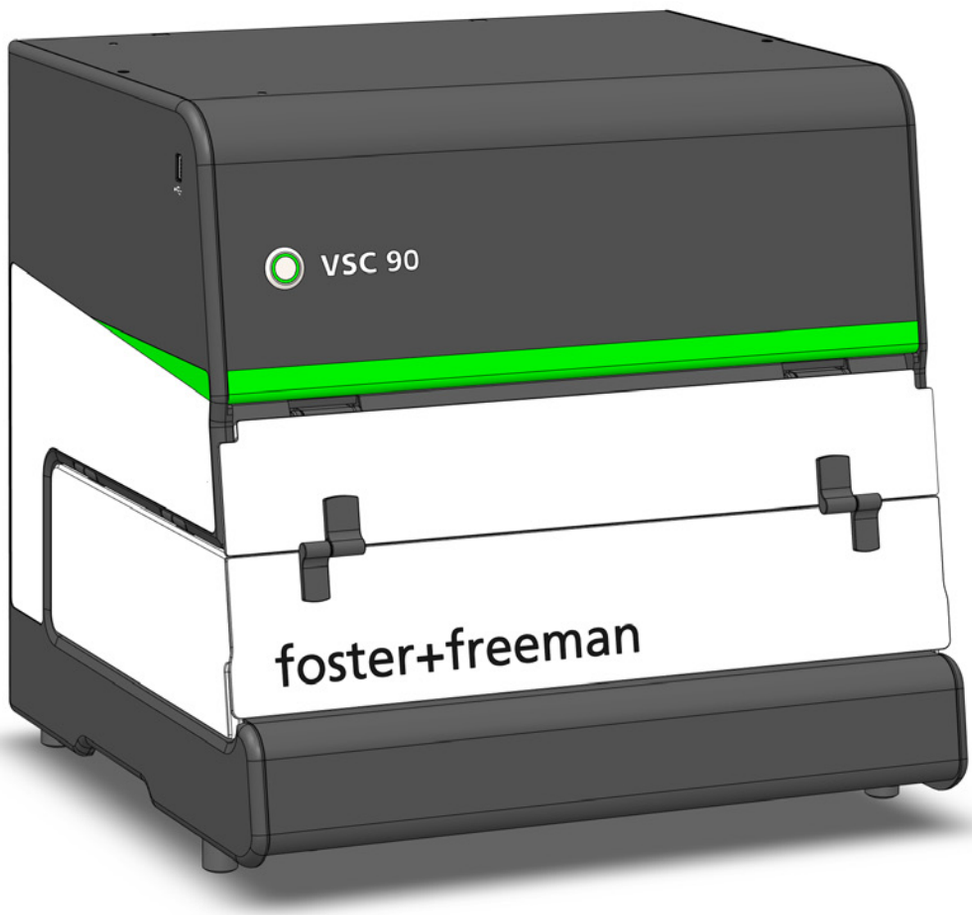
VSC®90

Video Spectral Comparator

User Manual

VSC®



Product: VSC®90.
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Customer Support and Feedback
foster+freeman welcome feedback from Customers regarding this product. Please contact one of our offices if you would like to pass on your comments.
foster+freeman are pleased to offer advice, installation, training and on-site maintenance worldwide for all of their products.
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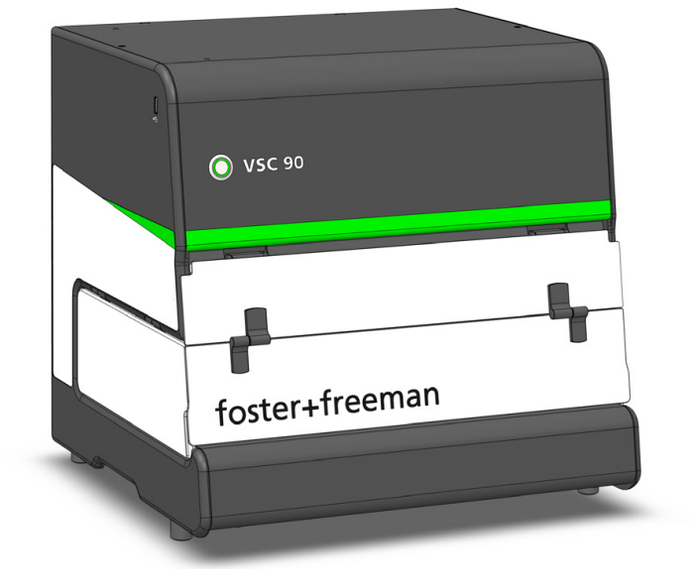
Specification
foster+freeman reserves the right to alter the specification of this product, accessories, and consumables without prior notice.

Copyright

Welcome



Welcome to the foster+freeman VSC®90 Video Spectral Comparator.
This equipment contains various light sources, methods of illumination and optical filters for the examination of questioned documents.

About this manual

Please read this information before using the product for the first time.

Important information regarding the use of text, illustrations, safety and warnings within this manual.

Text

Text formats are used as follows:

⚠ Important operating information
Additional notes and advice

Illustrations

Illustrations are for explanatory purposes only. The appearance of the product, its components, accessories, and consumables may differ from that shown.

Safety and Warning Markers

	Prohibited	Red markers prohibit certain actions or procedures. Disregard of these warnings may pose a health or safety risk to the user or cause damage to the equipment.
	Caution	Yellow markers warn of a hazard. The user should be aware of the associated risk and take appropriate precautions.
	Mandatory	Blue markers advise mandatory health and safety procedures, or other notable information. Disregard of the advice may increase an associated risk.

Before using the equipment for the first time, please read the safety information on the following pages.

About this product

Please read this information before using the product for the first time.

Every effort has been made to ensure that the information presented in this document is correct at the time of writing. Foster+freeman reserve the right to make changes without prior notice.

Product Compliance

When correctly employed by appropriately trained personnel, this equipment is fully compliant with the relevant standards laid down by the UK Health & Safety Executive (HSE).
Such compliances include:

- UKCA, CE and RoHS compliant.
- EN61010-1 safety standard for laboratory equipment compliant.
- EN62471 photobiological safety of lamps compliant.
- Electrical Safety Testing - (EST) EN 61010-1 :2010 - Safety requirements for electrical equipment for measurement, control, and laboratory use.
- Electromagnetic (EMC) - EN 61326-1 :2013 - Electrical equipment for measurement, control and laboratory use - EMC requirements.
- Electromagnetic (EMC) - FCC 47 CFR 15B – Radio Frequency Devices.
- Radio Equipment - ETSI EN 300 330 V2.1.1 - Short Range Devices (SRD).
- Artificial Optical Radiation (AOR) - EN 62471:2008 - Photobiological safety of lamps and lamp systems.
- ROHS - EN 63000:2018 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
- Low Temperature Storage - BS EN 60068-2-1:2007.
- High Temperature Storage - BS EN 60068-2-2:2007.
- Temperature Change - BS EN 60068-2-14:2009.
- Cyclic Humidity - BS EN 60068-2-30:2005.
- Vibration and Shock Test Sequence: BS EN 60068-2-64:2008.
- Vibration and Shock Test Sequence: EN 60068-2-27:2009.
- Freefall Drop - BS EN 60068-2-31:2008.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Contact foster+freeman customer service or an experienced radio / TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference,
2. This device must accept any interference received, including interference that may cause undesired operation.

Modifications not expressly approved by foster+freeman will void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Hazard Protection

When correctly employed, this equipment provides the user with the necessary level of protection from operating hazards. Protection provided by the equipment may be impaired if the equipment is used in a manner not specified in the operating instructions.

Certificate of Conformity

A certificate of conformity for this product is available from foster+freeman Ltd.
This equipment is manufactured in conformity with the requirements of the relevant directives of the European Community through compliance with a number of harmonised standards.

Calibration and Adjustment

This equipment is correctly calibrated and adjusted at the time of manufacture.
Provided that the equipment is used in accordance with its operating instructions and is not maltreated, no further calibration or adjustment is required.

Safety Information

Please read this information before using the product for the first time.

In the event of a query, please contact customer support:
customersupportteam@fosterfreeman.com

General Safety

- Do not tamper with the safety interlocks.

- Use the equipment only for the intended purpose.
- Use the equipment only in accordance with the operating instructions.
- Use only with equipment specified by foster+freeman.
- Do not use damaged equipment.
- Do not operate the equipment with any access cover removed.
- Do not remove any access covers.
- Access covers are only to be removed by trained individuals authorised by foster+freeman.
- Use only with spares, accessories or other consumables supplied by foster+freeman.
- Dispose of the equipment only in a responsible manner.
- Do not attempt to defeat the safety interlocks.
- Do not place head inside the VSC®90.
- The VSC®90 contains an RFID module that is classified as an intentional transmitter.

- Employ safe working practices.

Location

- Indoor use only.

- Do not operate the equipment outdoors.
- Position the equipment in a way that it can be easily disconnected if required.

Disposal

- Do not discard with normal commercial or domestic waste.

- Dispose of the equipment only where appropriate disposal or recycling facilities exist.

- Comply with all relevant legislation

This equipment falls within the scope of the European Directive 2002/96/EC on Waste Electrical & Electronic Equipment (WEEE)

Product Life Cycle Considerations

During the design and manufacture of our products, foster+ freeman has considered the environmental aspects of its activities, products, and services that it can control or influence, with regard to the following:

- Electrical items - Waste Electrical and Electronic Equipment Regulations SI 2013/3113
- Wiring - Waste Electrical and Electronic Equipment Regulations SI 2013/3113
- PCBs - Directive 1996/59/EC (OJ:L243/31/96) on the disposal of PCBs and PCTs
- Metalwork - Scrap Metal Dealers Act 2013 Chapter 10
- Plastic - Waste (England and Wales) Regulations SI 2011/988
- Glass - Dispose of as household waste.
- Batteries - Waste Batteries and Accumulators Regulations SI 2009/890

The legislation listed is the disposal route for products / items in the UK, disposal in territories outside of the UK must be in accordance with the legislation of that country.

Electrical Safety

- DANGER: Risk of electric shock.
- This equipment must be earthed.

- Operate the equipment only from an appropriately rated electrical power source in accordance with the regulations of the country of use.
- Only use a suitably rated detachable mains cord for this equipment.
- Switch off when not required for use.
- Do not operate the equipment with damaged electrical connection cables.
- Do not operate the equipment without a reliable earthed connection.
- Do not replace any electrical spares.
- Do not operate this equipment with an incompatible mains electricity supply.

- Indoor use only.

Mains Power Adaptor

- Do not open.

- DANGER: Risk of electric shock.

- Check mains power compatibility.

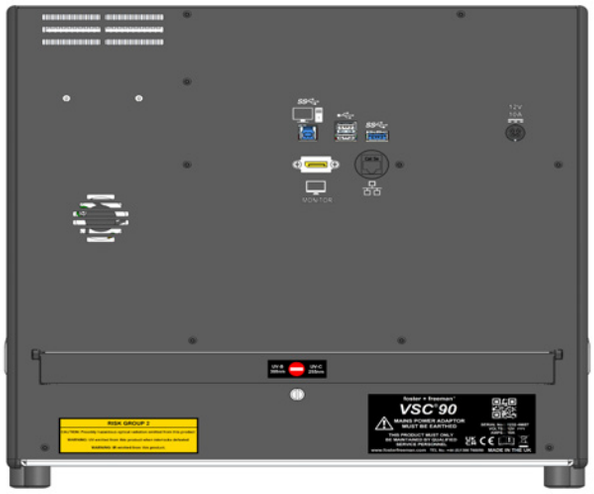
If the local power supply is potentially unstable, the use of an Uninterruptible Power Supply (UPS) is recommended.

Mechanical Safety

- CAUTION: Heavy.
- Use safe lifting and handling procedures.
- Weight of main unit, excluding PC, monitor or accessories = 17kg

- CAUTION: Fragile.

Optical Safety



RISK GROUP 2

CAUTION: Possibly hazardous optical radiation emitted from this product

WARNING: UV emitted from this product when interlocks defeated

WARNING: IR emitted from this product.

Risk Group 2 (Eye Safety)

- CAUTION: Possible optical radiation hazard.

- Do not stare at LEDs.
- Do not look directly at any of the light sources while they are active.
- UV emitted from the product if safety interlocks are defeated.

The VSC®90 has been classified to BS EN 62471 and is in excess of the Exempt Group, meaning that the system potentially poses a photobiological hazard.

The photobiological hazard to the user exists only when the lid of the main unit is open.

This product has been classified as Risk Group 2. The appropriate warnings are shown. Exposure Hazard Values (EHV) at the nominal worst-case exposure distance of 20 cm are as shown. Maximum daily safe exposure times based on Directive 2006/25/EC are also listed. Exposure times are representative of the normal use of the product.

Exposure Hazard Values (EHV)

This product has been classified as Risk Group 2. The appropriate warnings are shown. Exposure Hazard Values (EHV) at the nominal worst-case exposure distance of 20 cm are as shown.

- Note that UV daily exposure times are cumulative.
- Shortwave and Mediumwave UV (255nm and 308nm) present no EHV hazard when the safety interlocks are active.

- Do not touch any LEDs.
- Do not stare at any of the light sources.
- Do not place head near or inside the main VSC®90 unit.
- Do not defeat the safety interlocks.
- Wear adequate hand protection if using any of the UV light sources for extended periods of time.
- Avoid eye or skin exposure to unshielded UV if safety interlocks are defeated.
- Shortwave and mediumwave UV (255nm and 308nm) are very hazardous when the safety interlocks are defeated.

Note that in almost all cases the 20cm exposure distance cannot be achieved without inserting the head into the VSC®90. Please note that these values are subject to change.

LED source	Hazard	Risk Group	EHV at 20cm from source
Coaxial white	Blue light	1	28.66%
Transmitted flood UV 365	Actinic UV (eye and skin)	1	45.86%
Transmitted flood white (5000K)	Blue light	0	25.45%
Transmitted flood IR 850 nm	IR Eye	0	17.56%
Transmitted spot white (5000K)	Blue light	0	87.68%
Transmitted spot IR 780 nm	IR Eye	0	3.19%
Transmitted spot IR 850 nm	IR Eye	0	0.16%
Flood UV 255 nm	UVA Eye	3	4466.93%
Flood UV 308 nm	UVA Eye	3	142.57%
Flood UV 365 nm	UVA Eye	0	68.5%
Flood 780 nm	Retinal thermal	0	0.14%
Flood 850 nm	IR Eye	0	9.62%
Flood 940 nm	IR Eye	0	8.03%
Flood 980 nm	IR Eye	0	3.79%
Flood White (5000K)	Blue light	0	89.12%
Side light white (5000K)	Blue light	1	95.13%
Side light IR 850 nm	IR Eye	0	13.25%
OVD white (5000K)	Blue light	1	93.34%
Anti-stokes (IR 980 nm)	IR Eye	0	7.11%
Spot Violet 410 nm	Blue light	0	47.34%
Spot Blue 445 nm	Blue light	1	30.66%
Spot Blue-Green 475 nm	Blue light	0	57.52%
Spot White (5700K)	Blue light	0	15.41%
Spot Cyan 500 nm	Blue light	0	21.37%
Spot Green 525 nm	Blue light	0	4.77%
Spot Orange 590 nm	Blue light	0	0.55%
Spot Red 640 nm	Blue light	0	0.10%
Spot Deep Red 660 nm	Blue light	0	0.08%
Spot Far Red 740 nm	Retinal thermal	0	0.02%

Risk Group 3

Risk group 3 sources are high risk and may pose a hazard even for brief exposure. Only the UV 255nm and 308nm are risk group 3 and only if the safety interlocks are defeated. Interlocked flaps make these light sources completely safe.

Risk Group 2

Risk group 2 sources are moderate risk and describe a light that does not pose a hazard due to the aversion response to very bright light sources. Some blue LEDs in the Flood and Spot illumination plus the sidelights are risk group 2, do not stare at LEDs.

Risk Group 1

Risk Group 1 is a low-risk classification for an LED that does not pose a photobiological hazard due to normal behavioural limitations on exposure.

Risk Group 0 (Exempt)
Risk Group 0 is a zero-risk classification for an LED that does not pose any photobiological hazard, as defined by EN 62471.

Ultraviolet Light Sources

This equipment contains light sources that can produce UV-A, UV-B and UV-C radiation.

UV-A (365 nm)

- CAUTION: UV emitted from this product.

- CAUTION: Eye or skin irritation may result from exposure.
- Do not look directly at any of the longwave (365 nm) UV sources whilst they are active.

- Use appropriate shielding.

UV-B (308 nm); UV-C (255 nm)

- Do not tamper with safety interlocks.
- UV emitted from this product if safety interlocks are defeated.

- CAUTION: UV radiation.
- CAUTION: Risk of eye damage.
- CAUTION: Risk of skin damage.

Safety interlocks prevent the operation of potentially hazardous light sources unless the shielding flaps on the canopy are properly lowered.

Skin Protection

- CAUTION: Risk of skin damage.

- Wear personal protection equipment.

Wear lightweight gloves whenever the UV sources are to be used for extended periods with the lid of the main unit open. Almost any form of covering will fully protect the skin from injury.

Anti-Stokes Light Sources (IR 980 nm)

- NOTICE: Infrared radiation emitted from this product.

- Use appropriate shielding or eye protection.

Other Light Sources

Risk group information regarding other light sources within this equipment.

Risk Group 0

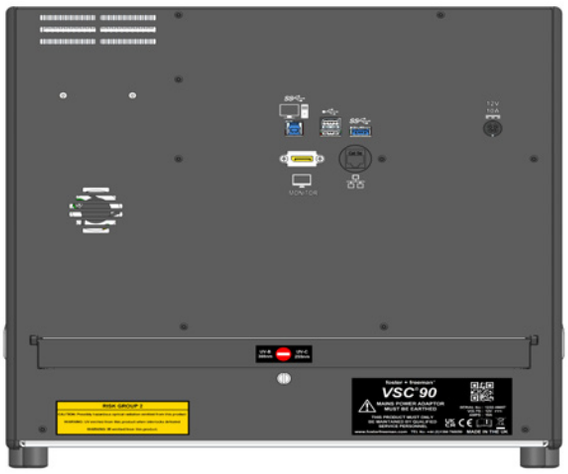
All other light sources, with the exception of those listed above, within this product are classified as Risk Group 0.

Risk Group 0 is a low-risk classification for an LED that does not pose any photobiological hazard, as defined by EN 62471.

Thermal Safety

- The unit contains several sources of heat such as light sources and electronic circuits.
- No user serviceable lighting.

- Maintain adequate ventilation.
- The equipment generates heat that is removed by natural convection and with the use of a forced air cooling fan.



Do not block ventilation from the rear of the unit when the equipment is in use.

Service, Care and Maintenance

In the event of a query, please contact Customer Support:
customersupportteam@fosterfreeman.com

Servicing

- This equipment contains no user-serviceable parts.
- The equipment contains no user-replaceable parts.
- Do not use spares, accessories, or other consumables other than those supplied by foster+freeman.
- Refer all servicing to qualified foster+freeman personnel.
- Unauthorised servicing may void the warranty on this product.

Care

- This product contains optical and other glass components.
- Protect the equipment from damage and contamination.
- When not required for use, store the equipment under its protective cover.
- Handle with care.
- Do not subject the equipment to mechanical shock.
- Do not drop.

Cleaning

- Do not use abrasive cleaning materials or those containing strong acids or alkalis.
- Do not allow the ingress of liquids or other contaminants.
- Do not immerse.

Remove dust deposits from external surfaces using a soft dry cloth or paper tissue. When necessary, use a soft cloth of paper tissue dampened with a mild cleaning solution. Allow all surfaces to dry thoroughly before resuming use.

Water-based solutions should only contain a little liquid soap, detergent, or mild bleach. Alcohol-based cleaning agents may eventually degrade the surface of some types of plastic and should be used sparingly on such materials.

Maintenance

- DANGER: Risk of electric shock.

- Disconnect mains power before removing cover.

Access Covers

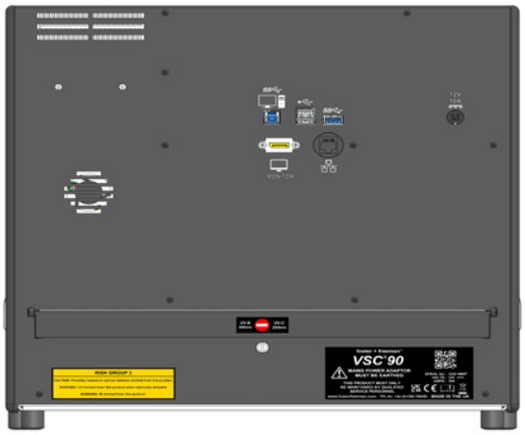
- Do not remove any access covers.
- Do not operate with any access covers removed.
- Access covers should only be removed by persons trained and authorised by foster+freeman to carry out maintenance procedures.

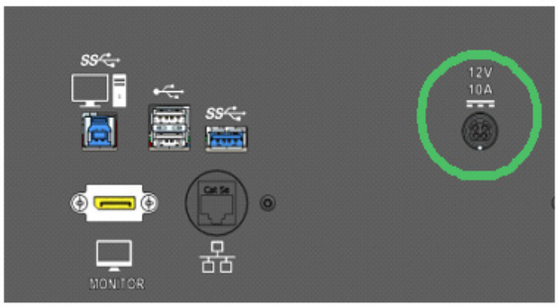
VSC®90 - Main Unit

Electrical Specification

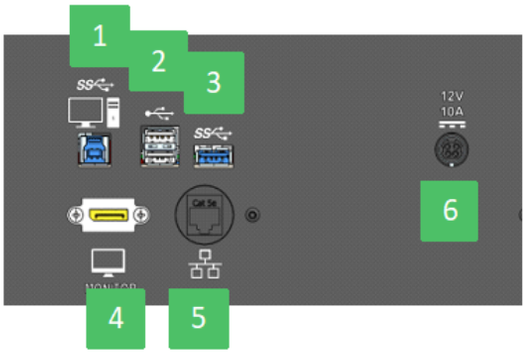
- Do not connect this product with an incompatible mains supply.

Mains input
100-240V AC, 50-60Hz 120W MAX 2.0A MAX

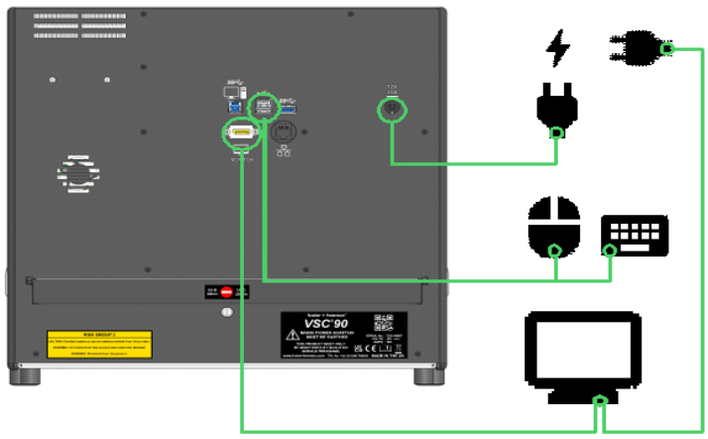




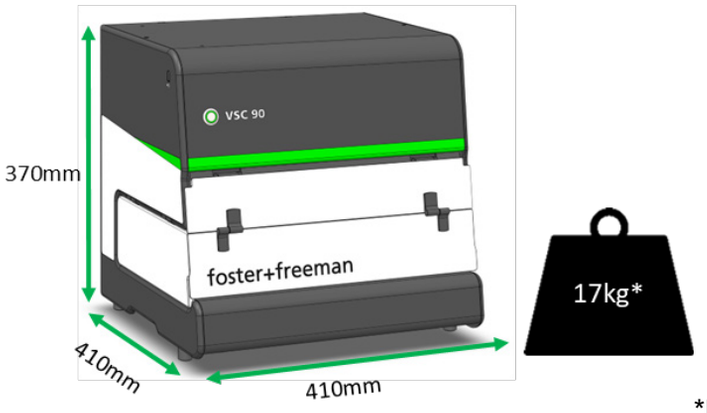
Electrical Connections



1. Computer connection via USB 3.0 for external computers.
2. USB 2.0.
3. USB 3.0.
4. Monitor connection.
5. Ethernet connection.
6. Mains electrical input.



Mechanical Specification



*Excluding PC, monitor and accessories.

Environmental Specification

- Indoor use only.
- Maintain adequate ventilation.

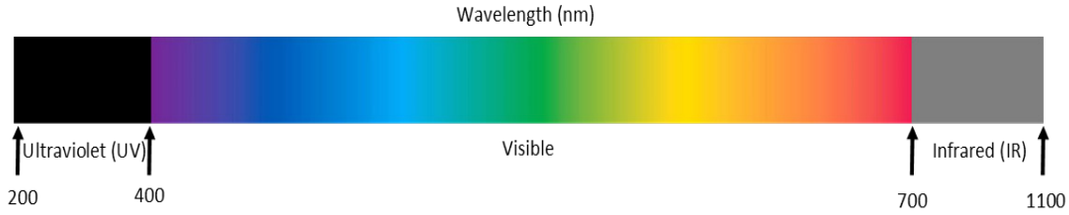
VSC®90: Environmental specification	
Location	Indoor use only
Altitude	2000m (Maximum)
Ambient temperature (°C)	5 - 40
Ambient humidity (RH%)	80% RH for temperatures up to 31°C, decreasing linearly to 50% RH for temperatures at 40°C
Pollution degree of the intended environment	Pollution Degree 2

Optical Specification

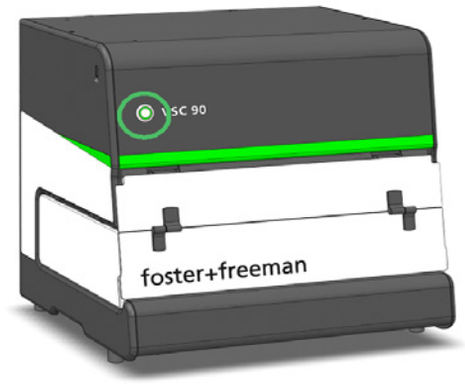
The VSC®90 contains a wide array of different light sources, illumination modes and filters that are useful for questioned document examination.

Light Sources

The VSC®90 is capable of providing illumination in the Ultraviolet (UV), Visible and Infrared (IR) regions of the spectrum by using a wide array of light sources available within the unit.



On Off Control (DC Power)



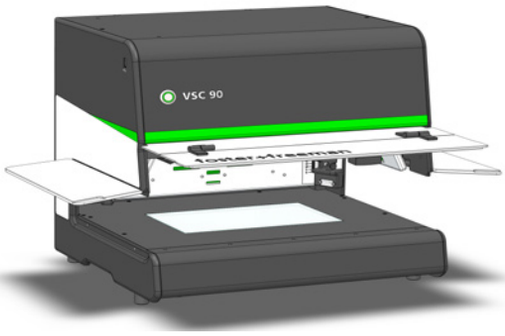
The VSC®90 is powered on by pressing the button on the front canopy of the unit.

Only a short press is required, do not press and hold this button.

See: "User Guide" on page 21.

Canopy

The canopy of the VSC®90 contains a high-definition camera, and various light sources and optical filters. The canopy contains hinged front and side flaps; these are used for access to the document platen, but also to eliminate external light when closed, and to protect the operator from hazardous radiation. A rear flap is fitted at the rear of the canopy for larger documents.



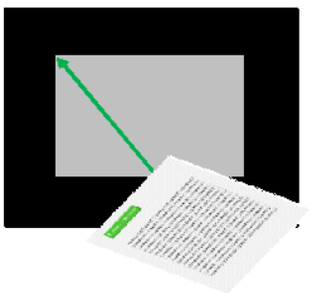
Safety Interlock

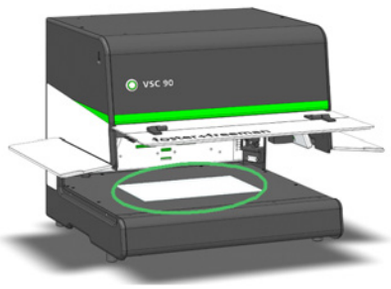
- Do not attempt to defeat the safety interlocks.

The canopy flaps are electrically interlocked to prevent the operation of potentially hazardous light sources. These light sources will not function unless the flaps are properly lowered, allowing the safety interlocks to be activated.

Document Platen

Documents for examination are usually placed face-up on the document platen under the canopy of the VSC®90.



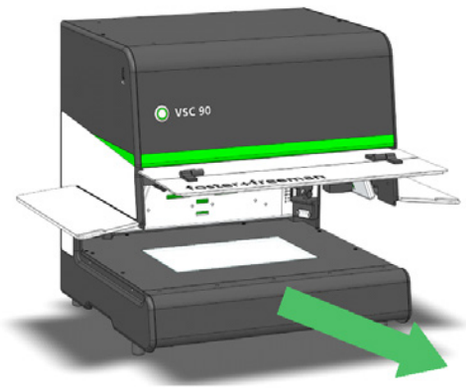


Larger documents may extend under the hinged flaps on the side of the unit, or through the rear flap (highlighted).

Removing the Document Platen

For some taller types of evidence, the document platen and transmitted light sources may need to be removed. Release the retaining screws at the rear of the main unit.

- Secure the retaining screw before transporting the equipment.



Translucent Panel

The centre of the document platen features a translight aperture, a panel of translucent material, below which are mounted the sources of transmitted light. The translucent panel is not removable.

RFID Module

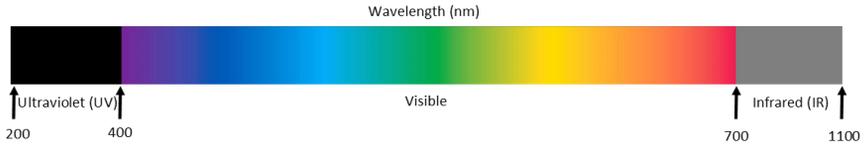
An RFID module is built-in under the translight assembly for the reading of e-Chip data from identity documents.

Monitor and Camera

The VSC®90 features an ultra high-definition camera with a motorised lens allowing for auto-focusing, and a supplementary close-up lens. This allows for a magnification of 114x with a 27" QHD or 4K monitor and windows display scaling set to 125%. 135x magnification can be achieved on a 32" QHD or 4K monitor.

Light Sources

The VSC®90 features a wide array of light sources in the UV, Visible and IR regions of the electromagnetic spectrum. All light sources are software-controlled to provide the maximum visual contrast of a specific feature type within a questioned document.



Light emitting diodes (LEDs) can be manufactured to produce a narrow bandwidth of light within the electromagnetic spectrum.

Flood Lights

Flood lights are used to evenly illuminate the entire document platen from above. The light sources available as flood lights are: UV-A, UV-B, UV-C, White visible light, and Infrared.

Colour	Nominal wavelength (nm)	
	Bandwidth (10%)	Peak
Ultraviolet (UV)	245 - 265	255
Ultraviolet (UV)	295 - 320	308
Ultraviolet (UV)	350 – 380	365
White (5000K)	400 – 700	
Infrared	700 - 800	780
Infrared	810 - 880	850
Infrared	890 - 980	950
Infrared	900 - 1020	980

Side Lights

The side lights provided within the VSC®90 are manually height adjustable. The side lights are used to provide oblique lighting for the examination of the surfaces of questioned documents, useful in examining intaglio printing, surface damage, alterations, or impressions.

Colour	Nominal wavelength (nm)	
	Bandwidth (10%)	Peak
White	400 – 700	
Infrared	810 - 880	850

Spot Lights

A high intensity LED spot light, available in an array of colours, utilised for fluorescence examination when used in combination with an appropriate longpass viewing/camera filter. See: "Fluorescence Examination" on page 20

Colour		White	Violet	Blue	Blue Green	Cyan	Green	Orange	Red	Deep Red	Far Red
Nominal wavelength (nm)	Bandwidth (10%)	420 - 670	395 - 440	420 - 485	450 - 520	475 - 535	490 - 535	540 - 615	600 - 655	625 - 680	680 - 750
	Peak		410	445	475	500	520	590	640	660	740

Transmitted Light

Transmitted lights are used to illuminate a document from underneath to view security features such as watermarks or embedded security threads.

The VSC®90 offers transmitted light as either a flood, where the entire translight aperture is illuminated; or as a spot, where only one region in the middle of the translight aperture is illuminated.

Colour	Nominal wavelength (nm)		Flood	Spot
	Bandwidth (10%)	Peak		
Ultraviolet (UV)	350 - 380	365	✓	
White (5000K)	400 – 700		✓	✓
Infrared (IR)	700 - 800	780		✓
Infrared (IR)	800 - 900	850	✓	✓

OVD Lighting

Optical Variable Device (OVD) lighting uses white lights from different directions, usually used to view iridescent or non-iridescent security features such as holograms or kinegrams. The VSC®90 uses a total of 42 LEDs, arranged around the document platen, so that when cycling through these lights, any iridescent features may be viewed in their entirety.

The VSC®90 can produce many outputs to view and report on these security features. See: "OVD Lighting" on page 27.

Colour	Nominal wavelength (nm)	Total Quantity of LEDs
	Bandwidth (10%)	
White	400 – 700	42

Coaxial Lighting

The VSC®90 provides the option for coaxial lighting to better view features on flat, reflective surfaces, and to view some security features such as retroflective printing and lamination.

Colour	Nominal wavelength (nm)
	Bandwidth (10%)
White	400 – 700

Anti-Stokes Lighting

Anti-stokes lighting uses infrared, at 980 nm, to excite some inks that will emit light back at a lower wavelength that can be detected by the VSC®90.

Colour	Nominal wavelength (nm)	
	Bandwidth (10%)	Peak
Infrared	900 - 1000	980

Phosphorescence

The VSC®90 uses a source of UV-A light, 365 nm, to excite certain dyes or inks that will continue to emit radiation in the form of light for a short time once the source of excitement is no longer active.

Fluorescence describes an ink that emits a longer wavelength of light during excitation, whereas phosphorescence describes the ability of an ink to continue to emit this light after the source of excitation is switched off. Capture of this phosphorescence relies on a frame delay, the time between the source of excitation being switched off, and image capture. This frame delay can be determined by the user within the software. See: "Phosphorescence" on page 30.

Colour	Nominal wavelength (nm)	
	Bandwidth (10%)	Peak
Ultraviolet (UV)	350 - 380	365

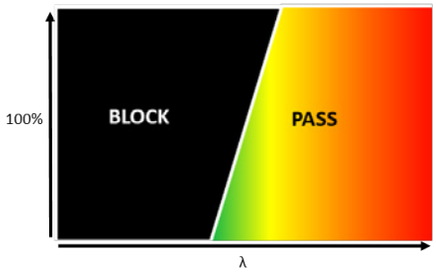
Optical Filters

The VSC®90 contains 13 individual filters that are mounted on a wheel and controlled by the VSC® software.

Filter Types

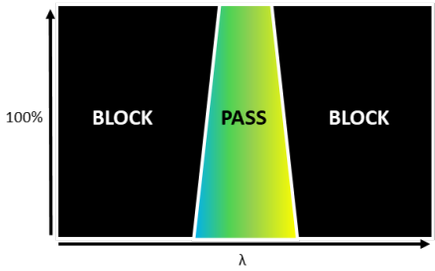
There are three filter types available, along with different light sources and illumination modes available within the VSC®90, allow for the document examiner to select precise wavelength ranges to view security features, or to determine the authenticity and integrity of a questioned document.

Longpass Filter



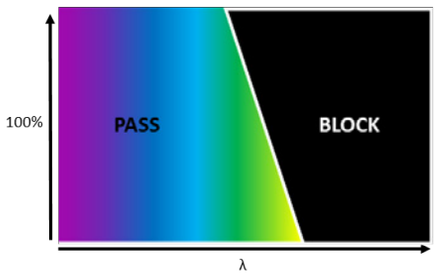
A longpass filter will block the shorter wavelengths and allow the longer wavelengths of light to transmit through the filter.

Bandpass Filter



A bandpass filter will block some of the shorter wavelengths and some of the longer wavelengths, allowing mid-range wavelengths of light to transmit through the filter.

Shortpass Filter



A shortpass filter will block the longer wavelengths and allow the shorter wavelengths of light to transmit through the filter.

Camera Filters

A range of camera filters are provided, mostly longpass filters with different wavelength cut-ons. For normal viewing, a shortpass or bandpass filter is used with the camera to mimic the view of the unaided eye.

Cut-on wavelength (nm) (50%)	400 - 700	570	590	610	630	645	665	695	715	735	780	850	1000
Use of filter	Visible filter for normal viewing	Fluorescence examination and contrast enhancement.											

Fluorescence Examination

For the safe viewing of fluorescence, a longpass filter with a cut-on wavelength that exceeds the long wavelength cut-off of the excitation light is required. There are many safe viewing filters for each waveband of excitation light, usually those with the shortest cut-on wavelength, although those with a longer cut-on may improve visual contrast. See: "Fluorescence Examination" on page 29.

Recommended LED and camera filter combinations for viewing fluorescence.

Colour		Violet	Blue	Blue - Green	Cyan	Green	Orange	Red	Deep Red	Far Red	White
Nominal wavelength (nm)	LED (10%)	395 - 440	420 - 485	450 - 520	475 - 535	490 - 535	540 - 615	600 - 655	625 - 680	680 - 750	420 - 670
	Camera filter (50%)	570	570	570	570	590	630	695	715	850	715

User Guide

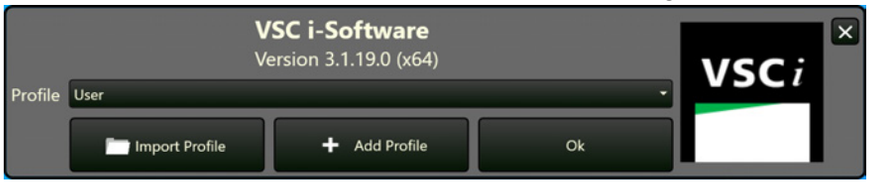
The VSC®90 and related software have been designed with the end-user in mind. The software is user friendly, icon-driven, with lots of different functions and the ability to customise and semi-automate the document examination process.

Once the VSC®90 has been powered on, the software can be started.

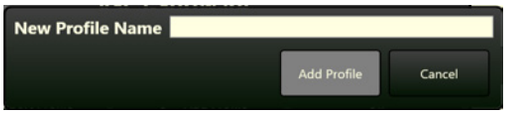
Double click the VSC®90 software icon to start the software.

Selecting a User

When the VSC®90 software has started, a window will open, prompting for the selection of a user.

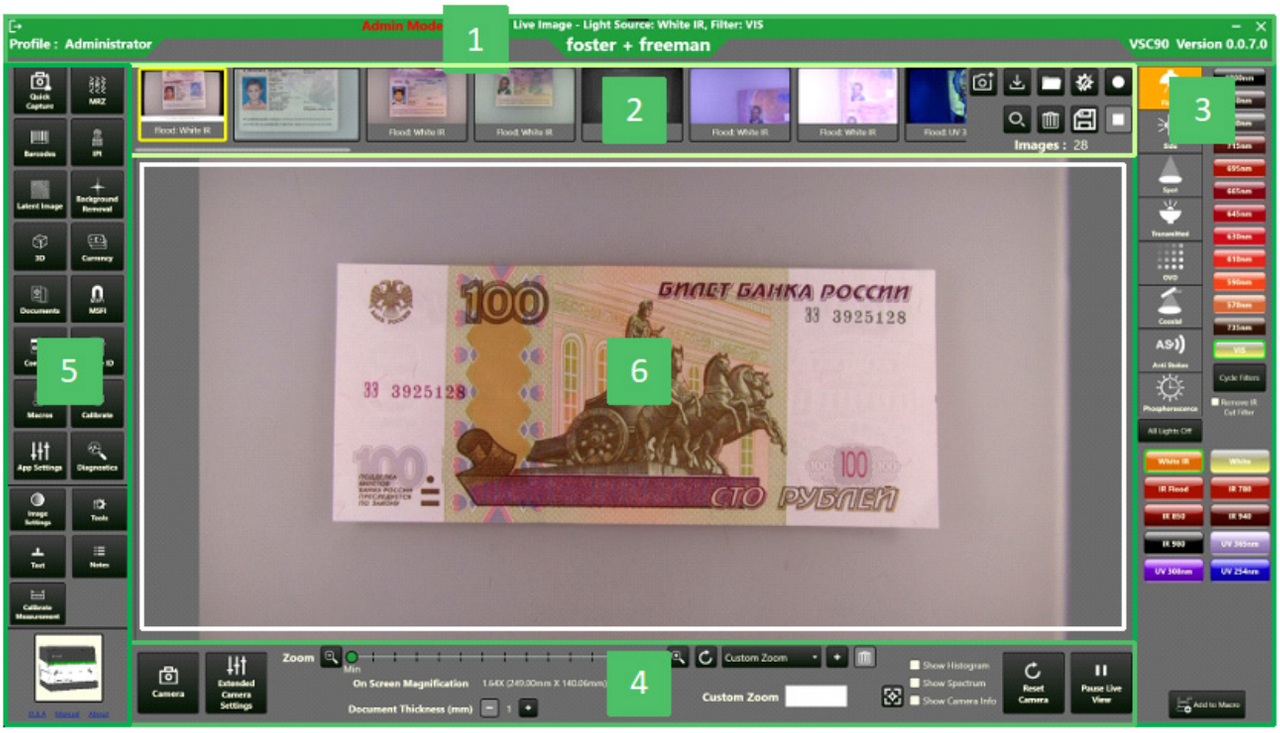


- Use the drop-down menu to select an existing user profile.
- Import a profile from existing VSC® software.
- Add a profile.
    - This will open a dialog box for the creation of a new user profile. Once created, select add profile.



Select the required user profile and select "Ok" to enter the main software.

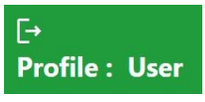
Main Screen



1. Current applied settings
2. Gallery menu
3. Environment menu
4. Camera menu
5. Features menu
6. Main image viewer

Current Applied Settings

At the very top of the main screen, a green bar shows the profile of the user, the view and settings applied to the main viewing screen in the centre, and the current software version.



Sign out.

Profile: The profile selected here is "User".

The current applied settings shows that the image in the main viewer is live, with a white and IR light source, and a visible light filter.

The current software version is shown here.

Sign Out

- Select this icon to sign out and close the VSC®90 software.

Gallery Menu Overview

1. Stored images.
2. Save current image to the gallery.
3. Save current image to a specified location.
4. Import images to gallery.
5. Apply image settings to live image.
6. Record video.
7. Search images.
8. Remove images from gallery.
9. Save options.
10. Stop recording.

Stored Images

Images that have been taken and stored on the VSC®90 are accessible from the gallery menu. A scroll bar will allow for the user to scroll right or left to view more thumbnail images.

- Click on an image to select it. Selected images will have a yellow border.
- Double click an image to open it into the main image viewer.

Save Current Image to the Gallery

- Selecting this icon will add an image from the live viewer to the gallery.
- Selecting this icon will also add a copy of an image from the live viewer to the gallery where a saved image has been opened for editing or annotating.

Save Current Image to Specified Location

- Save the current image directly to a location specified in the settings. See: "App Settings" on page 56

Import Images into Gallery

- Selecting this icon will open a window for other images saved on storage devices to be selected and imported into the gallery.

Apply Image Settings

- Selecting this icon will apply the captured image settings to the current live image.

Record Video

- Selecting this icon will start a recording of the live image viewer.

Search Images

- Selecting this icon will allow for the filtering of images in the gallery based on light source or filter used.

Remove Images from Gallery

- Selecting this icon will open a separate window where images can be selected and removed.

Save Options

- Selecting this icon will open the save options, allowing for the save location of taken images to be determined.

Stop Recording

- This icon becomes selectable once recording is in progress. Selecting this icon stops the recording, allowing for the recording to be played back in the main image viewer or saved to a specified destination.

Environment Menu Overview

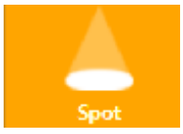
1. Illumination modes.
2. Filters.
3. Light sources.
4. Add selected viewing conditions to an existing macro. See: "Macros" on page 55

The right pane is variable, and different filter options and lighting conditions can be selected depending on the active illumination mode and light source. The illumination mode or light source selected will be highlighted in orange.

Any settings selected will show on the current applied settings bar at the top of the main screen.

Illumination Modes and Light Sources

The mode of illumination can be selected from the right pane of the main screen. Once selected, the icon for the method in use will turn orange, and applicable light sources, filters and other options will be available.

Illumination mode	Light sources available		
	• White • White + IR • IR (Activate all IR sources)	• IR 780 • IR 850 • IR 940 • IR 980	• UV 365nm • UV 308nm • UV 255nm
	• Left White + IR • Right White + IR • Left + Right White + IR	• Left White • Right White • Left + Right White	• Left IR • Right IR • Left + Right IR
	• White (420 - 670nm) • Violet (410 nm) • Blue (445 nm) • Blue Green (475 nm)	• Cyan (500 nm) • Green (525 nm) • Orange (590 nm)	• Red (640 nm) • Deep Red (660 nm) • Far Red (740 nm)
	• Flood White • Spot White • Spot White + IR 780 nm + 850 nm	• Flood White + IR 850 nm • Flood IR 850 nm • Flood UV 365 nm	• Spot IR 780 nm • Spot IR 850 nm • Spot IR 780 nm + 850 nm
	• White		
	• White		
	• IR 980		
	• UV 365nm		

Safety Interlocks

- Exposure to radiation from 255 nm and 308 nm sources can be hazardous to both the eyes and the skin.
- Do not attempt to defeat the safety interlocks.
- The hinged flaps are designed to protect the user from hazardous radiation.

As a safety feature, certain light sources will require that the flaps are fully closed, and the electrical interlocks are activated. If the flaps are opened and the interlocks defeated while these light sources are active then they will be switched off by the VSC®90.

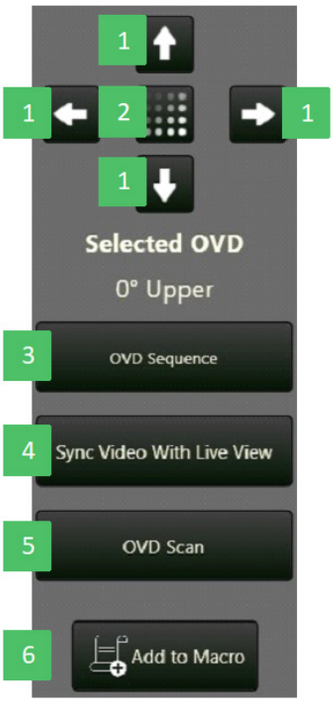
Light sources requiring safety interlock activation:

- Flood
  - UV 308 nm (UV-B)
  - UV 255 nm (UV-C)
- Phosphorescence
- Anti-Stokes
  - Infrared (980 nm)

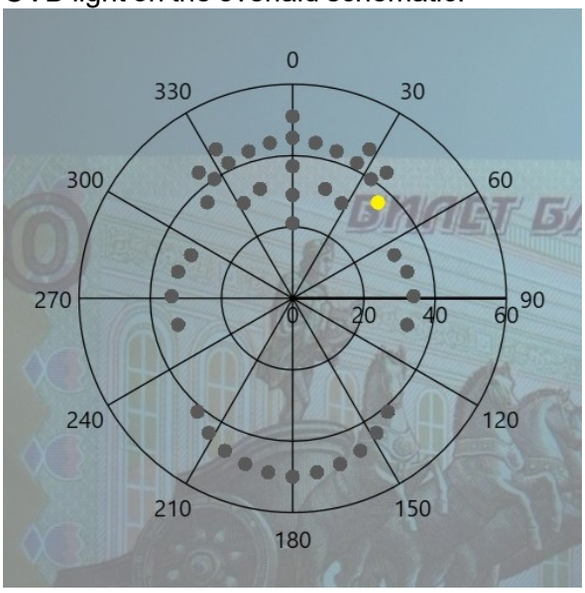
OVD Lighting

The circular plot schematic of the OVD array is overlaid over the live image with the active light source being highlighted in yellow. The controls for the OVD lighting are visible when the light source is selected. Controls are located in the lower right corner of the environment menu.

OVD Controls



1. Directional arrows: the active light source can be changed using the directional arrows on the OVD controls, or by selecting the required OVD light on the overlaid schematic.



2. OVD selector: Click to view the OVD schematic overlaid on the main image viewer. The overlay will disappear after 5 seconds.
3. OVD Sequence: another window will open, from which different sequences of OVD light can be selected or created. Sequences of OVDs are available from the OVD Sequence drop-down menu and include: All OVDs; Horizontal only; Vertical only. Any customised OVD sequences created can be selected from this list. Output options can also be selected from this window including:
    - Composite image: overlays every OVD image, useful for including holograms / kinegrams in printed reports.
    - Mosaic: this provides an image with thumbnails of every image taken, also useful for printed reports.
    - Output individual: this will produce an output image for each OVD light selected.
    - Output video: a video will be created of the document as each OVD is illuminated.
4. Sync video with live view.
5. OVD Scan: The OVDs will be illuminated in turn, and the time between image changes (1 - 5 seconds) can be selected. A drop-down box allows for the selection of either all OVDs, horizontal or vertical OVDs. Each new image will appear in the main image viewer. Select the time, OVDs, and use the start and stop functions.
6. Add to Macro. See: "Macros" on page 55

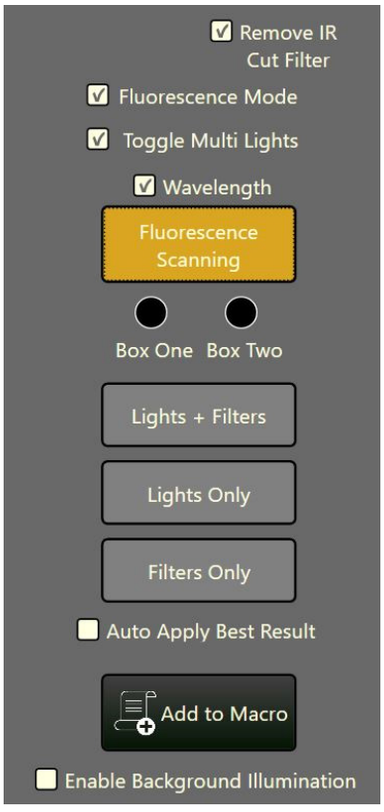
Spot Lighting

Spot lighting is often used for the detection of fluorescence due to the light sources available. Underneath the filter selection is a fluorescence mode tick-box. When this is activated, the filter availability will change with each light source selected to offer the best possible detection of fluorescence.

Colour		Violet	Blue	Blue - Green	Cyan	Green	Amber	Red	Deep Red	Far Red	White
Nominal wavelength (nm)	LED (10%)	395 - 440	420 - 485	450 - 520	475 - 535	490 - 535	540 - 615	600 - 655	625 - 680	680 - 750	420 - 670
	Camera filter (50%)	570	570	570	570	590	630	695	715	850	715

Fluorescence Examination

Spot lighting is a high-intensity coloured light source, that when used in combination with specific optical filters, can be used in the examination of fluorescence. Fluorescence scanning will interrogate the pixel intensity difference between two regions of a questioned document. Selecting Toggle Multi Lights will allow for more than one light source to be active at a time during the fluorescence examination.



1. Select Fluorescence Mode.
2. Select box 1 and select a relevant area of interest on the live image.
3. Select box 2 and select a second relevant area of interest on the live image.
4. Select the relevant fluorescence scanning option.

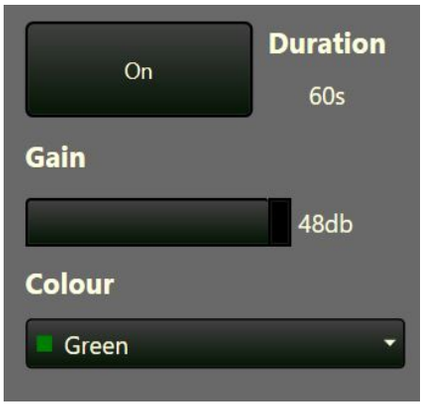
Lights and filters
- This option will allow for the combination of every light source and filter available.

Lights only
- This option will allow the light sources and optimal recommended filter to be cycled.

Filters only
- This option will allow the light source to remain constant whilst the VSC®90 cycles through the different available filters.

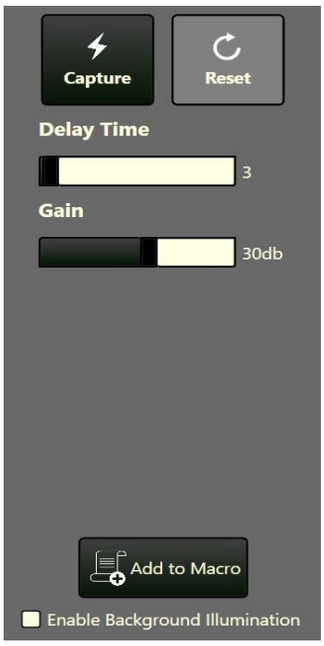
Select "Auto Apply Best Result" to save a single image output to the gallery that demonstrates the greatest pixel intensity difference between the two areas of interest. If not selected, the software will then open another window with information regarding the pixel intensities and differences for each image captured. From here, images can be added to the gallery.

Anti Stokes



- When anti stokes is selected, there are no selectable filter options.
- White light is active for document positioning prior to anti stokes activation.
- Select "On". This will activate the light source for up to 60 seconds.
- Each second of activation will require two seconds of cool-down, so 60 seconds of activation will require 120 seconds cool-down.
- The gain, or sensitivity to light, can be increased or decreased with the sliding bar.
- The colour of anti stokes fluorescence can be selected from the drop-down box. The colours available are blue, red, or green. Green is the most common form of anti stokes and is therefore the default option when the anti stokes light source is selected.
- Anti stokes and associated settings can be added to a macro.

Phosphorescence



- When phosphorescence is selected, there are no selectable filter options.
- Selecting capture will activate the light source for a short length of time.
- Selecting the reset icon will allow for the main image to be reset for phosphorescence recapture.
- The frame delay, the length of time between the switching off of the light source and image capture. This can be increased or decreased with the sliding bar.
- The gain, or sensitivity to light, can be increased or decreased with the sliding bar.
- Phosphorescence and associated settings can be added to a macro.
- Images captured displaying phosphorescence can be dark, and the background image, and therefore context, can be lost. To view the entire document with the addition of the phosphorescence, select enable background illumination.

Coaxial Lighting

Placeholder - Image to come

The coaxial lighting is user-configurable. This allows for the coaxial lighting to be directed in such a way as to view 3D features under a laminated surface.

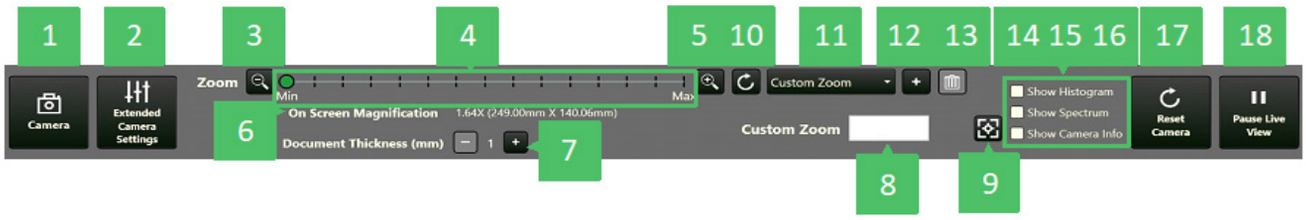
Select the relevant control box to illuminate the relevant third of the coaxial lighting.

Filters

There are numerous filters available for each light source and wavelength selected.

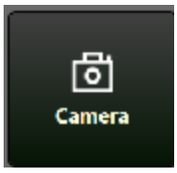
Cut-on wavelength (nm) (50%)	400 - 700	570	590	610	630	645	665	695	715	725	780	850	1000
Use of filter	Visible filter for normal viewing	Fluorescence examination and contrast enhancement.											

Camera Menu Overview

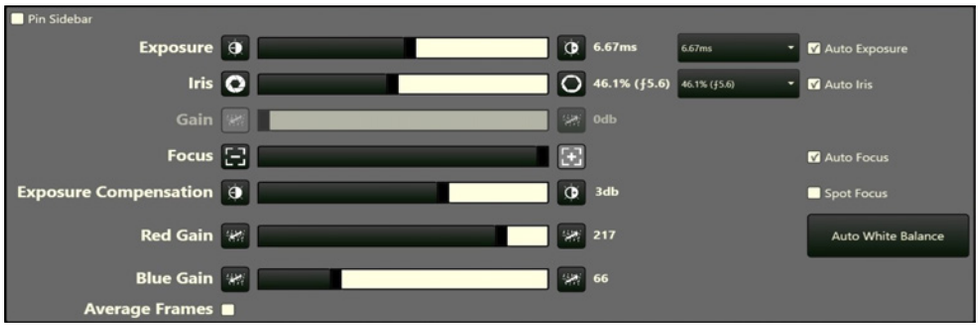


1. Camera Settings.
2. Extended Camera Settings.
3. Decrease Magnification.
4. Magnification Bar.
5. Increase Magnification.
6. On Screen Magnification
7. Document Thickness.
8. Custom Zoom.
9. Refocus
10. Reset Magnification.
11. Zoom Presets.
12. Add Current Magnification to Preset.
13. Delete a Preset.
14. Show Histogram.
15. Show Spectrum.
16. Show Camera Information.
17. Reset Camera.
18. Pause Live View.

Camera Settings



- As part of the advanced camera settings, exposure, iris, focus and exposure compensation can be amended.
- Click and drag on the sliding bar to amend these settings.

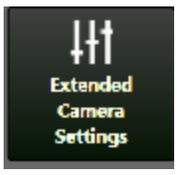


Exposure — Exposure, or integration time, controls the length of time over which the image is captured. A shorter exposure time will result in a darker image, whereas a longer exposure time will result in a brighter image.

Auto Exposure — When selected, auto exposure allows the software to adjust the exposure based on the aperture, controlled by the iris.

Iris	The iris controls how much light is taken in by the camera and influences the depth of field, also referred to as F-Stop. The depth of field denotes the distance at which the image is still in sharp focus. A smaller iris will result in a darker image and a deeper depth of field. A larger iris will result in a brighter image and a shorter depth of field.
Auto Iris	When selected, auto iris allows the software to adjust the iris and therefore the amount of light taken in by the camera.
Focus	The focus defines the clarity of an image and determines which areas of an image are sharp.
Auto Focus	When selected, auto focus allows the software to focus the camera on the object within the VSC®90.
Spot Focus	Allows for the software to control the focus of the camera onto a single spot.
Exposure Compensation	Allows the user to override automatic exposure adjustments to make the image brighter or darker.
Red Gain	The gain determines the balance of light, dark and background noise within an image. A higher gain will result in a lighter image but increase the background noise. A lower gain will result in a dark image with less background noise. Use the slider to increase or decrease red gain.
Blue Gain	The gain determines the balance of light, dark and background noise within an image. A higher gain will result in a lighter image but increase the background noise. A lower gain will result in a dark image with less background noise. Use the slider to increase or decrease blue gain.
Average Frames	Each pixel in corresponding positions of multiple frames are averaged to create a new frame. This is used to help reduce noise, blur and other artefacts within a video or image.
Auto White Balance	Allows for the software to control the white balance, or colour temperature, of an image.

Extended Camera Settings



- From the extended camera settings, more advanced camera settings can be changed.
- The extended camera settings are only available when selected in the app settings page. See: "App Settings" on page 56

Aperture	The aperture is the hole created and controlled by the iris that allows the light to enter the camera to determine the depth of field. The depth of field denotes the distance at which the image is still in sharp focus. A lower aperture will result in a darker image and a deeper depth of field. A higher aperture will result in a brighter image and a shorter depth of field.
Chroma Suppression	Chroma refers to the purity of a colour, and chroma suppression is similar to saturation control. A hue with high chroma has no black, white or grey added to it. The higher the chroma suppression, the more black, white or grey is added to reduce the saturation of colours with a high chroma. Using chroma suppression will selectively desaturate specific high chroma colours, leaving other colours unaffected. It is used to remove false colours that may be visible on the edges of lines.
Colour Gain	Colour gain controls the intensity of colours within an image. Increasing colour gain will make colours appear more vibrant whereas decreasing colour gain will reduce the intensity of colours. Adjusting the colour gain will equally affect all colours within an image to increase or reduce colour intensity.
Defogging	Apply a defogging algorithm to reduce the effects of haze, smog, or other particles in the air that scatter and attenuate light to enhance the clarity of a captured image.
Hue	The hue denotes the overall colour tint of an image.
Noise Reduction	Noise is defined as random and unwanted variations in brightness or colour that can make an image appear grainy, usually when an image is taken in low-light. Noise reduction involves the application of a digital filter that helps to reduce this noise and improve image clarity.
Backlight Compensation	This allows for the reduction of the effects of a strong backlight, or to increase light exposure for darkened areas, to improve the overall exposure of the image.
High Sensitivity	Sensitivity indicates the sensor's ability to record light. High sensitivity mode aids image capture in low-light settings.
IR Correction	Allows for the adjustment of captured images to correct the colour shift caused by the presence of infrared light, with the aim of making the image more consistent with how it appears in the visible spectrum.
Visibility Enhancer	A digital processing technique to adjust the contrast, brightness and sharpness of an image to make details more visible.
Wide Dynamic Range	Improves the capability of the imaging system to capture and reproduce a broad range of brightness levels within a single image. This ensures that details are still visible within both light and dark areas of an image.
Gamma Mode	Gamma corrections control image brightness to brighten darker areas of an image. Gamma corrections are particularly helpful when using light sources that stimulate fluorescence. Select the required Gamma mode: • Standard • Straight

Magnification

- Select the +/- to increase or decrease the current magnification.
- Select an area of the magnification bar to jump to that magnification.
- Alternatively, click, hold and drag the marker on the magnification bar to increase the magnification dramatically.

On Screen Magnification

When the VSC®90 is properly calibrated, the on-screen magnification values will be displayed underneath the zoom bar.

Document Thickness

- Document thickness can be amended using the + / - icons to match the thickness of the document in question.
- Amending the document thickness will alter magnification and calibrations.

Custom Zoom

Using the keyboard, enter the desired zoom and press enter.

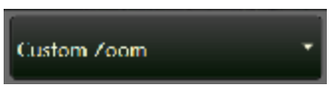
Refocus

- The VSC®90 features a software controlled motorised lens that allows for auto-focusing. If the image does not appear to be in focus, select this icon to force a re-focus of the image.

Reset Magnification

- Select this icon to reset the magnification to either the selected preset or the default magnification upon start-up.

Zoom Presets



- This drop-down menu contains custom zoom settings. Select, add or remove as required. See: "Add Current Magnification to Preset" below
- Select one of the identity document types from this list to adjust to the relevant optimal magnification settings.
- ID presets:
  - TD1 - ID cards.
  - TD2 - VISA pages.
  - TD3 - Passport pages.

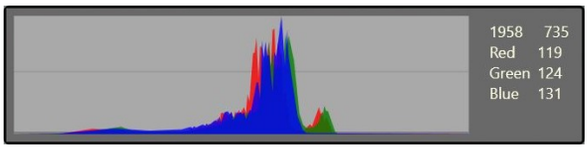
Add Current Magnification to Preset

- Select this icon to create a custom magnification and zoom preset from the settings applied to the main image.

Delete a Preset

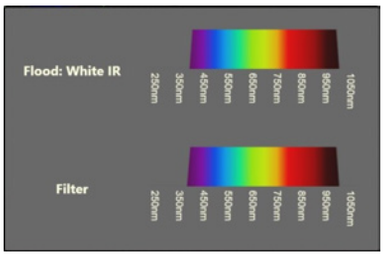
- Selecting this icon will delete the currently selected magnification and zoom preset.

Show Histogram



Show the histogram of the image as an overlay.

Show Spectrum



Show the spectrum of the image as an overlay.

Show Camera Info

Show the camera information of the image as an overlay.

Reset Camera

- Resets all camera settings back to default.

Pause Live View

- This allows the live image to be paused. The image will be bordered by a red box when the live image is paused. Select the icon again to return to live view.

Features Menu Overview

1. Quick capture.
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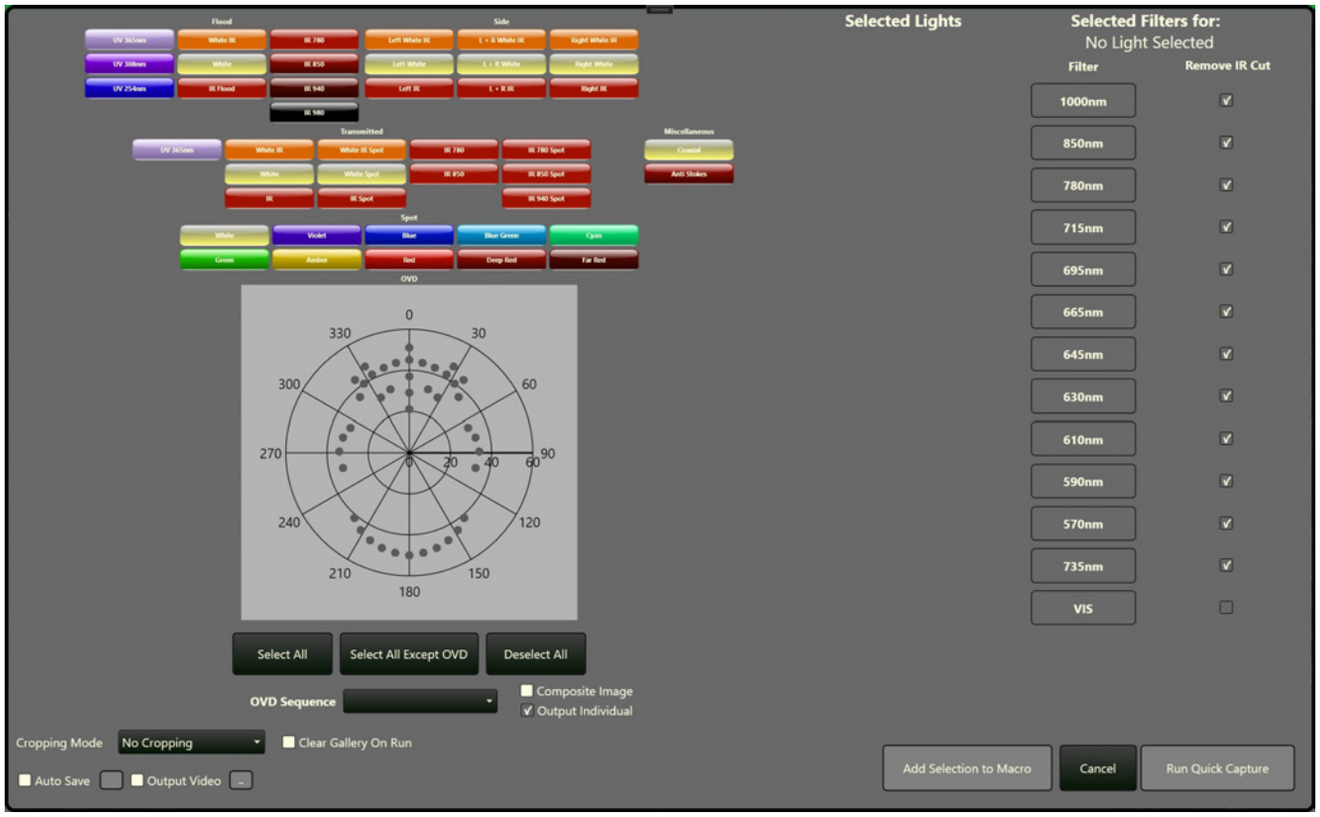
When an image from the gallery is opened into the main image viewer, the annotations icon is visible:

Quick Capture

- When selected, the quick capture window will open.
- Speeding up the process of multiple image capture, quick capture is designed to select multiple light sources, filters and OVD sequences. The images are then captured quickly and saved to the gallery without further user intervention.
- Select any combination of light sources, illumination modes and filters. Images will be captured with each of these settings applied in turn.

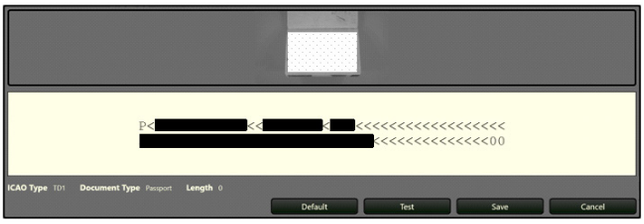


MRZ (Machine Readable Zones)

- Used to read MRZs within identity documents to determine if it conforms to ICAO (International Civil Aviation Organization) standards.
- Expected information is compared with the optical information obtained from the MRZ. The software reports errors on-screen and provides diagnostic tools to help users determine genuine nonconformity. Matches will be flagged with a green tick, and any issues will flag with a red cross.
- The validation process uses the standards specified in the ICAO document 9303 for Machine Readable Travel Documents.

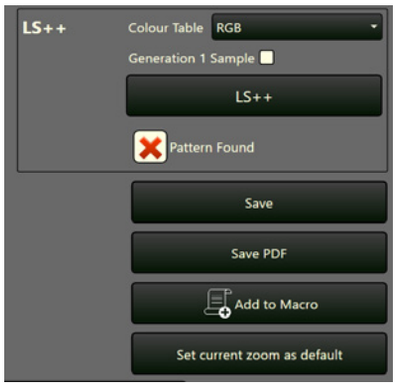
MRZ controls

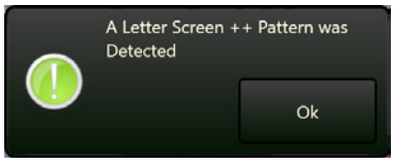
- "Retry MRZ" will prompt reading of the MRZ after a failed attempt.
- "Save" will open a dialog box for the MRZ information to be saved to a specified location.
- "Edit MRZ" allows for the editing of any misread MRZ's.
  - A window will open where the MRZ can be edited:
    Select an area with the mouse and use the keyboard to correct any misreads.



"Default" returns the MRZ to the optical MRZ.
"Test" will compare the MRZ to the ICAO standards.
"Save" allows the MRZ to be saved.
"Cancel" will return to the previous screen without editing the MRZ.

- "Read EChip" will prompt any connected E-chip readers to obtain the E-chip data for comparison with the optical MRZ.
- "Save PDF" will save the MRZ data as a PDF file. Select the save destination as required.
- "LS++" will open the LetterScreen++ controls:
  - This will allow for the selection of the LetterScreen++ area by clicking and dragging the cursor from top-left to bottom-right and ensuring the entire image is inside the red box. Select the "LS++" button.



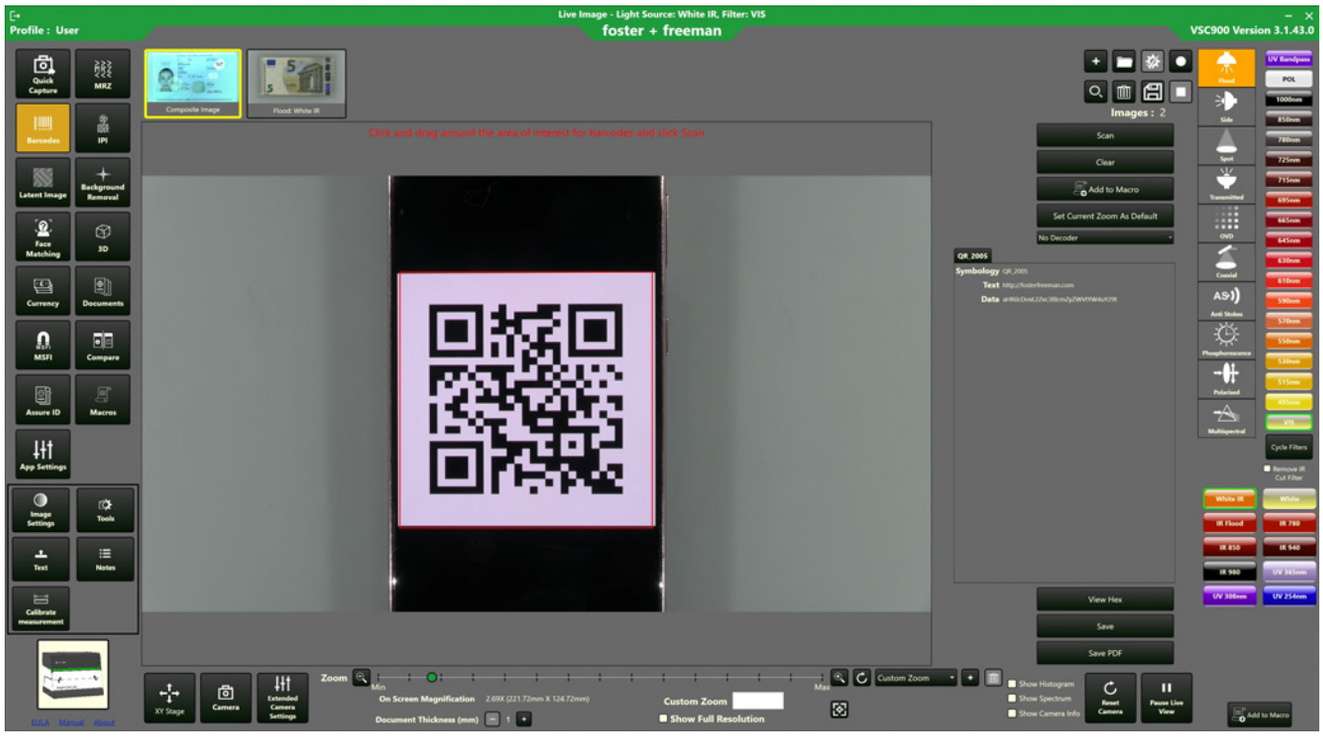


- Changing the colour table using the drop-down list allows for the selection of the pigment colour used in the LetterScreen feature. This can improve the capability of the software to detect the LetterScreen++ feature. However, RGB is the optimum setting and this should rarely need changing.
- "Pattern found" will display a green tick if positive, and a red cross if negative.
- "Save" will allow the LetterScreen++ to be saved.
- "Save PDF" will save the LetterScreen++ data into an individual PDF report.
- "Add to Macro" will add the LetterScreen++ function to a Macro, see: "Macros" on page 55.

- "Add to Macro" will allow MRZ reading to be added to a macro. See: "Macros" on page 55.
- "Image" will allow for the capture of an image of the MRZ.

Barcodes

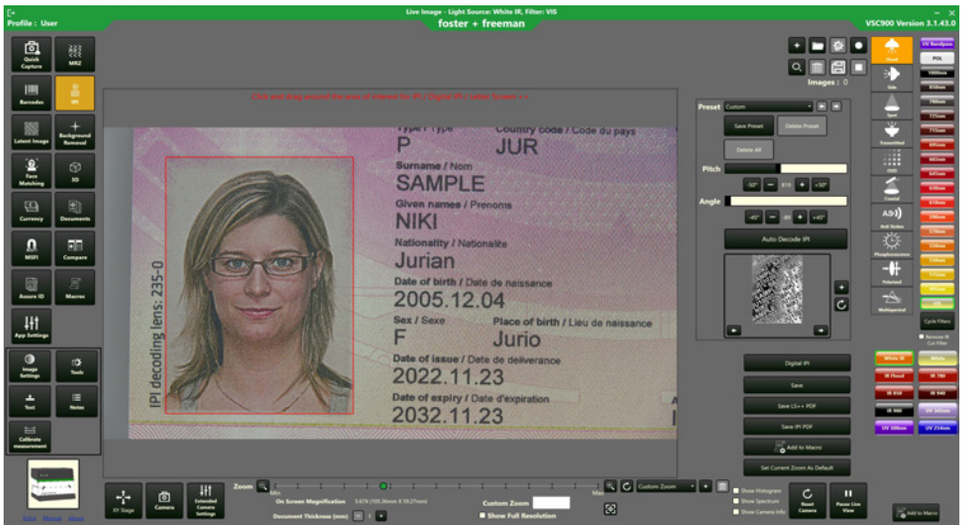
- This can be used to read one and two-dimensional barcodes, including QR codes.
- Select the barcodes icon to start.
    1. Click and drag from the top-left to the bottom-right of the barcode. A red box should surround the barcode.
    2. Select Scan, located on the right working pane, to read the barcode.
    3. If needed, specific decoders can be selected from the drop-down menu in the working pane.
    4. Barcode information will be visible in this right-hand working pane.
    5. The barcode and information can be saved, cleared, or the process added to a Macro using: Save, Save PDF, Clear or Add to Macro.



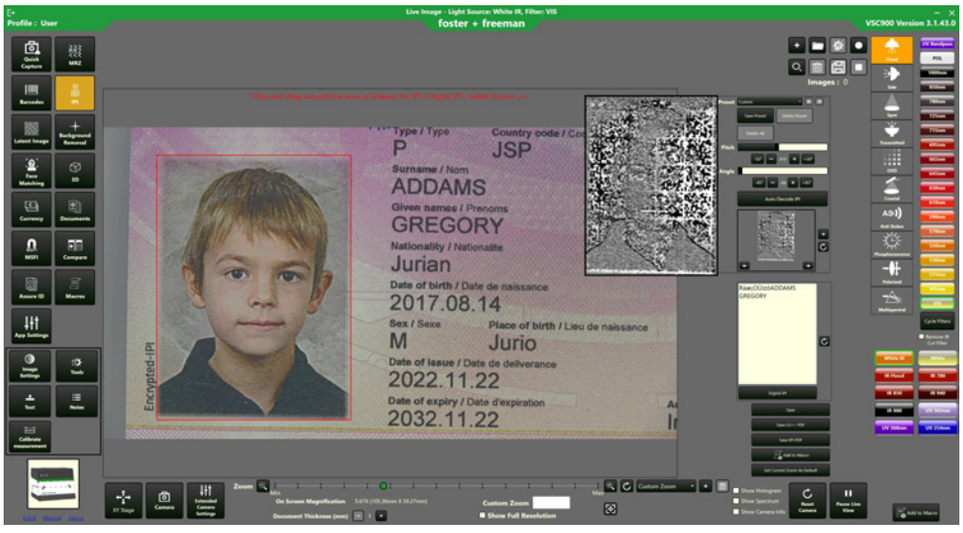
IPI (Invisible Personal Information)

- IPI is used to decode invisible personal information, or scrambled indicia, usually used within passport images, identity cards and stamps.

1. A red rectangle will appear on screen surrounding the image.
    - Ensure the image is fully inside the red border.
    - The red border can be manually adjusted by clicking and moving with the mouse to ensure the best fit.
2. A preset can be selected from the drop-down menu on the right side.
    - Presets may be added, amended or removed using the relevant buttons.
3. Either use the auto decode IPI function, or manually adjust the pitch and the angle on the software using the +/- or click and drag on the sliding bar until the information is clear.
    - The decoded IPI will be visible using the control area on the right.
4. Save, save individual report to PDF, add to Macro or set current zoom to default



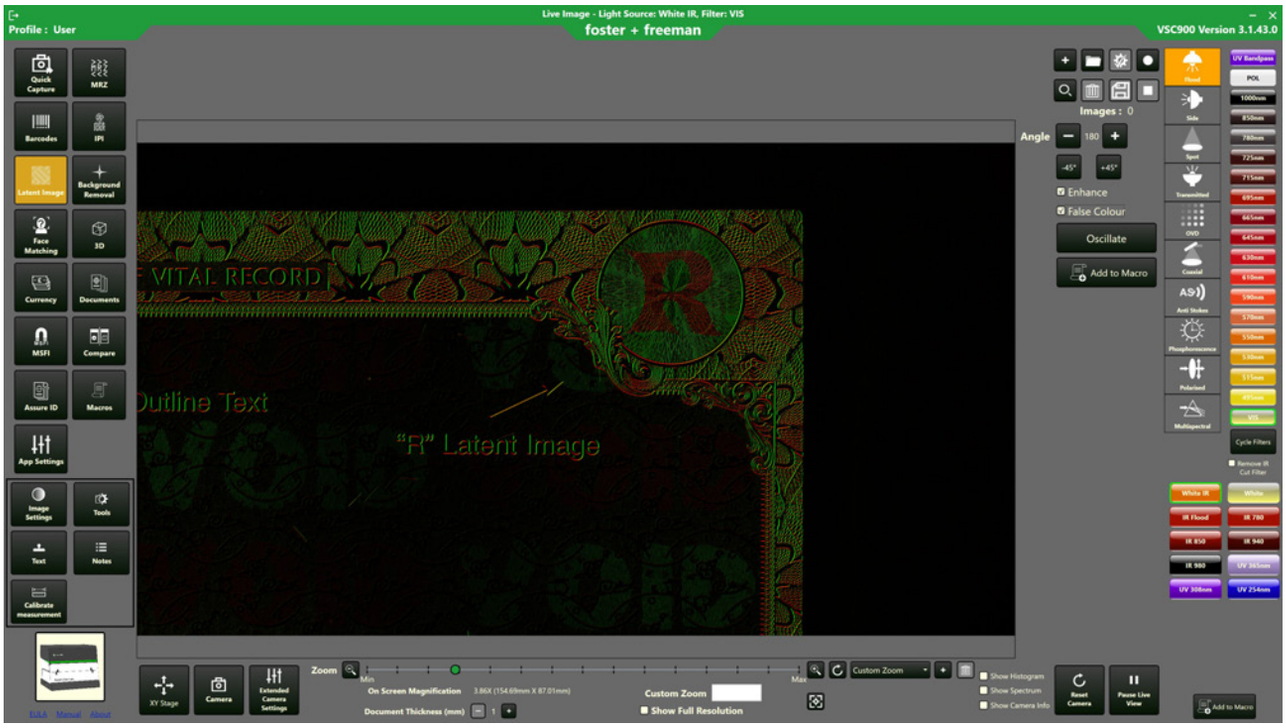
Digital IPI

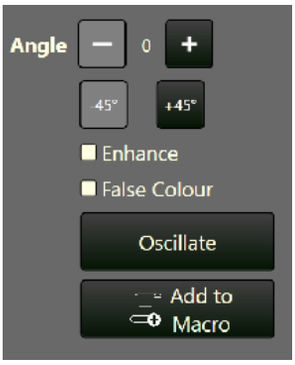


Digital IPI can also be decoded using the IPI feature. If an identity document contains Digital IPI, select Digital IPI from the controls. The PI and decoded two-dimensional barcode information will display on the right.

Latent Image

- Some documentation will contain hidden images, and this function applies a digital filter to the image. This can apply a false colour and the angle can be changed or oscillated to better view the latent image.
- If oscillation is selected, then the angle applied to the software will cycle for a document examiner to better view a latent image.





Without latent image viewer:

With latent image viewer:

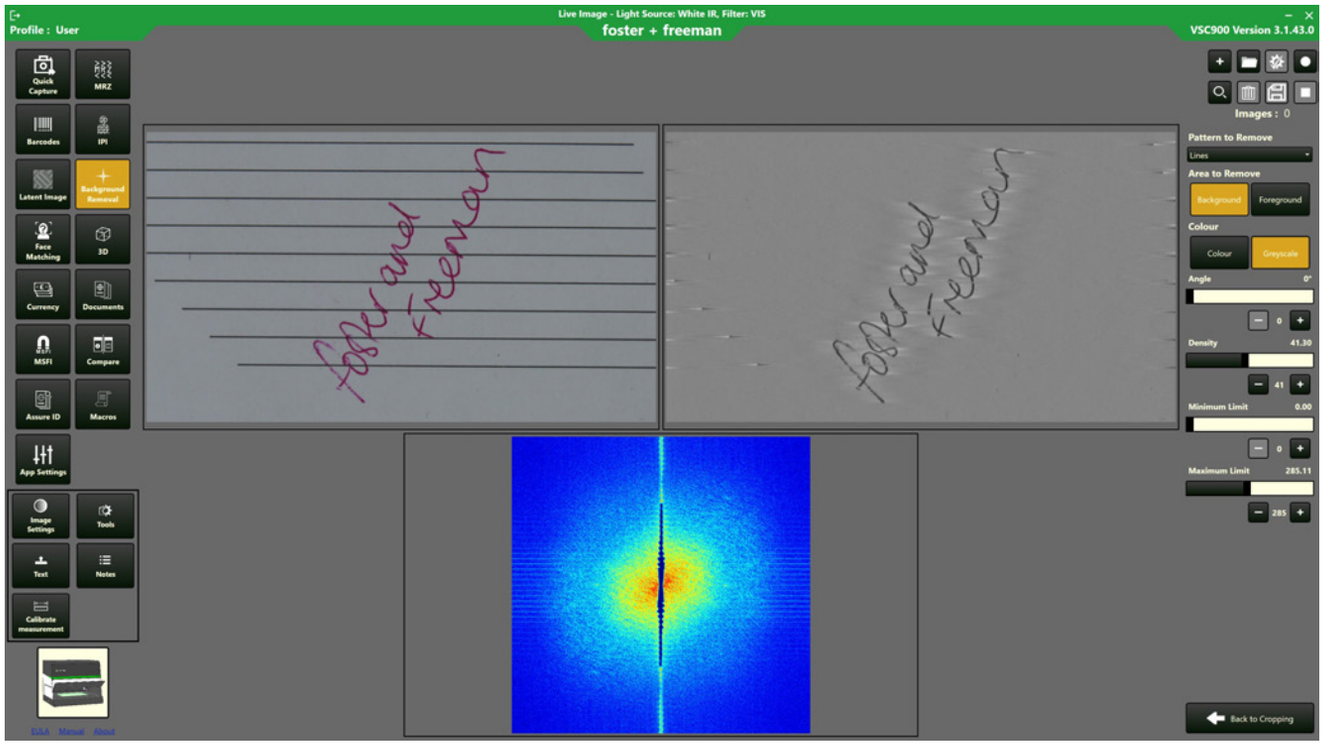
Enhanced:

Enhanced and False Colour:

Background Removal

Removal of patterned backgrounds can increase the quality of the foreground images or text.

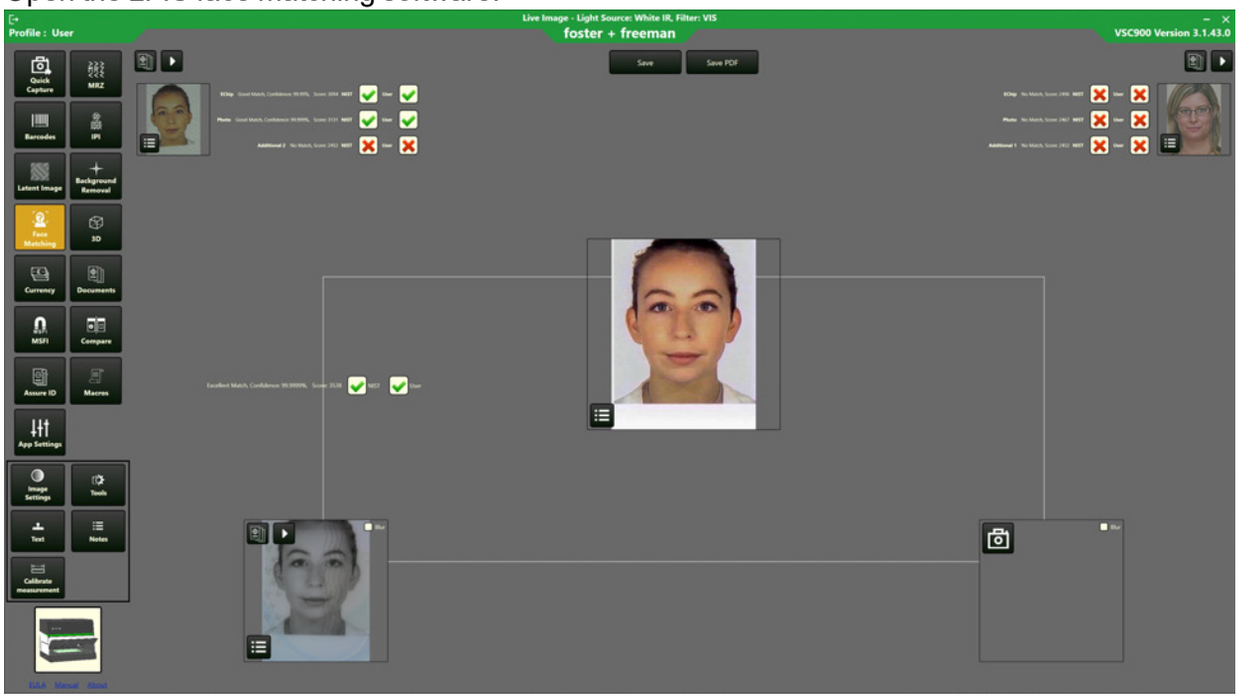
1. Select this icon to start the background removal process.
2. Click and drag from top-left to bottom-right to draw a red box around the area of interest
3. Select confirm crop in the top-right corner of the main image viewer.
4. Select the pattern type to remove: line, dots, grid or band.
5. Select the area to remove: foreground or background.
6. View the image in colour or greyscale.
7. Amend the angle, density, upper and lower limits using +/- or click and drag on the associated sliding bar.
8. Select back to gallery at the bottom-right of the screen to return to the live view.



Face Matching

- The VSC® software uses the Gemalto LFIS face recognition system to enable the comparison of faces from digital eChip images, passport photographs, live images from a webcam, and any stored images.

1. Open the LFIS face matching software.

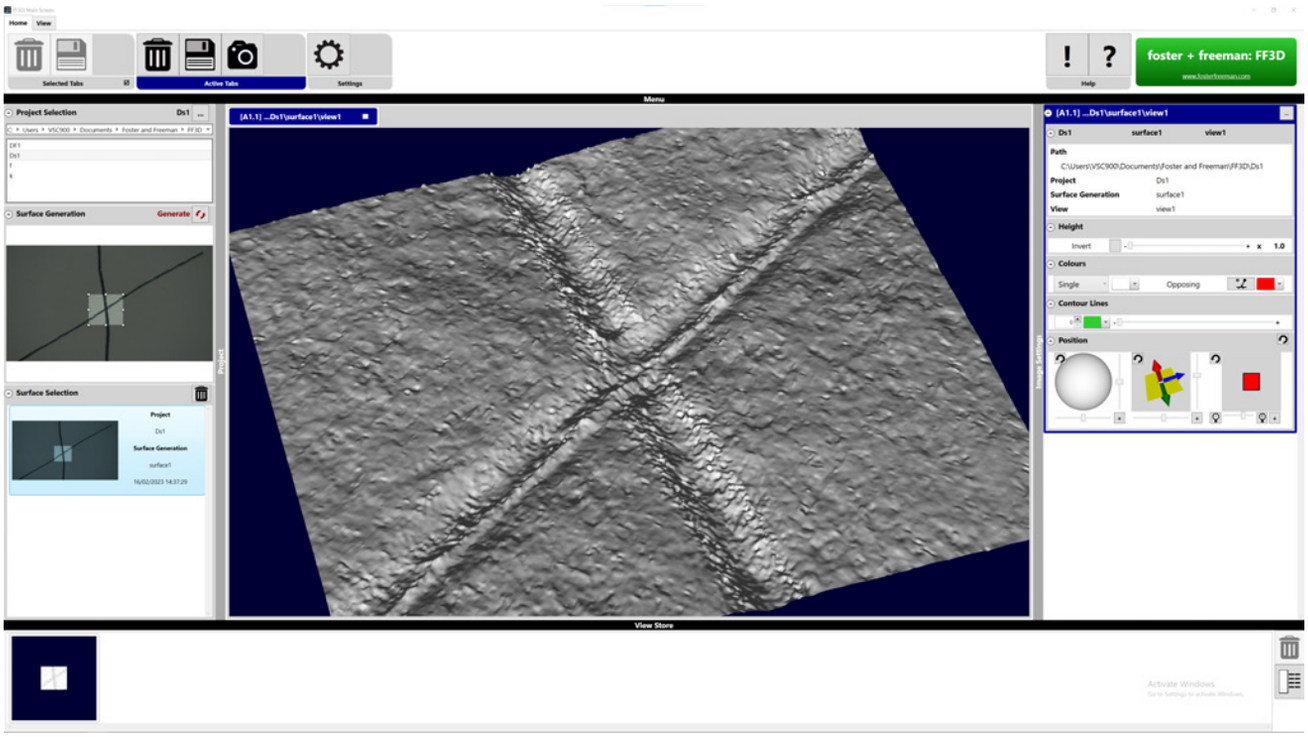


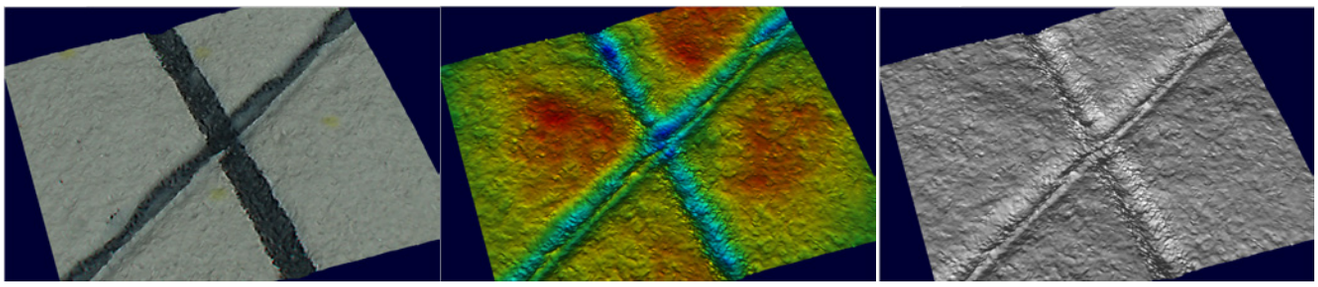
2.  Select this icon to upload up to 3 stored images for face matching,
3.  Select this icon to upload an image from the live view.
4.  Select this icon to upload an image from a connected web cam.
5. A match or mismatch will be demonstrated with a green tick or red cross, along with a measure of confidence in the match denoted as a percentage.
6. Select save to open a new window to determine a save location for a brief report containing all image comparisons and results.
7. Select save PDF to open a new window to determine a save location for a full PDF report, with company logos, containing all image comparisons and results.

3D

- 3D can be used to scan the surface of an item or a document. This can be used in the determination of order of line deposition
    1. Place the document or item inside the VSC®90.
    2. Select 3D, and allow the VSC®90 to scan the item.
    3. Once the item has been scanned, the scan will open inside the FF3D software.
    4. Select the area of interest and select generate.
    5. The FF3D software will allow the user to move the 3D scan around, change the lighting and overlay false colours.

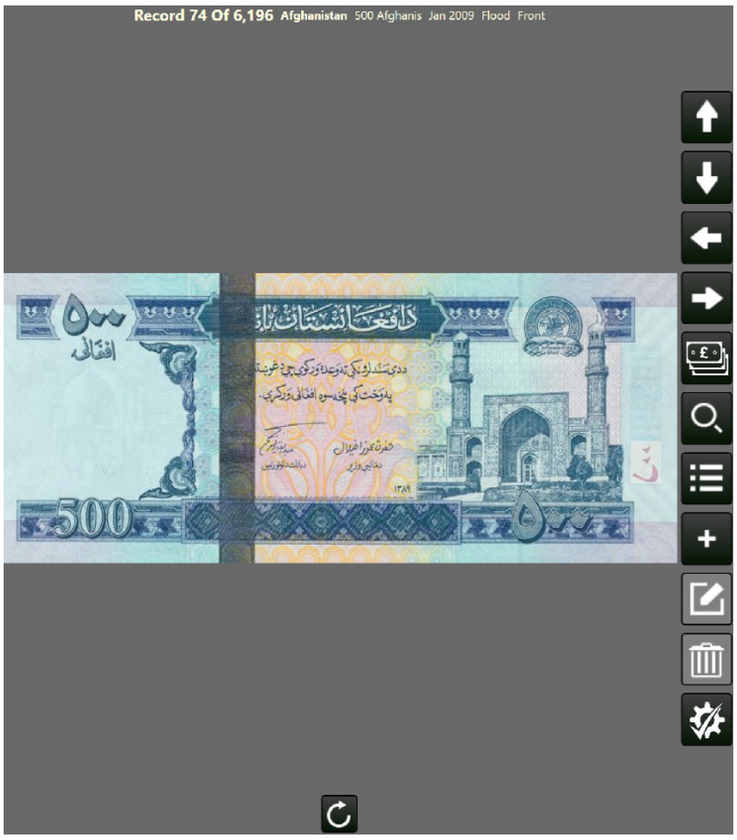
Please refer to the user manual within the help section of the FF3D software for more information.





Currency

- Compare currency under different lighting conditions to a database provided by Keesing® to determine authenticity.
- Once currency is selected, the screen will be divided in two. The live (or stored) image being examined will be open on the left and the database with database controls will be open on the right. The currency being displayed is noted above the database image.

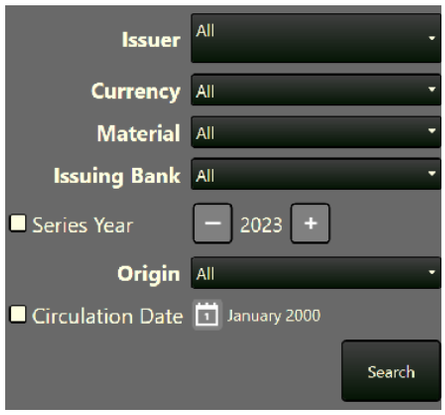


- Directional arrows are used to navigate the database and view different currencies.

- Select different lighting conditions for the front or back of the currency.
- Options include:
  - Flood Front.
  - Flood Back.
  - UV Front.
  - UV Back.

- Rotate image clockwise 90°.

- Search currency by issuer, currency type, material, issuing bank, country of origin and date of circulation.
- Select relevant details from the drop down lists provided.



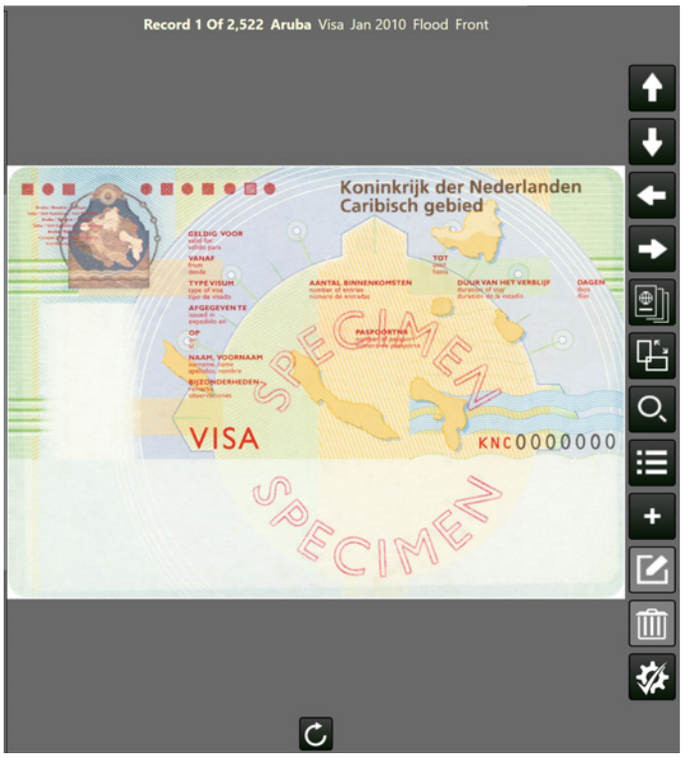
- Lists the information for the currency being displayed by the database.

- Add stored image to a custom database.
- Select the stored image or images to be added to the custom database.
- Select the down arrow and complete details as required.

- Apply image settings used within the database to the live image.
- Edit the details of an item within the custom database.
- Remove selected item from the custom database.

Documents

- Compare identity documents under different lighting conditions to a database provided by Keesing® to determine authenticity.
- Once documents is selected, the screen will be divided in two. The live (or stored) image being examined will be open on the left and the database with database controls will be open on the right. The document type and location being displayed is noted above the database image.

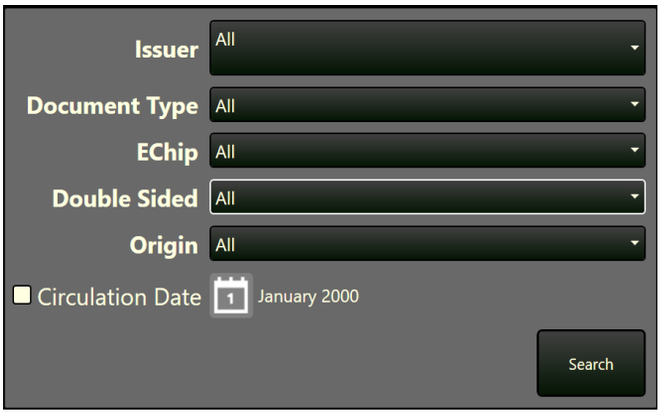


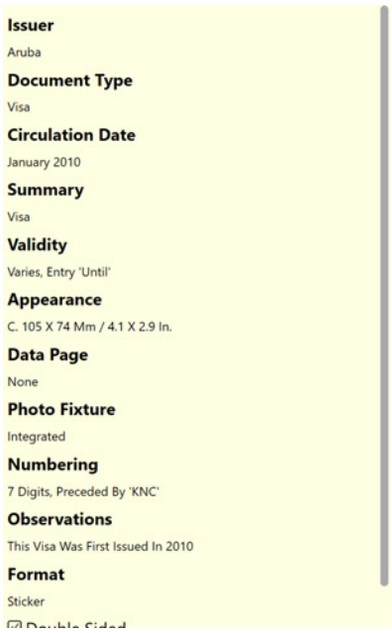
- Directional arrows are used to navigate the database and view different documents.

- Select different lighting conditions for the front of the document.
- Options include:
  - Flood Front.
  - IR Flood Front.
  - UV Flood Front.

- Rotate image clockwise 90°.

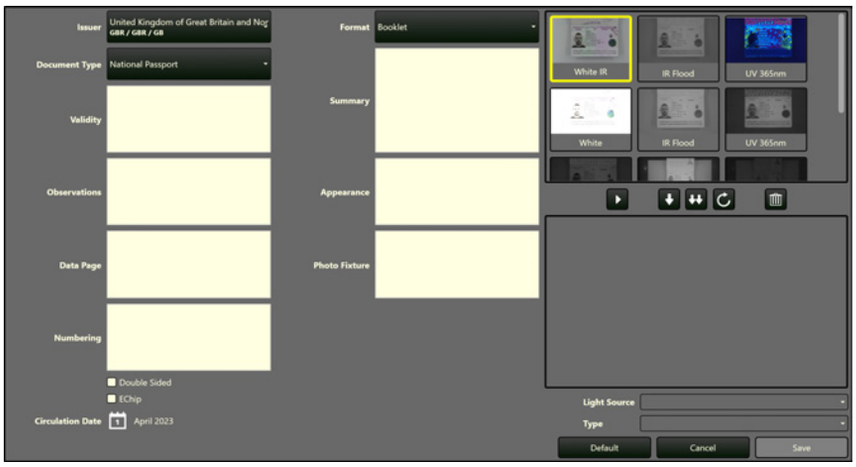
- Search document by issuer, type, Echip, single or double sided, country of origin, and date of circulation.
- Select relevant details from the drop down lists provided.





- Lists the information for the document being displayed by the database.

- Add stored image to a custom database.
- Select the stored image or images to be added to the custom database.
- Select the down arrow and complete details as required.



- Apply image settings used within the database to the live image in the right-hand pane.
- Edit the details of an item within the custom database.
- Remove selected item from the custom database.

Keesing Database Update

Placeholder—Image coming soon

Information to be confirmed.

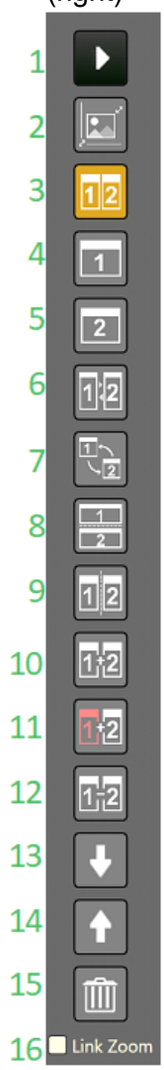
Magnetic Security Feature Imager

- Used for the visualisation of magnetic inks which may be used in the creation of some documents and banknotes, such as the US Dollar.
- This function is available on every VSC®90, but an MSFI reader is required, but provided separately.
- There is no light source used for this feature, visualisation is instead achieved using the MSFI reader placed directly on top of the document in question within the VSC®90.

Compare

Compare is used to determine similarities and differences between two images. A live image from the VSC®90 can be opened alongside a stored image from the gallery for comparison. Alternatively, two images from the gallery can also be opened and compared.

Control icons (right)



1. Live view: open the live view as image 1.
    - Double click an image from the gallery menu and select either 1 or 2 to open it as that image.
2. Automatically detect differences in orientation and scale and position image 1 to match image 2.
3. Images 1 and 2 will be displayed side-by-side.
4. View image 1.
5. View image 2.
6. Strobe: alternate viewing of images 1 and 2, for a few seconds at a time.
7. Flip: swap which images are images 1 and 2.
8. Horizontal split: both images are opened into the same viewing window and a split bar can be moved up or down to view more or less of one image.
9. Vertical split: both images are opened into the same viewing window and a split bar can be moved left or right to view more or less of one image.
10. Overlay: overlay images 1 and 2.
    - Transparency of images can be controlled using the click and drag bar at the bottom of the screen when in overlay mode.
11. Overlay with false colour: overlay images 1 and 2, with a magenta wash being applied to image 2.
    - Transparency of images can be controlled using the click and drag bar at the bottom of the screen when in overlay mode.
12. Overlay with colour inversion: overlay images 1 and 2, with image 2 being inverted and subtracted from image 1.
    - Transparency of images can be controlled using the click and drag bar at the bottom of the screen when in overlay mode.
13. Compares each pixel and takes the lowest value.
14. Compares each pixel and takes the highest value.
15. Delete: remove the contents from images panes 1 and 2.
16. Link Zoom: link images 1 and 2, so when one image is magnified, the other image is magnified by the same amount.

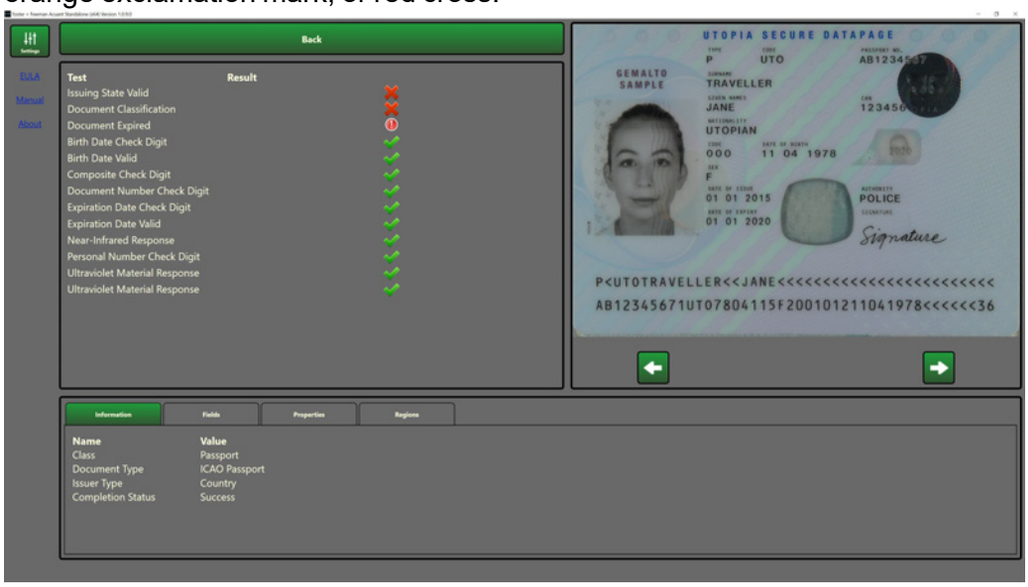
AssureID™

- Opens a database provided by Acuant AssureID™ to authenticate identity documents from other providers.
- A separate licence is required to access and use this database.

1. Enter the questioned ID document and select the relevant magnification preset.
2. A new pane will open to the right of the main image viewer. Select "Capture Images" to begin.
3. Images will be automatically taken of the ID with white light, infrared and ultraviolet.

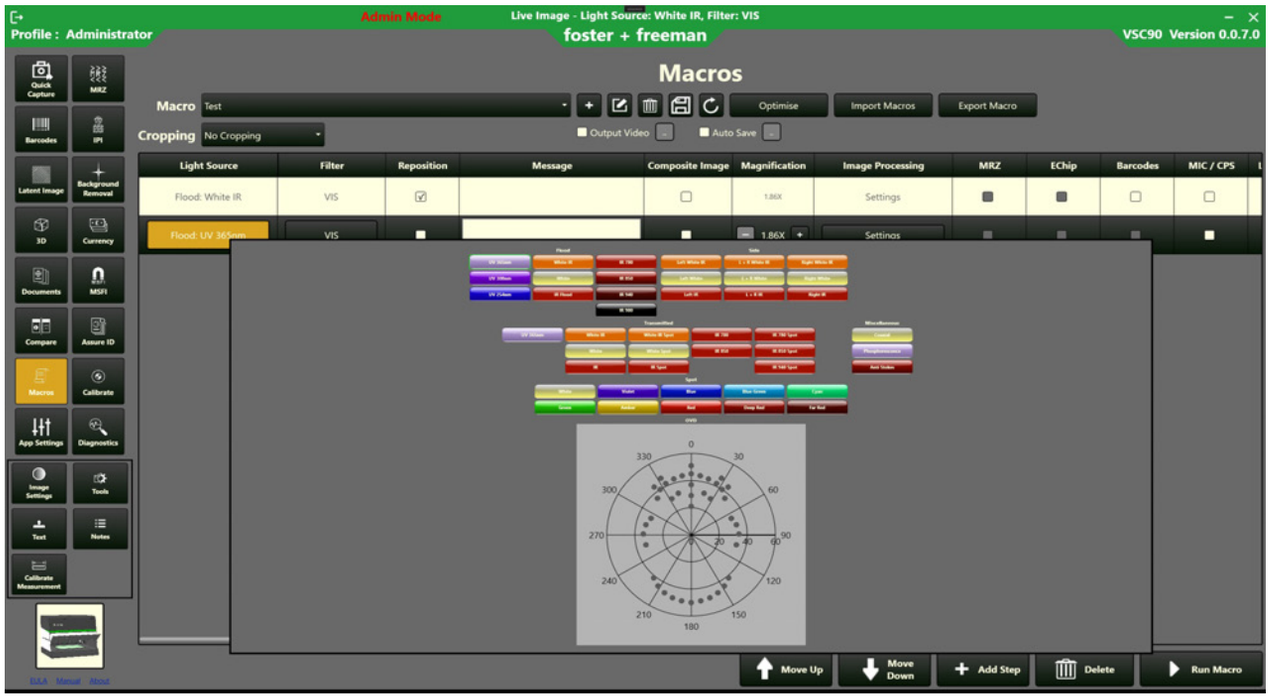
4. Select Open Acuant to open the third party AssureID™ software.
5. Another window will open with a prompt to click and drag a red box around the datapage, and select confirm.

6. Ensure that the correct lighting type is assigned to each image using the drop-down boxes.
7. Select "Analyse Selected Images".
8. AssureID™ will provide a pass/check/fail for all points of investigation denoted by a green tick, orange exclamation mark, or red cross.



Macros

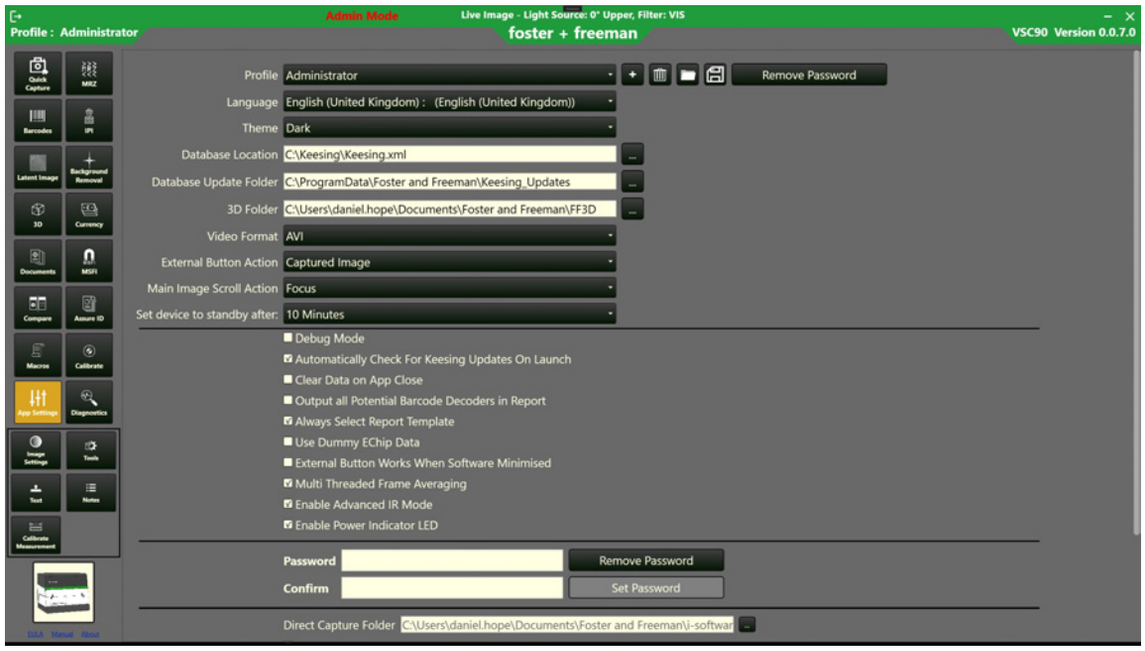
- Select this icon to view, amend and delete macros.
  - Macros are a pre-determined set of instructions that can be applied whenever the macro is selected and applied.



1. Select + to add a macro.
2. Name the macro.
3. Select the light source to open another window.
4. Add, amend, or remove steps as required to create a personalised sequence of events that will be carried out whenever the macro is selected.
5. Run Macro (bottom-right corner).

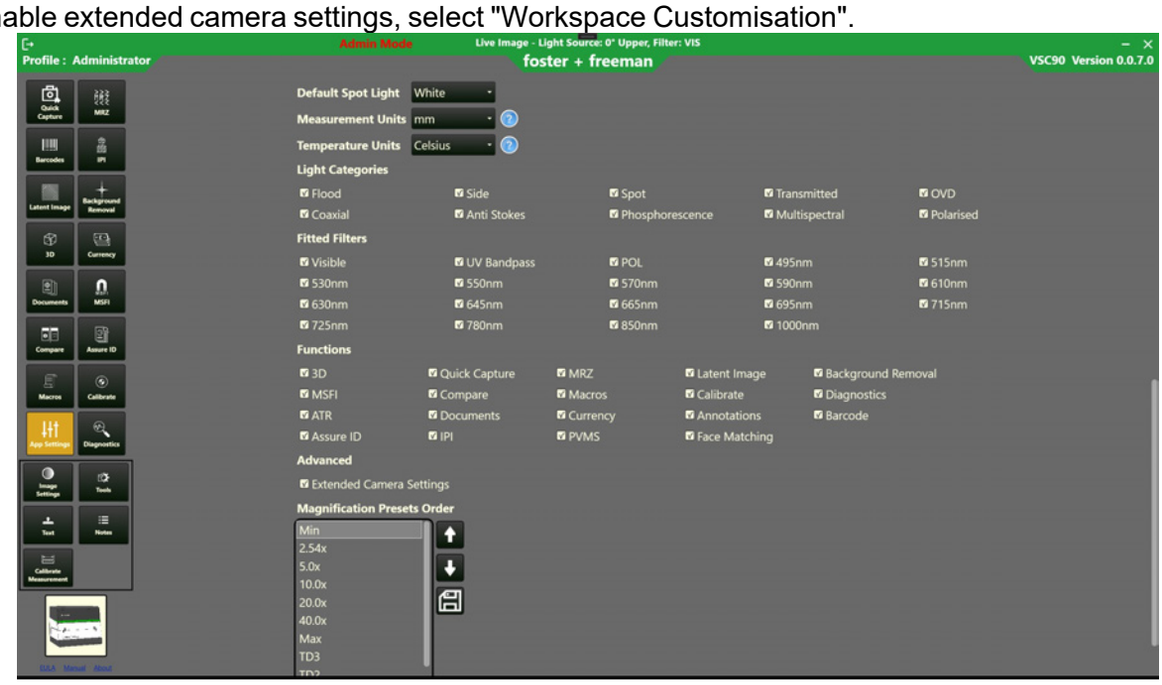
App Settings

- Select this icon to view and amend the settings for the VSC®90 software.
- Changes may require the software to restart.
- Amend language, theme and save settings as required.
- Select the app settings icon again to close.



Use the report manager to set up reporting within the VSC®90 software.

To enable extended camera settings, select "Workspace Customisation".



Under the heading "Advanced", select the check box labelled "Extended Camera Settings". Select and change any required settings with the use od the check boxes and drop-down boxes.

Annotations

- When an image from the gallery is open in the main image viewer, the annotations icon is available.
    - When selected, a floating window opens over the right of the image and allows for the addition of shapes, highlighting and text to be added to an image.

Shapes and arrows can be overlaid onto captured images to identify areas of interest within a document. These shapes can be coloured, moved and resized. Text can be added to provide further information to the images.

Other controls include undo, redo, remove, delete, send to front, send to back, and save. These controls can be applied to any annotation once selected.

Measurements can also be applied to an image by selecting one of the measurement icons.

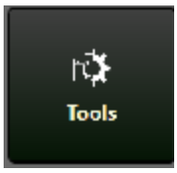
Image Settings

- From the image settings, the brightness, contrast, gamma, hue and saturation can be amended.
- Click and drag on the sliding bar to amend these settings.
- Select the relevant tick boxes to apply additional settings.

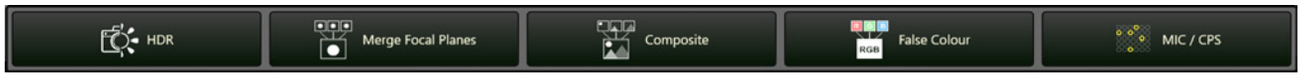
Brightness	Increases or decreases the overall lightness of an image. Adjust as required or select reset to return settings to default.
Contrast	The contrast of an image is the difference between the light and dark areas. Adjust as required or select reset to return settings to default.
Gamma	Gamma corrections control image brightness to brighten darker areas of an image. Gamma corrections are particularly helpful when using light sources that stimulate fluorescence. Adjust as required or select reset to return settings to default.
Hue	The hue denotes the overall colour tint of an image. Adjust as required or select reset to return settings to default.
Saturation	Saturation controls the colour intensity of an image. Adjust as required or select reset to return settings to default.
Digital zoom	Adjust the slider as required to apply a digital zoom to the main image.
Sharpen	The software will compare and determine differences in brightness, and increase the contrast between adjacent pixels to improve image clarity.
Blur	The software will add blur to make the image less sharp and reduce the amount of detail.
Erode	The software will erode away the boundaries of the foreground object, useful for removing areas of white noise but shrinks the object area.
Dilate	The software will dilate pixel boundaries to accentuate features. Often used following erosion to correct for object area shrinkage.
Greyscale	Converts the image to shades of black, white and grey.

Invert	Invert the colour of each pixel in the image to its complementary colour. This may also be known as a negative.
Mirror Horizontal	Horizontally flip an image.
Mirror Vertical	Vertically flip an image.
Equalise Histogram	A computer image processing technique used to improve contrast in images by spreading out the most frequent intensity values.
Show Crosshairs	Select to show the cross-hairs in the centre of the live image overlay for ease of aligning evidence.
Show Edge Markers	Select to show alignment lines on the edges of the live image overlay for ease of aligning evidence.
Grid	Select to show a grid on the live image overlay for ease of aligning evidence.
Ruler	Apply a ruler overlay.
Binarise	Images are converted into a binary black and white image based on the pixel value of the original.
Pixel Intensity Chart	Also known as a histogram, the pixel intensity chart demonstrates the number of pixels in an image at each different intensity value.
Rotation	Use +/- to rotate the image.
Channel	Select the relevant option from the drop-down menu to view the relevant colour channel. Colour channels refer to the Red/Blue/Green colour pixels that make up a colour image.
Isolate	Select the required colour channel to isolate from the drop down bar. • All • Red • Green • Blue
Enhance	Select the required colour channel to enhance from the drop down bar, and use the sliding bar to increase or decrease the applied enhancements. Enhancements include: • All • Red • Green • Blue

Tools



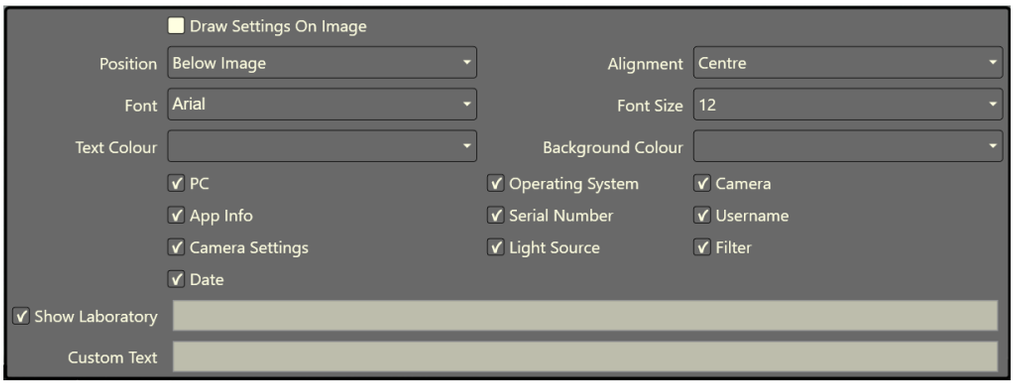
- The tools menu will allow for HDR, the merging of focal planes, composite images and false colouring of images.



HDR	High Dynamic Range involves taking and combining multiple images captured at different exposures to create an image that best mimics colours and brightnesses as seen by the human eye.
Merge Focal Planes	Create a single deep-focus image from a stack of images taken at different depths of field.
Composite	Create a composite image overlaying two or more images to create a single image.
False Colour	Create a composite image with rearranged colour channels. The final image does not reflect the colours of the original.
MIC / CPS	Machine Identification Code / Counterfeit Protection System will exaggerate the yellow tracking dots on printed items.

Text

- The text icon allows for the addition of text, or notes, to an image. The position, alignment, font, colour and size of this text can be changed.



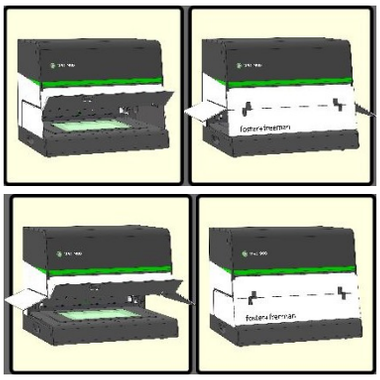
Add Notes

- This opens a window containing a notepad. This notepad can be moved around or pinned to the right side of the main image viewer. Notes can be added, saved, or discarded.

Calibrate Measurement

- This will open a small window for the input of a known measurement from a scale or ruler within the image. This will allow for the calibration of measurements, allowing subsequent direct measurement of on-screen features.

VSC®90 Overview



- This is an overview image of the VSC®90. The illustration will reflect the state of the unit, such as if the front or side flaps are open.

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Revision History

Revision	Revision Date	Description of Change	Author
1	TBC/09/2024	Initial release	KG

Approval	
PMO	
Marketing	
R&D Optic	
R&D Mech	
R&D Elect	
R&D SW Dev	

Image of signed approval table captured: