VC.3039

HD-Pro camera

euromex
microscopes holland

user manual

Contents

Figure 1.1 The HD-Pro Camera

1. The application of the HD-Pro camera

The HD-Pro 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 back illuminated CMOS sensor
- 1080P HDMI/USB multiple video outputs
- SD card for the captured image and video storage
- Embedded software for the control of the camera
- With strong ISP and other related processing functions
- ImageFocusAlpha software for PC
- ImageFocusAlpha software for MAC

2. HD-Pro camera's data

Order Code	Sensor & Size(mm)	Pixel (μm)	Sensitivity	FPS/ Resolution	Binning	Exposure (ms)
VC.3039	Sony IMX415(C) 1/2.8"(5.57x3.13)	1.45 x 1.45	300mv with 1/30s	30@1920*1080 (HDMI) 30@3840*2160 (USB)	1x1	0.04~1000

2.1 Available ports on the back panel of the camera body

Interface	Function Description
1. USB Mouse	Connect USB mouse for easy operation with embedded software
2. USB Video	Connect PC or other host device to realize video image transmission
3. HDMI	Comply with HDMI1.4 standard. 1080P format video output for standard monitor
4. LED	LED status indicator
5. DC12V	Power adapter connection (12V/1A)
6. SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images storage
7. ON/OFF	Power switch

Video Output Interface	Function Description
HDMI Interface	Comply with HDMI1.4 standard; 60fps@1080P
USB Video Interface	Connecting USB port of PC for video transfer MJPEG format video

Function Name	Function Description
Video Saving	Video format: 1920*1080 H264/H265 encoded MP4 file Video saving frame rate: 30fps (HD-Pro)
Image Capture	8M (3840*2160, HD-Pro) JPEG/TIFF image in SD card
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	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 (32 & 64 bit) OSx(Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	Ethernet Port: RJ45 Ethernet Port
	Display:19" or Larger

Operating Environment	
Operating Temperature (in Centidegree)	-10°~ 50°
Storage Temperature (in Centidegree)	-20°~ 60°
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH

3. Software and app

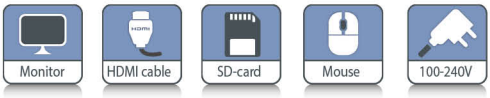
- The ImageFocus Alpha software for Windows, Mac OS and Linux as well as the Android App can be downloaded from the following link: https://www.euromex.com/en/download/
- The App for IOS is only available from the AppStore

4. HD-Pro camera application configurations

You can use the HD-Pro camera in two different ways. Each application requires different hardware environment

4.1 Camera working standalone with built-in embedded software

For this application, apart from the microscope, the user only needs a HD-Pro camera, an HDMI screen, an HDMI cable, a SD card, 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 displayer using the HDMI cable
- Insert the supplied USB mouse to the camera's USB port
- Insert the supplied SD card into the HD-Pro series camera SD card slot
- Connect power adapter to the camera the and switch it on
- Switch on the displayer and view the video in the embedded software. Move the mouse to the left, top or bottom of the embedded software UI, different control panel or UI will pop up and users could operate with the mouse at ease

4.2 Connecting camera to the PC with USB video port

Use ImageFocusAlpha for Windows 7 / 8 / 10 / 11 (32/64 bit)), MacOS (macOS 10.10 or above) or Linux (distributions with kernel 2.6.27 or higher)

The steps to start the camera are listed below:

- Install the ImageFocusAlpha on your PC
- Connect power adapter to the camera the and switch it on. After starting the camera, plug one end of the USB cable into the USB 2.0 Video port of the HD-Pro camera, and plug the other end into the USB port of the PC
- Open ImageFocusAlpha software. The HD-Pro camera will be recognized automatically by software. In ImageFocusAlpha software, select the corresponding HD-Pro camera by clicking the camera name in the camera list

Note:

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

5. Brief Introduction of the HD-Pro's UI and its functions

5.1 Embedded software UI

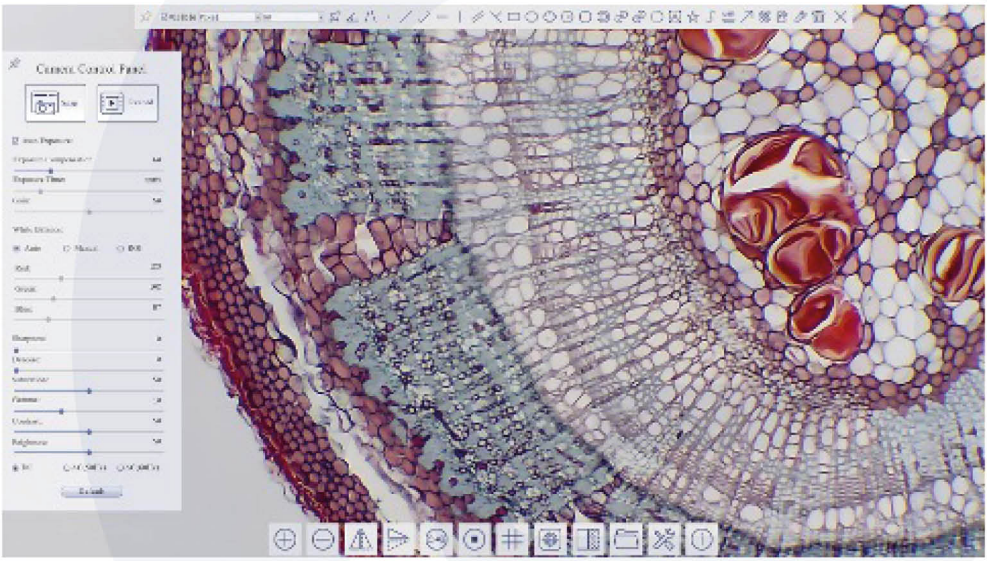
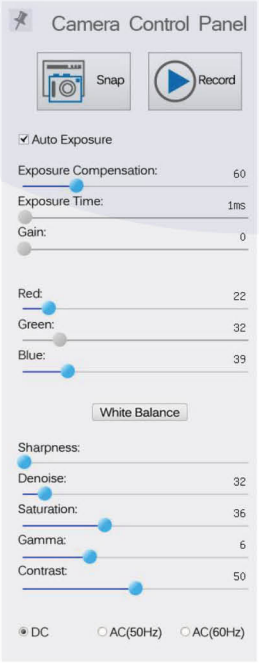


Figure 5.1 The HD-Pro camera control GUI

Notes	
1	To show the **Camera Control panel**, move your mouse to the left of the video window. See Sec.5.2 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, this 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.5.4 for details
3	When users move mouse cursor to the bottom of the video window, the **Synthesis Camera Control toolbar** will pop up automatically - -. See Sec.5.4 for details

5.2 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. It 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 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 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

Camera Control Panel	Function	Function Description
	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.
	Brightness	Adjust Brightness level of the video. Slide to the right side to increase Brightness and to the left to decrease Brightness.
	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

5.3 The Measurement toolbar on top of the video window

The 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

Icon	Function
	Ellipse
	5 Points Ellipse
	Circle
	3 Points Circle
	Annulus
	Two Circles and its Center Distance
	3 Points Two Circles and its Center Distance
	Arc
	Text
	Polygon
	Curve
um	Scale Bar
	Arrow

Icon	Function
	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 ImageFocusAlpha help manual
	Export the Measurement information to CSV file(*.csv)
	Measurement Setup

Icon	Function
	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 Left, Move Right, Move Up, Move Down, Color Adjustment and Delete

Note:

1. When user left-clicks **Display/Hide** button - - on the **Measurement toolbar**, this 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

5.4 Icons and functions of the Synthesis Camera Control toolbar

at the bottom of the video window

Icon	Function
	Zoom In the video Window
	Zoom Out the video Window
	Horizontal Flip
	Vertical Flip
	Color/Gray
	Video Freeze

Icon	Function
	Display Cross Line
	Overlay
	Compare Image with the current video
	Browse Images and Videos in the SD Card
	Settings
	Check the Version of embedded software

The Setting function - - is relatively more complicated than the other functions. Here are more details about it:

5.4.1 Setting>Measurement

Figure 5.4.1 The Measurement Setup

Global	Precision	Used to set the number of digits after the decimal point of the measurement result
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	

5.4.2 Setting>Magnification

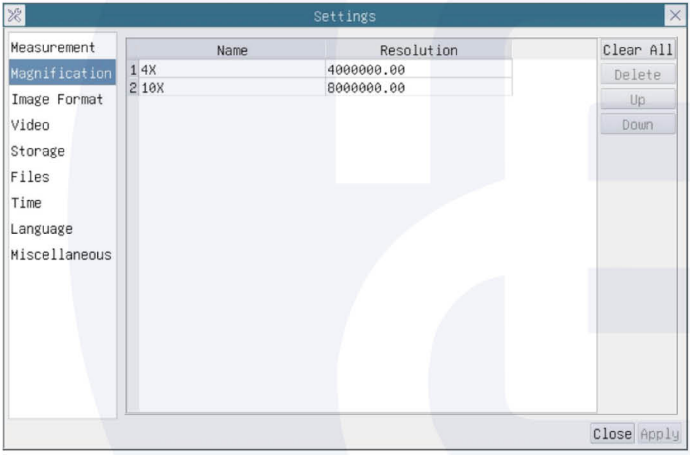


Figure 5.4.2 Comprehensive Magnification Calibration Settings Page

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

5.4.3 Settings>Image Format

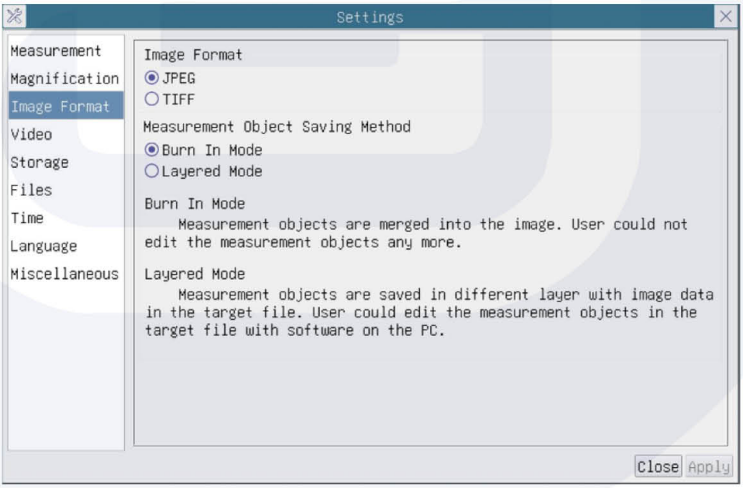


Figure 5.4.3 Comprehensive Image Format Settings Page

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

5.4.4 Settings>Video

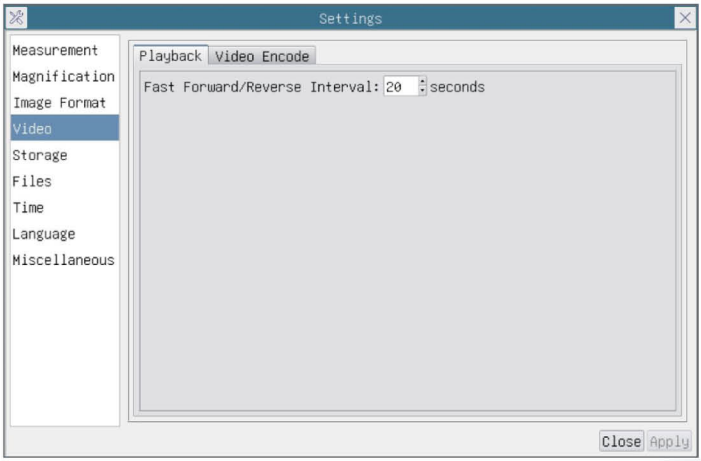


Figure 5.4.4.1 Comprehensive Setting of Video Settings Page-Playback

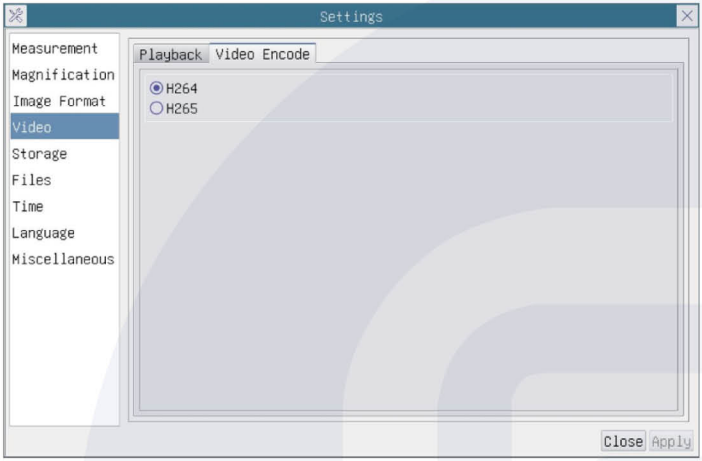


Figure 5.4.4.2 Comprehensive Setting of Video Settings Page-Video Encode

Fast forward/Reverse interval	The time interval of the playback of video files
Video encode	User can choose H264 or H265 encoding. H265 encoding can significantly reduce encoding bandwidth and save storage space under the same encoding quality

5.4.5 Setting>Storage

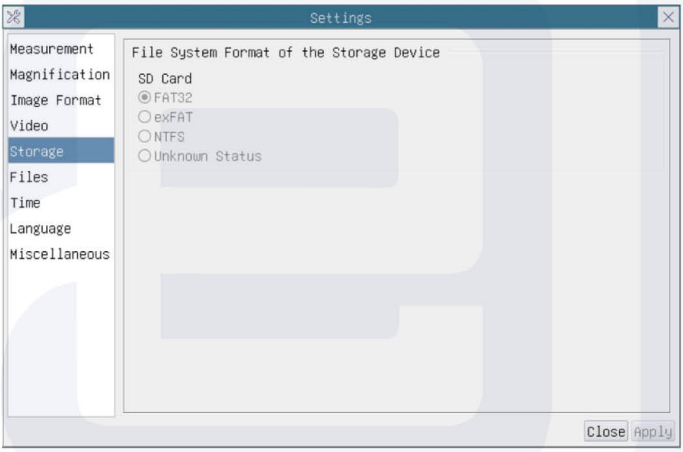


Figure 5.4.5 Comprehensive Setting of SD Card Setting Page

Storage	SD Card: SD Card is only supported as the storage device.
File system format of the storage device	Lists the file system format of the current storage device **FAT32:** The file system of SD Card is FAT32. The maximum video file size of single file is 4G Bytes **exFAT:** The file system of SD Card is exFAT. The maximum video file size of single file is 16E Bytes **NTFS:** The file system of SD Card is NTFS. The maximum video file size of single file is 2T Bytes. Use PC to format the SD Card and switch between FAT32, exFAT and NTFS **Unknown Status:** SD Card not detected or the file system is not identified

5.4.6 Setting>Files

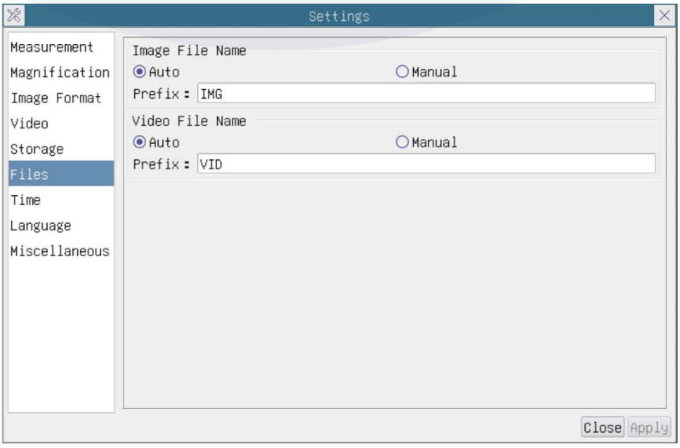


Figure 5.4.6 Comprehensive Setting of Files Settings Page

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.

5.4.7 Setting>Time

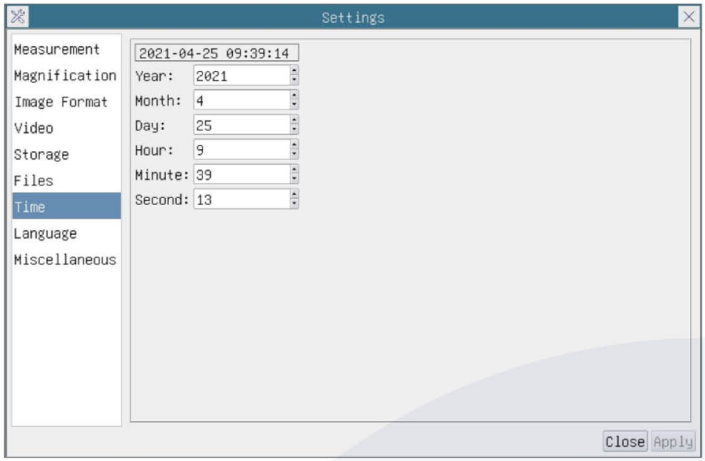


Figure 5.4.7 Time Setting

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

5.4.8 Setting>Language

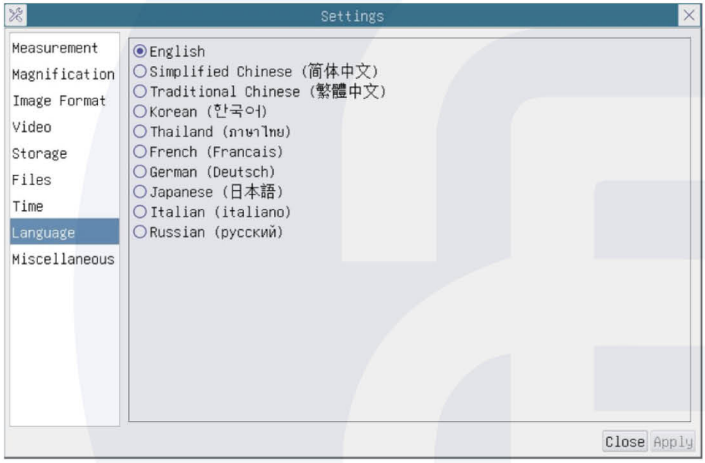


Figure 5.4.8 Comprehensive Setting of Language Selection Setting Page

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
Thai	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 Italia
Russian	Set language of the whole software into Russian

5.4.9 Comprehensive Miscellaneous Settings Page

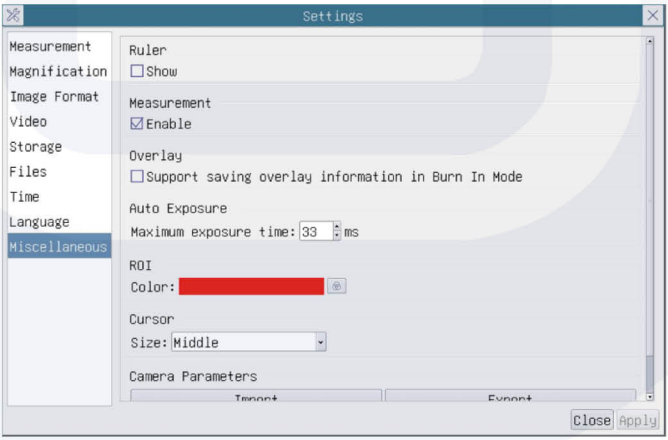


Figure 5.4.9 Comprehensive Miscellaneous Settings Page

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
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
ROI color	Choosing the ROI rectangle line color
Camera parameters import	Import the camera parameters from the SD card to use the previously exported camera parameters
Camera parameters export	Export the camera parameters to the SD card to use the previously exported camera parameters
Reset to factory defaults	Restore camera parameters to its factory status

6. Sample photos captured with the HD-Pro camera

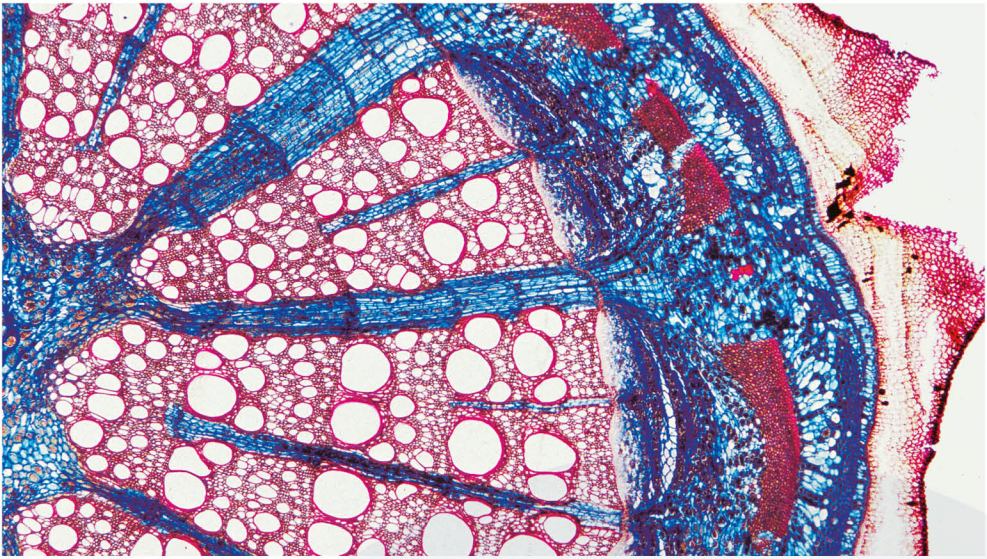


Figure 6.1 Aristolochia clematitis

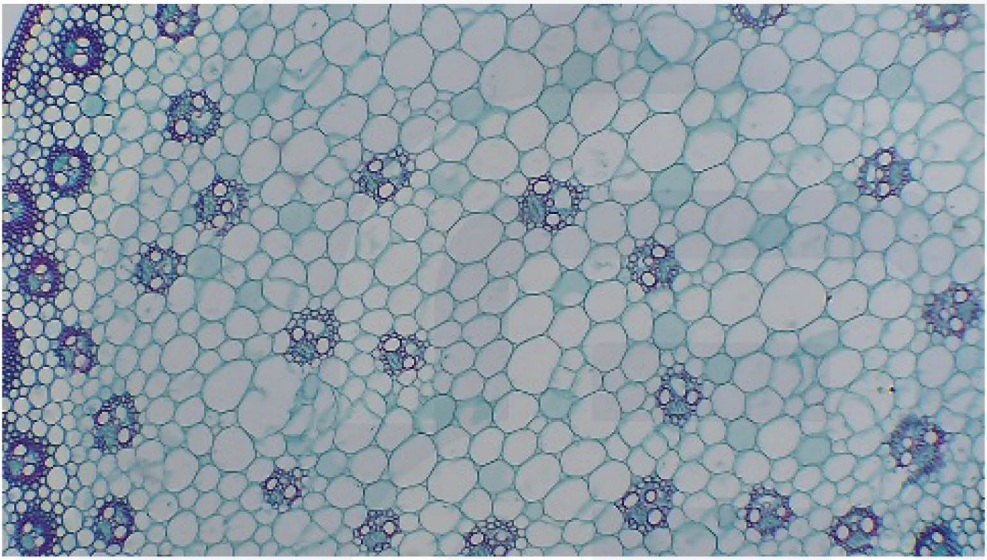


Figure 6.2 Corn stem

7. Contacting customer service

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

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