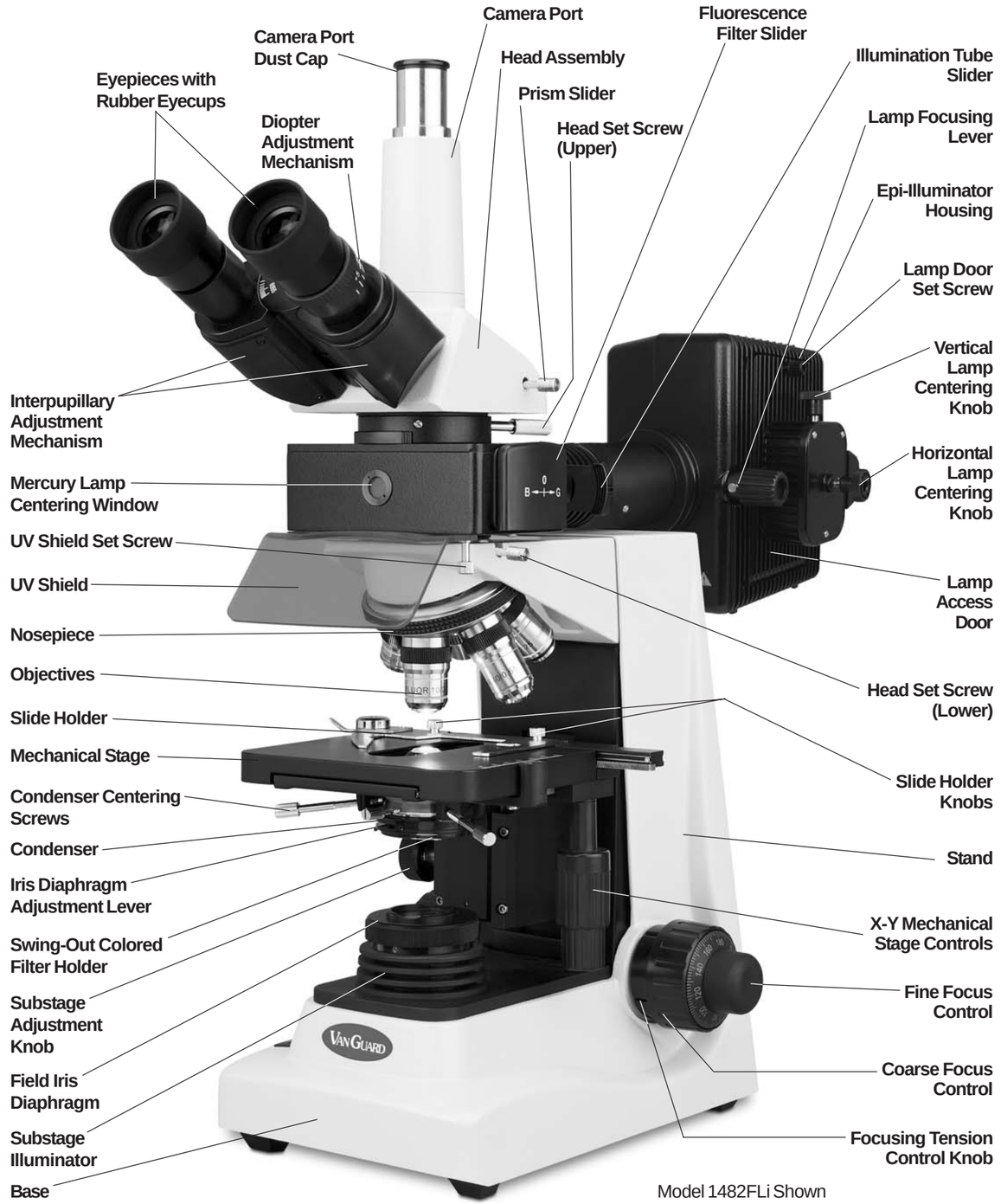


Figure 27

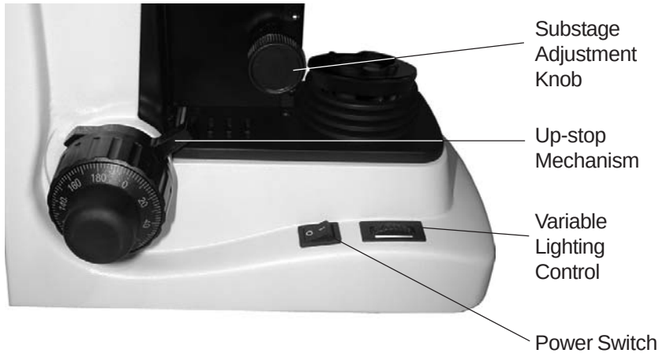
1400FLi Series Parts



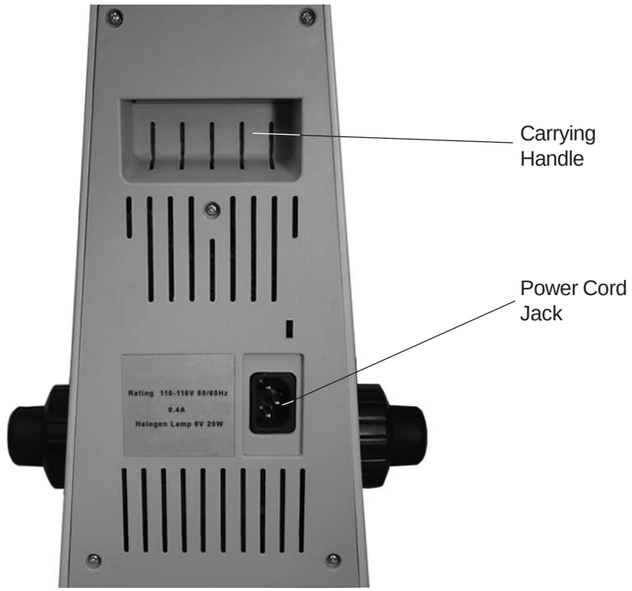
Model 1482FLi Shown

1400FLi Series Parts

1400FLi Series Base, Left Side View



1400FLi Series Stand, Rear View



Pictures and descriptions of the external power supply are shown on page 16.

Using your 1400i Series Microscope

Using the Camera Port

1. Make sure that you have installed the camera port tube as described on page 7 and shown in figure 23.
2. Assemble the adapters and connect to the camera using the instructions provided with the camera/adapter kit.

Figure 23

Note: Camera kit is not included with this microscope. Please see page 4 for available camera kits.

3. Remove the camera port dust cap, then slide the adapter into the camera port (see figure 24).
4. Pull the prism slider completely out to divert the image to the camera port. The prism slider is the silver knob on the right side of the head assembly (see figure 24).

Note: The 1400FLi Series Microscopes utilize a 70/30 split sliding prism. This split prism diverts 70% of the light to the camera port and the remaining 30% to the eyepieces. This allows the eyepieces to be used while the prism slider is pulled out, although the image seen through the eyepieces will be dim when compared to normal use.

5. When the camera port is not in use, be sure to cover with the camera port dust cap.

Figure 24

Using Filters

All Models

Your VanGuard Microscope was supplied with either two or three colored filters depending on model. Brightfield models come with a dispersion (frosted) filter and a blue filter. Phase contrast models add a green filter.

Procedure for Using Filters:

1. Locate the drop-in filter holder (see figure 25a) located on the top of the substage illuminator.
2. Place the desired filter into the filter holder.

Dispersion filters can be used to soften harsh illumination for both viewing and photomicroscopy.

The **green filter** is used mainly for added contrast and photograph color correction during phase contrast work.

The **blue filter** is used to approximate natural light and photograph color correction.

Filtering is a user preference and application specific issue and therefore is beyond the scope of this manual. There are many sources available that explain proper filtering technique and theory.

Figure 25

Using your 1400i Series Microscope

Interpupillary and Diopter Adjustments

1. Interpupillary adjustment (the distance between eyepieces) is made through a “folding” action. The Seidentopf design allows for a folding adjustment which is quickly and easily done for each user (see figure 21).
2. Dioptric adjustment allows for proper optical correction based on each individual’s eyesight. This adjustment is easily made and is recommended prior to each use by different users to prevent eyestrain.
3. Using the 40X objective and a sample slide (i.e. one which produces an easily focused image), close your right eye and bring the image into focus in your left eye with the coarse/fine focus control. Once the image is well-focused using only your left eye, close your left eye and check the focus with your right. If the image is not perfectly focused, make fine adjustments with the diopter adjustment mechanism located on the right eyetube (see figure 22a). Once complete, the microscope is corrected for your vision.

Figure 21

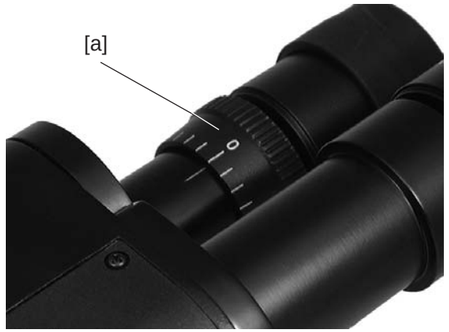


Figure 22

Oil Immersion Objectives

The 100X objective which comes with this microscope must be used with immersion oil in order to maintain image quality. After use, the objective tip needs to be wiped clean so that no oil residue remains.

Procedure for cleaning the 100X Oil Immersion Objective:

1. Lightly moisten a cotton swab with lens cleaner.
2. Wipe the objective with a twisting motion in order to remove all traces of the immersion oil.
3. Check that all the immersion oil has been removed before storing the objective.

Under no circumstances should an oil immersion objective be left sitting in oil for an extended period of time. Exceptionally long immersion periods can cause oil to penetrate the objective’s sealant and obscure the optics, which is not covered under warranty.

Setup

The next 4 pages are dedicated to assembling a working microscope. The following section, “Using your 1400FLi Series Microscope” (starting on page 13) explains the various features of the microscope and how to use them.

Assembly

All Models

1. After removing the microscope parts from the protective foam packaging and checking it over for all components and accessories (a list is provided on page 3), you can begin assembly.
2. Place the stand on a stable counter top.
3. Place the epi-illuminator housing assembly on top of the stand so that the dovetail flange slides into place. Secure with the head set screw (see figure 1a).

NOTE: Do not release the epi-illuminator housing assembly until it is firmly secured with the head set screw.

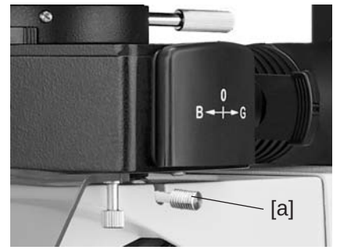


Figure 1

4. Place the head assembly on top of the epi-illuminator housing assembly so that the dovetail flange slides into place. Secure with the knurled head set screw (upper) (see figure 2a).

NOTE: Do not release the head until it is firmly secured with the head set screw (upper).

NOTE: The head may be installed directly on the stand if the epi-fluorescence illuminator will not be used.

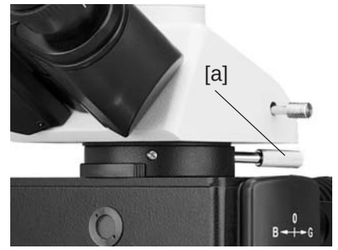


Figure 2

5. Remove the packing cap from the microscope head trinocular port and attach the camera port to the head assembly by turning in a clockwise direction until tight (see figure 3a).

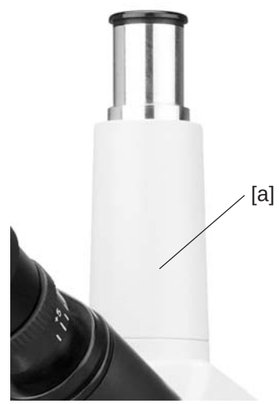


Figure 3

Setup

Assembly (continued)

6. Attach the UV shield to the bottom front of the epi-illuminator housing assembly with the UV shield set screw (see figure 4a).

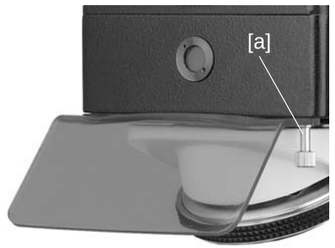


Figure 4

7. Slide the eyepieces into the eyetubes and attach eyecups (see figure 5).

Figure 5

8. After removing the objectives from their storage containers, individually install each one into the nosepiece by twisting them clockwise into the threaded holes of the nosepiece (see figure 6).

Figure 6

The next 4 steps describe how to install the condenser. With most microscopes the condenser comes pre-installed. If this is the case skip ahead to step 13.

9. Raise the substage and stage to their maximum height. Raise the stage via the coarse/fine focus controls (see figure 7a), and the substage using the substage adjustment knob (see figure 7b).

10. Loosen the condenser set screw (see figure 7c) enough to allow the neck of the condenser to slide through the silver ring.

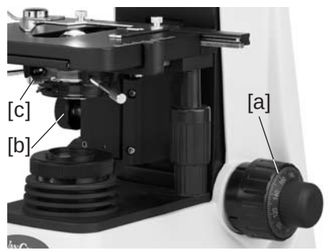


Figure 7

Using your 1400FLi Series Microscope

Focusing and Mechanical Stage Mechanisms

1. Focusing adjustment is achieved by turning the coarse/fine focus controls (see figures 19a and 20a). The large knob is used for coarse adjustment, the smaller knob for fine adjustment. The coaxial arrangement allows for easy, precise adjustment without stage drift.

2. Turning the coarse/fine focus control raises and lowers the stage vertically. One complete turn of the fine focusing knob raises or lowers the stage 0.3mm; the smallest graduation refers to 2 microns of vertical movement. One complete turn of the coarse focusing knob raises or lowers the stage 3.6mm. To ensure long life, turn the focusing knobs slowly and uniformly.

3. The focusing tension control knob is located just inside of the right-hand focus control knob (see figure 19b). For tighter tension, turn the control knob in a clockwise motion. For looser tension, turn the control knob in a counterclockwise motion.

4. Vertical Focusing: The condenser can be raised and lowered with the substage adjustment knob (see figure 20b) to focus the light for optimal illumination.

5. Aperture Adjustment: The light path can be adjusted with the iris diaphragm adjustment lever located underneath the condenser. Aperture adjustments are made to induce contrast into a specimen, not to adjust light intensity.

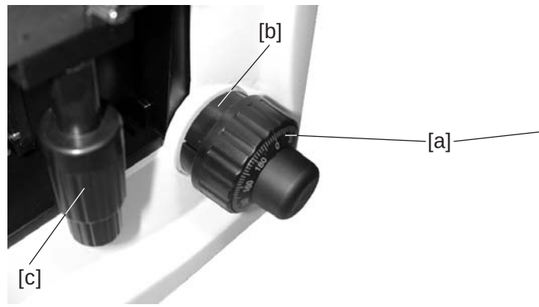


Figure 19

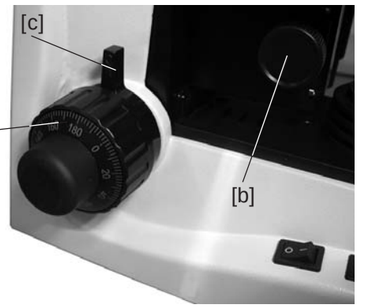


Figure 20

6. The mechanical stage X-Y controls, located underneath the right-hand side of the mechanical stage (see figure 19c), provide easy and accurate positioning of the sample. One complete turn of the longitudinal (Y) control (lower half of the stage controls) will move the specimen 34mm left or right. One complete turn of the transverse (X) control (upper half of the stage controls) will move the specimen 20mm front or back.

7. The spring-loaded slide holder can be removed for users who prefer to not use a mechanical stage. Simply loosen the knurled slide holder knobs which lock the slide holder on the stage, and slip out the slide holder.

Setting the Up-Stop Mechanism

The up-stop mechanism is located just inside of the left-hand focus control knob (see figure 20c). It allows the user to set a maximum point to which the stage can be raised.

1. To set this point, turn the up-stop mechanism in a counterclockwise motion, so that its tab is facing down (which is also the “no up-stop position” for normal use).

2. Raise or lower the stage, by turning the focus control knobs, to the desired height. Be careful not to raise the stage high enough to crash into the objective.

3. Once achieved, turn the up-stop mechanism in a clockwise motion, so that its tab is facing up.

4. Once gently tightened, the up-stop mechanism will not allow the stage to be raised higher than the set point.

Setup

Aligning the Phase Contrast Annulus Rings

Phase contrast is a system which involves a series of light baffling annular rings. Proper alignment of these rings is absolutely necessary to achieve optimum phase contrast.

1486FLi

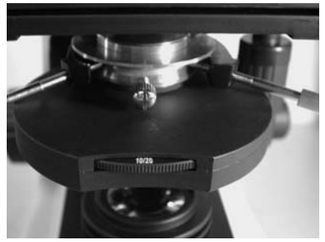


Figure 16

1. Begin by turning on the substage illuminator with the power switch located on the lower left side of the instrument. Set the objectives so they are in the approximate position for actual use. This is best achieved by placing a slide on the stage, rotating the 100X objective into position, then raising the stage (via the coarse/fine focus control knobs) until the tip of the 100X objective is just above the slide (almost touching).
2. Rotate the nosepiece until the 10X objective is in the light path, then rotate the phase annulus turret (the dial on the front of the condenser) in the phase contrast condenser assembly until the "10/20" is seen in the viewing window (see figure 16).
3. Remove an eyepiece from one of the eyetubes and replace with the phase contrast centering telescope (see figure 17).
4. Loosen the set screw on the phase contrast centering telescope.
5. While looking through the phase contrast centering telescope pull the end out until the image is in focus.
6. Tighten the phase contrast centering telescope set screw.
7. The image seen through the phase contrast centering telescope should resemble rings superimposed on one another (see Figure 18A). What is actually being viewed are the phase rings.
8. Turn the condenser centering knobs, which extend from the condenser mount, until the two rings of light are centered upon one another (see Figure 18B).

Figure 17

9. Once the phase rings are centered, remove the phase contrast centering telescope and replace with the eyepiece.
10. The phase rings are now centered for the other remaining objectives. This process shouldn't need to be repeated for each objective setting, although it is advised to perform off and on checks with the phase contrast centering telescope to confirm that the phase rings are still centered.

NOTE: Brightfield and darkfield work can be achieved on models with a phase contrast condenser. The "0" setting on the phase annulus turret is used brightfield and the "DF" setting is used for darkfield contrast.

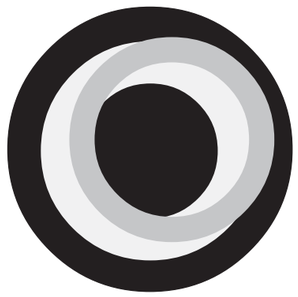


Figure 18A

Figure 18B

Note: This completes the setup for the 1486FLi. The next 5 pages will explain how to use and make adjustments to the microscope.

Setup

Assembly (continued)

11. Slide the neck of the condenser up through the silver ring of the condenser mount until it will go no further (see figure 8). Make sure that the text "NA 1.25" is facing upward. If the condenser will not slide freely through the silver ring do not force, simply wiggle the condenser while lightly pushing up. It may be necessary to loosen the *up-stop* mechanism in order to gain sufficient substage clearance (refer to the instructions on page 13).
12. Once the condenser assembly is in place, lower the substage via the substage adjustment knob and tighten the condenser set screw.

Note: The brightfield condenser (model 1482FLi) is pictured, but the assembly instructions are identical for the phase contrast condenser (1486FLi).

Figure 8

WARNING: DO NOT open the housing assembly while the illuminator is in operation or when it is connected to the power supply. When replacing, allow the lamp to cool for an extended period of time.

13. Remove the epi-illuminator lamp bracket (see figure 9a) from the epi-illuminator housing by loosening the lamp door setscrew (see figure 9b) at the top of the lamp bracket access door (located on the right side of the housing).

Figure 9

14. The epi-illuminator housing is shipped with a protective-insulating blank mounted in place of the lamp in the lamp-mounting sockets (see figure 10a). This must be removed and replaced by a lamp to operate the unit. Loosen the two lamp mounting screws and slide out the blank.

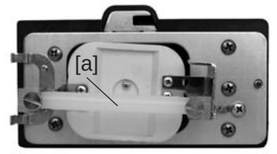


Figure 10

15. A 100W HBO Mercury Lamp comes with the unit. Remove the lamp from its protective packaging.

Note: Do not touch the glass bulb directly, as fingerprints can etch the quartz housing which decreases the bulb's life and performance. If contact is made with the glass bulb, clean with rubbing alcohol and dry thoroughly.

16. The lamp is polarized (one end is larger than the other). Insert the large end through the flexible mounting socket, but do not tighten the set screw (see figure 11).

Figure 11

Assembly (continued)

17. While the large end is through the flexible mounting socket, manipulate the flexible mounting socket to get the small end into the stationary mounting socket (see figure 12).

18. Push the small end in as far as it will go and then tighten the set screw on the stationary mounting socket.

19. Adjust the flexible mounting socket so that the set screw is over the metal end of the lamp, then tighten the set screw.

20. Place the entire assembly back inside the epi-illuminator housing and secure it in place with the lamp door set screw. Make certain there are no gaps between the lamp bracket access door and the epi-illuminator housing.

21. Plug the power supply cable (see figure 13) into the external power supply by lining up the notch on the plug with the alignment lug located in the socket. Secure the power supply cable by tightening the threaded silver ring.

22. Connect the female end of the first power cord (see figure 14) to the rear of the microscope, and the male end to a suitable power supply.

23. Connect the female end of the second power cord (see figure 14) to the rear of the power supply, and the male end to a suitable power supply.

24. Turn the substage illuminator on with the power switch located on the lower left side of the instrument. If the light does not come on, check to see that the variable lighting control, located next to the power switch is on the highest setting.

Figure 12

Figure 13

Figure 14

Alignment of the Mercury Lamp

All Models

NOTE: Please see page 16 to familiarize yourself with the operation of the external power supply before turning the external power supply on.

1. Once the external power supply is on, move the illumination tube slider into the 2nd or 3rd “open” position. Move the fluorescence filter slider into the middle or “0” position. Move the lamp focusing lever to approximately the middle position.

2. Look into the mercury lamp centering window located just below the eyepieces. If the lamp is centered, a green ball, slightly smaller in diameter than the viewing window can be observed. If not turn the vertical and horizontal lamp centering knobs, located on the right side of the epi-illuminator housing, until the green ball is centered. If you see a green light in the viewing window, use the focusing lever to concentrate the light into a ball.

3. If the lamp cannot be centered, it may have been mounted too far off center. In this case, the lamp must be physically moved in its mount. Turn off the external power supply and disconnect the power supply cable from the epi-illuminator housing. **ALLOW THE LAMP TO FULLY COOL.** Open the lamp bracket access door and reposition the lamp as needed, being careful not to touch the glass envelope of the lamp. Close the lamp bracket access door and reconnect it to the external power supply with the power supply cable. Repeat the above procedures until the lamp is centered.

4. Once the lamp is centered and focused, these procedures do not have to be repeated until the lamp is replaced (unless the settings are changed inadvertently).

Centering the Condenser

1482FLi

The condenser must be centered in the light path to ensure proper light control. A simple method for centering is as follows:

NOTE: This step is not required for the 1486FLi. Skip ahead to the next section “Aligning the Phase Contrast Annulus Rings”.

1. Adjustments to the substage condensing system are crucial for proper illumination and performance. There are three basic adjustments which need to be made: Centering, Vertical Focusing, and Aperture Adjustment.

2. **Centering**: The condenser must be centered in the light path to ensure proper light control. A simple method for centering is as follows:

- Rotate the nosepiece until the 10X objective is in the light path.
- Raise the substage assembly fully by turning the substage adjustment knob counter-clockwise.
- Open the aperature iris diaphragm to the largest setting by using the aperature iris diaphragm adjustment lever which extends from the condenser assembly.
- While looking into the microscope eyepieces, close the field iris diaphragm to the smallest setting by turning the uppermost section of the substage illuminator counter-clockwise.
- Closing the iris in this manner will reduce the field so that a small white hexagon is visible within a black field (see figure 15A). Focusing of the hexagon is performed by turning the coarse/fine focus controls. This white hexagon is the light which is passing through the field iris and should be centered in the black field. If not, move it to the center (see figure 15B) by tightening and/or loosening the condenser centering knobs.
- Fine tuning can be done by opening the field iris diaphragm until the white hexagon almost fills the entire field (see figure 15C), and then readjusting (see figure 15D). After centering the condenser open the field iris diaphragm slightly wider than the field of view.

Figure 15A

Figure 15B

Figure 15C

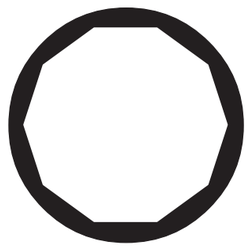


Figure 15D

3. **Vertical Focusing**: The condenser can be raised and lowered with the substage adjustment knob to focus the light for optimal illumination.ture Adjustment.

4. **Aperture Adjustment**: The light path can be adjusted with the aperature iris diaphragm adjustment lever located just below the condenser. Aperture adjustments are made to induce contrast into a specimen, not to adjust light intensity.

Note: If you purchased a 1482FLi this step completes the setup. Skip ahead to page 13, “Using Your 1400i Series Microscope”.