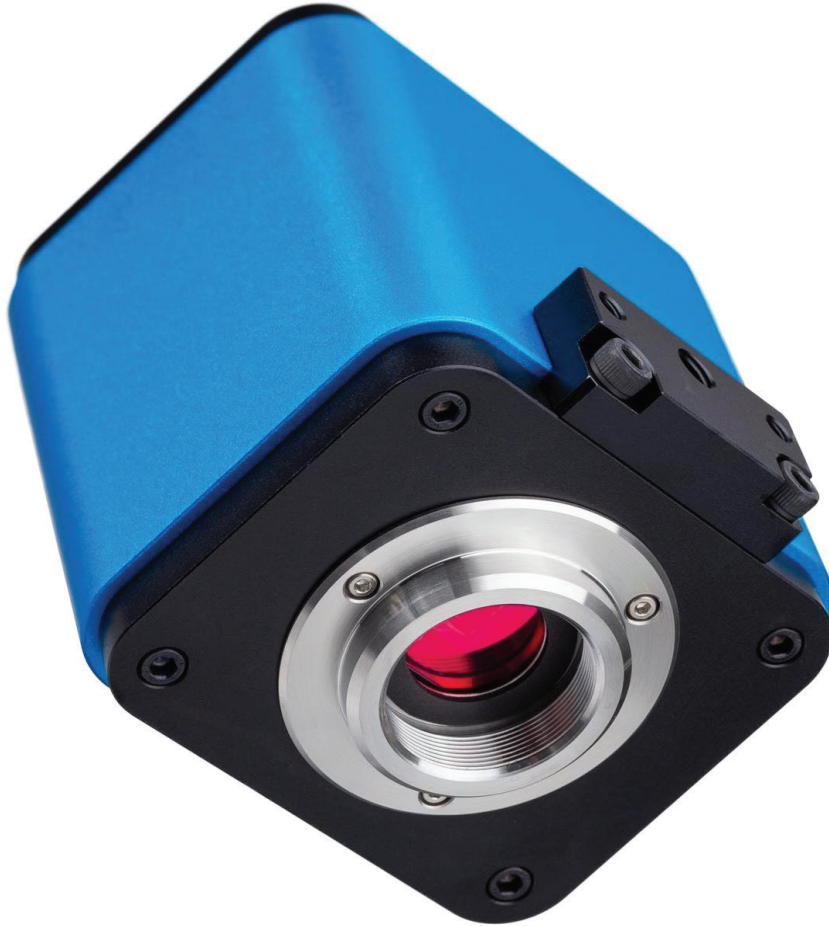


HD202-MW, HD205-WU, HD222-GS

User Guide



General Description

The HD202-MW, HD205-WU and HD222-GS are part of our HD network camera collection. The HD202-MW uses a 2MP sensor for 1080p video and photo capture. The HD205-WU uses a 5MP sensor which captures 1080p video and 5MP photos. The HD222-GS uses a cutting-edge 2MP sensor with global shutter technology for 1080p video and photo capture.

This camera is designed to be a multi-function imaging system for microscopy applications. It can be operated as standalone imaging system with internal recording, or linked to a computer for use with our specialized microscopy software.

When used with an HDMI monitor or television, the camera can be operated using internal software which provides essential viewing, recording, and measurement tools. The software can be easily navigated using the included USB mouse. Photos and videos can be recorded to Secure Digital media.

The camera can also be connected to a PC using a wi-fi connection. This allows you to capture photos and video on a computer when using our microscopy software suite.

Specifications

HD202-MW	
Sensor Model	Sony IMX236 (color)
Sensor Type	CMOS
Optical Format	1/1.9"
Active Pixels	2M (1920x1080)
Pixel Size	3.75µm x 3.75µm
Active Sensor Area	7.2mm x 4.05mm
Shutter	electronic rolling shutter
Sensitivity	1120mV @ 1/30s (f/5.6)
Spectral Response	380-650nm with IR-cut filter
Other Camera Specifications	
Video Preview Resolution (HDMI)	1920 x 1080
Video Preview Framerate (HDMI)	60fps
Video Capture Resolution	1920 x 1080
Video Capture Framerate	25fps (Secure Digital) 30fps max (USB)
Photo Capture Resolution	1920 x 1080
Internal Photo Capture Format	JPG
Recording Media	Secure Digital
Connectivity	HDMI, Wi-fi
Wi-fi Standard	802.11n 150Mbps
Lens-mount	C-mount
Compensating Lens	0.5X (optional)
Power	12VDC 1A
Dimensions	78mm x 65mm x 88mm
Operating Temperature	-10°C to 50°C
Operating Humidity	30-80% RH

HD205-WU	
Sensor Model	Sony IMX178 (color)
Sensor Type	CMOS
Optical Format	1/1.8"
Active Pixels	5M (2592x1944)
Pixel Size	2.4µm x 2.4µm
Active Sensor Area	6.22mm x 4.67mm
Shutter	electronic rolling shutter
Sensitivity	425mV @ 1/30s (f/5.6)
Spectral Response	380-650nm with IR-cut filter
Other Camera Specifications	
Video Preview Resolution (HDMI)	1920 x 1080
Video Preview Framerate (HDMI)	60fps
Video Capture Resolution	1920 x 1080
Video Capture Framerate	25fps (Secure Digital) 30fps max (USB)
Photo Capture Resolution	2592 x 1944
Internal Photo Capture Format	JPG
Recording Media	Secure Digital
Connectivity	HDMI, Wi-fi
Wi-fi Standard	802.11n 150Mbps
Lens-mount	C-mount
Compensating Lens	0.5X (optional)
Power	12VDC 1A
Dimensions	78mm x 65mm x 88mm
Operating Temperature	-10°C to 50°C
Operating Humidity	30-80% RH

HD222-GS	
Sensor Model	Sony IMX249 (color)
Sensor Type	CMOS
Optical Format	1/1.2"
Active Pixels	2M (1920x1080)
Pixel Size	5.86µm x 5.86µm
Active Sensor Area	11.25mm x 6.33mm
Shutter	global shutter
Sensitivity	1016mV @ 1/30s (f/5.6)
Spectral Response	380-650nm with IR-cut filter
Other Camera Specifications	
Video Preview Resolution (HDMI)	1920 x 1080
Video Preview Framerate (HDMI)	60fps
Video Capture Resolution	1920 x 1080
Video Capture Framerate	25fps (Secure Digital) 30fps max (USB)
Photo Capture Resolution	1920 x 1080
Internal Photo Capture Format	JPG
Recording Media	Secure Digital
Connectivity	HDMI, Wi-fi
Wi-fi Standard	802.11n 150Mbps
Lens-mount	C-mount
Compensating Lens	0.75X (optional)
Power	12VDC 1A
Dimensions	78mm x 65mm x 88mm
Operating Temperature	-10°C to 50°C
Operating Humidity	30-80% RH

The Camera Interface



HDMI

This port is used for output only. Use an HDMI cable to attach a display device such as a monitor or television.

USB

The USB port can be used with a compatible USB mouse during standalone operation, or with the provided USB wi-fi adapter. When used with the wi-fi adapter, the camera will broadcast a private wi-fi network which can be accessed by computers running the included microscopy imaging software.

DC12V

This is the port to which the included power adapter would be attached to supply the camera with the power it needs. Only use the provided power adapter, as incompatible adapters may cause severe damage to the camera.

ON/OFF

Use this button when the camera is connected to a power source to turn the camera on or off. A single press is used to change the power mode.

LED

The LED will display solid red when the camera is connected to a power source and is in its “off” state. The LED will flash blue once every second when the camera is initializing, and display solid blue when the camera is in its “on” state.

SD

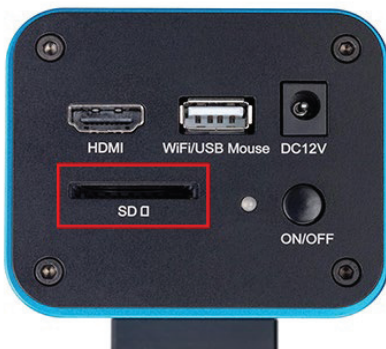
The Secure Digital port is used to record photos and videos to a Secure Digital card. The port has a spring mechanism to assist with loading and ejecting media. After a card is fully inserted, a gentle press will engage the spring mechanism to partially eject the card so that the top edge can be grabbed to remove the card.

Initializing the Camera



HDMI Output

Connect the included HDMI cable to the camera's HDMI port and an HDMI display such as a monitor or television. A display with 1920x1080 resolution or comparable is optimal. Lower resolutions may result in the displayed images being cut off. When the display is powered on, and the appropriate input is selected, a video signal should be present. The HDMI output can be used simultaneously with the computer link, but the camera's internal software will not be available because the USB interface will be used by the computer.



Insert SD Card

Insert a Secure Digital card if you wish to record photos or videos on the camera. SD cards with UHS-1 Class 10 speed or higher is recommended to capture 1080p video.

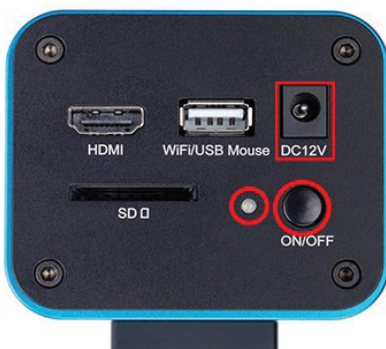


Attach USB Mouse

Attach the provided USB mouse if you wish to use the camera in standalone mode. This will allow you to navigate the internal software.

Attach the USB Wi-fi Adapter

Attach the provided USB wi-fi adapter if you wish to use the camera in network mode. The camera will broadcast a wi-fi network. A wi-fi enabled computer can connect to the network by using the password included with the camera. The network SSID and password should be listed on the camera's packaging or the camera itself. If no password is included, the default password is **12345678**.



Power On the Camera

Attach the included 12V power adapter to the camera's DC12V port. Plug the adapter into an AC outlet, at which time the LED on the control panel will light up as red. Push the ON/OFF button once. The LED will begin to flash blue. When the LED is solid blue, the camera is ready to use.

Using the Camera on a Network

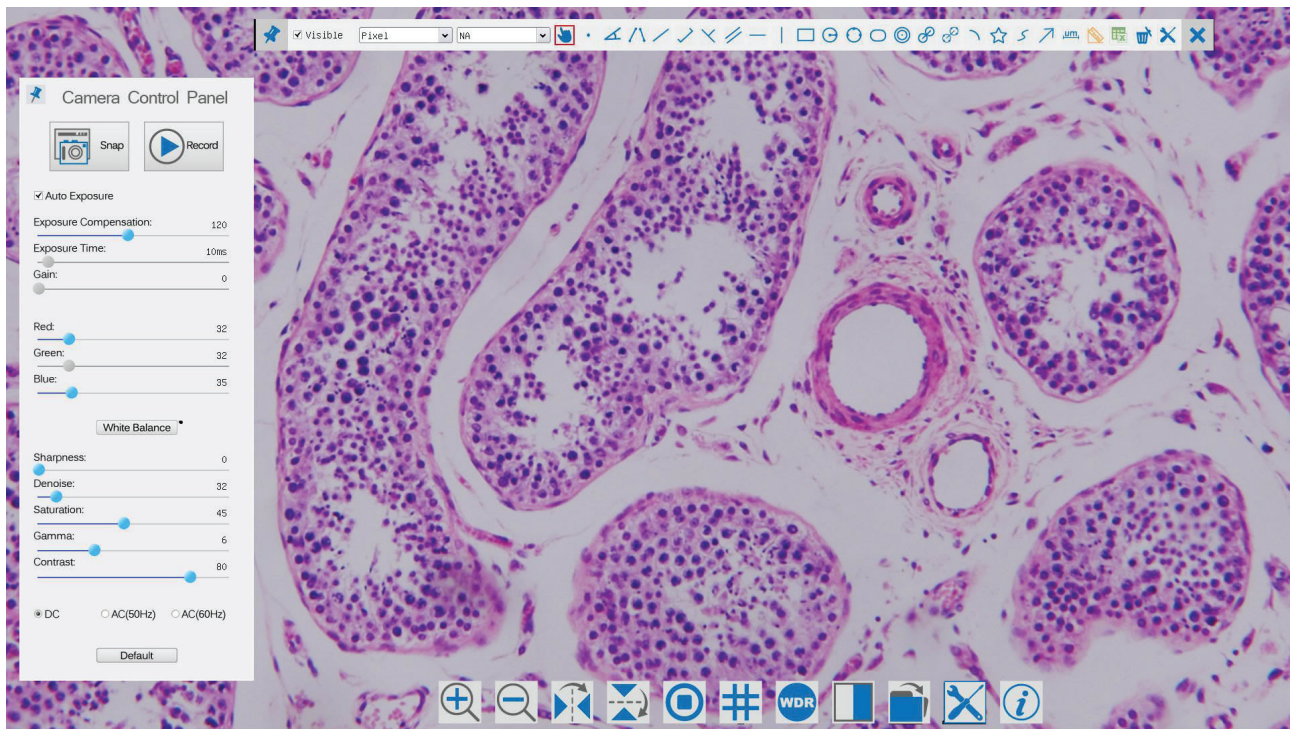


This camera can be used with wi-fi enabled computers by using the AmScope microscopy imaging software. The camera uses 802.11n WLAN standard, which can be accessed by compatible WLAN devices including wi-fi network adapters and wireless routers. To connect to the camera using wi-fi, follow these simple steps:

- Install the AmScope software on your Windows PC, or AmScope Lite software on your Mac or Linux computer. After installation, open the software.
- Plug the provided USB wi-fi adapter into the camera's USB port.
- Connect the power adapter, and plug the adapter into an AC outlet.
- Press the ON/OFF button once and wait for the LED to display solid blue.
- Browse available wireless networks on your computer. Look for the SSID listed on the camera.
- Select the SSID to begin connecting to the network. When asked for a password, enter the password listed on the camera. If none is listed, the default password is **12345678**.
- Once the network connection is established, the camera's model number should appear in the software's camera list, located near the top of the left control panel. Select the camera to open the live video window.
- The camera is ready to use. Follow the software's instructions to navigate the functions and tools.

Using the Camera in Standalone Mode

The HDMI/NETWORK UI shown below includes a [Camera Control Panel](#) on the left of the video window, a [Measurement Toolbar](#) on the top of the video window and a [Synthesis Camera Control Toolbar](#) on the bottom of the video window.

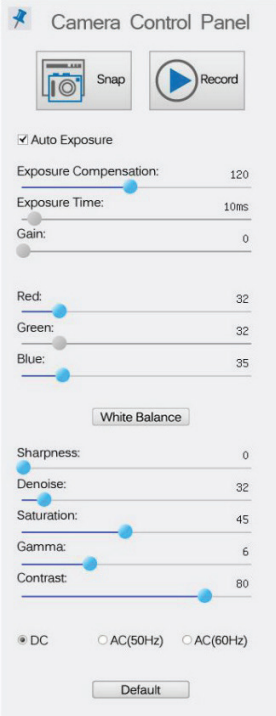


The HDMI/NETWORK Camera Control GUI

Notes	
1	To show the Camera Control Panel , move the mouse cursor to the left of the video window
2	To show the Auxiliary Toolbar , move the mouse cursor to the bottom of the video window
3	To show the Measurement Toolbar, move the mouse cursor to the top of the video window. Left-click the Float/Fixed button  on the Measurement Toolbar to prevent the toolbar from closing after the cursor has left its boundaries. This will disable the Camera Control Panel to allow measurements of objects across the entire view. To set the toolbar back to float mode and enable the control panel, left-click the  button on the Measurement Toolbar. During the measuring process, when a specific measuring object is selected, an Object Location & Attributes Control Bar  will appear for changing location and properties of the selected object.

Camera Control Panel

The **Camera Control Panel** is used to control the camera's exposure and color functions, as well as other image characteristics. The panel will appear when the mouse cursor is moved to the left edge of the video field. Left-clicking the pin button  will change the panel's **Display/Auto Hide** mode. Use this to prevent the panel from auto-hiding after the mouse cursor has left its boundaries.

Camera Control Panel	Function	Function Description
 The screenshot shows the Camera Control Panel with the following settings: Snap and Record buttons; Auto Exposure checked; Exposure Compensation at 120; Exposure Time at 10ms; Gain at 0; Red, Green, and Blue sliders at 32, 32, and 35 respectively; White Balance button; Sharpness at 0; Denoise at 32; Saturation at 45; Gamma at 6; Contrast at 80; and DC selected under the illumination mode.	Snap	Capture image and save it to the SD card
	Record	Record video and save it to the SD card
	Auto Exposure	Check the Auto Exposure radio option to put the camera into auto exposure mode. Auto exposure will automatically adjust the exposure to achieve a mid-tone grey average of the entire image. Exposure and Gain are not available during auto exposure.
	Exposure Compensation	Available when Auto Exposure is checked. Slide to left or right to adjust Exposure Compensation according to the current video brightness to achieve proper brightness value
	Exposure Time	Available when Auto Exposure is unchecked. Slide to left or right to reduce or increase exposure time, adjusting brightness of the video
	Gain	Gain adjusts the sensitivity of the camera's sensor. This can decrease the time necessary for proper exposure, but may result in increased image noise. This only works when Auto Exposure is not selected.
	Red	Slide to left or right to decrease or increase the proportion of Red in RGB on video
	Green	Green is base for reference and cannot be adjusted
	Blue	Slide to left or right to decrease or increase the proportion of Blue in RGB on the video
	White Balance	White Balance adjustment according to the window video every time the button is clicked
	Sharpness	Adjust Sharpness level of the video
	Denoise	Slide left or right to reduce noise in the video
	Saturation	Adjust Saturation level of the video
	Gamma	Adjust Gamma level of the video. Slide to the right side to increase gamma and to the left to decrease gamma.
	Contrast	Adjust Contrast level of the video. Slide to the right side to increase contrast and to the left to decrease contrast.
	DC	For DC illumination, there will be no fluctuation in light source so no flicker compensation is needed.
	AC(50HZ)	Check AC(50HZ) to eliminate flickering caused by 50Hz illumination
	AC(60HZ)	Check AC(60HZ) to eliminate flickering caused by 60Hz illumination
	Default	Restore all the settings in the Camera Control Panel to default values

Measurement Toolbar

The **Measurement Toolbar** will appear when the mouse cursor is moved to the top edge of the video field.



Left-click the **Float/Fix** pin button  on the **Measurement Toolbar** to prevent the toolbar from closing after the cursor has left its boundaries. This will disable the **Camera Control Panel** to allow measurements of objects across the entire view. To set the toolbar back to float mode and enable the control panel, left-click the  button on the **Measurement Toolbar**.

When a specific measuring object is selected during the measuring process, the **Object Location & Attributes Control Bar**  will appear for changing the object location and properties of the selected objects.

Icon	Function
	Float/ Fix switch of the Measurement Toolbar
☒ Visible	Define measuring object in Show / Hide mode
Nanometer (nm) ▼	Select the desired Measurement Unit
4X ▼	Choose the same Magnification as the microscope to ensure accuracy of measurement result when measurement unit is not in Pixel unit
	Object Select
	Point
	Angle
	4 Points Angle
	Arbitrary Line
	3 Points Line
	3 Points Vertical Line
	Parallel
	Horizontal Line
	Vertical Line
	Rectangle
	Circle
	3 Points Circle
	Ellipse
	Annulus
	Two Circles and Center Distance
	3 Points Two Circles and Center Distance
	Arc
	Polygon

The HDMI/NETWORK Series Camera Help Manual

		Curve
		Arrow
		Scale Bar
		Make Calibration to determine the corresponding relationship between magnification and resolution. This will establish ratio between the unit of measure and the camera sensor's pixel size. Calibration needs to be done with the help of a micrometer slide or target. For detailed steps of carrying out Calibration please refer to the help file included with the AmScope software.
		Export the measurement information to CSV file(*.csv)
		Delete all the measurement objects
		Settings
		Exit from Measurement mode
		When the measurement ends, left-click on a single measuring object and the Object Location & Properties Control Bar will show up. You can move the object by dragging it with the mouse or by using these controls. The icons on the control bar represent: Move Left , Move Right , Move Up , Move Down , Color Adjustment and Delete .

Auxiliary Toolbar

The **Measurement Toolbar** will appear when the mouse cursor is moved to the bottom edge of the video field.

Icon	Function	Icon	Function
	Zoom In the Video Window		Zoom Out the Video Window
	Horizontal Flip		Vertical Flip
	Video Freeze		Display Cross Line
	Wide Dynamic Range Mode		Compare Image with the Current Video
	Browse Images and Videos in the SD Card		Settings
	Check the Version of the UI		

Zoom In : Digital zoom in function. Dedicated demosaic algorithm is used with fewer artifacts when zooming in.

Zoom Out : Digital zoom out function.

Horizontal Flip : Horizontally flip the live image

Vertical Flip : Vertically flip the live image

Freeze/Resume : Freeze and resume the live image

Cross : This button will display or hide an on-screen crosshair.

Wide Daynamic Range : The dynamic range of the live image will be increased to display more detail in shadows and highlights.

Compare : This function can be used for a side-by-side comparison of images. When a photo is selected from the SD card, it will be displayed on the left portion of the screen, while the right portion will show the live image.

Browser : The Browser allows you to view the photos stored on the SD card. Videos will not playback internally.

Setting : This opens a settings panel which allows you to manually configure network settings such as IP address.