VC.3023-VC.3024-HDS

camera

euromex
microscopes holland

user manual

Contents

1.0 The application of the VC.3023 and VC.3024-HDS Series Camera

The VC.3023 and VC.3024-HDS series camera is intended to be used for the acquisition of digital images from the stereo microscope and biological microscope. The basic characteristics are listed below:

- Sony Starvis back illuminated CMOS sensor
- Full HD HDMI video outputs
- SD card for captured images and video storage
- Embedded on-screen ImageFocus for the control of the camera
- With strong 'image adjustment' and other related processing functions

Figure 1.0 VC.3023 and VC.3024-HDS series camera

2.0 Available ports on the back of the camera body

(the same for both cameras)

Interface	Function Description
1. HDMI	Complies with HDMI 1.4 standard. 1080 P format video output for standard Full HD monitor
2. USB Mouse	Connect USB mouse for easy operation with embedded On-screen ImageFocus software
3. SD	Complies with SDIO 3.0 standard and SD card can be inserted for video and images storage
4. DC 12 V	Power adapter connection (12 V / 1 A)
5. LED	LED status indicator

Figure 2.0a VC.3023

Figure 2.0b VC.3024-HDS

3.0 VC.3023 and VC.3024-HDS series camera function description

3.1 Video output

Video output interface	Function description
HDMI interface	Complies with HDMI 1.4 standard; 60fps@1080P

3.2 Image capture and video saving in SD card

Function name	Function description
Video saving	Video format: 2 MP (1920 x 1080) H264 encoded MP4 file: Video saving frame rate: 50~60 fps (related with SD card performance);
Image capture	2 MP (1920 x 1080) JPEG image in SD card
Measurement saving	Measurement information saved in different layer with image content; Measurement information is saved together with image content in **burn-in mode**

3.3 Image adjustment function

Function name	Function description
Exposure / Gain	Automatic / Manual exposure
White balance	Manual / Automatic / ROI mode
Sharpening	Supported
3D denoise	Supported
Saturation adjustment	Supported
Contrast adjustment	Supported
Brightness adjustment	Supported
Gamma adjustment	Supported
50 HZ / 60 HZ anti-flicker function	Supported

3.4 Image operation function

Function name	Function description
Zoom In / Zoom Out	Up to 10X
Mirror / Flip	Supported
Freeze	Supported
Cross line	Supported
Embedded files browser	Supported
Video playback	Supported
Measurement function	Supported

3.5 Other functions

Function name	Function description
Restore factory settings	Supported
Multiple language support	English / Simplified Chinese / Traditional Chinese / Korean / Thai / French / German / Japanese / Italian / Russian

4.0 VC.3023 and VC.3024-HDS series camera application configurations

4.1 Camera working standalone with built-in on-screen ImageFocus software

For this application, apart from the microscope, you only need an HDMI monitor, the camera comes with a USB mouse and the camera embedded on-screen ImageFocus software. The steps to start the camera are listed as below:

- Connect the camera to a HDMI monitor using the HDMI cable (1)
- Insert the supplied USB mouse to the camera's USB port (2)
- Insert the supplied SD card into the HDMI camera SD card slot (3)
- Connect the camera to the power adapter and switch it on (4)
- Turn on the monitor and view the screen in the on-screen ImageFocus software. Move the mouse to the left, top or bottom of the on-screen ImageFocus user interface (UI), a control panel or UI will pop up and users will be able to operate at ease with the mouse (Figure 4,1b)

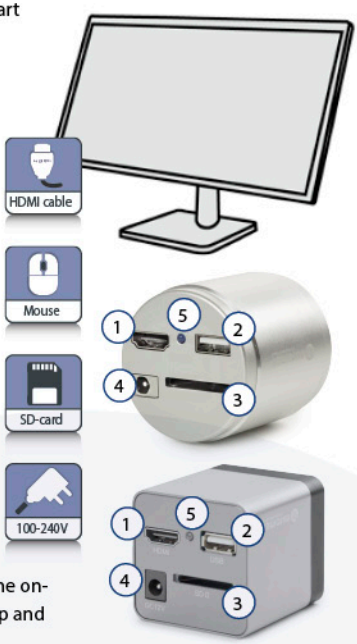


Figure 4.1a VC.3023 and VC.3024-HDS series

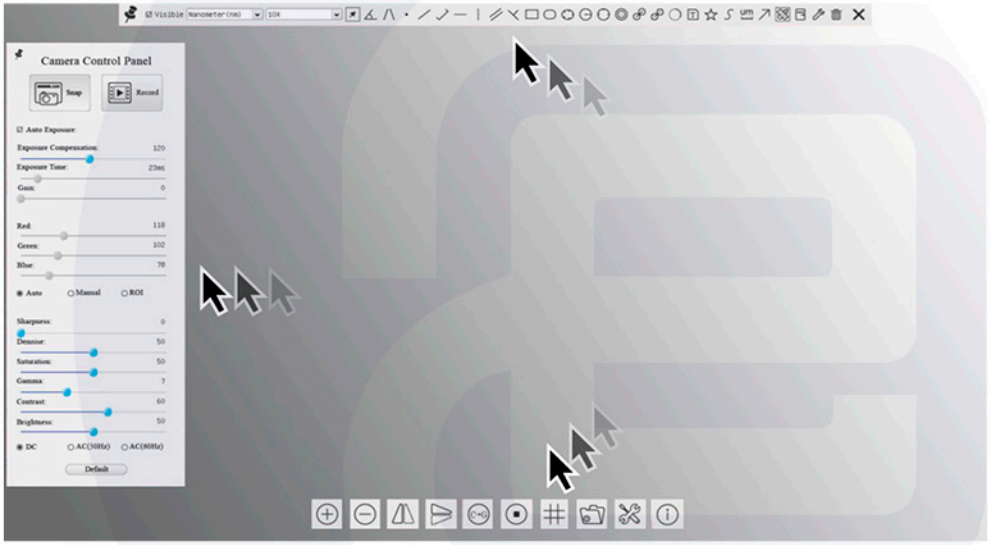


Figure 4.1b Menus

5.0 Brief introduction of the camera's UI and its functions

5.1 On-screen ImageFocus user interface (UI)

The VC.3023 and VC.3024-HDS series camera's UI shown in Figure 5.1 includes a **camera control panel** on the left of the screen, a **measurement toolbar** on the top of the screen and a **camera control toolbar** on the bottom of the screen

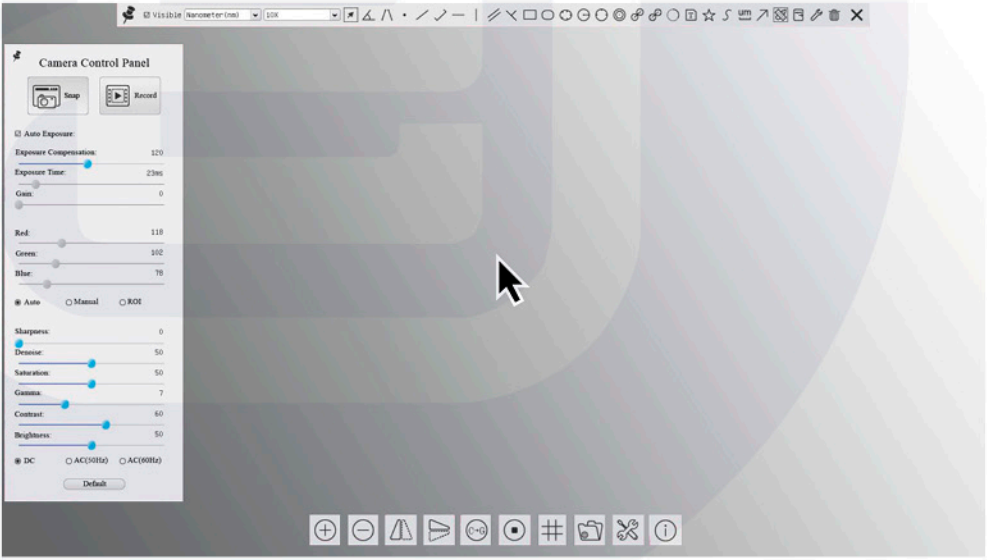


Figure 5.1 The VC.3023 and VC.3024-HDS series camera control UI

Notes	
1	To show the **camera control panel**, move your mouse to the left of the screen. See 4.1b and 5.1 for details
2	Move the mouse cursor to the top of the screen, 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 the mouse cursor to the left side of the screen. Only when user left-clicks the button on the **measurement toolbar** to exit from measuring procedure will he or she be able to do other operations on the **camera control panel**, or the **camera control 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. See Sec.7.3 for details
3	When users move mouse cursor to the bottom of the screen, the **camera control toolbar** will pop up automatically . See 5.4 for details

5.2 The camera control panel on the Left Side of the Screen

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 screen. 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
	Red	Slide to left or right to decrease or increase the proportion of red in RGB on video
	Green	Slide to left or right to decrease or increase the proportion of green in RGB on video
	Blue	Slide to left or right to decrease or increase the proportion of blue in RGB on the video
	Auto white balance	White balance adjustment according to the video continuously
	Manual white balance	Adjust the red or blue item 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.
	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

5.3 The measurement toolbar on top of the screen

The **measurement toolbar** will pop up when moving the cursor to any place near the upper edge of the screen. Here is the introduction of the various functions on the **measurement toolbar**:

Figure 5.3 The measurement toolbar on the upper side of the screen

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
	Ellipse
	5-Points ellipse

Icon	Function
	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
	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
export	Export the measurement information to CSV file(*.csv)
	Measurement setup

Icon	Function
	Delete all the measurement objects
	Exit from measurement mode

Icon	Function
	When the measurement ends, left-click on a single measuring object and the **object location & properties control bar** will show up. The user can move the object by dragging the object with the mouse. But more accurate movement can 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:

- When the user left-clicks the **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 screen. Only when user left-clicks the button on the measurement toolbar to exit from the measurement mode will he or she be able to do other operations with the camera control panel or the camera control toolbar
- When a specific measurement object is selected during the measurement process, 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 camera control toolbar at the bottom of the screen

Icon	Function
	Zoom in
	Zoom out
	Horizontal flip
	Vertical flip
	Color / gray

Icon	Function
	Video freeze
	Display cross line
	Browse images and videos on the SD card
	Settings
	Check the version of on-screen ImageFocus

The setting is relatively more complicated than the other functions. Here is more information about it:

5.4.1 Setting>Measurement

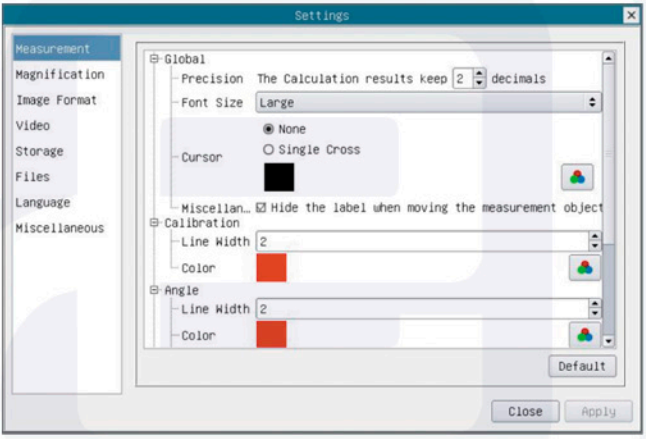


Figure 5.4.1 The measurement setup

Global	Precision	Used to set the number of digits after the decimal point of the measurement result
Calibration	Line Width	Used for defining the width of the lines for calibration
	Color	Used for defining the color of the lines for calibration
	EndPoint type	Used for defining shape of the endpoints of lines for calibration: **null** means no endpoints, **rectangle** means rectangle type of endpoints. It makes alignment easier
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

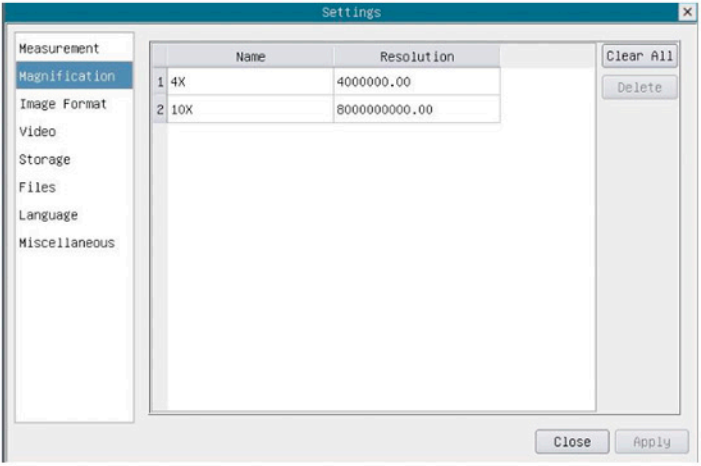


Figure 5.4.2 Comprehensive magnification calibration settings page

Name	The name given to the current calibrated magnification. This typically is the objective magnification, like 4x or 10x etc. Also, other user-defined information could be added into the name. 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 to clear the calibrated magnifications
Delete	Click **Delete** to delete the selected magnification

5.4.3 Settings>Image Format

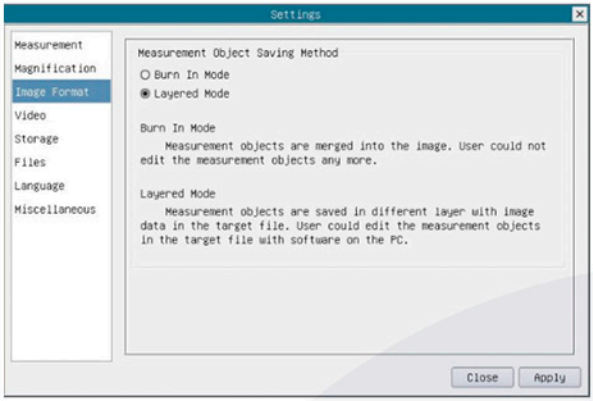


Figure 5.4.3 Comprehensive image format settings page

Measurement object save method	**Burn in mode:** The measurement objects are merged into the current image. User cannot edit the measurement objects anymore. This mode is irreversable **Layered mode:** The measurement objects are saved in a different layer with current image data in the target file. User can edit the measurement objects in the target file with photo editing software (not included) on the PC. This mode is reversable

5.4.4 Settings>Video

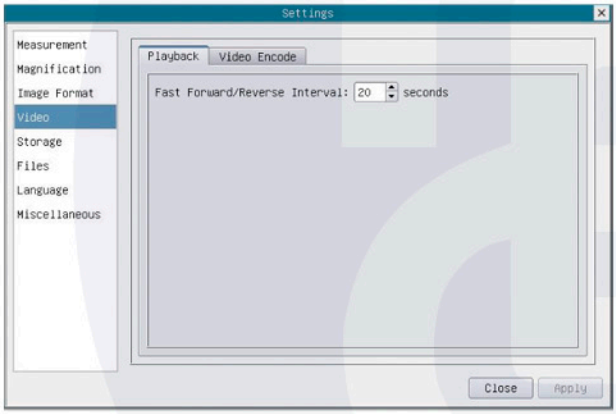


Figure 5.4.4a Comprehensive setting of video settings page-playback

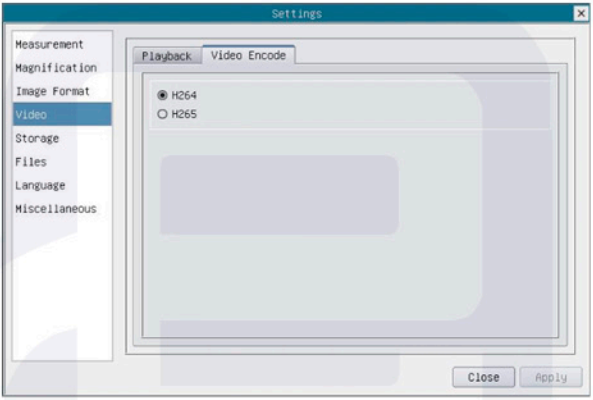


Figure 5.4.4b Comprehensive setting of video settings page-video encode

Fast forward/Reverse interval	The time interval of the playback of video files
Video encode	**H264**: The encoding format of the video files is H264 format **H265**: The encoding format of the video files is H265 format

5.4.5 Setting>Storage

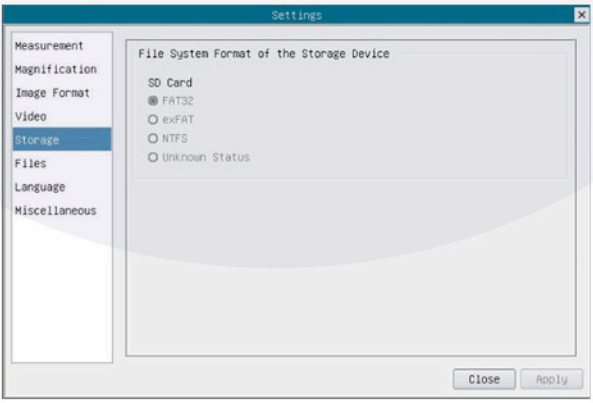


Figure 5.4.5 Comprehensive setting of SD card setting page

Storage device	**SD card**: SD card is only supported as storage device
File system format of the storage device	List 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 4 GB **exFAT**: The file system of SD card is exFAT. The maximum video file size of single file is 4 GB **NTFS**: The file system of SD card is NTFS. The maximum video file size of single file is 4 GB. Use PC to format the SD cards 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

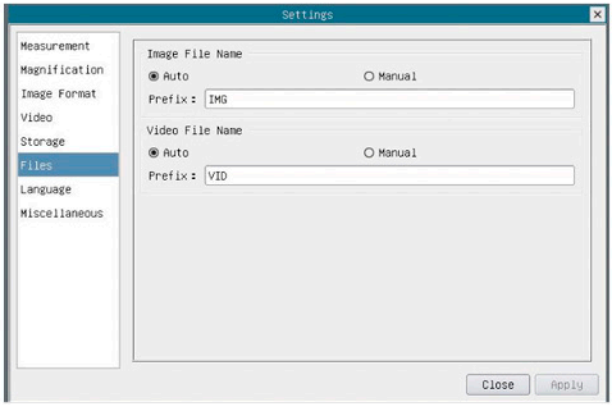


Figure 5.4.6 Comprehensive setting of files settings page

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
Note: The maximum video file size is 4 GB. Multiple video files may be generated automatically during long time video recording	

5.4.7 Setting>Language

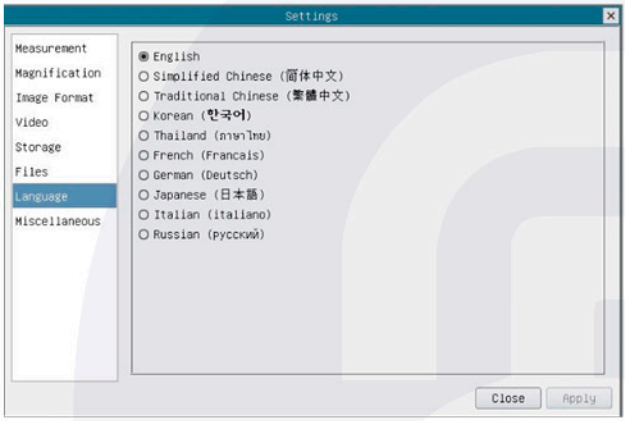


Figure 5.4.7 Comprehensive setting of language selection setting page

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

5.4.8 Setting>Miscellaneous

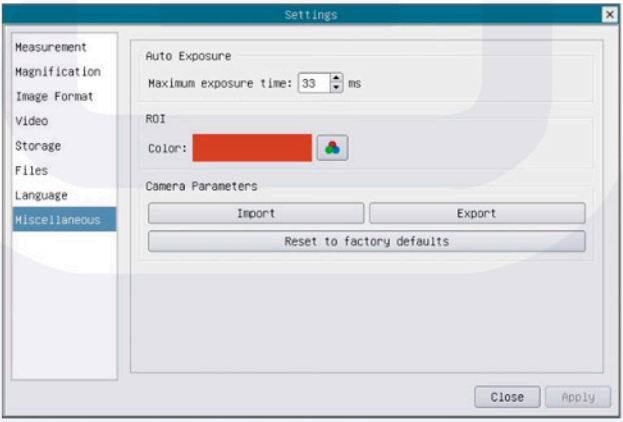


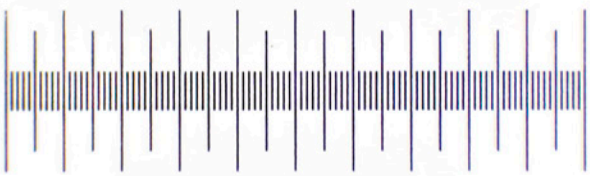
Figure 5.4.8 Comprehensive miscellaneous settings page

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

6.0 Calibration process of HDMI cameras

6.1 Step 1

You need to put a calibration slide like below on your microscope stage:



6.2 Step 2

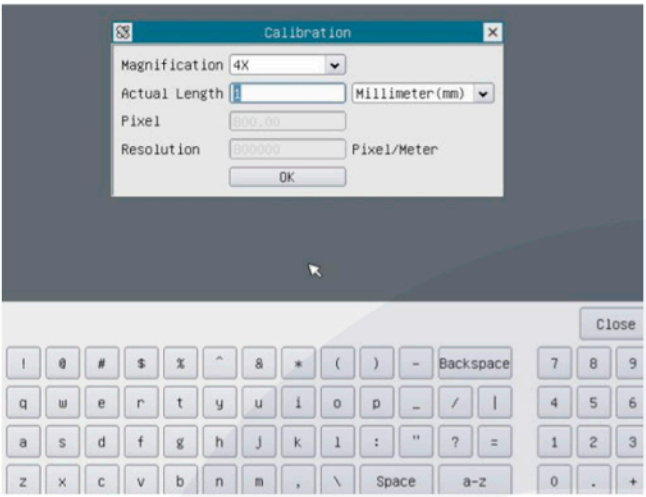
Click the **calibration button** which is circled out in red to start the calibration process

6.3 Step 3

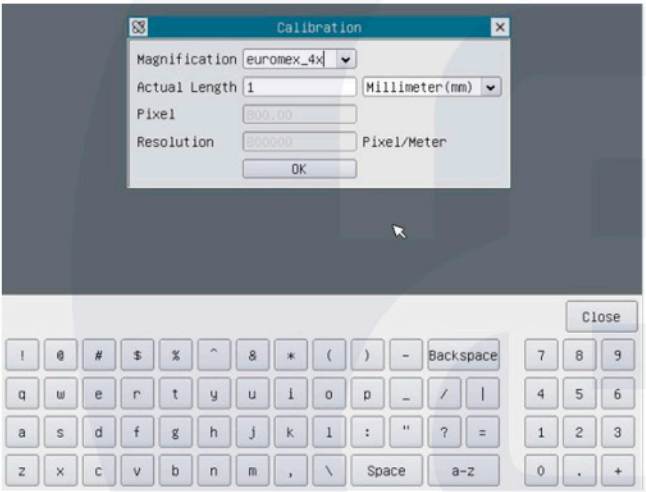
After you click the **calibration button** a calibration window and a soft-keyboard will pop up. Use the soft-keyboard to enter magnification of the microscope and actual length of the calibration slide:

For example: when using a Euromex microscope at 4x: you enter in 4x.

Actual length is the actual length of the calibration slide you are using



You can also name the magnification to be “euromex_4x”



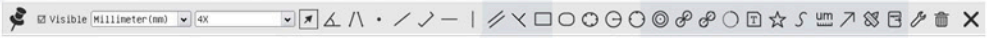
Click OK to complete the calibration process

6.4 Step 4

After the calibration process has been completed you will be able to find the magnification (4x) in menu bar:

Before:

After:



6.5 Step 5

Change the unit of length/area in the dropdown list and start the measuring procedure

7.0 Sample photos captured with these cameras

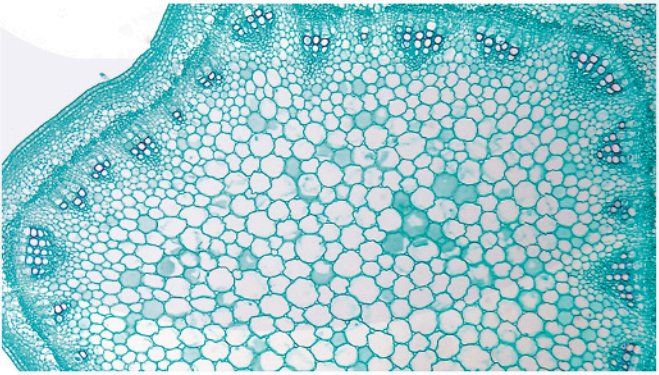


Figure 7.0a Alfalfa stem

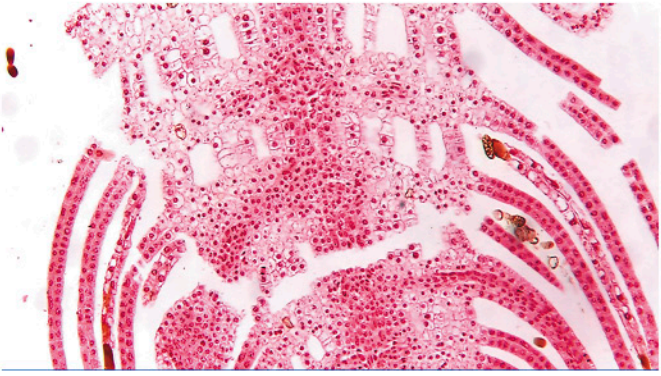


Figure 7.0b Top bud

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