

DM756 Series Digital Microscopes

Introduction

This manual applies to the DM756 line of digital microscopes and accessories. The information in this manual is provided to help you familiarize yourself with the assembly and use of the products. Please read thoroughly before using the products, and keep this manual with the product for reference.

This product line includes multiple variations with different specifications.

v1.0.202205

Safety

Before using your AmScope microscope, please read the following safety precautions carefully to avoid causing damage to your AmScope product, or injury to yourself or others.

Turn off power if the instrument exhibits unusual or dangerous behavior such as emitting smoke or unusual odors. These can be indications of electrical problems, in which case the instrument should be disconnected from any power source if safe to do so. Other indicators can be a loud buzzing sound or crackling. Contact AmScope to report such behavior.

Do not use around flammable liquids or gases. Electric instruments can ignite flammable substances which could result in an explosion or fire.

Do not use in a wet environment. Electrical components of the instrument can discharge when exposed to water, potentially resulting in damage to the instrument, or injury to yourself or others.

Only use the provided power adapter or authorized replacement. Incompatible power adapters can cause damage to the instrument. If you should lose the included power adapter, please contact AmScope for information about a replacement.

Do not dismantle. Dismantling can result in damage to the instrument, and potential exposure to dangerous materials or electric current.

Notices

AmScope reserves the right to change specifications of the hardware and software at any time without notice. Continuous efforts are made to improve performance and reliability, which can result in changes to design and compatibility. Please contact AmScope for any concerns regarding such changes.



Proposition 65 Notice for California Residents

Cables included with the products described in this manual can expose you to chemicals including lead, which is known by the state of California to cause cancer, birth defects or other reproductive harm. Visit www.P65Warnings.ca.gov for more information.

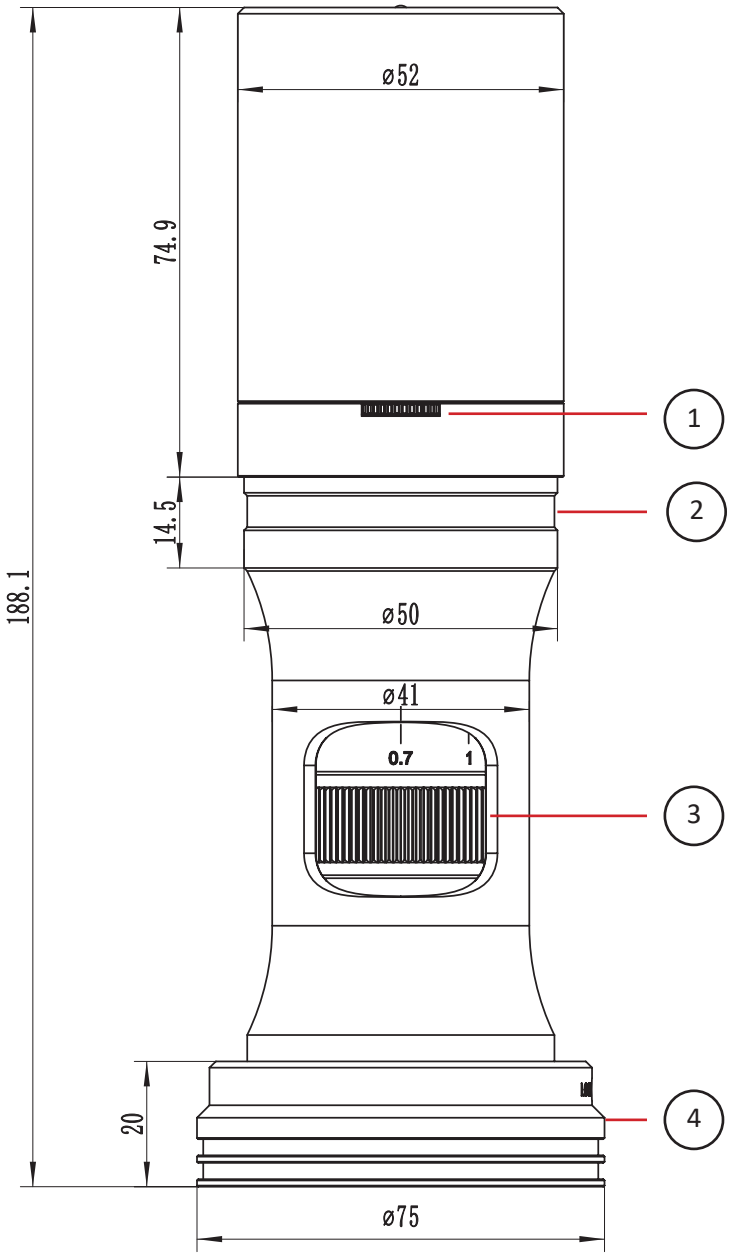
Trademark Information

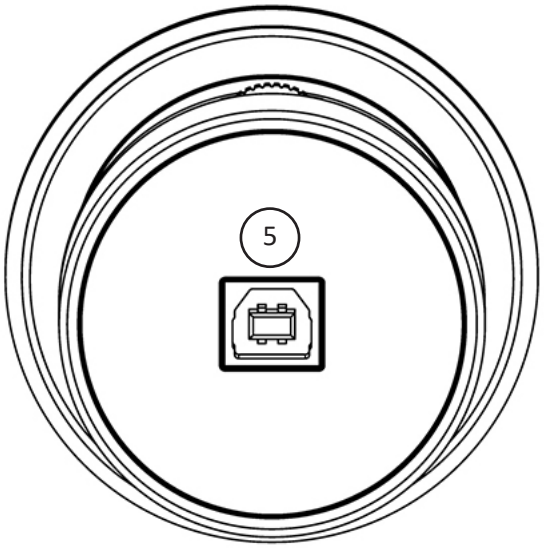
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DM756-U830

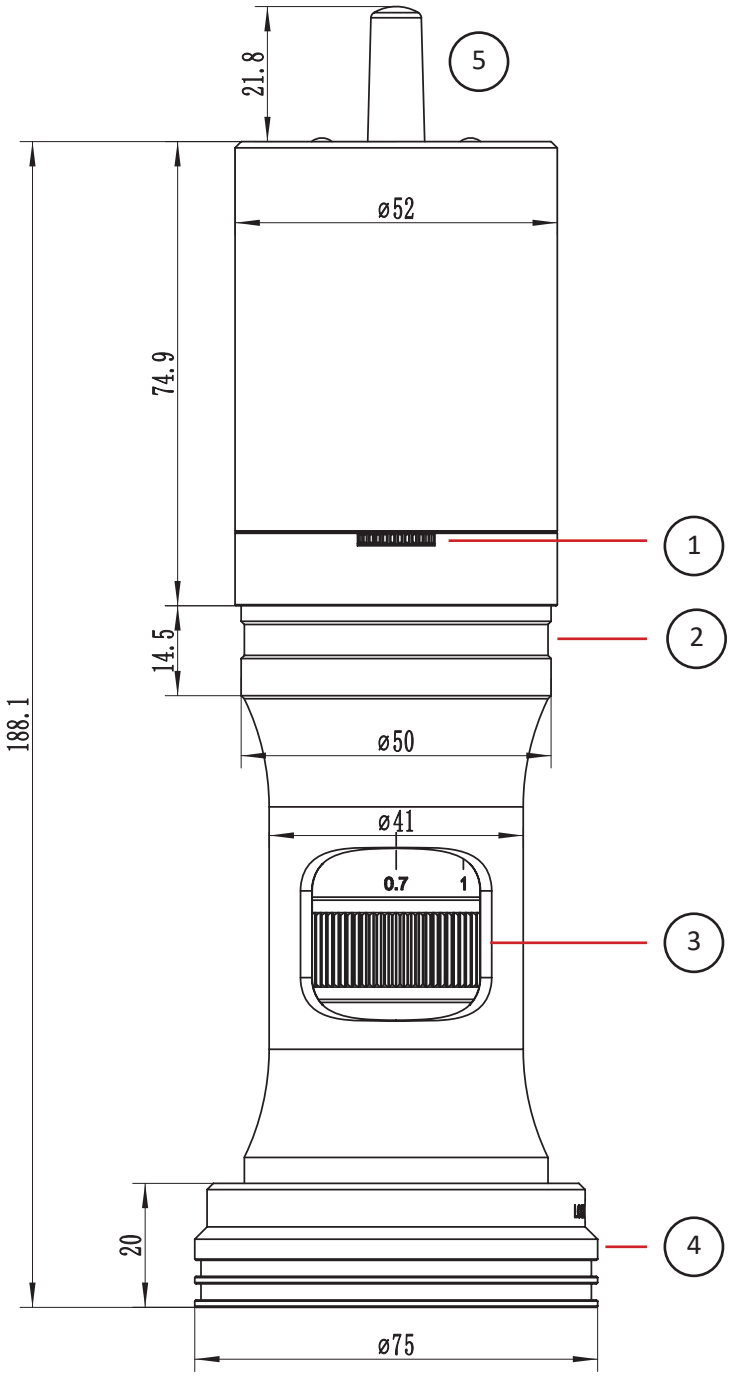


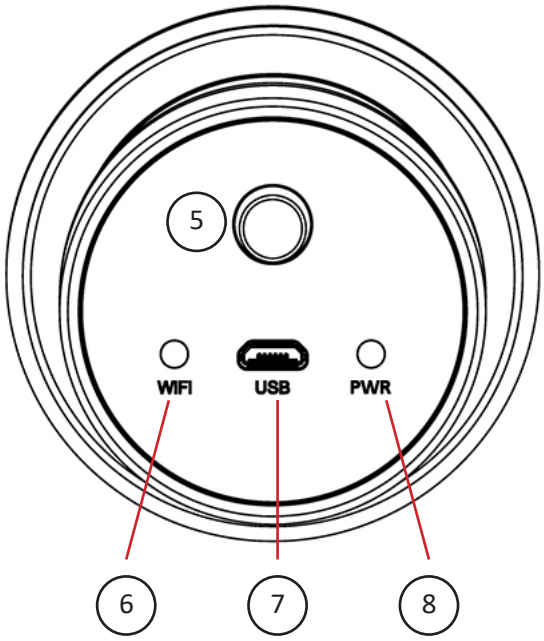


1. 3-way multi-function switch
2. 50mm mounting groove
3. zoom wheel
4. ring light
5. USB port

Model Specifications	
Model	DM756-U830
Zoom Magnification	0.7X-5.6X
Sensor	IMX415 (color)
Sensor Type	CMOS
Sensor Optical Format	1/2.8”
Integrated Reduction	0.5X
Active Pixels	8.3M (3840 x 2160)
Pixel Size	1.45µm x 1.45µm
Active Sensor Area	5.57mm x 3.13mm
Shutter	electronic rolling shutter
Sensitivity	300mV @ 1/30s, f/5.6
Exposure Time	0.01ms - 1000ms
Spectral Response	380-650nm with IR-cut filter
Capture Resolution and Maximum Framerate	30fps @ 3840x2160 30fps @ 1920x1080 30fps @ 1280x720 30fps @ 960x540
Connectivity	USB 2.0
Power	5VDC, 1A over USB, AC adapter included
Operating Conditions	-10°C to 50°C, 30%-80% relative humidity
Storage Conditions	-20°C to 60°C, 10%-60% relative humidity

DM756-W1080

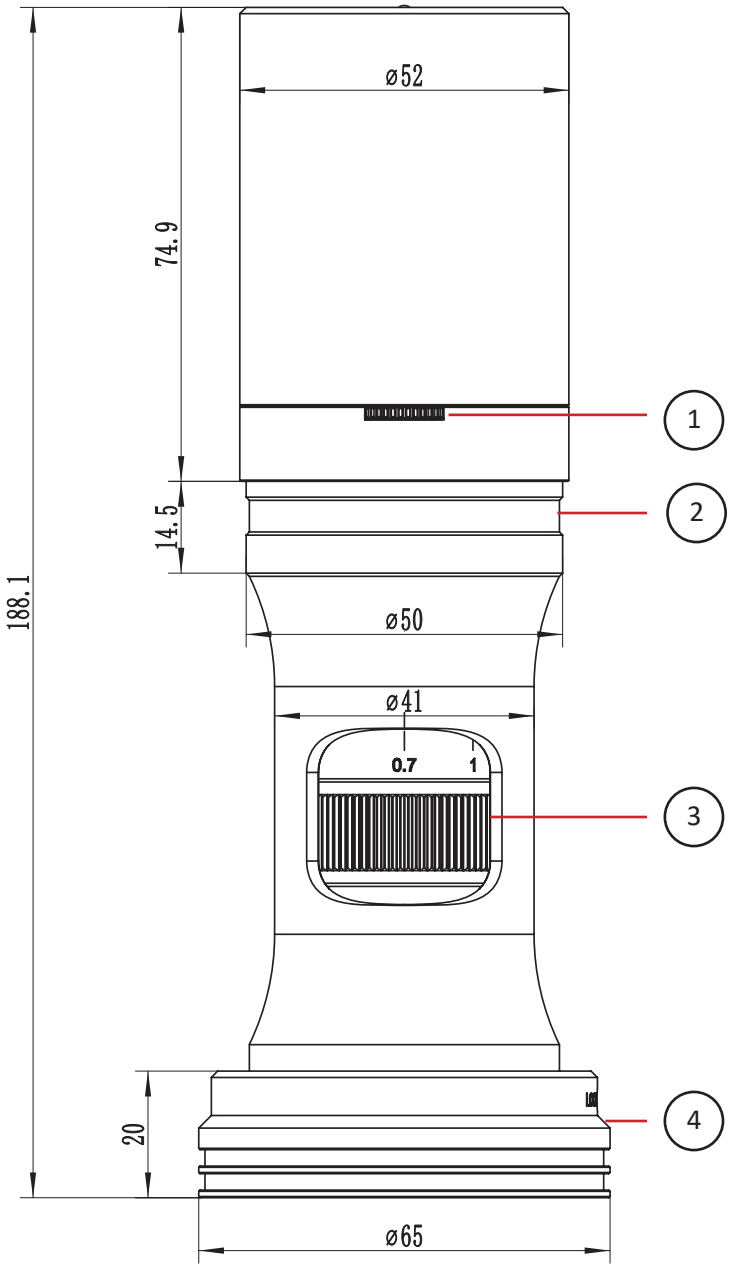


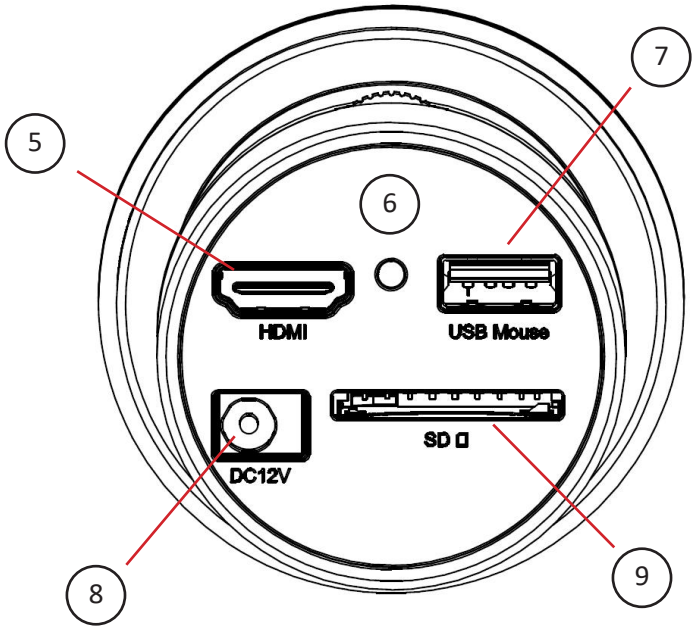


1. 3-way multi-function switch
2. 50mm mounting groove
3. zoom wheel
4. ring light
5. antenna
6. wi-fi activity LED
7. USB port
8. power LED

Model Specifications	
Model	DM756-W1080
Zoom Magnification	0.7X-5.6X
Sensor	IMX307 (color)
Sensor Type	CMOS
Sensor Optical Format	1/2.8”
Integrated Reduction	0.5X
Active Pixels	2M (1920 x 1080)
Pixel Size	2.9µm x 2.9µm
Active Sensor Area	5.57mm x 3.13mm
Shutter	electronic rolling shutter
Sensitivity	1300mV @ 1/30s, f/5.6
Exposure Time	0.01ms - 1000ms
Spectral Response	380-650nm with IR-cut filter
Capture Resolution and Maximum Framerate	50fps @ 1920x1080 (USB) 50fps @ 1920x1080 (wi-fi)
Connectivity	USB 2.0, wi-fi
Wi-Fi Standard	802.11b/g/n
Wi-Fi Mode	access point (AP)
Power	5VDC, 1A over USB, AC adapter included
Operating Conditions	-10°C to 50°C, 30%-80% relative humidity
Storage Conditions	-20°C to 60°C, 10%-60% relative humidity

DM756-H1080





1. 3-way multi-function switch
2. 50mm mounting groove
3. zoom wheel
4. ring light
5. HDMI port
6. power LED
7. USB mouse port
8. 12VDC power port
9. Secure Digital reader/recorder

Model Specifications	
Model	DM756-H1080
Zoom Magnification	0.7X-5.6X
Sensor	IMX307 (color)
Sensor Type	CMOS
Sensor Optical Format	1/2.8”
Integrated Reduction	0.5X
Active Pixels	2M (1920 x 1080)
Pixel Size	2.9µm x 2.9µm
Active Sensor Area	5.57mm x 3.13mm
Shutter	electronic rolling shutter
Sensitivity	1300mV @ 1/30s, f/5.6
Exposure Time	0.01ms - 1000ms
Spectral Response	380-650nm with IR-cut filter
Capture Resolution and Maximum Framerate	60fps @ 1920x1080 (HDMI) 50-60fps @ 1920x1080 (SD)
Connectivity	HDMI video out (v1.4 standard) USB input (mouse)
Media Reader/Writer	Secure Digital (SDIO 3.0 standard)
Video Format	H264, H265 encoded MP4
Power	12VDC, 1A
Operating Conditions	-10°C to 50°C, 30%-80% relative humidity
Storage Conditions	-20°C to 60°C, 10%-60% relative humidity

General Information

AL-DM756 Objective Lenses

A range of objective lenses are available for the DM756. A lens must be mounted on the microscope to function properly. Each lens will modify the microscopes overall magnification and the working distance. The table below shows the relevant specifications.

Model	Lens Magnification	Modified Zoom Range	Working Distance	Numerical Apertures
AL050-DM756	0.5X	0.35X-2.8X	160mm	0.009-0.046
AL075-DM756	0.75X	0.525X-4.2X	105mm	0.013-0.069
AL100-DM756 (included with microscope)	1X	0.7X-5.6X	80mm	0.018-0.092
AL150-DM756	1.5X	1.05X-8.4X	51.5mm	0.026-0.138
AL200-DM756	2X	1.4X-11.2X	37.5mm	0.035-0.182

System Magnification

The DM756 series microscopes use multiple stages of magnification. The initial stage is performed by the objective lens which can range from 0.5X to 2X magnification. The second stage is performed by the internal zoom optics which provide 0.7X-5.6X magnification. These stages compound to create the optical magnifications which are typically listed. A third stage is used to compensate for the format of the digital image sensor. This document refers to this stage as integrated reduction, since the purpose is to reduce the size of the image to optimize the field-of-view for the specific image sensor. While this reduction stage modifies the overall magnification prior to being imaged, it is typically not referenced in listed magnifications due to its variable nature, and its association with the image sensor.

Digital microscopes often present smaller fields-of-view when compared to optical microscopes with equivalent magnifications. This is due to the digital microscope's image sensor. The dimensions of the sensor determine the field-of-view much like the aperture of an eyepiece (usually printed on the eyepiece as its field number). Each model will list its sensor's dimensions which can be used to calculate the field-of-view.



Multi-Function Switch

Multi-Function Switch

The multi-function switch is located on the front of the microscope above the collar groove. The switch is spring-loaded, and can be toggled left and right, or pressed.

When a series-specific illuminator such as an LED ring light is attached, moving the switch to the left or right will decrease or increase the brightness in stepped graduations. The illuminator must be compatible with the microscope's magnetic mount for the switch to function.

- Move the switch to the left to decrease the illuminator's brightness.
- Move the switch to the right to increase the illuminator's brightness.

When the switch is pressed inward, it will actuate the camera to capture an image. For standalone HDMI models, the image will be captured using the internal software. When using the USB or wi-fi models, the action will trigger the associated software to capture an image.



Zoom Wheel

Zoom Wheel

The zoom wheel controls the magnification of the microscope by adjusting the internal zoom mechanism. The wheel can be rotated in a continuous movement until either terminus has been reached. By rotating the wheel to the right, the magnification will decrease until it reaches 0.7X. Rotating the wheel to the left will increase the magnification until it reaches 5.6X. The instrument's overall optical magnification depends on the attached objective lens. For this reason, the magnifications associated with the zoom wheel are considered multipliers rather than absolute. For example, when the zoom wheel is set to 2X, and the standard 1X objective lens is attached, the optical magnification will be 2X. However, when an optional 1.5X objective lens is attached, the optical magnification will be 3X.



Magnetic Accessory Coupling

The microscope uses magnetic coupling to attach compatible accessories such as ring lights. This allows accessories to be quickly attached and detached as needed. Compatible ring lights also draw power through the coupling, allowing them to be controlled by the multi-function switch.

Ring Lights

Before attaching a ring light, locate the two electrical pins on the top of the ring light, and align them with the two electrical contacts on the mounting surface of the microscope. It is possible to attach the ring light without proper alignment of the pins, but the attachment will not receive power. Once the pins are aligned, guide the ring light toward the microscope's mounting surface until it snaps in place. The ring light will have a hex screw attached to the outer sleeve. This can be used to secure the attachment. Using a 1.5mm hex wrench, rotate the screw clockwise until it stops. Overtightening can result in damage to the screw and surface of the microscope, so avoid applying too much pressure.

The ring-light's brightness can be controlled by the microscope's multi-function switch as well as software.



Using Support Systems

The DM756 is designed for use with a variety of support systems, including those typically used with stereo microscopes such as table stands, boom-arm stands, and articulating stands. Due to the DM756's high magnifications, it is recommended to always use a support to avoid shaking which will result in poor-quality images.

This microscope uses a 50mm mounting diameter which requires a specific collar or adapter. Support systems which use 50mm collars can be used with the DM756 without any adapters. Support systems using 76mm collars can be used in conjunction with the AD-SZ76 adapter.



Mounting to a 50mm Collar

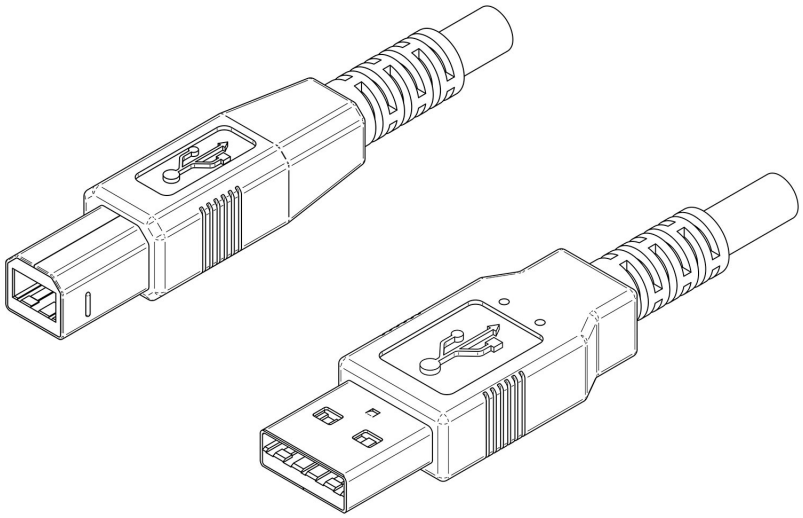
To mount the microscope to a 50mm collar, first ensure that no accessories are attached which would cause obstruction, such as ring lights. Next, loosen any locking screws on the collar. With the microscope's lens pointed down, gently slide the instrument into the collar. The collar should align with a groove on the microscope located above the zoom dial, at which point the microscope should be properly seated, and unable to be lowered any further. Rotation of the microscope can verify that it is properly seated. Align the logo on the microscope with the front of the collar, then tighten any locking screws enough to prevent further rotation.

Mounting to a 76mm Collar

To mount the microscope to a 76mm collar, the AD-SZ76 adapter must be attached to the microscope. Begin by visually inspecting the inner surface of the adapter to ensure that the securing screws are not protruding, as they can obstruct or scratch the microscope. A 2mm hex wrench can be used to loosen the screws if necessary. Next, with the microscope's lens pointed up, gently slide the adapter with the lip facing downward onto the microscope until it is properly seated. The adapter should have two or three securing screws pre-mounted. These screws prevent the microscope from rotating. Use a 2mm hex wrench to tighten these screws, being careful not to overtighten them. Once the adapter is secure, turn the microscope so the lens is pointing downward, then lower the microscope into the collar of the support system until the adapter's lip is flush with the collar.

USB Models

The USB models are designed to be used with computers, relying on the provided AmScope software to capture and process images. Certain functions can be controlled using the microscope's multi-function switch as described in the Multi-Function Switch section of this manual. All other functions are performed by the software. Software is available for current versions of Windows, Mac OS, and Linux operating systems, but availability or compatibility is subject to change. Before connecting the microscope to a computer, install the included software to ensure the device will be recognized by the operating system. More information regarding the software is available in the software's help file which can be accessed from the software's menu under "Help."



USB type B (left) and USB type A (right) connectors

A split USB cable is included for connecting to a computer. The cable's three connectors include one type-B and two type-A. Begin by plugging the type-B connector into the microscope's USB port. The primary (data) Type-A connector has two wires attached, and should be plugged into a USB 2.0 or faster port on the computer. The secondary (power) Type-A connector is intended to connect to a power source using the included AC-USB adapter, or by plugging into a 5V charging port. In some cases the primary USB connection can provide enough power for the microscope to function. However, since the microscope and attached accessories draw power exclusively from the USB connection, it may be necessary to use the additional connector.

Note: Attached illuminators will not function until the software is running, and the microscope has been selected from the camera list.

USB/Wi-Fi Models

The USB/Wi-Fi model offers two operating modes which allow you to use the microscope with a computer or mobile device depending on the type of connection. In USB mode, the USB connection can be used to connect the microscope directly to a desktop or laptop computer. In wi-fi mode, other devices such as computers and mobile devices can connect to the microscope wirelessly. Regardless of the operating mode, a USB connection is required to supply power to the microscope.

AmScope Imaging Software

AmScope imaging software for Windows, Mac OS, and Linux is used to capture and edit images generated by the microscope. While the microscope may work with 3rd-party UVC-compatible software, it is recommended to use the provided software to ensure full functionality. For the most up-to-date version, please visit the AmScope website at www.amscope.com, and navigate to the software download page.

ToupView App

For Android and iOS devices, the ToupView app is available on the respective app stores. The app provides basic functionality to view a live feed from the microscope, and to capture still images.

USB Mode

When the microscope is connected directly to a computer's USB data port using the provided USB cable, it will enter USB mode. Power and data are both transmitted over the USB cable, so no other connections are necessary.

Using a Computer

Connect the USB cable to the microscope by plugging the micro-USB connector into the microscope's USB port. Next, plug the type-A connector into an available USB 2.0 or faster data port on the computer. Since the microscope draws all of its power from the USB connection, the USB port must provide adequate power and current. Avoid using hubs when possible, or ensure that the hub can provide 5 volts and at least 1 amp. When the microscope has powered on, both the Power LED and Wi-Fi LED will light up. Once the microscope is recognized by the computer, the Wi-Fi LED will turn off. Open the AmScope imaging software. In the top-left corner, a camera list will display the model of the microscope. Click on the appropriate model to initialize the live video feed. More information regarding the software is available in the software's help file which can be accessed from the software's menu under "Help."

Wi-Fi Mode

When the microscope is connected to a power source other than a computer, it will default to wi-fi mode. In this mode, the microscope acts as a WLAN (wireless local-area network) access-point to which other devices can connect.

Connecting to a Power Source

The microscope's USB connection provides all of the power required for the device to operate. To connect the microscope to an AC outlet, use the included USB cable and AC-USB adapter. Power banks and other power sources can be used as long as they provide 5 volts with a minimum of 1 amp. Plug the USB cable's micro-USB connector into the microscope's USB port. Next, plug the cable's type-A connector into the appropriate USB power port. When the microscope is connected to a power source, the blue Power LED will flash. When the LED produces a solid light, the microscope is ready to use.

Using a Computer

To use this microscope with a computer over wi-fi, the computer must have wi-fi enabled, and the AmScope imaging software installed. When the microscope is powered on, and no data connection is detected, the green Wi-Fi LED will light up to signify that the microscope is in Wi-Fi mode. Use your computer's wireless network settings to search for available wireless networks. The microscope will broadcast a network identifier (SSID) containing its model number. Select this network, and when prompted, enter the default key/password: 12345678. Once connected to the network, open the AmScope imaging software. In the top-left corner, a camera list will display the model of the microscope. Click on the appropriate model to initialize the live video feed. More information regarding the software is available in the software's help file which can be accessed from the software's menu under "Help."

Note: As additional models are added to the product line, the SSID may change. The microscope will have a label near the top interface with the SSID suffix and the wi-fi key.

HDMI Models

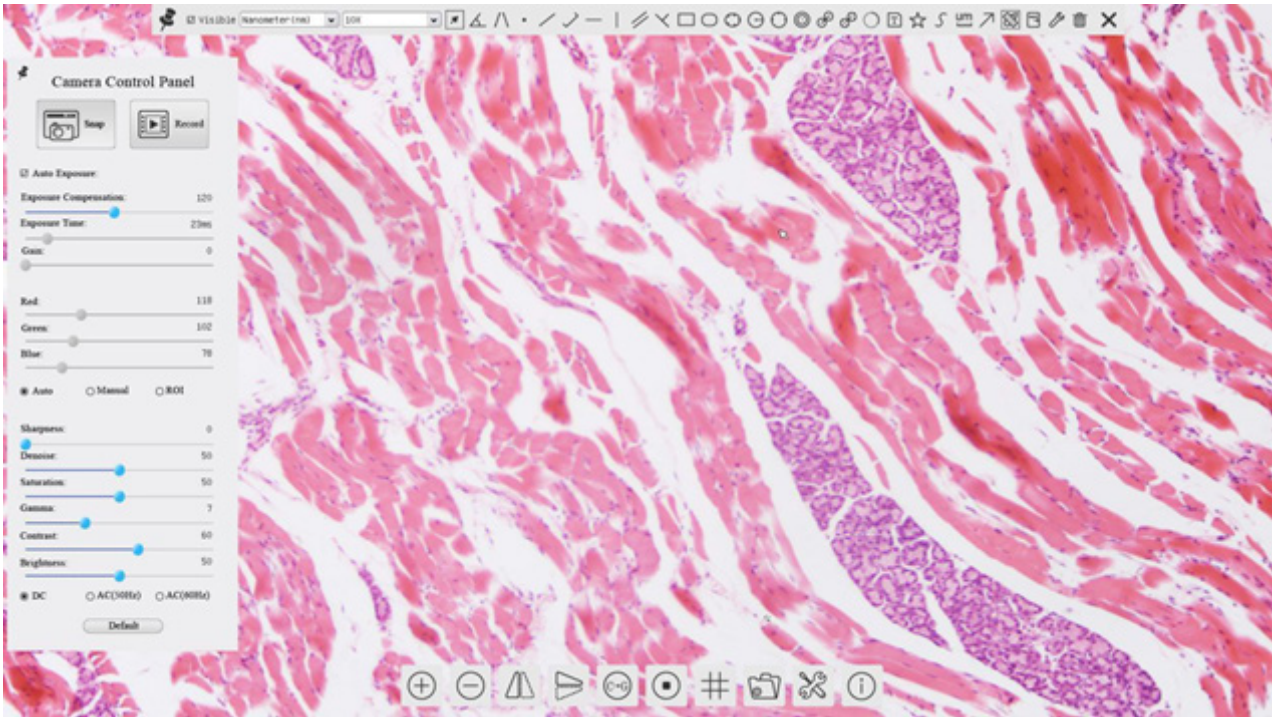
Setup

Use the provided AC power adapter to connect the microscope to an AC outlet. When the microscope is powered on, the Power LED will light up. Attach the provided mouse by plugging its USB connector into the microscope's USB port. Use the provided HDMI cable to attach to a viewing device such as a television or monitor. Once everything is connected, a cursor will appear on the viewing device.

User Interface

The HDMI model uses an on-screen UI to operate. The camera controls are located in the panel on the left side of the window, the measurement toolbar on the top, and additional display controls and settings are on the bottom.

By default, the panels will only display when the mouse cursor is hovering over the appropriate area. Left-clicking on the "pin" icon will maintain the panel's visibility, but will prevent other panels from opening.



The HDMI model's user interface

The Camera Control Panel

The Camera Control Panel controls the camera to achieve the best video or image quality according to the specific applications. To open the panel, move the mouse cursor toward the left edge of the video window.

Control Panel	Function	Description
	Snap	Capture image and save it to the SD card.
	Record	Record video and save it to the SD card.
	Auto Exposure	When Auto Exposure is checked, the system will automatically adjust exposure time and gain according to the value of exposure compensation.
	Exposure Compensation	Available when Auto Exposure is checked. Slide to increase or decrease the overall brightness to compensate for varying subjects.
	Exposure Time	Available when Auto Exposure is not checked. Slide to increase or decrease exposure time for achieving appropriate brightness.
	Gain	Available when Auto Exposure is not checked. Slide to increase or decrease signal amplification. Increasing the amplification will increase brightness without adjusting exposure time, but will result in increased noise levels.
	Red	Manually adjust the proportional Red level of the RGB video.
	Green	Manually adjust the proportional Green level of the RGB video.
	Blue	Manually adjust the proportional Blue level of the RGB video.
	Auto (White Balance)	Continuously adjusts RGB levels automatically based on the overall video content.
	Manual (White Balance)	Enables the manual RGB controls to adjust the color balance.
	ROI (White Balance)	Use the on-screen Region-of-Interest selector (rectangle will appear) to define a region which should be used as reference when performing white balance.
	Sharpness	Slide to adjust the sharpness level of the video.
	Denoise	Slide to adjust the amount of noise-reduction to apply to the video.
	Saturation	Slide to adjust the color saturation of the video.
	Gamma	Slide to increase or decrease the Gamma level of the video.
	Contrast	Slide to adjust the contrast of the video.
	DC	Select when using DC powered illumination. No flicker compensation.
	AC (50Hz)	Select when using AC powered illumination with 50Hz to remove flickering.
	AC (60Hz)	Select when using AC powered illumination with 60Hz to remove flickering.
	Default	Restore all values in the Camera Control Panel to their default settings.

Image Exposure

Manual Exposure

Image exposure controls the amount of light captured by the imaging device. Exposure time is used to set the amount of time over which light is collected. More time will result in a brighter image. For most static subjects, increasing exposure time to achieve the appropriate brightness is the preferred method. For moving subjects, too much time will result in blurring as the subject's location changes over time. Exposure time must be limited in these cases to prevent excess movement. Use of the gain setting would therefore be the preferred method to achieve optimal brightness. Gain controls the amount of amplification applied to the signal generated by the imaging sensor. While the signal strength would be increased, noise generated during the imaging process would also be increased.

Auto Exposure

Auto exposure relies on software to set the exposure time and gain. This simplifies the workflow, especially when capturing images in changing lighting conditions. As a microscope's magnification changes, or the distance from the microscope to the subject changes, the amount of light collected will also change. Auto exposure can continuously compensate for these changes. This method assumes that the optimal amount of light would create an image with levels which would average to a middle tone. Because of this, images of light subjects may appear too dark, and images of dark subjects may appear too bright. For this reason, adjustment can be done using the exposure compensation control, sometimes called exposure target. This allows you to increase or decrease the target level of brightness.

Color

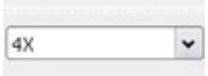
White Balance

The color of an object is influenced by the color of light reflecting off of it or passing through it. Different light sources produce light with different color-biases. Common examples are incandescent lamps which typically produce warm colors compared to fluorescent or LED lamps which produce cooler colors. This sort of bias is referred to as color temperature. Due to this phenomenon, a white object may appear slightly yellow in morning sunlight, and slightly blue in afternoon shade. To compensate for these variations, digital imaging devices can process images using what is called "white balance." The white balance process shifts colors based on the color of the light source, with the goal of producing a more neutral white or grey.

The Measurement Toolbar

The Measurement Toolbar will pop up when moving the mouse cursor toward the upper edge of the video window. This panel contains tools and settings for performing measurements.



Icon	Function
	Pin the Measurement Toolbar
	Show / Hide Measurement Objects
	Select Measurement Unit
	Select Magnification (requires calibration process)
	Object Selector
	Angle
	4-Point Angle
	Point
	Arbitrary-Angle Line
	3-Point Lines
	Horizontal Line
	Vertical Line
	Parallel
	3 Points Vertical Line
	Rectangle
	Ellipse
	5-Point Ellipse
	Circle
	3-Point Circle
	Annulus (Concentric Circles)

Icon	Function
	Two Circles with Distance from Centers
	Two 3-Point Circles with Distance from Centers
	Arc
	Text
	Polygon
	Curve
	Scale Bar
	Arrow
	Perform magnification calibration. Defines relationship between the measurement unit and pixel size. Requires the use of a micrometer slide.
	Export measurement information to CSV file
	
	Delete measurement object
	Exit measurement mode
	Left-clicking on a measurement object will open the Object Location & Properties Control Bar. The icons on the control bar: • Move Up • Move Down • Move Left • Move Right • Adjust Color • Delete

When the Pin icon  is clicked to lock the Measurement Toolbar, the Camera Control Panel will not be displayed until the Measurement Toolbar is unpinned by clicking the Exit icon .

The Camera Control Toolbar

The Camera Control Toolbar provides a subset of tools for controlling the camera's video, as well as general settings and the file viewer.

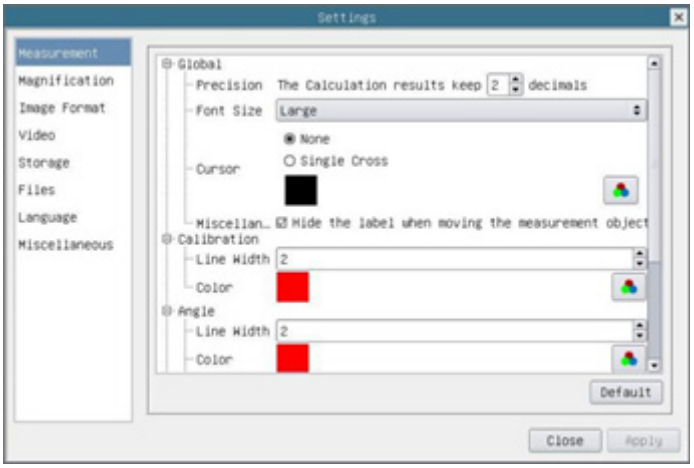


Icon	Function	Icon	Function
	Zoom In		Zoom Out
	Horizontal Flip		Vertical Flip
	Color/Grayscale		Freeze Video
	Display Crosshair/Grid		Browse Images and Videos on SD Media
	Settings		Software Version Information

Settings

Measurement

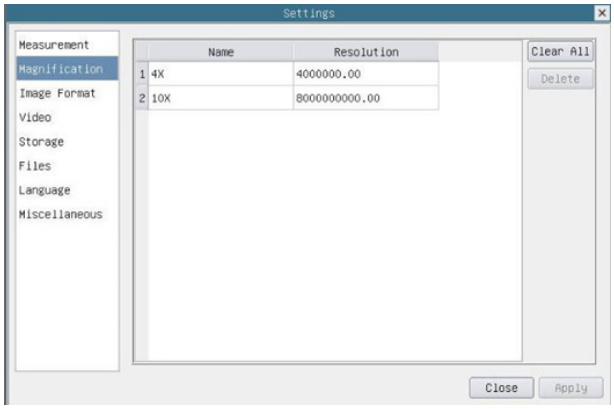
Measurement settings allow you to customize shapes, and define the precision of measurements.



Global	Precision	Sets the decimal scale: number of digits after a decimal point
Calibration	Line Width	Sets the width of lines used for calibration
	Color	Sets the color of lines used for calibration
	Endpoint	Sets the shape used at each endpoint of a line. Includes null or rectangle
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve		
	Each shape can be customized using attributes such as Line Width and Color	

Magnification

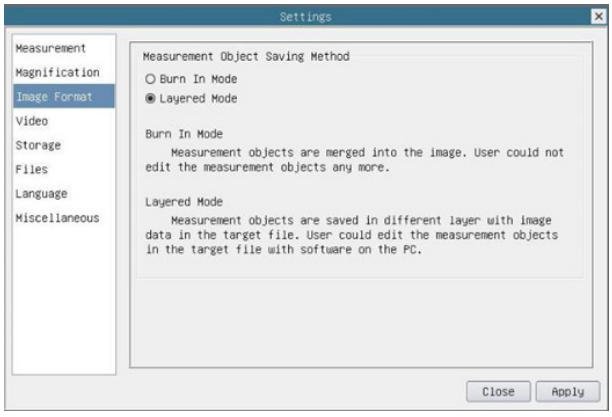
Magnification settings allow you to edit stored magnification calibrations. Each time the calibration process is completed, you can save the results as a magnification preset. These presets can be selected from the Measurement Toolbar to use the appropriate, calibrated settings.



Name	This is the user-defined name of magnification setting. Names typically incorporate the magnification of the objective lens used, and additional information pertaining to the microscope or camera used.
Resolution	The number of pixels per meter.
Clear All	Clears all saved calibration data
Delete	Clears the selected calibration data

Image Format

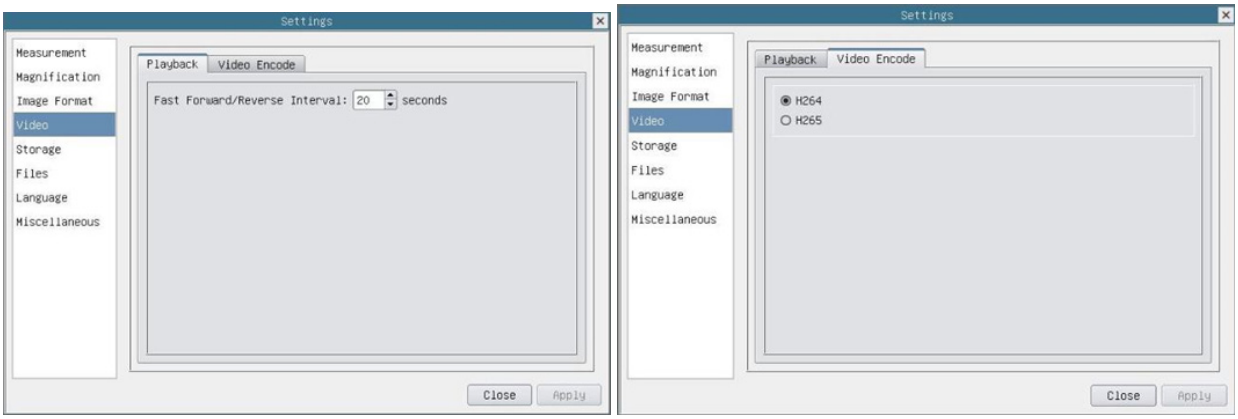
Image Format settings allow you to determine whether measurement objects will be merged into saved images, or embedded as a separate layer.



Measurement Object Saving Method	Burn In Mode	Measurement objects are merged with the image before saving the file. Objects can neither be edited nor removed.
	Layered Mode	Measurement objects are saved in a separate layer, and can be edited.

Video

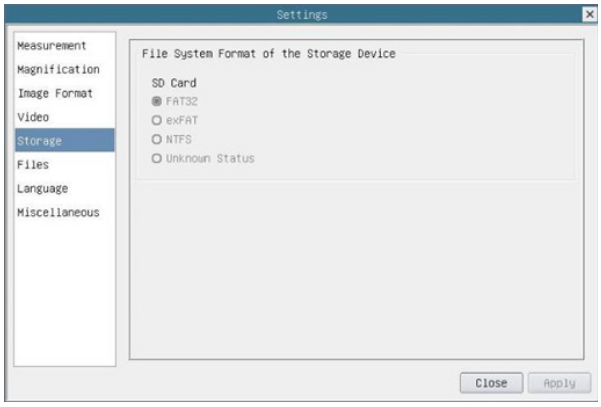
Video settings allow you to change the fast-forward and reverse intervals, and to choose the video codec.



Playback	Fast Forward/Reverse Interval	The number of seconds to be skipped when fast-forwarding or reversing playback of videos
Video Encode	H264	Older AVC video codec with better compatibility across multimedia devices, but less efficient compression compared to H265.
	H265	Newer HEVC video codec with improved compression while retaining high quality

Storage

Storage displays the format of the current SD card's file system, such as FAT32, exFAT, and NTFS. Unformatted cards must be formatted on a computer or other device.



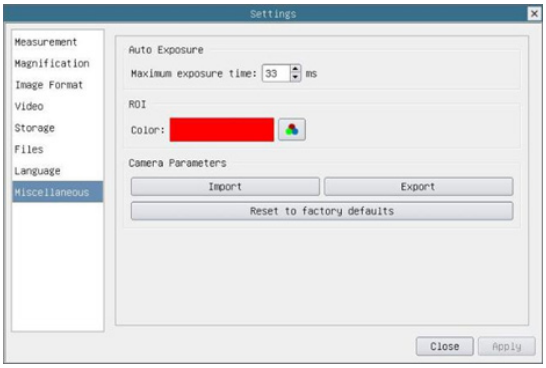
Language

Language setting selects which language will be displayed.



Miscellaneous

Miscellaneous settings include additional helpful settings.



Auto Exposure	Set the maximum exposure time for the Auto Exposure mode. Setting a lower number can improve the frame rate.
ROI Color	Select the color of the Region of Interest (ROI) frame
Camera Parameters Import	Import previously-saved parameters from the SD card
Camera Parameters Export	Export current parameters to the SD card
Reset to Factory defaults	Restore all parameters to the factory-default values