





## User Guide EVO Cam digital microscope

- Multi-axis stand
- Ergo stand



FM 557119

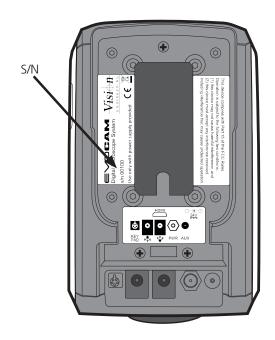
Vision Engineering Ltd has been certified for the quality management system ISO 9001:2008.

## System serial numbers

Unit type	Serial number
EVO Cam	
Multi-axis stand	
Ergo stand	
Focus assembly	
Transmitted substage illumination module (option)	

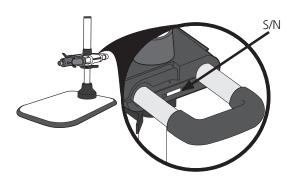
## EVO Cam

On the rear of the unit.



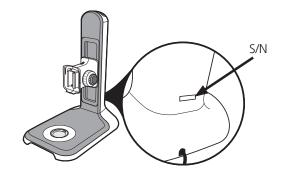
## Multi-axis stand

On the rear of the stand mechanism.



## Ergo stand

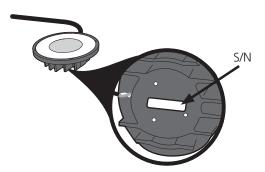
At the base of the column at the back.



# Focus assembly On the rear of the unit.



Transmitted substage illumination module (option)
On the underside of the module.



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## **PREFACE**

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**OPERATION** 

#### General

#### Safety

Before using your system for the first time, please read the Health & safety section of the user guide.

#### Ensure that:

- Your system and accessories are operated, maintained and repaired by authorised and trained personnel only.
- All operators have read, understood and observe the user manual, in particular the safety regulations.

#### Cleaning

- Disconnect your system from the electrical source before cleaning.
- Do not use any unsuitable cleaning agents, chemicals or techniques for cleaning.
- Never use chemicals to clean coloured surfaces or accessories with rubberised parts.
- Use a specialist lens cloth to clean optical surfaces.

#### Servicing

Repairs may only be carried out by Vision Engineeringtrained service personnel. Only original Vision Engineering spare parts may be used.

## Symbols used



## **Warning!**

A potential risk of danger exists. Failure to comply can cause i) a hazard to personnel; ii) instrument malfunction and damage. Please consult the operating instructions provided with the product.



#### Warning of electrical shock hazard

This symbol indicates the presence of electric shock hazards. Please consult the operating instructions provided with the product.



#### Important information

This symbol indicates important information. Please carefully follow the instructions or guidelines.

## Health & safety



Unauthorised alterations to the instrument or non-compliant use shall invalidate all rights to any warranty claims.

#### Electrical safety

- Disconnect your system from the electrical source before undertaking any maintenance.
- Avoid using any form of liquid near the system.
- Do not operate your system with wet hands.

#### Illumination safety

• Do not look directly at the illuminated LED's. This may cause damage to the eyesight.

#### Environmental considerations

- Avoid large temperature fluctuations, direct sunlight and vibrations.
- Ensure electrical components are at least 10cm from walls and combustible materials.
- Position the system on a firm, rigid and level table.
- The equipment should be positioned so that access to the electrical input connector is always available.
- Avoid positioning your system where bright reflections may affect the image.

#### Operator wellbeing

- The advanced ergonomic design and construction of Vision Engineering products are intended to deliver superior ergonomic performance, reducing the exertion of the user to a minimum. Depending on the duration of uninterrupted work, appropriate measures should be taken to sustain optimal operator performance. This could include: Optimal arrangement of workplace; Variation in task activity; Training of personnel on workplace ergonomics and general health and safety principles.
- It is important to set-up and optimise your working environment correctly in order to obtain maximum benefit from the advanced ergonomic design of your system. For more information visit: www.visioneng.com/ergonomics

#### Compliance statements

Vision Engineering and its products conforms to the requirements of the EC Directives on Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS).





All Vision Engineering products conform to the CE mark, demonstrating that each product meets the requirements of the applicable EC directives. Where applicable, other characteristics of the CE directive are implied such as essential health and safety requirements from all the directives that applies to its product, including low voltage directive and the EMC directive.



## Sub-assemblies



## Optical data

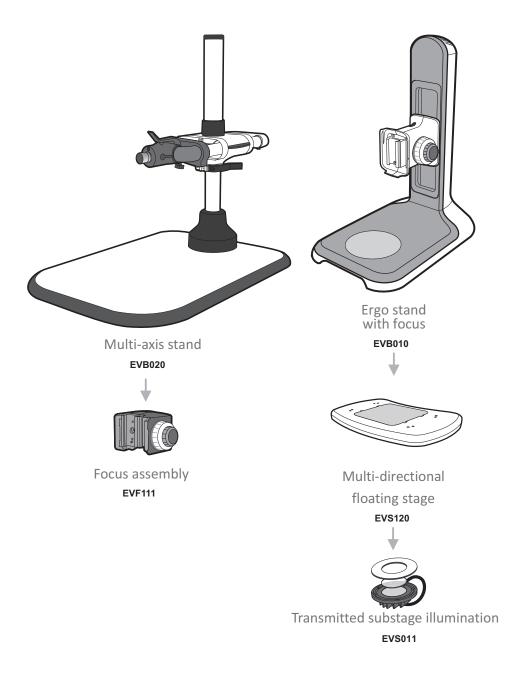
Objective lens	Part number	Magnification zoom range*	Working distance	Field of view at min. zoom	Field of view at max. zoom
				(width / height)	(width / height)
0.454	FC104F	Full field: 4.0x – 67x	176	134mm / 75mm	8.0mm / 4.5mm
0.45x   ECL045	ECLU45	Optimal: 6.7x – 67x	176mm	80mm / 45mm	8.0mm / 4.5mm
0.62x	ECL062	Full field: 5.5x – 92x	128mm	95mm / 53mm	5.7mm / 3.2mm
0.02	ECL002	Optimal: 9.2x – 92x	12011111	57mm / 32mm	5.7mm / 3.2mm
1.0x	ECL100	Full field: 8.9x – 148x	75mm	55mm / 31mm	3.3mm / 1.9mm
1.00	ECLIUU	Optimal: 14.8x – 148x	ווווווכי	33mm / 19mm	3.3mm / 1.9mm

<sup>\*</sup> with 25" monitor

Objective lens	Part number	Magnification zoom range*	Working distance	Field of view at min. zoom (width / height)	Field of view at max. zoom (width / height)
4 dioptre	ECL040	1.8x – 52x	250mm	295mm / 172mm	10.3mm / 5.8mm
5 dioptre	ECL050	2.3x – 65x	200mm	234mm / 137mm	8.2mm / 4.6mm

<sup>\*</sup> with 25" monitor

## Stand options

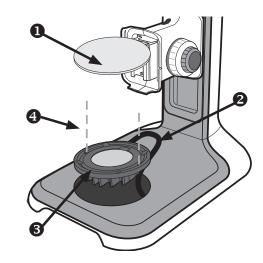


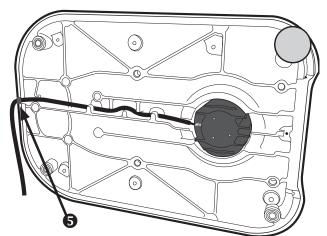


# Transmitted substage illuminator (option)

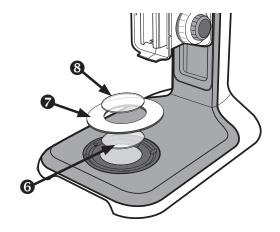
- ▶ Remove the stage cover plate **1** and thread the lead **2** through the stand base.
- ▶ Locate the illuminator **3** into the stage base and secure it with the 2 screws **4**.

- ▶ Carefully lay the Ergo stand on to its side and thread the lead through the base as shown.
- ▶ Push the cable grommet **⑤** into the stand.





- ► Turn the Ergo stand upright and replace the illuminator diffuser **6** shiny side up, surround **7** and glass **8**.
- ▶ Once EVO Cam is installed on the stand (see *page 4*) connect the sub-stage power cable to the EVO Cam.
- If assembling the optional glare reducing filter, this needs to be placed between the diffuser and the surround.



### Stand mounts

#### Ergo stand

- ▶ Locate EVO Cam **1** on to the stand's dovetail interface **2**.
- ► Tighten securing grub screw **3** with Allen key provided

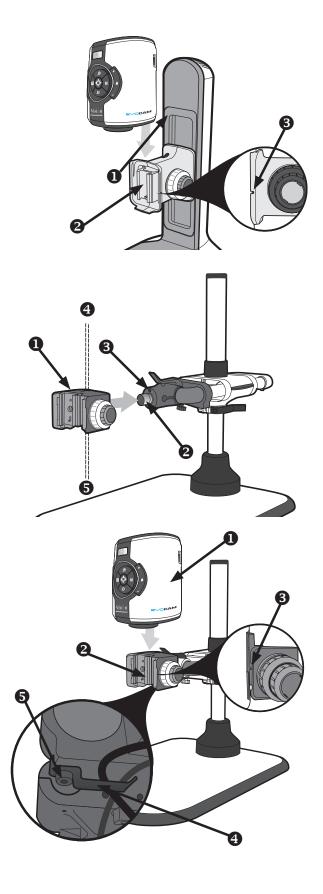
#### Multi-axis stand

- ▶ Place focus assembly **①** on the mounting post **②** so that the locator pin is located in the locator pin recess **③**.
- To change the camera rotation, remove the locator pin from the focus assembly before attaching it to the mounting post and attach the focus assembly in the desired orientation.



Take care when mounting EVO Cam.

- ▶ Ensure the mounting plate is perpendicular to the base or work bench.
- ▶ Tighten the 2x grub screws ④ at the top of the focus assembly and the 2x grub screws ⑤ at the bottom of the focus assembly.
- Locate EVO Cam **1** on to the stand's dovetail interface **2**.
- ► Tighten securing grub screw **3** with Allen key provided
- ▶ Secure the cable retaining clip ④ under the knuckle of the multi-axis stand using the screw ⑤ provided. The clip can be secured to the left or right side.





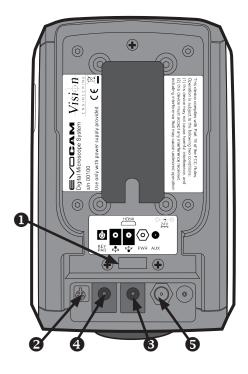
## Objective lens

- ▶ While holding the objective lens **1** in position, use the Allen key supplied to secure the lens by tightening the grub screw **2** finger tight.
- Do not over tighten the grub screw holding the lens in place.



## Cabling

- Plug the HDMI cable into the EVO Cam connector 1 and the other end into your HDMI-compatible monitor or TV
- ▶ Plug the external Control Console (optional) into the 4-pin socket ② at rear of EVO Cam.
- ▶ Plug the transmitted substage illuminator cable into the connector ③ on the rear panel of EVO Cam.
- The transmitted substage illuminator is an option for use with the Ergo stand.
- ▶ If required, an external ringlight (option) can be used with EVO Cam. Plug the external ringlight into the rear panel connector ④ of EVO Cam.
- Only use a Vision Engineering-authorised external ringlight with EVO Cam.
- Plug the power supply into a mains socket. Plug the power lead from the power supply into the EVO Cam power connector 5 on the back of the unit.



## Quick start

- Power on/off
- 2 Zoom in
- 3 Zoom out
- 4 Image capture
- **5** Transmitted substage illuminator (option)
- Overview mode
- Ringlight illumination control
- 8 Menu

#### Power on/off

- 1 Short press = Power on
  - Long press = Power off

#### Zoom control

- 2 Zoom in
- 3 Zoom out

#### Image capture

4 - Capture image

#### Transmitted substage illuminator (option)

- **6** Press '+' to increase brightness
  - Press '-' to decrease brightness

#### Overview mode

**6** - Short press = Activate overview mode (Press any button to exit overview mode)

#### Ring-light illumination control

- Press '+' to increase brightness
  - Press '-' to decrease brightness

#### Menu

Short press = Access camera menu (Press Sto exit menu)



## Image brightness mode

- 8 Long press to activate image brightness mode
- 2 Press to increase image brightness
- **3** Press to decrease image brightness

#### Activate auto white balance

**6** + **8** - Short press together

#### Toggle frame rate (50fps/60fps)

From off, press and hold **1** + **6** until 4 quick beeps are heard.

#### Reset factory defaults

From off, press and hold **1** + **3** until 4 quick beeps are heard.



## Control functions

- ▶ Push the power button **①** to turn the unit on. A blue image will appear on your screen and after a few seconds the picture from the camera will appear. If not, switch your monitor to the input used for EVO Cam.
- ▶ Hold the Power button in for ~3 seconds to power off EVO Cam.

#### Illumination control

- ▶ The integrated ringlight illumination level can be adjusted by the right hand side buttons ②.
- ▶ The optional sub-stage illuminator intensity can be adjusted using the left hand side buttons ③.
- ▶ When connected, the external rightlight illumination level can be adjusted using the right hand side buttons ②.
- The internal ringlight is disabled when the external ringlight is connected.



## Image capture

- ▶ To use this feature, insert a USB memory stick into the USB port **1**.
- ▶ When the system has detected the USB memory stick it will report "USB Key Ready"
- When you have an image you want to capture, simply press the capture button 2.
- ▶ The system will indicate the image is being saved to the drive and indicate when the image has been saved. The image is saved as a 1920 x 1080 bitmap (.bmp) format.
- ▶ The image name is Date and Time stamped and saved in the format: "IMG-DateTime.bmp".
- The USB memory stick must be in FAT File System Format. It will not work with any other format.



## Magnification

▶ Press the Zoom-In button ① to enlarge the subject within the image and Zoom-Out button ② to reduce the subject size within the image. The unit will make a sound to indicate when it has reached maximum or minimum zoom limits.

## Magnification level OSD (On Screen Display)

The current magnification level is displayed for example "x30" to show a magnification level of 30. When the magnification changes from optical to digital zoom a' d' is also displayed, e.g. "x60d" to indicate a magnification level of 60 including digital zoom.



When changing lenses or monitor, the Lens Power and Screen Size settings need to be changed using the menu options (see *page 9*) to ensure the correct magnification is displayed.

#### Overview

Overview allows you to easily locate a point of interest on the object you are viewing.

- Press and release the Overview button 3 to make the camera zoom out fully. A cross is displayed in the centre of the screen as an aid to location.
- ▶ Place the point of interest under the cross and press any key to restore the magnification to the previous level.

## **Brightness**

The image brightness can be adjusted to suit your preference.

- Brightness adjustment is available by pressing and holding the Menu button 4 until you should hear a beep.
- Next use the Zoom In and Zoom Out buttons (1) and
   2) to adjust the image brightness as desired.
- Press the Menu button again to save the setting and exit Brightness mode. The setting you choose will be saved and used subsequently for that mode of operation.





## Factory defaults

To restore EVO Cam to it's factory settings follow the procedure below:

- Ensure EVO Cam is turned off.
- Press and hold the power **1** and Menu **2** buttons until 4 beeps are heard.
- ▶ EVO Cam will then turn on and display default information.
- ▶ Press any button to exit the display and resume operation.

#### Auto-white balance

White balance is the process of removing unrealistic colour casts, so that objects which appear white are rendered white on the display.

- ▶ Place a white sheet under the camera and ensure that it covers more than half the image.
- Press the Menu 2 and Overview 3 buttons together and the EVO Cam will automatically perform a White Balance operation.
- White Balance data is lost when the power is turned off. If the power is turned off, set the White Balance again using this method.

## Main menu options

- ▶ To access the Main Menu press the Menu button ②.
- ▶ The Menu will appear on the top of the screen including the menu navigational controls.
- ► To Exit the menu at any time simply press the overview button ③.

The following menu options are available.

Sound: On / Off

Enable or disable the system sound.

Crosshair: On / Off

Enable or Disable the two artificially generated lines that appear on the screen in both the horizontal and vertical directions which cross at the centre of the image.



#### **OPERATION**

Crosshair: Long / Short

Select the Crosshair size - Short or Long.

Select the crosshair colour

Cross Col: White / Green / Blue / Red / Yellow / Purple

/ Cyan

Bright: Levels 1 – 15

The image brightness can be adjusted to suit your

preference.

White Balance: On / Off

Turns the auto white balance on / off.

Focus: Manual / Auto

Select between manual and auto focus modes. When manual focus is selected EVO Cam's internal focus is fixed - use focus control on the microscope stand to adjust focus in this mode.

Infrared: On / Off

Normally the system filters out Infrared light.

Turning the Infrared On allows this spectrum of light to pass through to the camera.

When the Infrared mode is turned on the image becomes black and white.

Cam WDR: Off / WD / VE

The Wide Dynamic Range mode is a function for dividing an image into several blocks and correcting blocked-up shadows and blown-out highlights in accordance with the intensity difference.

It enables you to view images with large intensity differences.

**WD** – Images with Wide Dynamic Range are reproduced by combining long exposure signals with high-intensity signals obtained with short exposure.

**VE** – Using the Visibility Enhancer function will make the darker part of a camera image brighter as well as automatically correct brightness and contrast to show parts clearly without overexposure.

Pick the option which shows the best results in your application.

Noise R: -3 to 2

The Noise Reduction function removes noise to provide clearer images.

Screen Size: 7 - 100

Enter the size of your display in inches (Measured Diagonally) . This size is used to calculate the magnification levels.

Lens Power: x0.45of, x0.62of, x1.0of, x0.45ff, x0.62ff, x1.0ff, x1.0av, 4 dioptre, 5 dioptre

Enter the Lens power / dioptre number of the lens to be used. This is used to calculate the magnification levels.



'of' is short for Optimal Field, 'ff' is short for Full Field and 'av' is short for All-round View

Unit: Metric / Imperial

Select the units for cursor and grid measurements.

Show OSD: On / Off

Turning the On Screen Display (OSD) off removes all the static messages from the screen. The menu will still be displayed when the menu mode is entered.

Time: xx:xx

Enter the current time starting with minutes and then hours.



Time and Date are only used to Date Stamp the captured images.

Date: xx/xx/xxxx

Enter the current date starting with day, month and then the year.



Time and Date are only used to Date Stamp the captured images.

Rev: xxxxxxxxxx

Displays the firmware revision number of the system. This may be required for support issues.



## Using the control console (optional)

An optional control console can be used with EVO Cam which allows many of EVO Cam's controls to be operated remotely.

The control console can also be used to navigate EVO Cam's menu and select items.



For full details of the control console, refer to the accompanying user guide.

## Changing the camera objective lens

- ▶ Holding the lens barrel **1** from the bottom, use the Allen key supplied to partially unscrew the grub screw **2** releasing the lens from its housing.
- ▶ While holding the objective lens **1** in position, use the Allen key supplied to secure the lens by tightening the grub screw **2**.
- Do not over tighten the grub screw holding the lens in place.



## Troubleshooting

### Changing the output frame rate

Most monitors and HD televisions can display all the many different standards of HD signals, however some cannot. If your monitor/TV does not display the image from the EVO Cam you should try the following: ensure EVO Cam is turned off. Press and hold the Overview and power buttons until 4 quick beeps are heard. This will change between 50Hz and 60Hz modes and display the selected frequency. Press any key to continue using EVO Cam.

#### Taking care of your EVO cam

Do not touch the lens. Dirt on the lens will appear as a blurred or dim image or as fuzzy spots on the screen. If you believe the lens is dirty, it can be cleaned with a soft, dry cloth applying minimal pressure. As the lens is polished and coated, do not use a wet or coarse cloth, avoid detergents and abrasive substances or solvents to clean it.



Never look directly at the LED light source for any prolonged period of time.

Use only the supplied power supply and inspect the cabling regularly for damage.



EVO Cam contains a small battery to enable time and date settings to be retained while the unit is powered off. Should the battery need replacing please contact you Vision Engineering representative who will be able to advise you.



## Firmware upgrade

EVO Cam includes a Firmware Upgrade Function allowing users to install new versions of the firmware.

- Make a directory called "Upgrade" in a USB memory stick. If the directory already exists then delete all the .bin files from that directory.
- ▶ Copy the two upgrade files to this "Upgrade" directory. The files should be in the format "ARMxxxx.bin" and "FPGAxxxx.bin". The "xxxx" shows the version number.
- ▶ To enter the Firmware Upgrade Function, power up the system with the front panel Zoom In and Zoom Out buttons pressed.
- ▶ The system will make a sequence of 5 beeps upon entry to the Firmware Upgrade Function.
- A beeping sound will be emitted until a USB Flash Drive is detected. If no drive is detected the system will timeout after approximately 20 seconds and turn on normally.
- ▶ To exit the Firmware Upgrade function before the USB drive is detected, simply power cycle the system by pressing the Power Button.
- When the USB memory stick is detected, the Firmware Upgrade Function searches the "Upgrade" directory for the 1st file with the name format "ARMxxxx.bin" and upgrades the ARM processor.
- ▶ The Firmware Upgrade Function then searches for the 1st file with the name format "FPGAxxxx.bin" and upgrades the FPGA Firmware.
- ▶ **NB:** The Firmware Upgrade Function will use the 1st file with the correct name format it finds. Therefore it is recommended that you only have the firmware version that you want to install in the "Upgrade" directory and not multiple versions.
- ▶ During the upgrade process beeping sounds will be emitted indicating progress.
- ▶ When the upgrade is complete the system will automatically restart with the new version.

## Lighting controller firmware update

In addition to the standard upgrade, the light control can be upgraded with new firmware. To upgrade the light control firmware:

Copy the EVOLxxx.bin into the Upgrade directory on a USB drive.

Power off the system, then press and hold the Menu, Zoom in and Power button until 4 quick beeps are heard.

The system will start normally until the USB flash drive is detected; it will then enter the light control upgrade mode and display "UPGRADE IN PROGRESS" and emit a number of beeps whilst the upgrade is uploaded and applied.

When the upgrade is complete the unit will emit a longer beep and briefly display "UPGRADE FINISHED".

Use the illumination controls to re-set the illumination level after the upgrade.

#### **Important**

If the USB memory stick is removed during the upgrade process or contains a corrupt file, the system will not restart and the upgrade process will have to be repeated.

Camera resolution:	HD 1080p, 1920x1080 at 50/60 Hz		
Monitor connections:	HDMI		
Monitor requirements:	HD ready or full HD (recommended)		
Outputs:	HDMI		
Image capture:	USB 2.0 High-speed		
Dimensions:	11 x 16.5 x 14 cm (w x h x d)		
Power:	Max. 72 Watts - depending on external attachments		
Operating temperature:	Storage: -10°C to +60°C. Operating: +5°C to +40°C		



## Service record

Service	Comments	Date of service	Date of next service	Company	Signature





#### **WARRANTY**

This product is warranted to be free from defects in material and workmanship for a period of one year from the date of invoice to the original purchaser.

If during the warranty period the product is found to be defective, it will be repaired or replaced at facilities of Vision Engineering or elsewhere, all at the option of Vision Engineering. However, Vision Engineering reserves the right to refund the purchase price if it is unable to provide replacement, and repair is not commercially practicable or cannot be timely made. Parts not of Vision Engineering manufacture carry only the warranty of their manufacturer. Expendable components such as fuses carry no warranty.

This warranty does not cover damage in transit, damage caused by misuse, neglect, or carelessness, or damage resulting from either improper servicing or modification by other than Vision Engineering approved service personnel. Further, this warranty does not cover any routine maintenance work on the product described in the user guide or any minor maintenance work which is reasonably expected to be performed by the purchaser.

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