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INSTRUCTIONS FOR

MODEL DC5-420TH

STEREOSCOPIC MICROSCOPE WITH DIGITAL CAMERA

(For microscope operation only. Camera operation covered in PDF format on disc)

HOW TO USE YOUR MICROSCOPE SERIAL NUMBERS

1. Microscope serial number: This number (etched under zoom objective assembly) is the number under which your warranty is registered.
2. Microscope & Motic CD DM number: This number (found on a white sticker on CD sleeve) is used for logging on to the Motic web site, which gives you the ability to download free software upgrades.

*Please retain for your records

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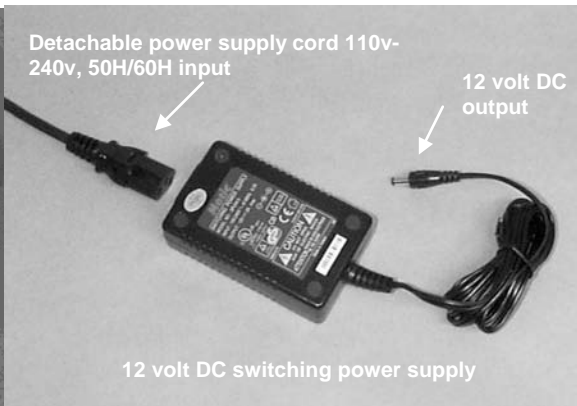
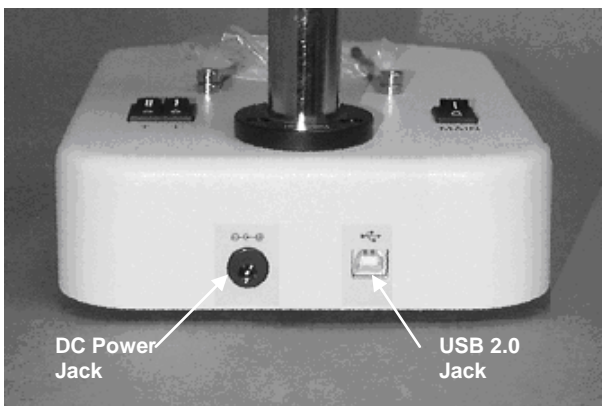
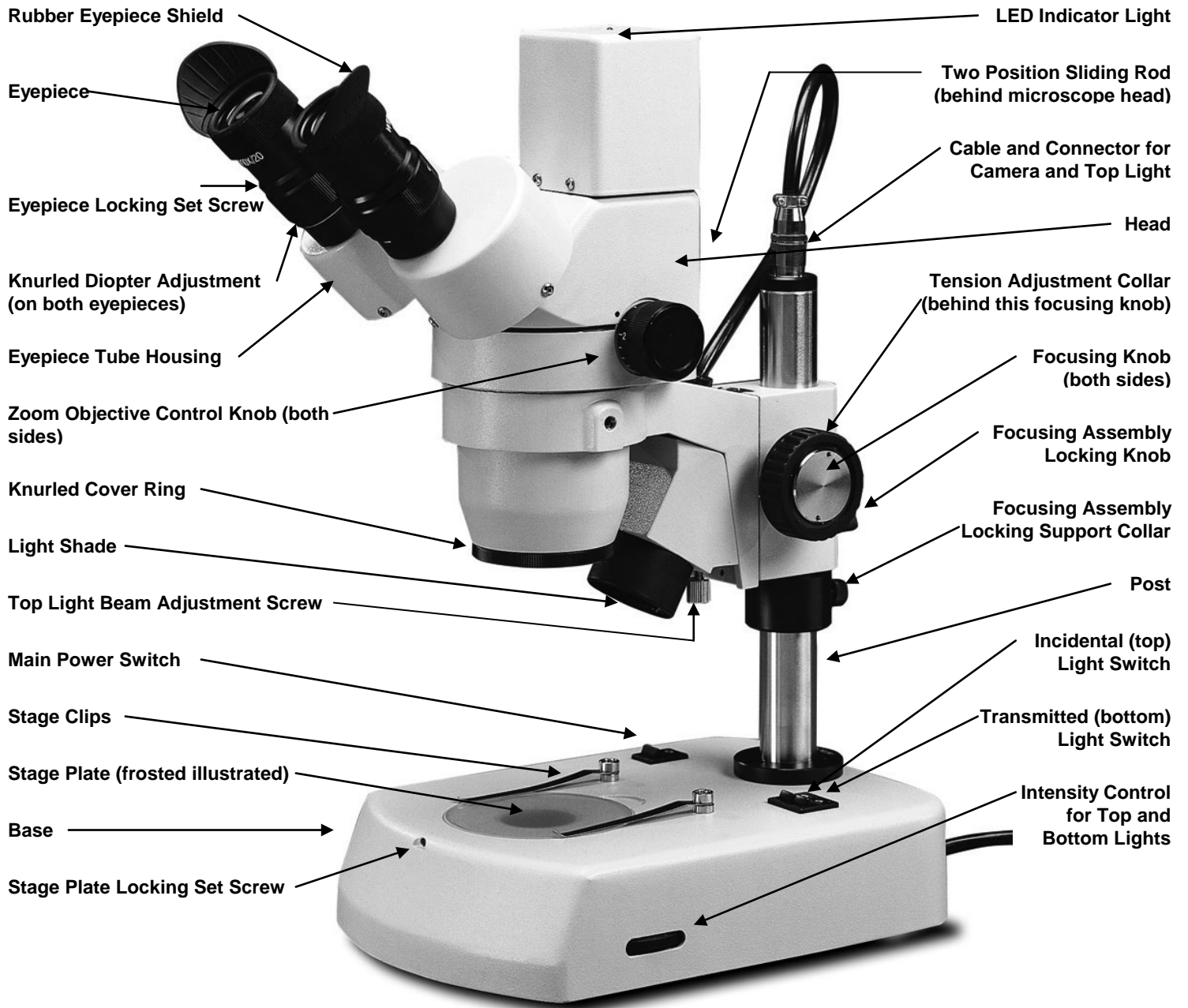
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*Drawings done monthly, winners will be posted on our website.

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ABOUT THE DIGITAL MICROSCOPE

Your new digital stereomicroscope incorporates a built in camera that utilizes ultra high-speed data transmission made possible through a simple plug and play USB 2.0 cable. Your stereoscopic microscope can be used independent of the camera so that you can view 3-dimensional objects, inspect or assemble small parts, and for dissection of biological specimen. They provide an upright, un-reversed image that permits easy manipulation of the object being viewed while looking through the microscope. They are designed for viewing solid objects at low magnification, but they will also permit viewing of some transparent specimen slides.

UNPACKING

Your microscope is packed with the following components, all of which have been checked at the factory. Carefully remove all components and check against this list. Make certain not to touch any of the lens surfaces while handling the microscope. Dust, dirt or fingerprints can damage the delicate lens surfaces or adversely affect image quality.

1. Microscope, with one pair of eyepieces
2. Instruction manuals for microscope and separate instructions for camera.
3. CD Motic Images software.
4. Calibration slide
5. 12VDC switching power supply, operates on 100v-240v, 50H/60H
6. AC power cord
7. USB 2.0 cable (for connecting microscope to computer)
8. Rubber eyecups (pair)
9. Two 80mm O.D. stage plates: plastic black/white & frosted glass (one installed)
10. Frosted 35.6mm blue filter
11. "L" hex wrench (for changing stage plate)
12. Dustcover
13. Warranty card

Examine packing material before you discard it. Retain **the Styrofoam container in case you need to transport, store, or return the microscope for service**. If it becomes necessary to ship the microscope for any reason, pack it in the Styrofoam container, and then pack the Styrofoam in another corrugated shipping container for optimum protection. Use of the Styrofoam alone will not provide adequate protection in transit, and will void your warranty.

DESCRIPTION OF COMPONENTS

1. EYEPIECE: Group of lenses closest to the eye, they magnify image formed by the objectives.
2. RUBBER EYEPIECE SHIELDS: These help block out undesired light reflections, and to position your eyes at the proper point above the eyepieces.
3. DIOPTER: Knurled diopter adjustment permits user to adjust for differences in eyesight between left and right eyes and to parfocal zoom objective lens.
4. EYEPIECE TUBE HOUSING: Permits each user to adjust spacing between eyepieces in order to accommodate distance between their eyes. Adjusts interpupillary distance from 55mm to 75mm.
5. ZOOM OBJECTIVE CONTROL KNOBS: Knobs located on left and right side of microscope, with scales printed on knobs, indicate the objective magnification in use.
6. KNURLED OBJECTIVE COVER RING: Ring can be removed so that either a ring light adaptor can be installed, or auxiliary objective lenses.
7. LIGHT SHADE: Helps block out undesired light from incidental illuminator.
8. TOP LIGHT BEAM ADJUSTMENT SCREW: Knurled adjustment screw moves the center of incidental light to desired location on specimen.
9. MAIN POWER SWITCH: Main power switch supplies power to incidental and transmitted control switches.
10. STAGE CLIPS: Two locked-on clips hold specimen slide in place on stage plate.
11. STAGE PLATES: Frosted stage plate illustrated is generally used for viewing transparent specimen. Frosted stage plate can be replaced by the black and white stage plate for viewing opaque specimen
12. STAGE PLATE LOCKING SET SCREW: Locks 80mm stage plate into recess of microscope base
13. LED INDICATOR LIGHT: Indicates if camera is ON. Your computer supplies power for the digital camera and this LED lamp will be illuminated when 2.0 USB cord from computer is connected to your digital microscope and turned on by software.

14. HEAD: Viewing head with 45 degree inclined eyepieces.
15. SLIDING ROD: Rod controls optical path of right OPTICAL GROUP OF LENSES. When control rod is pushed in, the image of specimen is directed into left and right eyepieces of the microscope. When control rod is pulled out the image of specimen is directed to camera and to left eyepiece, no image will be visible through right eyepiece.
16. CABLE: Connects camera and top light to electrical circuits located in the base.
17. FOCUSING KNOBS: Coarse focusing knobs located on each side of arm moves head up or down to bring specimen into focus.
18. TENSION ADJUSTMENT COLLAR: Used to adjust tension of focusing mechanism.
19. POST LOCKING KNOB: Locks focusing assembly to vertical post.
20. SUPPORT COLLAR: Provides additional support for focusing and stereo head. It prevents the stereo head from accidentally dropping down on its vertical post and perhaps causing damage to the stereo head and or the specimen.
21. POST: 25mm O.D. diameter post provides additional height for focusing on large (taller) specimens.
22. SELECTOR SWITCHES: Individual switches allow user to select between incidental (top lighting) or transmitted (bottom lighting) or both.
23. INTENSITY CONTROL: Rotating this control, varies light level of incidental and transmitted illuminators.
24. USB 2.0 Jack: USB 2.0 cable is plugged in here, connecting digital microscope to computer.
25. POWER JACK: Input power jack provides power for incidental and transmitted illuminators.

ASSEMBLY

The microscope is packed fully assembled, except minor parts.

1. Install the rubber eyepiece shields over top edge of eyepieces with flared portion of the eye shields positioned at the outside edges of eyepieces. (See diagram on page 2)
2. Attach female cable connector to male connector located on top of post.
 - A. Align the key-way slot located on the 7-pin female cable connector to the key located in the male connector on the post.
 - B. Lock connector into position by pressing down on connector until it snaps into a locked position.
3. Installing blue filter.
 - A. Remove the stage plate by loosening locking set screw located on front of base with supplied "L" wrench. Insert daylight blue filter into machined groove provided in center of base.
 - B. The microscope is furnished with two stage plates. The frosted glass plate is used when viewing transparent specimen slides or for viewing some specimen thin enough through which light can pass (insect wings, etc.) The plastic black/white contrast plate can be used when viewing opaque objects or for dissecting. Choose side of plate providing best contrast with specimen. Install stage plate and tighten locking setscrew.

OPERATION

Your microscope is fully functional as a standard microscope. The following instructions apply only to operation of the microscope. Refer to separate included instructions for installation and operation of software and operation of the camera. Some steps for microscope operation are altered slightly in the software documentation, in order to utilize some of the unique features provided by the digital camera and software.

1. ILLUMINATION
 - A. Before operating microscope, adjust intensity control located on side of base to the minimum position. This should be done prior to each time light is turned on or off, in order to extend bulb life.
 - B. Supplied is a 12VDC switching power converter and separate power cord. Note that the switching power converter will operate on 120v or 240v current, 50 hertz or 60 hertz.

Plug one end of power cord into 12VDC power converter and other end into power outlet. Plug 12VDC power converter into power jack on base of microscope.

- C. There are three rocker type light controls located on top surface of microscope base.

MAIN = Turns power on and off
"I" = Turns incidental light on (top illumination)
"T" = Turns transmitted light on (substage illumination)

NOTE: USE TRANSMITTED ILLUMINATION ONLY WITH FROSTED GLASS STAGE PLATE AND BLUE FILTER IN PLACE. HEAT GENERATED IN BASE FROM BOTTOM LIGHT WILL WARP OR DAMAGE THE PLASTIC BLACK/WHITE PLATE. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.

Incidental illumination can be used with either frosted glass plate or black/white plastic stage plate. The illuminators have an intensity control located on side of base. Adjust intensity control to provide proper illumination of specimen. The top light can also be centered on specimen by using the top light beam adjustment screw. This allows user to select the best spot illumination required for specimen being viewed.

Transmitted and incidental illumination combined can provide extra illumination for certain objects where additional top illumination will enhance the object being viewed.

2. INTERPUPILLARY ADJUSTMENT

This permits each user to adjust spacing between eyepieces in order to accommodate distance between their eyes. First make certain that the Camera Control ROD is pushed completely into the head so that field of view in both eyepieces are illuminated. While looking through the microscope eyepieces with both eyes, grasp eyepiece tube housings with both hands and rotate them on their axis, moving eyepieces apart or together until a full field of view is observed and images blend into one. Interpupillary distance is now corrected for your own inter-ocular distance and does not require further adjustment later unless another user changes this adjustment.

3. FOCUSING

- A. Rotate zoom adjustment zoom knobs (located on both sides of head) so that the lowest magnification number "1" is positioned at the black index dot located on side of head. Lower magnifications have larger fields of view, making it easier to position and locate area to be viewed.
- B. Place a flat object or specimen slide (cover glass up), on stage plate.
- C. Position focusing knobs in the center of focusing range.
- D. Viewing head is mounted on a post. The height of viewing head can be adjusted up or down on the post in order to focus on different sized objects. Loosen the locking knob located on the locking support collar, allowing the support collar to slide down to bottom of post. While firmly holding viewing head with one hand, loosen locking knob located on back of focusing assembly so that head can move freely up or down on post.
- E. While looking through microscope, move viewing head up or down on post until object can be seen in approximate focus. Tighten focusing assembly locking knob. Position the support collar under the focusing block and tighten locking knob on support collar. It is not necessary to make this adjustment every time you change objects to be viewed, so long as the different objects are of similar thickness or height.
- F. Both eyepiece tubes have knurled diopter adjustment rings used to adjust for difference in eyesight and parfocal zoom lens. Rotate both left and right diopter in a clockwise direction to lowest position.
- G. Rotate zoom adjustment zoom knobs to the highest magnification by aligning the number "4" on knob to the black index dot on head.
- H. While looking through right eyepiece with one eye, rotate focusing control knob until specimen comes into sharp focus through right eyepiece.
- I. Rotate zoom adjustment zoom knobs to the lowest magnification by aligning the number "1" on knob to the black index dot on head.
- J. Adjust the right side eyepiece diopter until the image is sharp. Do not change the focusing knob position.
- K. Without changing the position of the focusing knob, adjust the left eyepiece diopter until you obtain a sharp image in left eyepiece. The image should now be sharp throughout the zoom magnification range.

MICROSCOPE MAGNIFICATION CHART

Eyepieces	Zoom Objective Position	Standard Objective 1X (Supplied)		Auxiliary Objective 0.75X (Optional)		Auxiliary Objective 1.5X (Optional)	
		Working Distance 79mm		Working Distance 90mm		Working Distance 34mm	
		Maximum Specimen Height 93mm		Maximum Specimen Height 66mm		Maximum Specimen Height 120mm	
		Total Magnification	Field Size	Total Magnification	Field Size	Total Magnification	Field Size
WF5X Field No.22 (Optional) (No Reticle Holder) Interpupillary Distance 59~83	1X	5X	22mm	3.75X	29.3mm	7.5X	14.7mm
	2X	10X	11mm	7.5X	14.6mm	15X	7.3mm
	3X	15X	7.3mm	11.25X	9.8mm	22.5X	4.9mm
	4x	20X	5.5mm	15X	7.3mm	30X	3.7mm
WF10X Field No. 20 (Supplied) Accepts Reticle 22.8mm O.D. Interpupillary Distance 54~78	1X	10X	20mm	7.5X	26.7mm	15X	13.3mm
	2X	20X	10mm	15X	13.3mm	30X	6.7mm
	3X	30X	6.7mm	22.5X	8.9mm	45X	4.4mm
	4x	40X	5mm	30X	6.7mm	60X	3.3mm
WF15X Field No. 13 (optional) (No Reticle Holder) Interpupillary Distance 50.5~74.5	1X	15X	13mm	11.25X	17.3mm	22.5X	8.7mm
	2X	30X	6.5mm	22.5X	8.7mm	45X	4.3mm
	3X	45X	4.3mm	33.75X	5.8mm	67.5X	2.9mm
	4x	60X	3.25mm	45X	4.3mm	90X	2.2mm
WF20X Field No. 10 (optional) (No Reticle Holder) Interpupillary Distance 52~76	1X	20X	10mm	15X	13.3mm	30X	6.7mm
	2X	40X	5mm	30X	6.7mm	60X	3.3mm
	3X	60X	3.3mm	45X	4.4mm	90X	2.2mm
	4x	80X	2.5mm	60X	3.3mm	120X	1.7mm

MAINTENANCE

WARNING: For your own safety, turn switch off and remove plug from power source before maintaining your microscope. If the power cord is worn, cut or damaged in any way, have it replaced immediately to avoid shock or fire hazard.

1. OPTICAL MAINTENANCE

- A. Do not attempt to disassemble any lens components. Consult a microscope service technician when any repairs not covered by instructions are needed.
- B. Prior to cleaning any lens surface, brush dust or lint off lens surface using a camel hairbrush. You can also use an ear syringe or canned compressed air, such as that sold by most computer stores.
- C. To clean eyepiece lenses, do not remove from eyepiece tube. Clean only the outer lens surface. Breath on lens to dampen surface, then wipe with lens paper or tissue or use a cotton swab moistened with distilled water. Wipe lenses with a circular motion, applying as little pressure as possible. Avoid wiping dry lens surface as lenses are scratched easily. If excessive dirt or grease gets on lens surfaces, a small amount of Windex can be used on a cotton swab or lens tissue. Follow the same procedure to clean objective lens covers.

2. MECHANICAL MAINTENANCE

The only mechanical adjustment the microscope might require is the tension of the focusing mechanism. This has been adjusted at the factory, but over the course of time it may loosen and cause the head of the microscope to slip downward on the focusing block.

The tension adjustment collar is located between arm and focus knob on left side of microscope. With a jeweler's type screwdriver, loosen slotted setscrew located on knurled surface of the tension adjustment collar. Turn collar clockwise to tighten tension, counter-clockwise to loosen tension. After adjusting, tighten the setscrew to lock collar in place.

NOTE: It is recommended that you leave the tension as loose as possible for ease of focusing, yet not so loose that it permits the head of microscope to drift downward from its own weight and cause the microscope to "drift" out of focus.

3. ELECTRICAL MAINTENANCE

The extent of electrical maintenance, by other than a qualified technician, should be bulb replacement. **BE CERTAIN TO TURN SWITCHES OFF AND REMOVE PLUG FROM POWER SOURCE OUTLET BEFORE CHANGING BULBS.**

- A. To replace top bulb (factory #800-422 12v 15 watt halogen), remove light shade by rotating in a counter-clockwise direction. Remove light housing by rotating in a counter-clockwise direction. Remove light bulb by firmly grasping and pulling straight out from bi-pin socket. Note that this socket holds bulb securely, so you might have to pull rather firmly. Using a cloth, hold new bulb and gently push new bulb into bi-pin socket. Replace light housing and light shade.
- B. To replace bottom bulb (factory #800-170).... remove cover plate located on bottom of base by removing four rubber feet that secure cover to base. Holding lamp with a cloth, gently pull lamp straight out from socket. Push new lamp into place in same manner and replace cover plate.

NOTE: Make certain that new bulb is clean, as fingerprints on bulb can affect light transmission. Grasp bulb gently with a tissue or cloth to prevent touching bulb surface.

TROUBLESHOOTING:

PROBLEM	REASON FOR PROBLEM	SOLUTION
A light fails to operate.	Outlet inoperative.	Have qualified service technician repair outlet.
	Main power switch not turned ON	Push main power switch to ON position
	AC power cord not connected.	Plug into outlet.
	DC power input not connected.	Plug into adapter and microscope.
Incidental (top light) fails to operate	Incidental switch in OFF position	Push incidental switch to ON
	Lamp burned out.	Replace lamp.
Transmitted (bottom light) fails to operate	Transmitted switch in OFF position	Push transmitted switch to ON position
	Lamp burned out.	Replace lamp.
Image only visible in left eyepiece	Camera control rod improperly positioned.	Push camera control rod completely into head.
Image does not remain in focus	Head of microscope drops from its own weight.	Adjust tension control collar
Poor resolution (Image not sharp)	Lens cover dirty	Clean glass surface of lens cover
Spots in field of view.	Eyepiece lens dirty.	Clean eyepiece lenses. ***

***Spots in field of view can also result from dirt on inside of eyepiece. It is recommended that you have service technician clean inside of lens.

OPTIONAL ACCESSORIES AND PARTS:

- #605-400 WF5X Eyepieces (Does not affect image magnification on computer monitor)
 - #615-400 WF15X Eyepieces (Does not affect image magnification on computer monitor)
 - #620-400 WF20X Eyepieces (Does not affect image magnification on computer monitor)
 - #800-170 Replacement bulb, bottom light, 12v 10-watt halogen bi-pin
 - #800-422 Replacement bulb, top light, 12v 15-watt halogen bi-pin
 - #965-400-05 Eyepiece reticle, 5mm/100 divisions, O.D. 22.8mm (for use only with WF10x eyepieces)
 - #965-400-10 Eyepiece reticle, 10mm/100 divisions, O.D. 22.8mm (for use only with WF10x eyepieces)
- Note: Any reticle installed in eyepiece will be visible only when viewing through microscope, and will not be visible on computer or video monitor.

LIMITED LIFETIME WARRANTY

Please see our website, www.nationaloptical.com, for complete warranty details and exclusions.



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