BMS Bluebox HDMI/USB Multi-outputs C-mount 4K video and 8Mp Camera Manual

Version: 19-9-2025_v4

Contents

1   The Application of the BMS Bluebox Camera

Figure 1 The BMS Bluebox Camera

The BMS Bluebox camera is intended to be used for the acquisition of digital images from the stereo microscope and biological microscope. The basic characteristic is listed as below:

- Sony Exmor/STARVIS back illuminated CMOS sensor
- 4K HDMI/USB multiple video outputs
- 4K/1080P auto switching according to the display resolution
- USB flash drive for the captured image and video storage
- Embedded XCamView for the control of the camera
- Excellent ISP with local tone mapping and 3D denoising
- BMS_pix3 software for PC
- BMS_pix3 lite software for MAC

2   BMS Bluebox Camera's Datasheet and Functions(2)

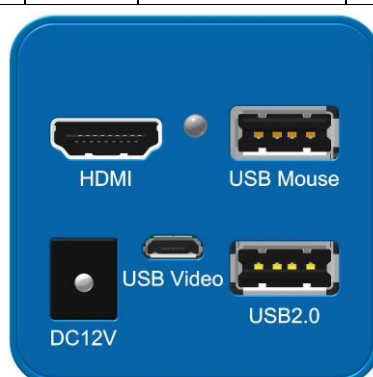| Order Code	Sensor & Size(mm)	Pixel(µm)	G Sensitivity	FPS/Resolution	Binning	Exposure(ms)
BMS BlueBox	Sony IMX334(C) 1/1.8"(7.68x4.32)	2.0x2.0	505mv with 1/30s 0.1mv with 1/30s	30@3840*2160(HDMI) 20@3840*2160(USB)	1x1	0.04~1000

Figure 2 Available Ports on the Back Panel of the Camera Body

Interface	Function Description
HDMI	Comply with HDMI1.4 standard. 4K or 1080P format video output for standard monitor
LED	LED status indicator
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software
DC12V	Power adapter connection (12V/1A)
USB Video	Connect PC or other host device to realize video image transmission
USB2.0	Connect USB flash disk for capturing video and image storage

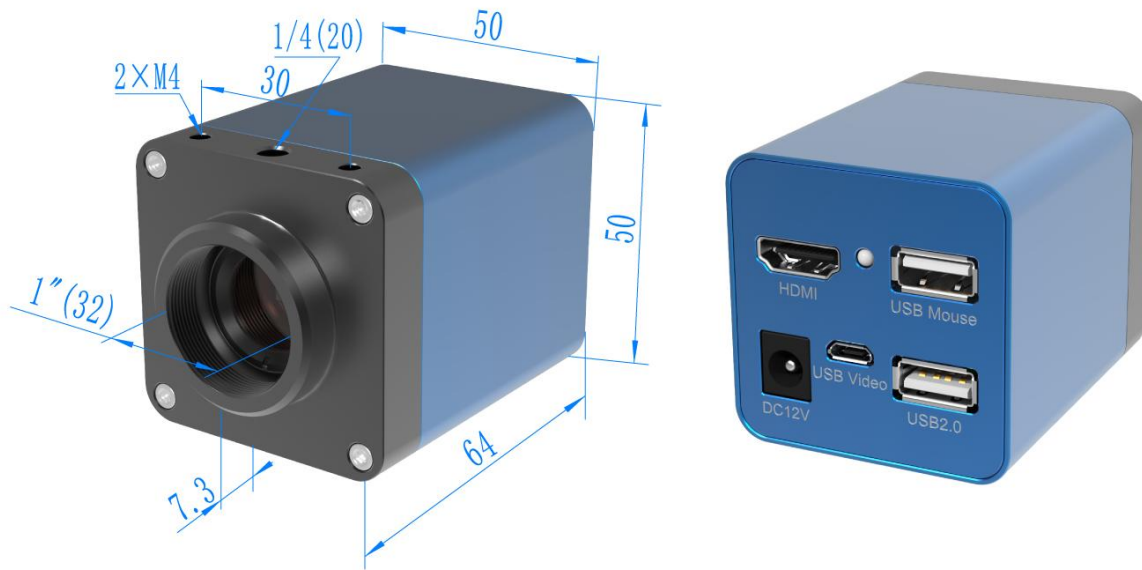| Video Output Interface	Function Description
HDMI Interface	Comply with HDMI1.4 standard 30fps@4K or 30fps@1080P
USB Video Interface	Connecting USB port of PC for MJPEG format video transmission
Other Function	**Function Description**
Video Saving	Video format：8M(3840*2160) H264/H265 encoded MP4 file Video saving frame rate：30fps
Image Capture	8M (3840*2160) JPEG/TIFF image in USB flash drive
Measurement Saving	Measurement information saved in layer mode with image content Measurement information is saved together with image content in burn in mode
ISP Function (Image Signal Processor)	Exposure(automatic / manual exposure) / gain，white balance(manual / automatic / roi mode)，sharpening，3d denoise，saturation adjustment，contrast adjustment，brightness adjustment，gamma adjustment，color to gray，50hz/60hz anti-flicker function
Image Operations	Zoom in/zoom out, mirror/flip, freeze, cross line, overlay, embedded files browser, video playback, measurement function
Embedded RTC(Optional)	To support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thai / French / German / Japanese / Italian / Russian
Software Environment under USB Video Output	
White Balance	Auto white balance
Color Technique	Ultra-Fine™ Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK(Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still picture or movie
Operating System	Microsoft® Windows® 10 /11 and higher OSx(Mac OS X) lite version Linux lite version
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or higher
	Memory: 4GB or more
	Display:19" or larger
	USB port
Operating Environment	
Operating Temperature (in Centidegree)	-10°~ 50°
Storage Temperature (in Centidegree)	-20°~ 60°
Operating Humidity	30~80% RH
Storage Humidity	10~60% RH
Power Supply	DC 12V/1A adapter

3   Dimension of BMS Bluebox

Figure 3 Dimension of BMS Bluebox
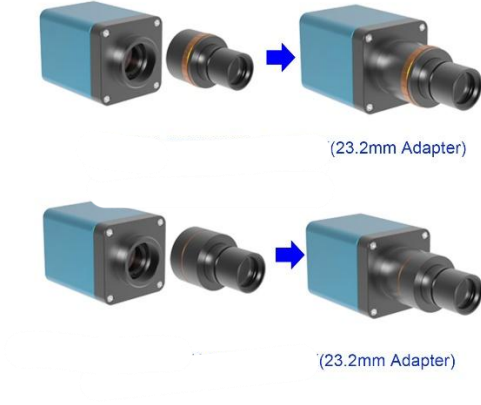
4   BMS Bluebox Camera Packing Information

Figure 4 The BMS Bluebox Camera Packing Information

Standard Packing List	
A	Gift box : L:25.5cm W:17.0cm H:9.0cm
B	BMS Bluebox camera

C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A European standard:Model: POWER-E-12V1A(MSA-C10001C12.0-12H-DE)		
D	USB Wireless mouse		
E	HDMI cable		
F	Micro USB cable		
G	USB flash disk (Driver & utilities software)		
Optional Accessory			
H	USB flash drive		
I	Adjustable lens adapter	C-Mount to Dia.23.2mm eyepiece tube (Please choose 1 of them for your microscope)	108001/AMA037 108002/AMA050 108003/AMA075
J	Fixed lens adapter	C-Mount to Dia.23.2mm eyepiece tube (Please choose 1 of them for your microscope)	108005/FMA037 108006/FMA050 108007/FMA075
	Note: For **I** and **J** optional items, please specify your camera type(C-mount, microscope camera or telescope camera), BMS microscopes engineer will help you to determine the right microscope or telescope camera adapter for your application;		
K	108015 (Dia.23.2mm to 30.0mm Ring)/Adapter rings for 30mm eyepiece tube		
L	108016 (Dia.23.2mm to 30.5mm Ring)/ Adapter rings for 30.5mm eyepiece tube		
M	Calibration kit	106011/TS-M1(X=0.01mm/100Div.); 106012/TS-M2(X,Y=0.01mm/100Div.); 106013/TS-M7(X=0.01mm/100Div., 0.10mm/100Div.)	

5   Extension of BMS Bluebox Camera with Microscope Adapter

Extension	Picture	
C-mount Camera		Machine vision; Medical imaging with Labomed microscopes; Semiconductor equipment; Test instruments; Document scanners; 2D barcode readers; Web camera and security video; Microscope imaging
Microscope Camera	 (23.2mm Adapter) (23.2mm Adapter)	

6   Software Application and App

The software application, BMS_pix3, or the APP can be downloaded from the following link：

Windows: http://extern.bmsmicroscopes.com/BMS_pix3/BMS_pix3.zip

7   BMS Bluebox Camera Application Configurations

You can use the BMS Bluebox camera in two different ways. Each application requires different hardware environment.

7.1   Camera Working Standalone with Built-in XCamView Software

Figure 5 BMS Bluebox Camera with the HDMI display

For this application, apart from the microscope, the user only needs an BMS Bluebox camera, an HDMI display, an HDMI cable, an USB flash drive, a USB mouse and a power adapter that come with the camera. The steps to start the camera are listed as below:

- Connect the camera to a HDMI display using the HDMI cable;
- Insert the supplied USB mouse to the camera's USB port;
- Insert the supplied USB flash drive into the BMS Bluebox camera USB2.0 port;
- Connect power adapter to the camera;
- Switch on the display and view the video in the XCamView software. Move the mouse to the left, top or bottom of the XCamView UI, different control panel or UI will pop up and users could operate with the mouse at ease.

7.2   Connecting Camera to the PC with USB Port

For Windows user (Windows 10 and higher), please use BMS_pix3

For macOS and Linux user (macOS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), please use BMS_pix3 lite.

The steps to start the camera are listed below:

- Install the BMS_pix3 on your PC;
- Connect power adapter to the camera the and switch it on. After starting the camera, plug one end of the Micro USB cable into the Video USB port of the BMS Bluebox camera, and plug the other end into the USB port of the PC;
- Open BMS_pix3 software. The BMS Bluebox camera will be recognized automatically by software. In BMS_pix3 software, select the corresponding BMS Bluebox camera by clicking the camera name in the camera list.

Note:
When the Micro USB cable and the mouse are plugged into the camera at the same time, the Micro USB cable is preferred and the mouse is not available; when the Micro USB cable is unplugged, the mouse can be used normally.

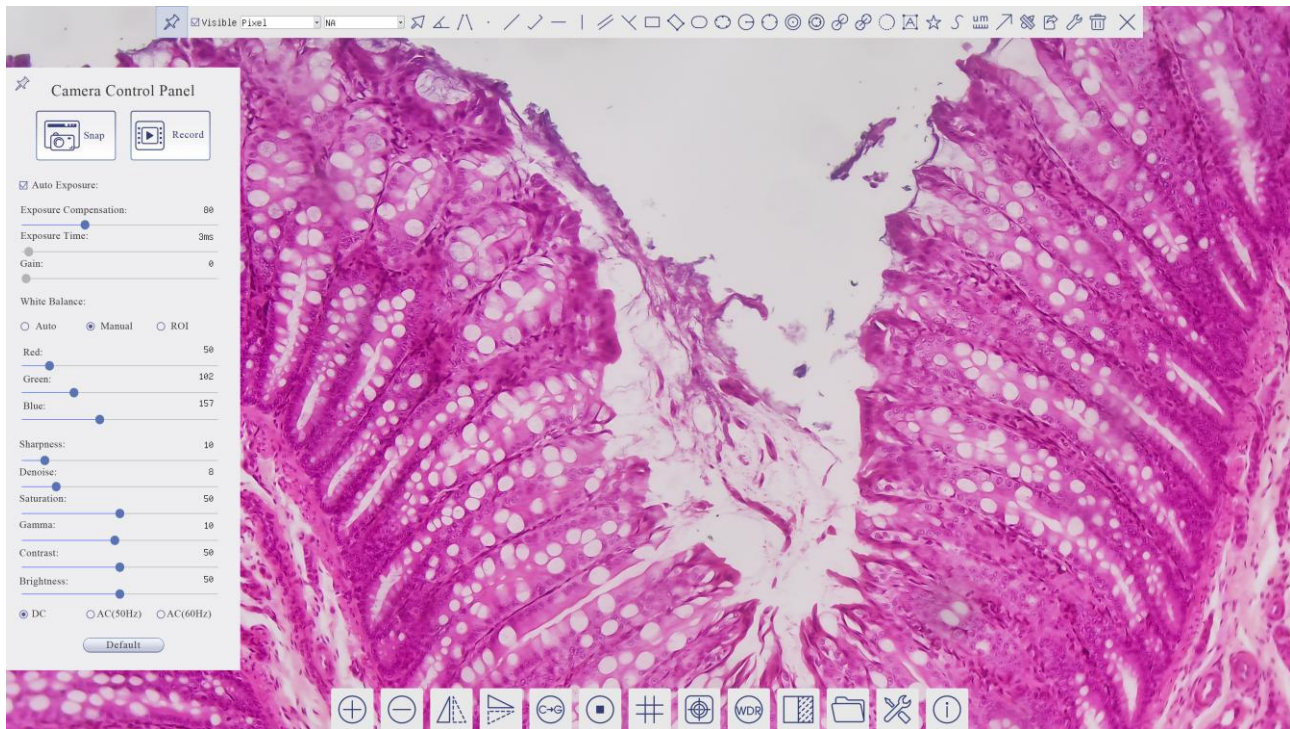# 8   Brief introduction of BMS Bluebox Camera's UI and its functions
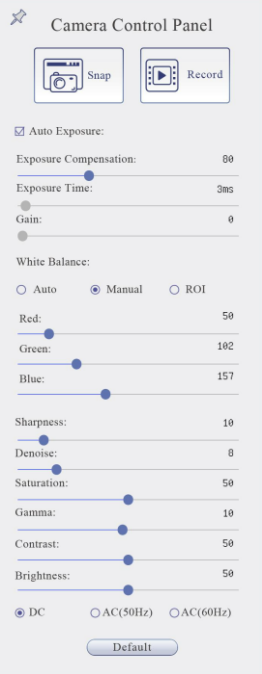
8.1   XCamView UI

Figure 6 The BMS Bluebox Camera Control GUI

Notes	
1	To show the Camera Control Panel, move your mouse to the left of the video window. See Sec.8.2 for details.
2	Move the mouse cursor to the top of the video window, a Measurement Toolbar will pop up for calibration and measurement operations. When user left-clicks the Float/Fixed button ⚲ on the Measurement Toolbar, the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if users move mouse cursor to left side of the video window. Only when user left-clicks the ✕ button on the Measurement Toolbar to exit from measuring operations will they be able to do other operations on the Camera Control Panel, or the Synthesis Camera Control Toolbar. During the measuring operations, when a specific measuring object is selected, an Object Location & Attributes Control Bar ⬚⬚⬚⬚⬚⬚ will appear for changing location and properties of the selected object. See Sec.8.3 for details.
3	When users move mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically. ⊕⊖⊿▷⊶▪#⊕ WDR ▦⬚✕ⓘ. See Sec.8.4 for details.

8.2   The Camera Control Panel on the Left Side of the Video Window

The Camera Control Panel controls the camera to achieve the best video or image quality according to the specific applications; It will pop up automatically when the mouse cursor is moved to the left side of the video window (in measurement status, the Camera Control Panel will not pop up. The Camera Control Panel will only pop up when the measurement operations are finished or terminated while user's cursor on the left edge of the video window). Left-clicking ⚲ button to achieve Display/Auto Hide switch of the Camera Control Panel.

Camera Control Panel	Function	Function Description
	Snap	Capture image and save it to the USB flash drive
	Record	Record video and save it to the USB flash drive
	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 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 not checked. Slide to left or right to reduce or increase Exposure Time, adjusting brightness of the video
	Gain	Adjust Gain to reduce or increase brightness of video. The Noise will be reduced or increased accordingly
	Auto White Balance	White Balance adjustment according to the video continuously
	Manual White Balance	Adjust the Red or Blue slide bar to set the video White Balance.
	ROI White Balance	White Balance could be adjusted when the ROI region is changed according to content inside the ROI region.
	Red	Slide to left or right to decrease or increase the proportion of Red item in RGB on video
	Green	Slide to left or right to decrease or increase the proportion of Green item in RGB on video
	Blue	Slide to left or right to decrease or increase the proportion of Blue item in RGB on the video
	Sharpness	Adjust Sharpness level of the video
	Denoise	Slide left or right to Denoise 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 need for compensating light flickering
	AC(50HZ)	Check AC(50HZ) to eliminate flickering caused by 50Hz light source
	AC(60HZ)	Check AC(60HZ) to eliminate flickering caused by 60Hz light source
	Default	Restore all the settings in the Camera Control Panel to default values

8.3   The Measurement Toolbar on Top of the Video Window

The Measurement Toolbar will pop up when moving mouse cursor to any place near the upper edge of the video window. Here is the introduction of the various functions on the Measurement Toolbar:

Icon	Function
	Float/ Fix switch of the Measurement Toolbar
☑ Visible	Show / Hide Measurement Objects
Nanometer(nm) ▼	Select the desired Measurement Unit
4X ▼	Select Magnification for measurement after Calibration
	Object Select
	Angle
	4 Points Angle

	Point
	Arbitrary Line
	3 Points Line
	Horizontal Line
	Vertical Line
	3 Points Vertical Line
	Parallel
	Rectangle
	3 Point Rectangle
	Ellipse
	5 Points Ellipse
	Circle
	3 Points Circle
	Annulus
	3 Points Annulus
	Two Circles and its Center Distance
	3 Points Two Circles and its Center Distance
	Arc
	Text
	Polygon
	Curve
	Scale Bar
	Arrow
	Execute Calibration to determine the corresponding relation between magnification and resolution, which will establish the corresponding relationship between Measurement Unit and the sensor pixel size. Calibration needs to be done with the help of a micrometer. For detailed steps of carrying out Calibration, please refer to help manual.
	Export the Measurement information to CSV file(*.csv)
	Measurement Setup
	Delete all the measurement objects
	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. User could move the object by dragging the object with the mouse. But more accurate movement could be done with the control bar. The icons on the control bar mean Move Up, Move Down, Move Left, Move Right, Color Adjustment and Delete.

Note:

   1) When user left-clicks Display/Hide button ⬚ on the Measurement Toolbar, the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if moving the mouse cursor to the left edge of the video window. Only when user left-click the ✕ button on the Measurement Toolbar to exit from the measurement mode will they be able to doing other operations with the Camera Control Panel or the Synthesis Camera Control Toolbar.

   2) When a specific Measurement Object is selected during the measurement operation, the Object Location & Attributes Control Bar ⬚⬚⬚⬚⬚⬚ will appear for changing the object location and properties of the selected objects.

8.4   Icons and Functions of the Synthesis Camera Control Toolbar at the Bottom of the Video Window

Icon	Function	Icon	Function
⊕	Zoom In the Video Window	⊖	Zoom Out the Video Window
◬	Horizontal Flip	▷	Vertical Flip
C→G	Color/Gray	■	Video Freeze
#	Display Cross Line	◉	Overlay
WDR	WDR	▦	Compare Image with the Current Video
📁	Browse Images and Videos in the USB flash drive	✂	Settings
ⓘ	Check the Version of XCamView		

   The ✂ Setting function is relatively more complicated than the other functions. The followings are the details about it:
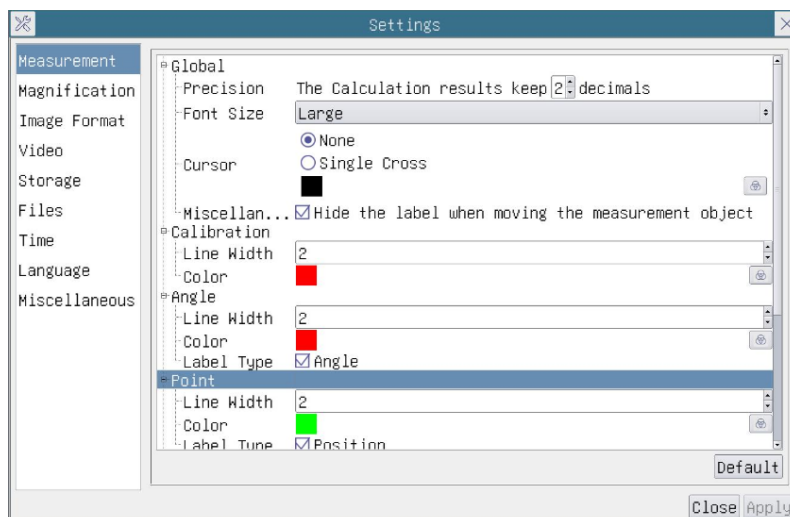
8.4.1   Setting>Measurement

Figure 7 The Measurement Setup

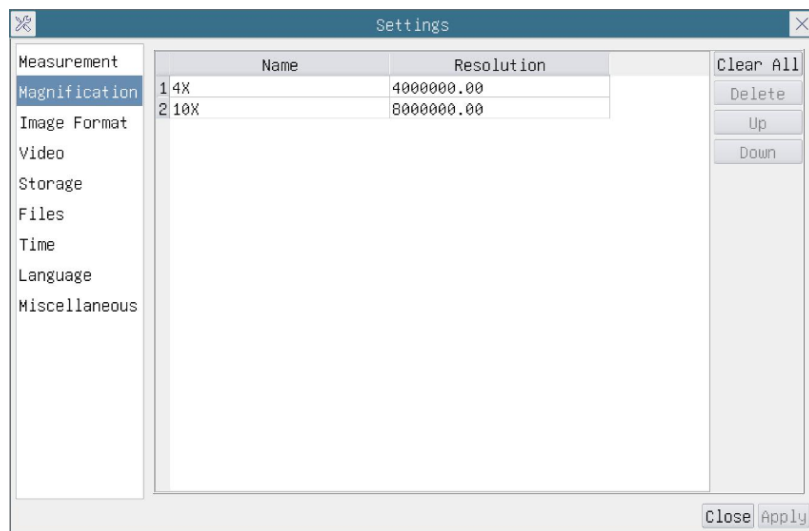| Global | Precision | Used to set the number of digits after the decimal point of the measurement result; |
	Font Size	The measured data fonts are divided into three types: large, medium and small;
	Cursor	Used to set cursor type and color;
	Micellaneous	Used to set whether to hide dimensions when moving measurement objects;
Calibration	Line Width	Used for defining width of the lines for Calibration;
	Color	Used for defining color of the lines for Calibration;
	EndPoint	Type: Used for defining shape of the Endpoint of lines for calibration: Null means no EndPoint, rectangle means rectangle type of Endpoint. It makes alignment more easily;
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve		
		Left-click the ⊞ along with the Measurement command mentioned above will unfold the corresponding attribute settings to set the individual property of the Measurement Objects;

8.4.2   Setting>Magnification

Figure 8 Comprehensive Magnification Calibration Settings Page

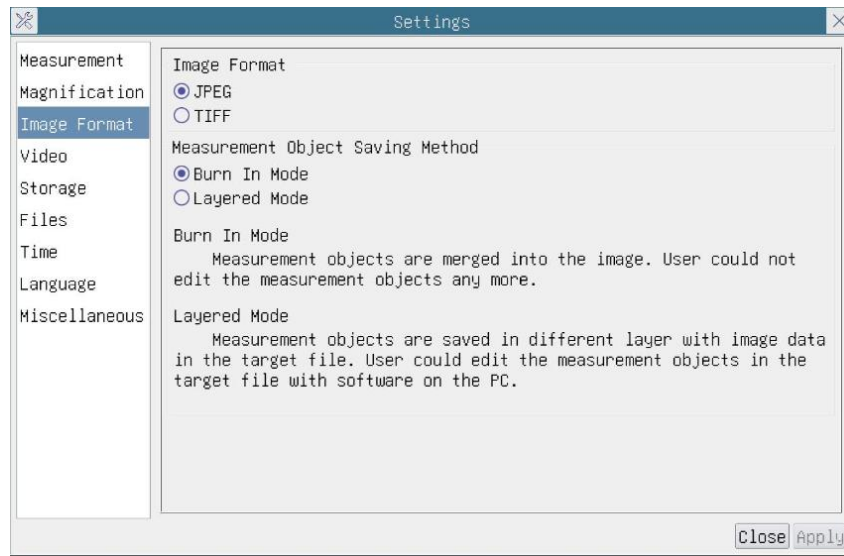| Name | The name of the Magnification, usually the Magnification of the objective of the microscope is used as the Magnification name when calibration, such as 4X, 10X, 40X,100X, etc. Besides, other user-defined information could be added into the Magnification name too, for example, microscope model, operator name, etc; |
Resolution	Pixels per meter. Image device like microscopes have high resolution value;
Clear All	Click the Clear All button will clear the calibrated Magnification;
Delete	Click Delete to delete the selected Magnification;
Up	Click Move Up to move up the selected Magnification;
Down	Click Move Down to move the selected Magnification down;

8.4.3 Settings>Image Format

Figure 9 Comprehensive Image Format Settings Page

|	
Image Format	JPEG: The extension of JPEG file can get very high compression rate and display very rich and vivid images by removing redundant images and color data. In other words, it can get better image quality with the least disk space. If Measurement Objects are available, the Measurement Objects will be burned into the image and the Measurement Objects cannot be edited; TIFF: Tag Image File Format(TIFF) is a flexible bitmap format that is mainly used to store images including photos and artistic images;
Measurement Object Saving Method	Burn in Mode: The Measurement Objects are merged into the current image. User could not edit the Measurement Objects anymore. This mode is not reversable; Layered Mode: The Measurement Objects are saved in different layer with current image data in the target file. User could edit the Measurement Objects in the target file with some software on the PC. This mode is reversable;

8.4.4 Settings>Video
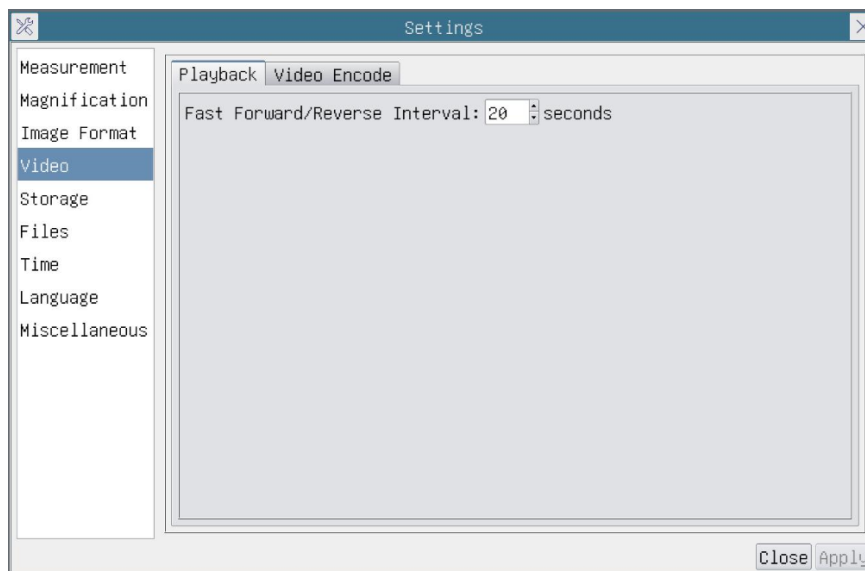
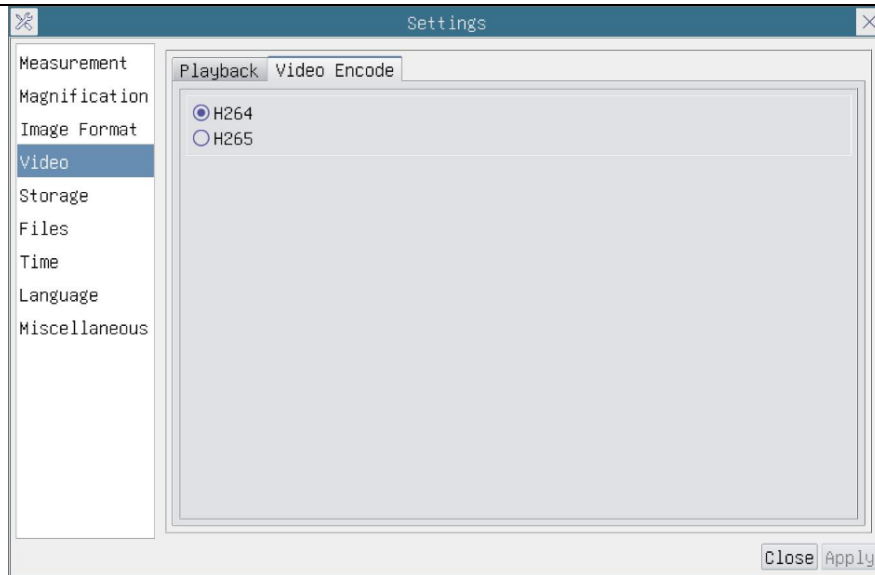Figure 10 Comprehensive Setting of Video Settings Page-Playback

Figure 11 Comprehensive Setting of Video Settings Page-Video Encode

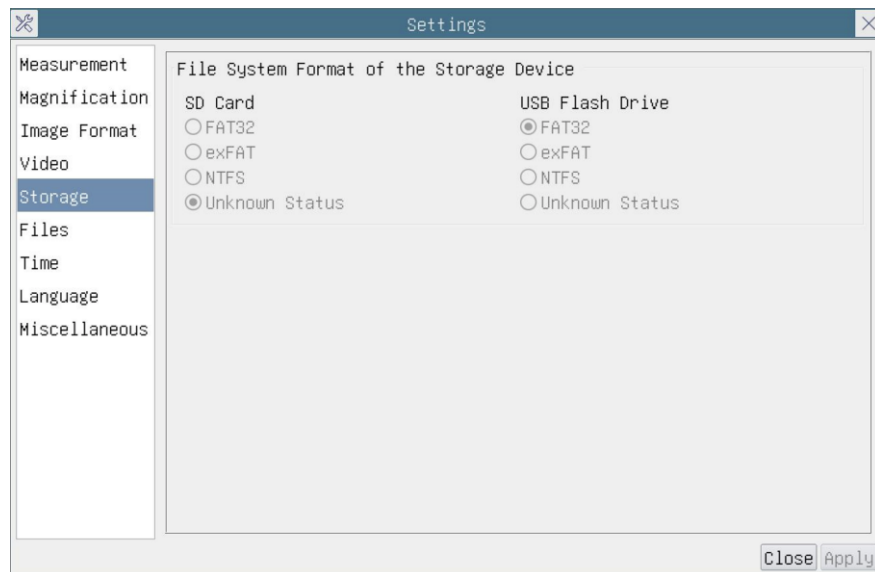| Playblack	Fast Forward/Reverse Interval time interval of the playback of video files;
Video Encode	You can choose H264 or H265 encoding. H265 encoding can significantly reduce encoding bandwidth and save storage space under the same encoding quality;

8.4.5   Setting>Storage

Figure 12 Comprehensive Setting of Storage Setting Page

| Storage Device	USB flash drive is the only supported storage device;
File System Format of the Storage Device	List the file system format of the current storage device FAT32: The file system of USB Flash Drive is FAT32. The maximum video file size of single file is 4G Bytes; exFAT: The file system of USB Flash Drive is exFAT. The maximum video file size of single file is 4G Bytes; NTFS: The file system of USB Flash Drive is NTFS. The maximum video file size of single file is 4G Bytes. Use PC to format the USB flash drive and switch between FAT32, exFat and NTFS; Unknown Status: USB Flash Drive not detected or the file system is not identified;

8.4.6 Setting>Files
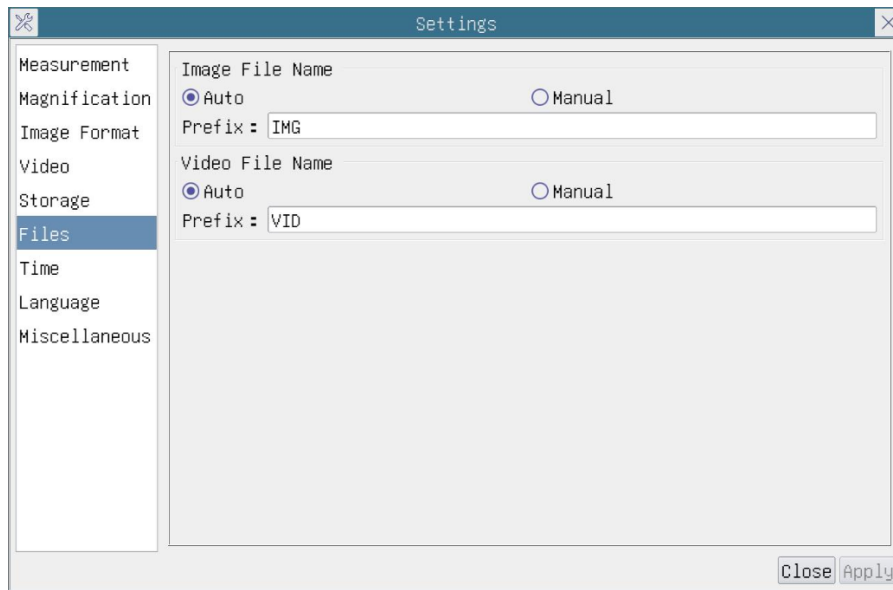
Figure 13 Comprehensive Setting of Files Settings Page

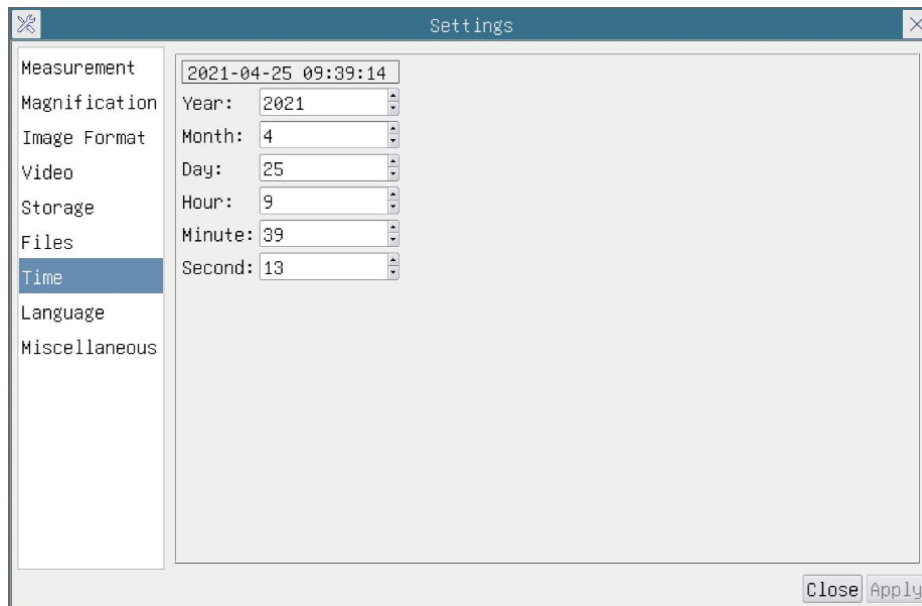| Image File Name	Auto: The image files will be saved automatically with the specified prefix; Manual: Users has to specify the file name before image saving;
Video File Name	Auto: The video file will be saved automatically with the specified prefix; Manual: Users has to specify the Video File Name before video recording;

8.4.7 Setting>Time

Figure 14 Time Setting

Time	User can set Year, Month, Day, Hour, Minute and Second ital.in this page;

8.4.8 Setting>Language
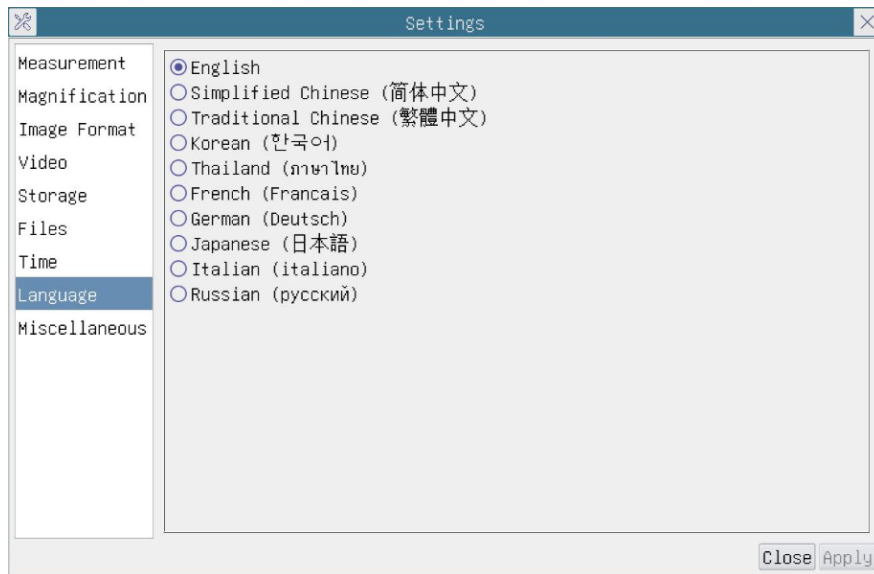

Figure 15 Comprehensive Setting of Language Selection Setting Page

English	Set language of the whole software into English;
Simplified Chinese	Set language of the whole software into Simplified Chinese;
Traditional Chinese	Set language of the whole software into Traditional Chinese;
Korean	Set language of the whole software into Korean;
Thailand	Set language of the whole software into Thailand;
French	Set language of the whole software into French;
German	Set language of the whole software into German;
Japanese	Set language of the whole software into Japanese;
Italian	Set language of the whole software into Italian;
Russian	Set language of the whole software into Russian;

8.4.9 Comprehensive Miscellaneous Settings Page

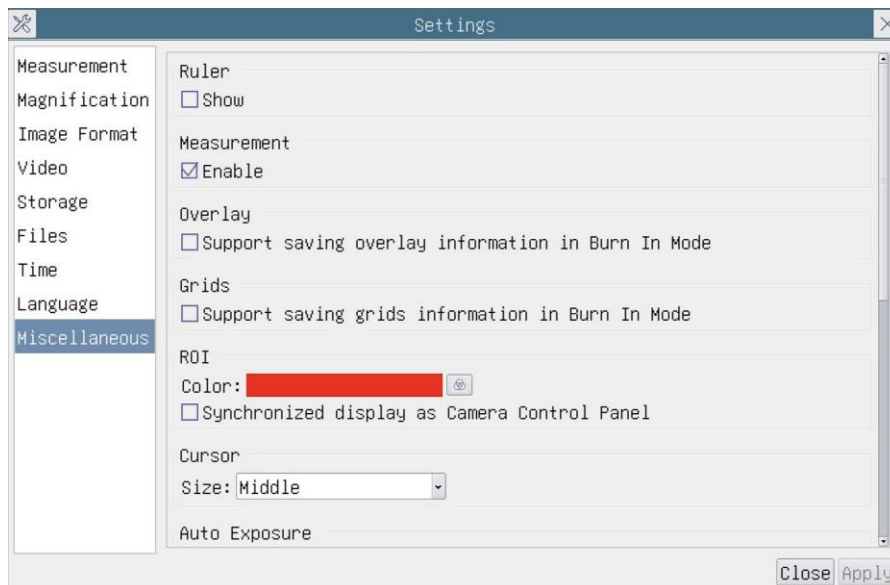Figure 16 Comprehensive Miscellaneous Settings Page

Ruler	Select to display the Ruler in the video window, or not to display the Ruler;
Measurement	Select to display the Measurement toolbar in the video window, otherwise, the Measurement toolbar will not be displayed;

Overlay	Select to support saving graphics Overlay information in fusion mode, and not to save graphics Overlay information in fusion mode;
Grids	Select to Support saving grids information in Burn In Mode, otherwise not to support;
ROI Color	Choosing the ROI rectangle line color ;
Cursor	Choosing the Cursor size according to the screen resolution or personal preference;
Auto Exposure	The maximum exposure time during auto exposure process could be specified. Setting this item to a lower value could guarantee a faster frame rate during Auto Exposure;
Auto Exposure Region	Select the AE reference area;
Gamma Curve Type	Select the appropriate Gamma curve type;
Camera Parameters Import	Import the Camera Parameters from the USB flash drive to use the previously exported Camera Parameters;
Camera Parameters Export	Export the Camera Parameters to the USB flash drive to use the previously exported Camera Parameters;
Reset to Factory Defaults	Restore camera parameters to its factory status;

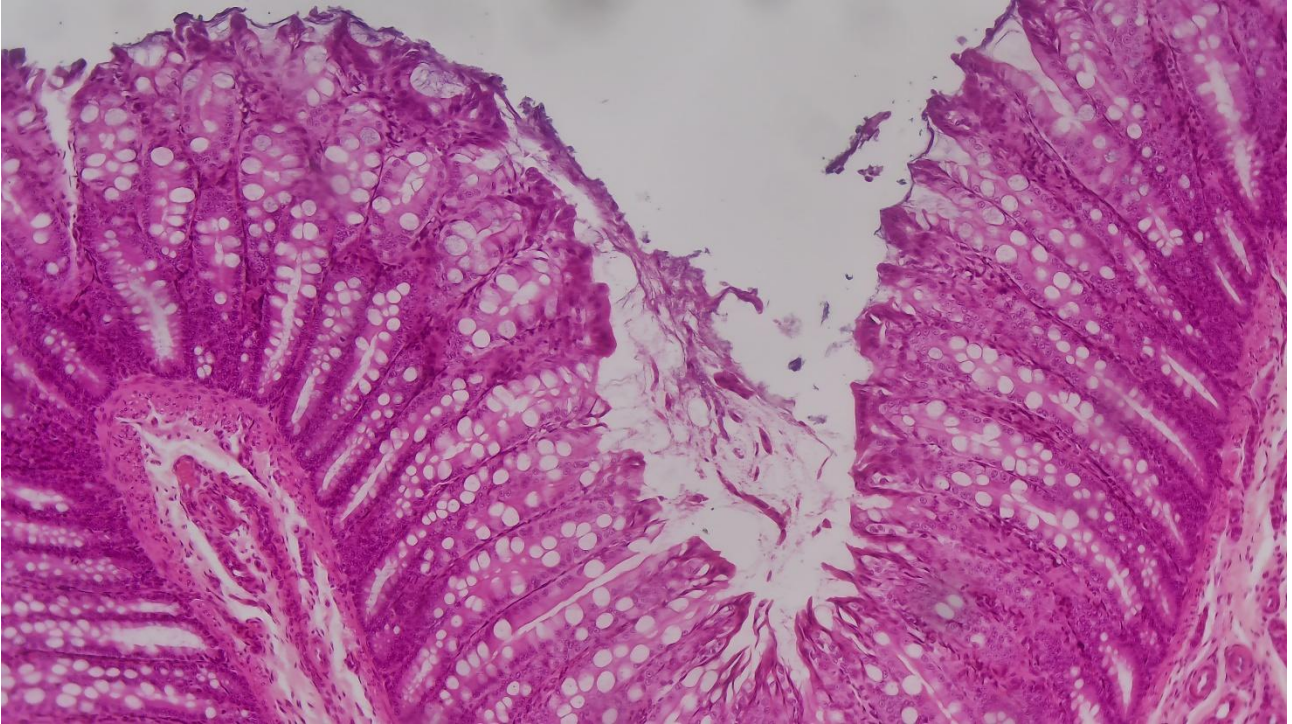## 9   Sample Photos Captured with BMS Bluebox Camera

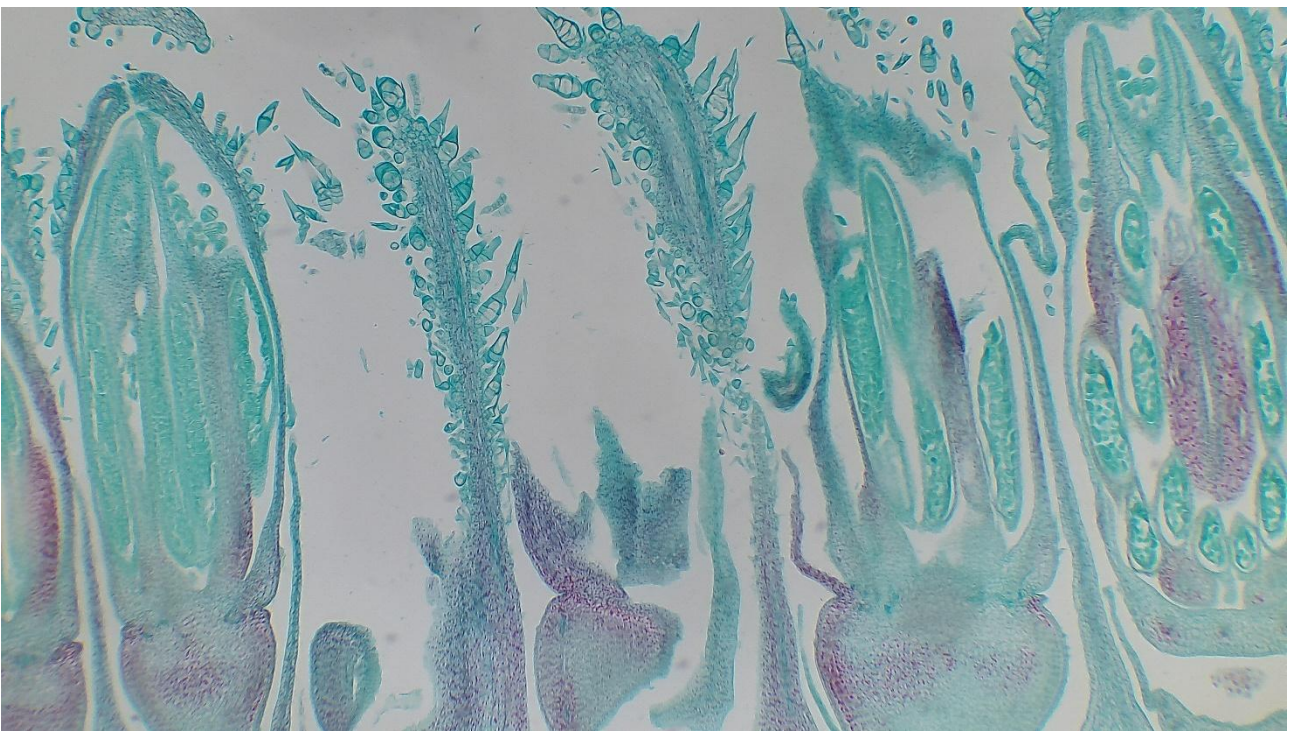Figure 17 Large Intestine Captured with BMS BlueBox

Figure 18 Sunflower Flower Captured with BMS BlueBox

10   Contacting Customer Service

Please contact your local distributor if you have any questions about the product.