

OPERATOR

[Please Read This Manual Before Using the Microscope]



SM-3 Series

Stereo Microscope

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AmScope

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BEFORE USE.....	4
<i>Introduction</i>	<i>4</i>
<i>Precautions</i>	<i>4</i>
1. MICROSCOPE PARTS.....	5
2. OPERATION.....	6
2-1 Unpacking.....	6
2-2 Assembly.....	6
2.3 Setting up the Specimen	11
2.4 Focusing.....	12
2.5 Attaching a Camera.....	16
2.6 Adjusting Focus Tension.....	17
2.7 Maintenance.....	18
3. SPECIFICATIONS	19
3.1 General Model Specifications	19
4. PARAMETERS.....	20
4.1 Electrical System	20
4.2 Eyetube Parameters.....	20
4.3 Objective Lens Parameters	20
5. RECOMMENDED ACCESSORIES.....	21
5.1 Eyepieces.....	21
5.2 Barlow Lenses	21
5.3 Cameras and Accessories.....	22
5.4 Stands.....	23
5.5 Ring Lights and Illuminators.....	24
5.6 Darkfield Condensers	24
6. TROUBLESHOOTING	25
6.1 Optical Issues	25
6.2 Mechanical Issues.....	26
6.3 Electrical Issues.....	26
7. GENERAL MICROSCOPY GUIDE.....	27

Before Use

Introduction

Congratulations on the purchase of your new AmScope Microscope! This manual is designed for the SM-3 series microscopes (SM-3B, SM-3T, and all their variants).

The two base models of this series differ in that the -B models are binocular (two eyepiece ocular tubes), while the -T models are trinocular (two eyepiece ocular tubes with a third port on top for a microscope camera).

Please take a few minutes to familiarize yourself with the features and functions of your new microscope. If you want more information on microscope, parts, and accessories, please visit our website at:

www.AmScope.com



We recommend that you study this manual thoroughly before operating the microscope and that you keep it on hand for future reference. If you have additional questions or need assistance, please send us an email at:

info@AmScope.com

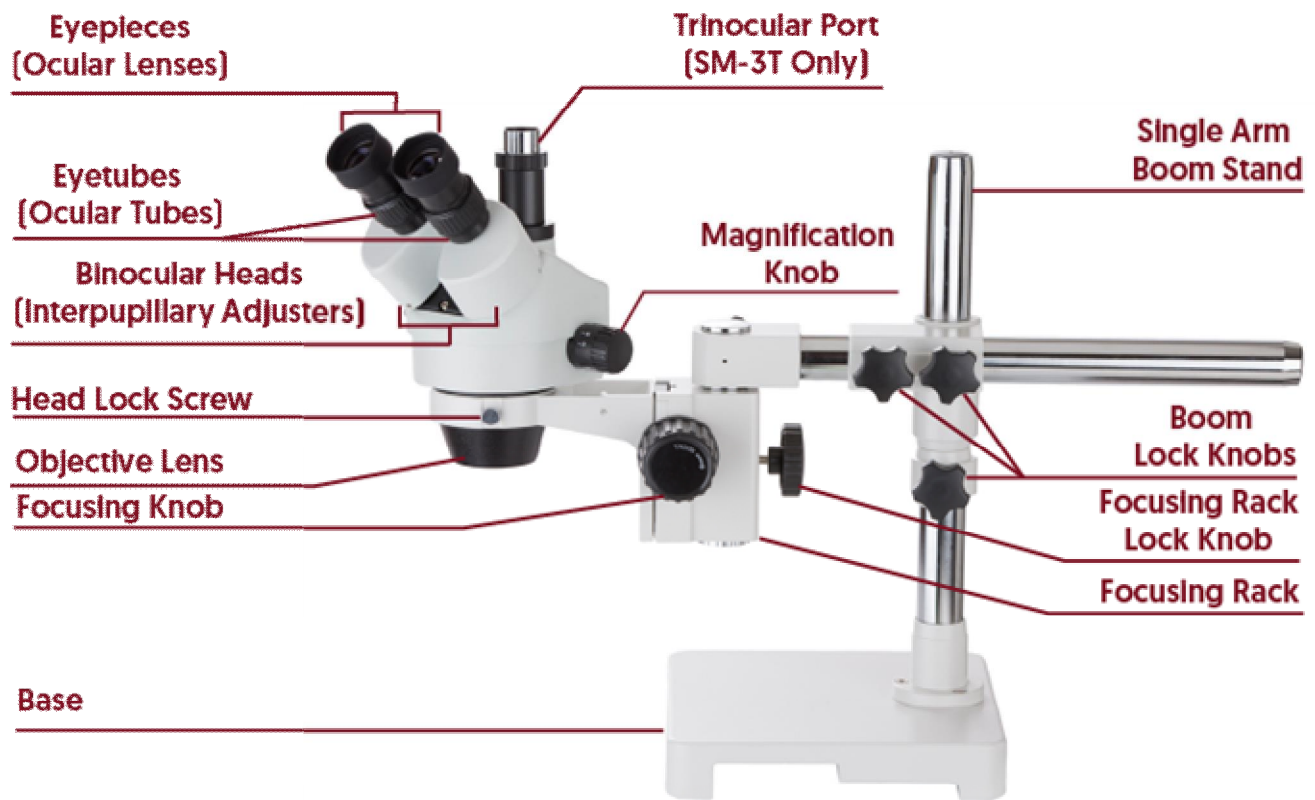
Please include the microscope model number in your email so that we can identify your model and provide immediate help.

Precautions

1. As the microscope is a precision instrument, always handle it with care, avoiding impact or abrupt movement during transportation. Do not shake the package.
2. Do not place the microscope in direct sunlight or in high heat. Keep it indoors in a dry and clean place with temperatures between 32°-100° F (0°-40°C), maximum relative humidity: 85%
3. Avoid touching the lenses on the objective and the eyepiece so that oil and dirt from your fingerprints do not obstruct your view.
4. Before turning the power on, make sure that the power supply voltage is consistent with the voltage of your microscope.

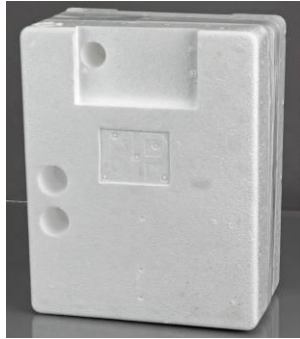
1. Microscope Parts

Stereo Microscope



2. Operation

2-1 Unpacking



1. Very carefully slide the Styrofoam container out of the cardboard carton.
2. Lay the Styrofoam container on its side. Make sure the side labeled up is up.
3. Remove the tape.
4. Carefully open the Styrofoam container, avoid dropping and damaging the optical items.
5. Check the packing list to ensure that all parts and accessories are intact.

Please note that the packing list can vary depending on which model you purchased. Packing lists are generally listed on www.amscope.com on the microscope's details section for your specific model.

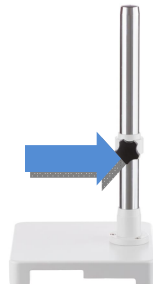
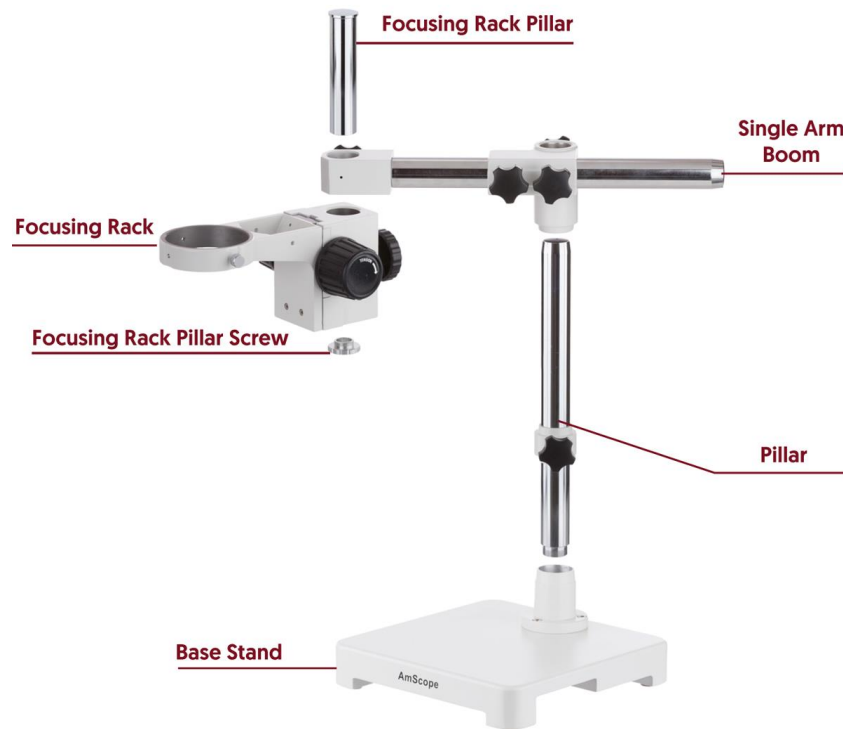
2-2 Assembly



Remove the microscope from the box and remove the plastic protective covering.

The body of the microscope is composed of the base included with your unit, the arm, the focusing rack, and the head lock screw.

2.2.1 Assembling the Single Arm Boom Stand



1. Screw the pillar into the stand. Screw it in as tightly as possible.
2. The knob on the pillar adjusts the vertical movement of the arm. Tighten the knob for now to secure the arm during installation.

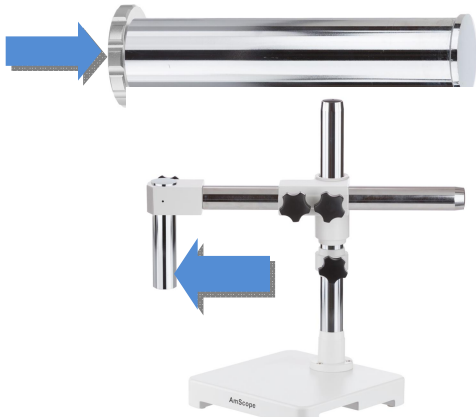


3. Slide the arm unto the pillar. The side with the knobs closest to the top should be facing up.

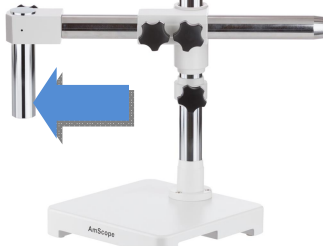


4. This knob adjusts the horizontal movement of the arm. Tighten the knob for now to secure the arm during installation.

2.2.2 Assembling the Focusing Rack



1. Unscrew and remove the ridged screw cap from the focusing rack pillar.



2. Place the focusing rack pillar into the hole on the opposite side of the arm from the knobs. The uncapped end goes downside.

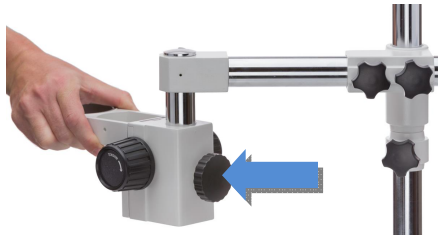


3. Slide the focusing rack up the focusing rack pillar to the top.

4. Screw the ridged cap back on the focusing rack pillar to secure. Make sure to tighten securely.



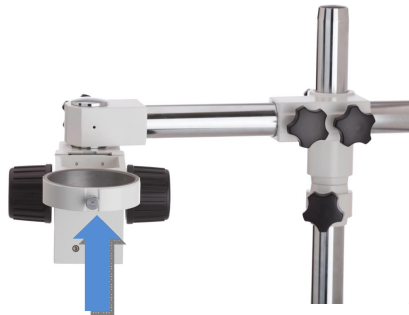
5. This knob adjusts the horizontal movement of the focusing rack. Tighten the knob for now to secure the focusing rack during installation.



6. This knob also adjusts the horizontal movement of the focusing rack. Tighten the knob on the back of the focusing rack to secure the focusing rack to the focusing rack pillar.



7. The two knobs on the arm adjust the horizontal movement of the focusing rack along the arm. Tighten the knobs for now to secure the focusing rack during installation.



8. Loosen the head lock screw on the side of the focusing rack. Please note that although there are 3 screw holes there is only one screw. The screw can go in any of the holes and will securely place.



9. Slide the objective of the microscope into the collar (O-ring) of the focusing rack and secure with the included head lock screw. Although there are three available holes, there is only one screw needed, you can decide which hole works best for your needs.

2.2.3 Inserting Eyepieces



1. Remove the eyetube caps.



2. Place the desired eyepieces into the empty eye/ocular tubes.



3. Be sure to avoid touching the lenses.

2.2.4 Removing the Objective Lens Housing Cap



Remove the cap from the objective lens housing. Be careful just to unscrew the cap at the bottom. Do not unscrew the objective lens housing.

2.2.6 Attaching a Ring Light (Optional Accessory)



Ring lights are a recommended accessory and are purchased separately.



1. Loosen the screws on the ring light. The ring light may be black or white depending on the model.



2. Screw the ring light adapter into the bottom of the objective lens housing.
3. Adjust the screws on the ring light.
4. Securely mount the ring light onto the adapter.
5. Turn it on and adjust the light.

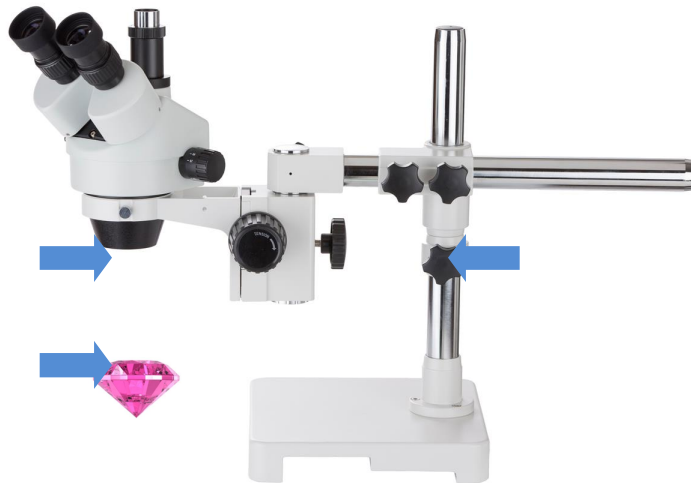
2.3 Setting up the Specimen

Place the specimen on a flat surface beneath the head of the microscope.

2.4 Focusing

AmScope's SM series microscopes have continuous zoom magnification power allowing you to change magnification through a range, instead of at fixed stops.

2.4.1 Adjusting the Focusing Rack, Coarsely.



Loosen the lock-screw located behind the pillar stand.

Move the entire focusing rack down as far as possible. Move the rack back up until the working distance is roughly 1+.

Working Distance is the term for the distance between the bottom of the objective lens and the top of the specimen.

Tighten the focusing rack lock knob to fix the final position.

2.4.2 Adjusting the Focusing Rack, Finely.



When first using the microscope, remove any Barlow lens.

Adjust the magnification knob to the lowest setting (0.7X)

Move the microscope's focusing knobs to adjust the height of the unit until at approximately 4 inches (101mm) away from the specimen. This should bring the microscope in focus at 7x.

2.4.3 Parfocal



Under the diopter on the eyetube, there is a silver ring. The diopter must be set to just above the ring, so the image will remain in focus for the entire magnification range. So, if you adjust the diopters properly, you will stay more in focus when you add a camera or switch objective lenses.

2.4.4 Focus Each Eye Individually

Focus each eye separately to accommodate individual vision, you should not need your glasses when using the microscope. Some models have diopters on both eyepieces. Some models have a diopter on only one eyepiece.

If you only have one diopter, focus the eyepiece with the diopter second. If you have diopters on both eyepieces, the order doesn't matter. Adjust the first eyepiece with the focusing knobs and the second with the diopter. Then you can adjust the diopter on the first eyepiece, if necessary.



1. Look with one eye through the eyepiece without the diopter. Or, if you have two diopters, select either eyepiece.
2. Close your other eye.
3. Focus the image using the focusing knobs.

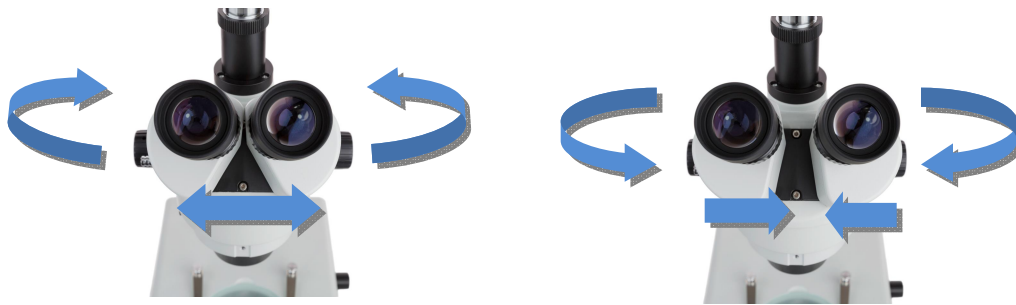
Focus with the diopter.



1. Close the first eye. Open the other one.
2. Look with the second eye through the eyepiece with the diopter.
3. Turn the diopter until the image is clear.

2.4.5 Focusing the distance between your eyes.

(The interpupillary distance, the distance between your eye pupils.)



With both eyes open, look into the eyepieces. Adjust the interpupillary distance by holding the eyetubes and rotating the tubes either towards or away from each other until only one circle of light is seen by both eyes.

2.4.6 Using a Barlow Lens.

The SM-3 series microscopes have a standard working distance of 4+ (101.6mm). Barlow lenses increase or decrease working distance and magnification to achieve the desired field of view. These lenses screw directly onto the objective lens housing.

The SM series microscopes have two standard Barlow Lens options, the 0.5X and the 2.0X.



The 0.5X Barlow Lens will cut magnification in half, down to a minimum of 2.0X. The 0.5X Barlow Lens can have a maximum working distance of 7 inches (177.8mm).



The 2.0X Barlow Lens doubles magnification and cuts the working distance down to 1.5 inches (38.1mm).

In practical terms, if you are looking at a coin, you might see the entire coin with a 0.5X Barlow Lens and a small section of the coin and great detail with the 2.0X Barlow Lens.



1. To install a Barlow Lens, first remove the adapter and light ring from the bottom of the objective lens housing, if you are using a ring light.



2. Screw a Barlow Lens into the bottom of the objective lens housing.



If you are using a ring light and the 0.5 Barlow Lens, screw the light ring adapter into the Barlow Lens and the ring light into the adapter. The decreased magnification requires a greater working distance, so you will need to raise the focusing rack

If you are using a ring light and the 2.0 Barlow Lens, the mounting adapter for the ring light is built into the lens, so the ring light adapter isn't needed. The increased magnification requires a shorter working distance, so you will need to lower the focusing rack.

2.5 Attaching a Camera

2.5.1 Binocular Head



1. Remove the eyepiece from the microscope head.
2. Place the 30mm adapter into the eyetube.
3. Place the camera into the adapter and eyetube.
4. Plug one end of the cord into the camera and the USB end into your computer.
5. Open up your AmScope Digital Camera Solution software on your computer and let it connect to your microscope.

2.5.2 Trinocular Head

The AmScope SM-3T models are uniquely designed so that you can view the image through the eyepieces and the trinocular port without removing the camera or using your eyepiece, turning the microscope into a digital microscope.

This feature allows the images through the microscope's eyepieces, and those displayed on your computer screen or television be viewed at the same time (you may have a different field of view between the camera and the eyepieces). Our photo port is a 23mm size.



Remove the photo port cap from the top of the trinocular port.



Pull the trinocular shutter control lever. This lever changes the view from the trinocular port to the left eyetube. Pull it out for trinocular viewing, push it in for binocular viewing.



1. Place the camera directly into the trinocular port.
2. Plug one end of the cord into the camera and the USB end into your computer.
3. To focus through the trinocular port, turn middle portion of the tube.
4. Open up your AmScope Digital Camera Solution software on your computer and let it connect to your microscope.

To focus through the trinocular port (simul-focal models only), simply turn middle portion of the tube, after focusing the eyepieces. If you have difficulty focusing them at the same time, adjust the diopter as described in section 2.4.4.

2.6 Adjusting Focus Tension



To adjust the tension of the focusing knobs, look for the focusing knob marked **Tension+**.

Find the matching focusing knob on the other side of the focusing rack. Use both hands, one on each knob. Always turn the focusing knobs in opposite directions. If you are turning one clockwise, turn the other one counterclockwise.



To tighten tension, turn the focusing knob marked tension clockwise and the other focusing knob counterclockwise.

To loosen tension, turn the focusing knob marked tension counterclockwise and the other focusing knob clockwise.

Be careful not to loosen the tension too much or the focusing rack will not stay in place. Make sure the tension is tight enough to support the head and any accessories you may add.

2.7 Maintenance

2.7.1 No Sun/Heat



Do not place the microscope in direct sunlight or in high heat.

Keep the microscope indoors in a dry and clean place with temperatures between 32°-100° F (0°-40°C), maximum relative humidity: 85%.

2.7.2 No Dust



Always keep the microscope covered by the dust cover when not in use. The glass will attract dust, obscuring your view. Make sure to keep it in a dry and clean place in order to prevent rust.

2.7.3 Keep Glass Clean



All glass surfaces must always be kept clean.

Oil and dirt from your fingerprints will obstruct your view.

Fine dust on the optical surface should be blown off using a hand blower or gently wiped off with a soft lens tissue.

2.7.4 Use an optical lens cleaner



Carefully wipe off oil or fingerprints on lens surfaces using a tissue moistened with a small amount of 3:7 alcohol to ether mixture.

2.7.5 Do not use lens cleaner on the non-glass parts of the microscope.



Do not use the optical lens cleaning solution to wipe the surfaces of the other components of the microscope.

All other parts, especially those made of plastic, should be cleaned with a mild detergent.

2.7.6 Do not touch the glass.



Avoid touching the lenses on the objective and the eyepiece.

2.7.7 Do not take apart the microscope.



Do not assemble or disassemble the microscope's electrical components yourself.

3. Specifications

3.1 General Model Specifications

PARTS	SPECIFICATIONS	SM-3BY	SM-3TY	SM-3BZ	SM-3TZ	SM-3BZZ	SM-3TZZ
Widefield Eyepiece	WF10X/20 (EP10X30)						
	WF20X/10 (EP20X30)						
Barlow Lenses	0.5x (SM05)						
	2.0x (SM20)						
45 Degree Viewing Head Interpupillary Adjustment	Binocular						
	Trinocular						
Trinocular Port	C-Mount Photoport (Optional)						
	23mm Photo Port						

4. Parameters

4.1 Electrical System

The florescent ring lights are wide range and operate at 110V/220V.
The LED ring lights are also wide range and operate at 110-240V, 50-60HZ, auto switching.

4.2 Eyetube Parameters

1. Diopter adjustment: ± 5 dp
2. Interpupillary adjustment: 55-75mm.

4.3 Objective Lens Parameters

1. 7X-45X continuous zoom magnification power.
2. Zoom Range: 6.5:1

5. Recommended Accessories

(Purchase separately. Please visit www.amscope.com and search with SKU #, for more information.)

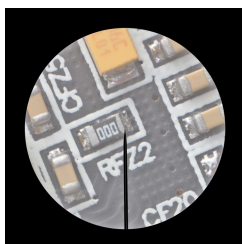
5.1 Eyepieces



20X Eyepieces
SKU: EP20X30



25X Eyepieces
SKU: EP25X30



10X w/ Pointer
SKU: EP10X30P



10X w/ Reticle
SKU: EP10X30R

5.2 Barlow Lenses



0.5X Barlow Lens
SKU: SM05



2.0X Barlow Lens
SKU: SM20

5.3 Cameras and Accessories

Cameras (USB2.0)

To capture images, video, or view live display on a computer (PC/Mac OS X). Real-Time Live Video Microscope Digital Camera, Reduction Lens, High Sensitivity Sensor and Deluxe Calibration Kit.



350K Pixel	1.3 Mega Pixel	3 Mega Pixel	5 Mega Pixel	8 Mega Pixel	9 Mega Pixel	10 Mega Pixel	14 Mega Pixel
SKU: MU035	SKU: MU130	SKU: MU300	SKU: MU500	SKU: MU800	SKU: MU900	SKU: MU1000	SKU: MU1400

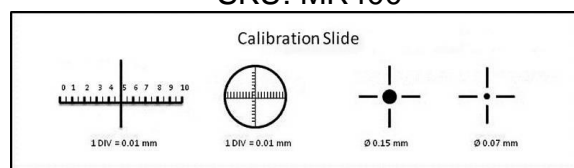
High Speed Cameras (USB3.0)

3 Mega Pixel	5 Mega Pixel	10 Mega Pixel	14 Mega Pixel
SKU: MU303	SKU: MU503	SKU: MU1003	SKU: MU1403

Calibration Micrometer

Calibrate the camera software for on-screen measurements.

SKU: MR400



Charge-Coupled Device Television



**CCD Digital
(VGA, Trinocular Only)**
SKU: CCD-MT



**CCD TV/Video
(Trinocular Only)**
SKU: CCD-NP



**1920x1080 Full HD HDMI
(Trinocular Only)**
SKU: HD1080

5.4 Stands



Single Arm
SKU: SAW



Double Arm
SKU: DAW



Ball Bearing
SKU: BBB



**Articulating Arm
w/ Clamp**
SKU: ASC



**Articulating Arm
w/ Stand**
SKU: ASB



**Articulating Stand
w/ Post Clamp**
SKU: APC



Super Large Flat Stand
SKU: TS100-FR



Dual LED Pillar Stand
SKU: TS130-LED



Dual LED Track Stand
SKU: TS130R-LED

5.5 Ring Lights and Illuminators



56 LED Ring Light
SKU: LED-56S



144 LED Ring Light
SKU: LED-144A



144 LED Ring Light
SKU: LED-144S



Fiber Optic
Ring Illuminator
SKU: HL250-AR



Fiber Optic
Gooseneck Illuminator
SKU: HL250-AY



Fiber Optic
Illuminators
SKU: HL250-BOYS



20W LED Fiber Optic
Illuminator
SKU: LED-20WYR



30W LED Fiber Optic
Illuminator
SKU: LED-30WYR



50W LED Fiber Optic
Illuminator
SKU: LED-50WYR

5.6 Darkfield Condensers



Darkfield Condenser
SKU: DK-S
(Included with all . DK models)



Darkfield Condenser with Iris
SKU: DK-SI

6. Troubleshooting

6.1 Optical Issues

SYMPTOM	CAUSE	REMEDY
OPTICAL ISSUES		
Obstructions are observed in the field of view	Stains, dust, or dirt has accumulated on the specimen. Stains, dust, or dirt have accumulated on the lenses.	Clean the slide or use a new specimen if sample is destroyed. Clean the objective and eyepiece lenses.
Unclear Image	Stain or dust has accumulated on the lens in the inlet of the head. The microscope head is not in the right position to be focused.	Clean the lens with lens cleaner or a nonabrasive lint free cloth, as well as spray with compressed air. Adjust the height of the microscope with the focusing knob on the focusing rack until image appears in focus. Note: Higher magnification will require the head to move closer, while lower will require more distance between the sample and the lens.
One side of the field of view is dark or the image moves while focusing	The specimen is not fixed.	Secure the slide to the stage with clips or another manner so that the sample does not move.
The field of view is not bright enough	The light source is not present. The light source is too dim. Stains, dust, or dirt has accumulated on the condenser, objective, eyepieces, or base lens.	A light source must be used with this model micro-scope to view a sample (ring light, built in illuminator, or gooseneck illuminator). The light source used is not bright enough, or is set at too low an intensity setting. Adjust setting to a higher or change light sources. Thoroughly clean all lenses with lens cleaner or a lint free nonabrasive cloth.

6.2 Mechanical Issues

SYMPTOM	CAUSE	REMEDY
MECHANICAL ISSUES		
Focus knob does not turn	The tension knob is too tight.	Loosen it by adjusting the tension by grabbing both knobs on the focusing rack and twisting them in opposite directions.
Stage declines by itself	The tension knob is too loose.	Tighten it by adjusting the tension by grabbing both knobs on the focusing rack and twisting them in opposite directions.
The focusing knob won't raise/lower the head	The focusing rack has reached the maximum travel distance in either direction.	Move the focusing rack higher or lower on the pillar, if using a stand with a pillar.

6.3 Electrical Issues

SYMPTOM	CAUSE	REMEDY
ELECTRICAL ISSUES		
The bulb flickers.	The bulb is close to burning out.	Replace the bulb.
The microscope does not light up.	The microscope is unplugged.	Check the power cable's plug.
	The bulb is not inserted correctly.	Insert it correctly.
	The bulb burned out.	Replace the bulb.
The bulb burns out frequently.	The voltage is too high.	Use correct power supply.
	Used wrong bulb.	Replace w/correct bulb.

7. General Microscopy Guide

Microscopes come in a wide variety of types with many different features. Each AmScope model is designed for specific uses and specific users. This guide will help illustrate what some of the different product variations mean and why they are useful.

Compound and Stereo Microscopes

The best choice to use a compound or a stereo microscope depends on the specimen being studied.



Compound microscopes are best for smaller transparent specimens, like slides and biological subjects.

Compound microscopes show a two-dimensional image of the specimen (usually reversed and upside-down)

The common magnification range of our compound microscopes is between 40X-1000X, could be up to 2500X. You need a minimum of 400X to study cell structure.



Stereo microscopes are best for larger specimens you cannot see through.

Stereo microscopes show a 3D image. Three dimensional imaging is perfect for performing dissections, repairing circuit boards, studying fossils and gems or examining any specimen where you want to use your hands.

The magnification range of our stereo microscopes is between 2X to 225X.

Barlow Lens



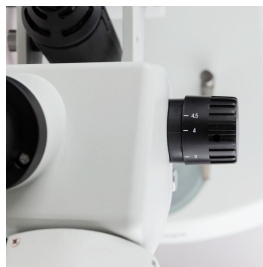
Barlow lenses screw onto the objective lens housing to either amplify or reduce the total magnification of the objective lens.



The SM microscope has two options available--the 0.5x and the 2.0x. The 0.5x will cut magnification in half down to a minimum of 3.5x (and double working distance to approximately 8 inches or 203mm), while the 2.0x will double your magnification (but half the working distance, down to 3/32 of an inch or 2.4mm).

Continuous Zoom/Fixed Power

AmScope's objective lenses have either fixed power or continuous zoom objectives.



Continuous zoom microscope head's have a dial to move through an entire range of zoom such as 0.7x-4.5x. To move through the magnification range you would adjust the dial accordingly.



Fixed power objective lenses are pre-set at certain levels. Magnification is changed by twisting the objective lens housing.

Fixed power objective lenses are more economically priced than continuous zoom microscopes and produce specific magnifications.

Darkfield Condenser Lens



The purpose of the condenser lens is to focus the light onto the specimen.

A darkfield condenser can offer bright images against a dark background of otherwise difficult to view specimens. The darkfield condenser is popular for gem studies.

Darkfield condenser lenses do not come standard with SM models unless they have %DK+ in the SKU number.

Dimmers



Controls the amount of light that escapes from the illumination source. You can control the top and bottom lights separately. The knobs are on the base.

Diopter



A small ring on one of the eyetubes, used to focus that ocular lens (eyepiece).

When you are focusing a microscope, you focus one eye at a time. With one eye shut, you focus the objective lens first, using the focusing knobs. Then you focus the other eyepiece using the diopter ring.

Eye Guards



Eye Guards fit over the eyepieces, they are for comfort only.

Eyepieces



Eyepieces are also called ocular lenses. Eyepieces come in many magnifications and you replace them by swapping them out of the eyetubes.

The eyepieces magnify the specimen further from the first magnification through the objective lens. Each eyepiece is marked with 2 numbers. The first number is the magnification and the second is the field of view.

For example, an eyepiece marked WF10/20 has a magnification of 10X and a field of view of 20mm.

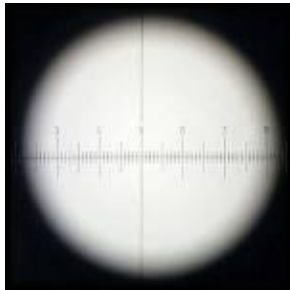
Eyetubes



Eyetubes are also called ocular tubes. Eyetubes house the eyepieces and camera adapters.

You change eyepieces by removing them from the eyetubes.

Field of View and Working Distance



Field of view is how much of the specimen you can see through the eyepiece. The linear field of view of the eyepiece is divided by the magnification of the objective. The higher the magnification, the smaller the field of view.



Working distance is the distance between the bottom of the objective lens and the stage. You change the working distance when you use the focusing knob.

Together, working distance and field of view determine how much of the specimen you see and how closely.

Focusing Knobs



The focusing knobs focus the objective lens by changing the distance between the objective lens and the stage.

When you are focusing a microscope, you focus one eye at a time. With one eye shut, you focus the objective lens first, using the focusing knobs.

Gooseneck Illuminator



Illuminator independent of the unit that allows movement of one or two necks for controlled lighting.

Head Lock Screw



The lock screw allows you to adjust the focusing rack. Loosening the screw allows you to move the microscope head up and down. Tightening the screw locks it into place.

Please note that although there are three holes, there is only one screw.

Head Types

Monocular



Monocular microscope heads have one eyepiece.

Binocular



Binocular microscope heads have two eyepieces.

Trinocular



Trinocular microscope heads have two eyepieces and a photo port for a camera. This allows you to look at a specimen with a camera without removing an eyepiece.

Multi-head



Multi head microscopes are specially designed for three-person observation. Ideal for teaching and/or training purposes. It has a binocular head and two monocular heads.

Simul-Focal



Simul-Focal heads mitigate the amount of re-focusing needed when you change your view from the eyepieces to the monitor.

Perfect for lectures, teaching demonstrations, clinical examinations and laboratory applications.

Lenses

Microscopes have a two lens system, objective and ocular.



Objective Lens

The Objective Lens is the lens closest to the specimen or object.



Ocular Lens (Eyepiece)

The Ocular Lenses (Eyepieces) are the lenses closest to the eye.

Light Bulbs-Caution

1. Turn off the microscope when not in use to preserve the life of the bulb.
2. Never touch a light bulb directly, especially when it's turned on.
 - a. The light bulbs can get hot enough to burn skin. Wait until the bulb has cooled completely before handling it.
 - b. The oil from your skin will create a hot spot on the bulb which will damage the glass, dramatically shortening the life of the bulb.
 - c. When changing light bulbs cover skin with cloth or paper to handle the bulb. This will protect both you and the bulb.
3. Hot bulbs will not damage the microscope. AmScope's microscopes are designed specifically to handle the heat output of the model's bulb.

Lighting-Types



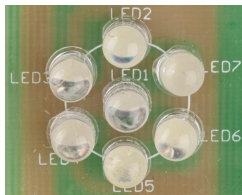
Tungsten

Tungsten light bulbs are the most economical, providing a reliable source of light. They burn hotter than the other bulbs, but are the best option for certain microscopes.



Fluorescent

Fluorescent bulbs burn cooler and brighter than tungsten bulbs. The bulbs are more expensive than tungsten, but last longer.



LED

LED light bulbs burn the coolest of all the bulbs and last the longest. The bulbs are also the most expensive. Depending on use, LED lights should last about 40,000 hours.



Halogen

Halogen light bulbs produce the most amount of light. The light is very white and concentrated; the bulbs can get very hot and must be cooled regularly. Depending on use, halogen light bulbs can last anywhere from 1 week to 6 months.



Fiber Optic

Fiber optical lighting uses a system of flexible transparent fibers made of plastic or glass. The light is transmitted between the two ends of the fiber, allowing for greater illumination in confined spaces.

Magnification

Microscopes have a two lens system. Total Magnification is the power of two lenses multiplied together. E.g.: (10x Eyepieces) x (4x Objective) = 40x Total Magnification

Parfocal

When changing objectives, the image of the specimen stays in focus without needing to adjust the coarse focusing knob. Not all compound microscopes are parfocal.

Stands



Arm/Track Stand



Pillar Stand



Boom Stand



Table Stand

A microscope stand is the physical connector between the microscope body and the base. The main types are arm/track, pillar, boom and table stands.

Trinocular Port



A trinocular microscope has three viewing ports. There are two eyepieces and a third 23mm port for photography and video.