AUROX

Operating Manual

Clarity / Clarity^{HS}

Laser Free Confocal Spinning Disc Imaging Attachment

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IMPORTANT INFORMATION

This user manual applies to the Clarity systems manufactured in the UK by Aurox Limited. All references to the Clarity refer to both the Clarity LFC and Clarity^{HS} unless otherwise specified.

Product: Clarity, Clarity^{HS}
Electrical Ratings: AC 230 V 50/60 Hz 150 Watts

Before attempting to operate the system, PLEASE READ THE INSTRUCTIONS.

This product should only be used by persons legally permitted to do so.

If the equipment is used in a manner not specified in the User Manual, the protection provided by the equipment may be impaired.

Important Health and Safety Notice

When returning components for service or repair it is essential that the item is shipped together with a signed declaration that the product has not been exposed to any hazardous contamination or that appropriate decontamination procedures have been carried out so that the product is safe to handle.

Care has been taken to ensure the information in this manual is accurate and at an appropriate level. Please inform Aurox if you have any questions, suggestions for corrections or improvements to this manual.

Clarity service and support is available for technical and operational issues as indicated below.

- E-mail: support@aurox.co.uk
- Phone: +44 (0) 1865 407814 between 7 a.m. and 4.00 p.m. (UK time), Monday to Friday
- Fax: +44 (0) 1865 407814

This users' manual has been written according to standard 89/392/EEC and further modifications.

Specifications are subject to change.

Aurox acknowledges all trademarks and registrations.

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1. HEALTH & SAFETY

1.1 General

In normal operation, Clarity is designed to operate safely. All users of Clarity should be aware of potential hazards that exist in and around equipment of this type and the ways of avoiding possible injury and equipment damage that may result from inappropriate ways of working. A description of such potential hazards and how to avoid them is given in this section.

This Operating Manual includes information and warnings that must be observed by the user.

This manual adopts the following convention:

	**WARNING** **Indicates a potential hazard which may result in injury or death**

	**CAUTION** **Indicates a potential hazard which may result in damage to equipment**

	**CAUTION** **UV radiation is emitted!**

Warning symbols on the equipment are:

	**CAUTION** **Risk of electric shock**

	**CAUTION** **Refer to accompanying documents**

The Clarity may only be used for the techniques described in this manual. The manufacturer cannot assume any liability for any other application, including that of individual modules or single parts of the Clarity. This also applies to all service or repair work that is not carried out by authorized service personnel. All warranty claims shall be forfeited.

Clarity is equipped with an external power supply, which permits the use of line voltages in the range 100 to 240 V ±10 %, 50 / 60 Hz, without having to change the line voltage adjustment on the Clarity. The distributor will supply Clarity with a mains lead suitable for the country of installation.

Before switching on Clarity, check whether it is suitable for the line voltage present and that the correct lead has been supplied.

See original manufacturers' manuals for further safety data on third party equipment supplied with the system. A list of these is available on the Aurox website.

	**WARNING** **Never use Clarity with an external power supply other than the one shipped with the instrument! Doing so may damage Clarity and may compromise its safety.**
	**WARNING** **Do not take risks. You have a responsibility to ensure the safe condition and safe operation of equipment.**

Clarity is not equipped with any special devices for the protection from substances that are corrosive, toxic, radioactive or other substances that could be hazardous to health. When handling such substances, observe all legal regulations, particularly the relevant national regulations for the prevention of accidents.

	**CAUTION** **Gas-discharge lamps or LED light sources fitted with UV emitter used in microscopy light sources emit ultraviolet radiation, which can cause burns on the eyes and skin. Therefore, never look directly into the light of these lamps or into the coupling light guide and avoid direct, unprotected incidence of their light on your skin.** **When using the microscope, always use its protective devices (*e.g.* special attenuation filters or the fluorescence protection shield). When they are hot, gas-discharge lamps are under high internal pressure and may therefore only be changed when they have cooled down. For lamp replacement, make sure to use protective gloves and mask and consult the relevant user manual. This equipment has not been designed and manufactured for the medical diagnosis of patients.**

Clarity is a sealed unit; hence the internal optics will not be affected by normal level of ambient dust and dirt. However user accessible elements such as the filter cubes or illumination adapter can become exposed to dust, which could impair the performance of the Clarity. Therefore the filter turret door should be kept closed and the illumination source attached to the Clarity.

	**CAUTION** **Clarity may only be operated by trained personnel who must be aware of the possible dangers involved with microscopy and the relevant application. Clarity is a high-precision instrument that can be impaired in its performance or damaged if handled improperly.**

1.2 Electrical Safety

In normal use the user is protected from the dangers associated with the voltage, current and power levels used by the equipment. Only personnel qualified to work with the voltages and currents used by this equipment should attempt to disconnect, dismantle or modify the equipment.

1.2.1 Potential Electrical Hazards

The following list is not intended as a complete guide to all the electrical hazards on the system, but serves to illustrate the range of potential hazards that exist:

- Electric shock
- Electric burn
- Fire of electrical origin
- Electric arcing

1.2.2 Recommended Precautions

	**WARNING** **All of the electrical equipment supplied as part of the system should be provided with a protective ground. Do not remove protective grounds as this may give rise to an electrical safety hazard. It is vitally important that the system is properly grounded at all times.** **Follow local and national electrical regulations and procedures.** **Do not remove connectors, disconnect equipment, open safety covers, dismantle or modify equipment unless you are qualified and authorised to do so and you are fully conversant with its operation and potential hazards, or have total assurance through your local electrical permit to work system that the equipment has been made safe.** **Ensure that the mains supply is fused at an appropriate rating, or fitted with a circuit breaker, and that it can be isolated locally via a clearly labelled, clearly visible and easily accessible isolating switch. Isolate the supply before carrying out any maintenance work.** **Do not touch any unshielded wires or connectors while mains power is supplied to the system.** **Do not allow water or any other foreign objects to come into contact with Clarity's electrical components.**

1.2.3 First Aid

A course in first aid to include methods of artificial respiration is recommended for those whose work involves equipment that may produce a high voltage.

	**WARNING** **Do not attempt to administer first aid to someone who may have suffered electric shock until the source of the shock has been isolated.** **Mains voltages are present in the system. High voltages are used by the X-ray tube and power supply. These can cause serious injury or death.** **Only personnel qualified to work with high voltages and currents should perform service or maintenance work on such equipment.**

1.2.4 Modifications and Service

Aurox will not be held responsible for the safety, reliability or performance of the equipment unless assembly operations, extensions, re-adjustments, modifications and repairs are carried out only by persons authorised by Aurox.

2 INTRODUCTION

2.1 Scope

This manual applies to the Clarity laser free spinning disc confocal imaging attachment designed and manufactured by Aurox Ltd.

2.2 Definitions

The following definitions will be used throughout this Manual:

Clarity or Clarity^{HS}	Spinning disc confocal imaging attachment as supplied by the manufacturer or by an authorised distributor.
Manufacturer	Aurox Ltd.
Distributor	Microscope system manufacturer or integrator who incorporates Clarity into an imaging system that would typically also include a microscope, imaging sensor and light source.
User	End user of the imaging system supplied by the distributor or manufacturer.
Software	Aurox Visionary for controlling the Clarity and other components of the imaging system as well as implementing image processing algorithms required for its correct functioning, supplied by the distributor or manufacturer.
Firmware	Internal software of Clarity that supports its hardware functions, supplied by the manufacturer.

2.3 How To Use This Manual

This manual is aimed at operators and maintenance personnel of the Clarity. Operators of the Clarity should be computer literate, familiar with confocal fluorescence microscopy techniques, have had training in the use of the Clarity system by Aurox or an authorised Aurox distributor. This manual is intended to provide operators with a practical guide to the Clarity and its operation. This is intended to familiarise the user with how the Clarity works and provide a better understanding of the Clarity operation.

All personnel who are likely to operate the Clarity or who are likely to come into contact with any of the Clarity components should read the health and safety information section of the manual. This provides basic information aimed at highlighting the safety hazards associated with the equipment.

More detailed information and instructions for component parts of the Clarity are given in the third party manuals supplied with the system, which are listed on the Aurox website. These manuals should also be read and understood before operating the system.

The purpose of this manual is to:

- Explain how to operate the equipment
- Explain how to interface to the equipment
- List performance characteristics of the equipment
- Describe how the equipment operates
- Assist with simple fault finding and maintenance

2.3 System Overview

Clarity is a laser free confocal add-on device that can be added to a wide range of compatible upright and inverted research microscopes, thereby converting them from widefield microscopes to laser free confocal fluorescence microscopes.

3 SPECIFICATIONS

3.1 Operating environment

Table 3.1.1 Operating Environment Specifications

Ambient temperature	+10 to +35°C
Relative humidity	20 to 75 % non-condensing
Air pressure	800 to 1060 mBar
Pollution degree	2

3.2 Electrical

Table 3.2.1 Electrical Specifications

Enclosure protection	IP20
Electrical safety	IEC 61010-1:2010
Noise suppression	EN 55011 Class B
Noise immunity	EN 61000 - 4

Table 3.2.2 Base Unit Power Requirements

Voltage	12 V DC
Current	12.5 A

Table 3.2.3 Mains Power Supply Specifications

Line voltage	100 to 240 V AC (±10 %), self-sensing
Line frequency	50 to 60 Hz
Line current	3 A
Power lead socket	IEC-320/C14 (3 pins)
Short circuit protection	Continuous

3.3 Interfaces

Table 3.3.1 System Adapter Specifications

Computer interface	USB 2.0
Camera adapters	C-mount
Microscope adapters	Microscope stand specific
Light source adapter	Ring dovetail
Recommended collimating adapter beam diameter	27mm

Table 3.3.2 Camera Mount Specifications

Load carrying capacity	2 kg
Moment on microscope mount (upright configuration, excluding camera)	<0.5 nm

3.4 Optical

Table 3.4.1 Optical Specifications

Disc rotation speed	3000 rpm
Disc grid position 1	High sectioning mode
Disc grid position 2	Mid sectioning mode
Disc grid position 3	Low sectioning mode
Switching time between modes	< 3 s
Field of view (in the intermediate image plane)	8 x 14 mm
Filter cubes turrets	4 channels, user-replaceable cubes
Filter switching time	< 200 ms

4. TECHNICAL DESCRIPTION

The Clarity is an attachment to a wide-field microscope that enables the acquisition of sectioned images.

The Clarity unit is designed to work as part of an imaging system consisting of the following:

- Microscope stand (inverted, upright or macroscope) fitted with a motorised z-drive or alternatively an external motor focus controller and optional motorized XY stage.
- Scientific CMOS detector,
- Arc Lamp or LED light source
- Computer with minimum specifications detailed in Table 4.1

For a list of currently supported detectors, light sources and microscope stands; please refer to the following Aurox web-page:

http://aurox.co.uk/aurox-confocal-microscope-downloads-supported-devices.php.

Table 4.1 Compatible Computer Specifications

Intel i5 processor or better
Integrated Intel graphics
16Gb Ram minimum (32Gb recommended)
2Tb Hard Drive recommended
6 USB ports minimum
Windows 10 operating system
1920x1080 pixel resolution monitor

Clarity will typically be installed at the user's facility by a service engineer working for the distributor or the manufacturer. However, the Clarity component of the system has been designed to be user-installable by following the instructions in this Operating Manual.

This Operating Manual describes the installation of the Clarity only. For further notes and instructions on how to control the Clarity through Aurox Visionary please refer to the software Operating Manual supplied by the distributor or manufacturer. For questions related to microscope, camera or light source consult the relevant manuals from the manufacturers of those devices.

It is essential that prior to the initial start-up of the Clarity the user should familiarise themself with the notes on Clarity safety as well as the chapters dealing with Instrument Description, Installation and Operation.

5 HANDLING, INSTALLATION, STORAGE AND TRANSIT INFORMATION

Typically the first installation of the Clarity, especially if purchased as a part of complete microscopy system, would be done by the supplier's service engineer or authorized distributor. However, the Clarity has been designed so that the user can install, align and start up the device.

Before installation and start-up, make sure that you have read the sections on Clarity Health and Safety (Section 1 of this Manual).

5.1 Microscope stand requirements

The Clarity is primarily designed to work with an inverted compound microscope, which has a left hand side camera port complying with the C-Mount standard. A typical view of a fully assembled Clarity can be seen in figure 5.1.

The Clarity may also be installed on the right hand or bottom port of an inverted microscope or on the camera port of an upright microscope or macroscope. The user should check with the microscope vendor or Aurox whether the load-bearing properties of the camera mount are sufficient to support the weight distribution of the Clarity.

If in doubt about the load-bearing capacity, never mount the Clarity on a vertical port! Mechanical failure of the port adapter will result in damage to the microscope and Clarity and may lead to injury to the user.

This manual will address only the installation of Clarity onto the left hand side camera port of an inverted microscope frame.

For a current list of compatible microscopes or instructions on the installation of the Clarity on an upright microscope, stereomicroscope or macroscope, please contact Aurox Ltd for relevant information.

	NOTE The optical sectioning imaging method used in the Clarity can be sensitive to vibration that can degrade the image quality delivered by the Clarity. It is therefore recommended by the manufacturer that the microscope together with the attached Clarity should be installed on a vibration isolation table where possible.

Figure 5.1 Fully assembled Clarity system with Liquid Light Guide and collimating adapter, scientific camera and microscope frame.

5.2 Unpacking Clarity

5.2.1 Weight and Dimensions

Table 5.2.1.1 Clarity Weights and Dimensions

	Weight	Dimensions (W x D x H)
Base unit	5.8 kg	390 x 220 x 135 mm
Power supply	1 kg	175 x 85 x 45 mm

The Clarity is supplied in a polyethane carry case surrounded by cardboard packaging.

Open the cardboard box and take out the plastic carry case.

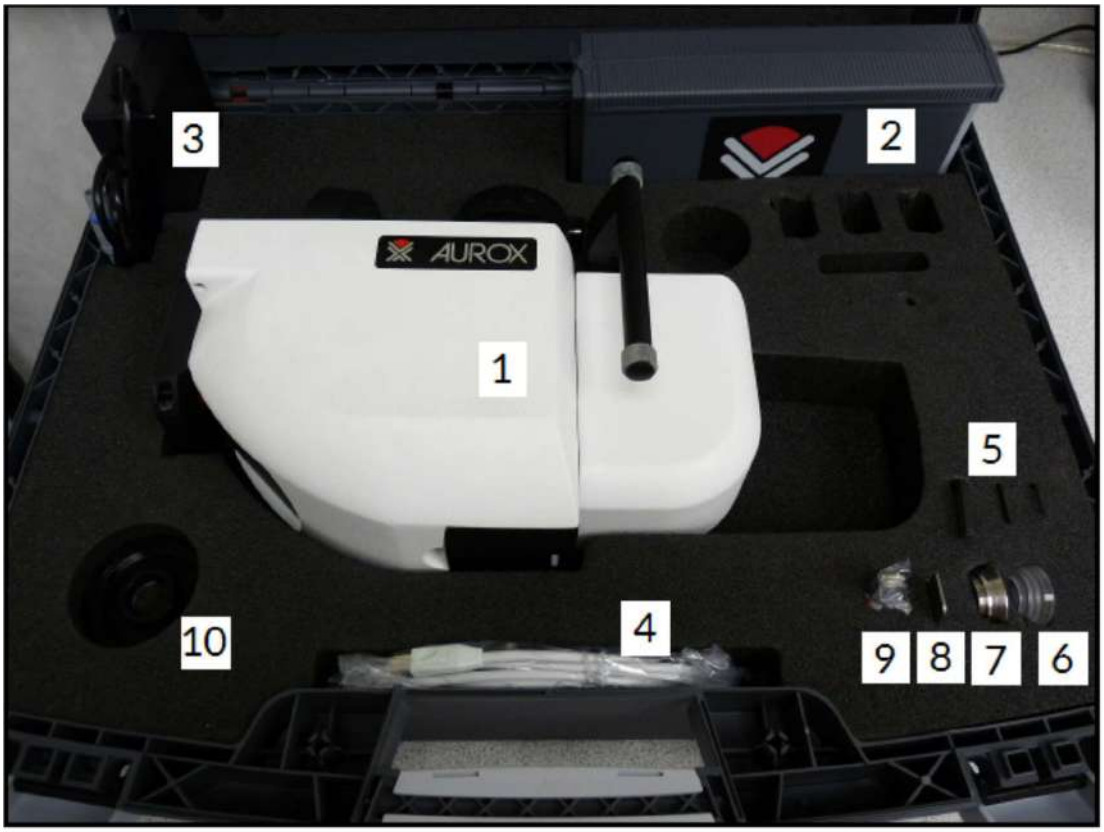

Figure 5.2 The contents of the carry case.

The carry case will contain:

1. Clarity 2. Filter cube box containing filter cubes (if ordered) 3. Clarity power supply 4. USB cable 5. 3 Allen keys (2mm, 3mm and 5mm) 6. Pupil alignment target 7. Camera adapter	8. Camera adapter tool 9. USB stick containing Aurox Visionary software 10. Microscope adapter (if ordered)

Please ensure all items are present and also verify that all components listed on the delivery note are present (*e.g.* light source and detector). Please note that additional items may be packaged in a separate box.

Keep the original packaging for a possible longer storage or return of the Clarity to the manufacturer or dispose of it properly.

5.2.1 Filter cubes

Filter cubes are stored in clear plastic bags for cleanliness and supplied in a polyethylene case that can hold up to four filter cubes, figure 5.2.1 (a)

Each filter cube has a label showing the excitation, emission and dichroic wavelengths. Each filter cube is comprised of one excitation filter and two emission filters, figure 5.2.1 (b)

	**CAUTION** **Care should be taken to not touch the optical surfaces of the filter cubes**

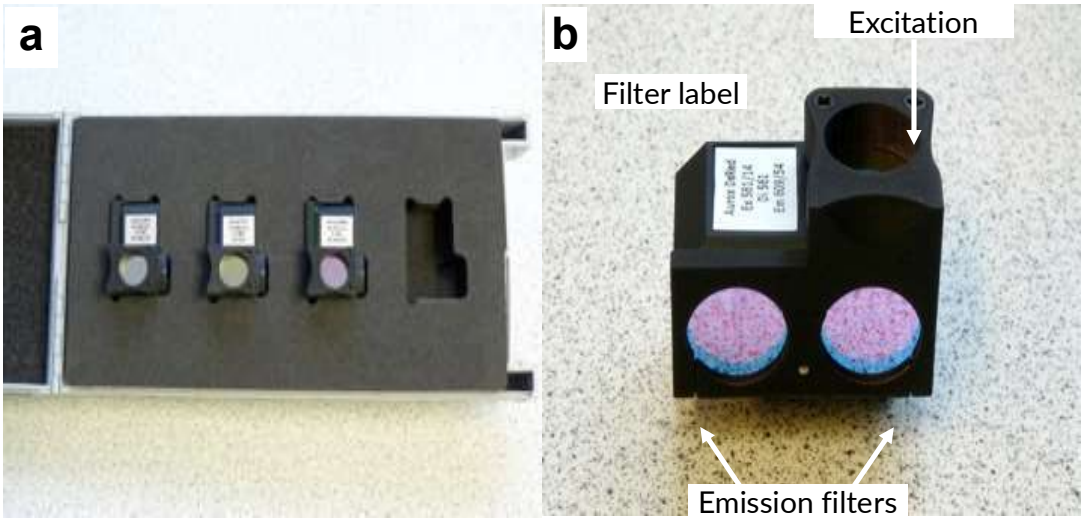

Figure 5.2.1 (a)Filter cube case with three filter cubes, (b)Close-up photograph of a filter cube showing their positions and labelling.

5.3 Storage and transportation

If removed from the microscope for storage the Clarity should be stored within its carry case under the environmental conditions listed below:

Table 5.3.1 Environmental conditions

Ambient temperature	-10 to +50 °C
Relative humidity	20 to 75 % at +35 °C
Air pressure	800 to 1060 mBar

5.4 Installation

The following installation instructions for the Clarity are also available in video format via our web-site.

5.4.1 Attaching the microscope adapter

The Aurox Clarity attaches to the camera port of an inverted compound microscope using a microscope specific adapter. Please ensure that the correct adapter has been supplied. The list below shows the different microscope adapters available as well as the method by which to attach them to the microscope camera port.

Table 5.4.1.1 Microscope Adapters and Attaching Instructions

Nikon Ti		Remove any existing camera adapter from the camera port. Slide the Nikon Ti Range adapter into the camera port until it is flush with the side of the microscope. Tighten both grub screws to hold the adapter firmly in place.
Zeiss AxioImager		Remove any existing camera adapter to expose the threaded spigot that will protrude from the side of the camera port of the microscope. Attach the Aurox microscope adapter by screwing the adapter on to the spigot in a clockwise direction until it is finger tight.
Zeiss Axio Vert 200		Remove any existing camera adapter to expose the camera port. Hold the Aurox microscope adapter over the spigot and tighten the hex screws to hold firmly in place.
Leica DMi8		Remove any existing camera adapter to expose the camera port. Remove the securing grub screw from the microscope camera port. Place the Aurox microscope adapter onto the spigot. Rotate gently until the recessed notch on the adapter is in line with the grub screw hole on the microscope and replace and tighten the grub screw to hold firmly in place.
Olympus IX70		Remove any existing camera adapter from the camera port. Slide the Olympus IX70 Range adapter into the camera port until it is flush with the side of the microscope. Tighten the grub screw to hold the adapter firmly in place.
Olympus IX71/81		Remove any existing camera adapter from the camera port. Slide the Olympus IX71/81 Range adapter into the camera port until it is flush with the side of the microscope. Tighten the grub screw to hold the adapter firmly in place.

5.4.2 Connecting the Clarity to the microscope

1. Remove the red plastic shipping cover from the microscope port of the Clarity by gently pulling it free.
2. Do not touch the optical surface of the window, which is exposed after removing this cover.
3. Slightly loosen the clamping mechanism of the Clarity using an M6 Allen key, figure 5.4.2 (b).

	NOTE Do not over loosen this bolt. One or two turns of the Allen key are sufficient.

4. Slide the Clarity onto the microscope adapter, figure 5.4.2 (a). If the Clarity is not approximately horizontally aligned with the microscope adapter, it may not mount correctly and you must adjust the height adjustment on the leg assembly as shown in section 5.4.6.

	NOTE The Clarity comes fitted with a carry handle, hold the handle with one hand and support its weight from underneath with the other while moving the Clarity.

5. Tighten the clamping mechanism using the provided M6 Allen key, figure 5.4.2 (b).

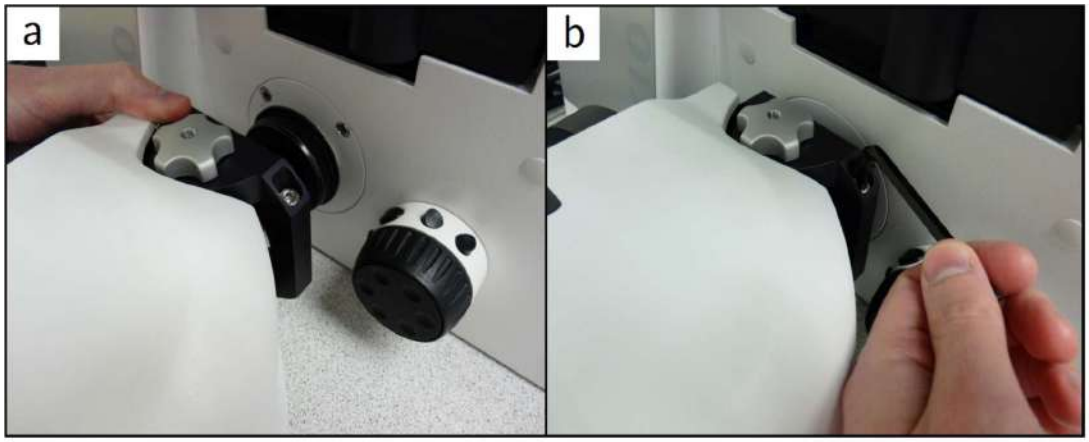

Figure 5.4.2(a)Engaging Clarity onto the microscope adapter, (b) locking the microscope clamp.

The result of this procedure should be a solid connection between the Clarity and microscope.

5.4.3 Electrical and data connections

All the electrical connections of the Clarity are located on the back of the Clarity, figure 5.4.3.

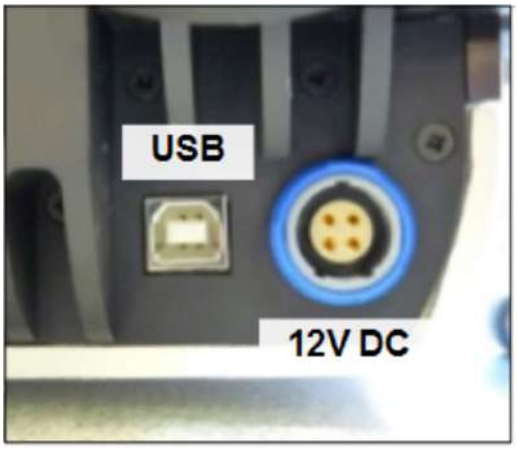

Figure 5.4.3 Clarity power and USB connections.

1. Insert the supplied USB cable into the USB socket and connect the other end to the computer running the imaging software.
2. Insert the DC supply plug from the Power Supply Unit into the 12V socket of the Clarity.

	NOTE The socket is keyed to avoid inserting the plug in the wrong orientation.

	CAUTION Do not force the plug into the socket; check the orientation of the plug relative to the socket. The plug should easily connect to the socket without requiring excessive force.

3. Connect the power supply to the lab plug socket and leave the plug socket in the off position.

5.4.4 Inserting and removing filter cubes

The Clarity is equipped with filter cubes, which are user-replaceable. It will be necessary to install the filter cubes before the Clarity can be used. The same operation will have to be performed with any new filter cubes purchased by the user. The filter turret can hold up to four filter cubes. A full list of filters is available from the distributor or from Aurox.

5.4.4.1 Inserting filter cubes

The Clarity has an initialisation step which senses incorrect filter cube insertion and/or obstruction of the filter wheel. It is therefore recommended to power the Clarity during filter cube exchange.

	**CAUTION** If a light source is connected to the Clarity make sure that it is on standby or turned off before opening the filter turret door.

1. Turn on the power to the Clarity.
2. Open the filter turret door.
3. Select the desired turret position, figure 5.4.4 (a) by rotating the wheel gently by hand.
4. Insert the filter cube along the guiding spokes of the filter turret until the locating magnet pulls the filter cube, figure 5.4.4 (b). The insert of figure 5.4.4(b) shows that the cube has not been pushed beyond the turret retaining spring and is therefore not locked in place yet.

	**CAUTION** **Do not use excessive force in this step! If you are having trouble inserting the cube it is most likely due to initial misalignment of the cube with respect to the turret. Remove the filter cube retry.**

5. Lock the filter cube in place by pushing it against the filter turret, figure 5.4.4 (c), insert shows that the cube has been pushed beyond the turret retaining spring and is therefore locked.
6. Check that the filter cube is flush with the turret

	**CAUTION** **Failure to insert the filter cube properly could result in damage to the Clarity and/or filter cube, as well as compromising the optical performance of the Clarity.**

7. Repeat from step 2 to insert the next filter cube
8. When all filter cubes have been inserted close the filter turret door. The Clarity will undergo its initialisation procedure during which the wheel spins slowly to detect any misplaced filter cube or obstruction. If the initialisation procedure fails the filter turret door indicator will remain dark. If the initialisation procedure passes then the door indicator will light up.

5.4.4.2 Removing filter cubes

1. Pull the filter cube outward by holding the side grip as shown in figure 5.4.4 (d)

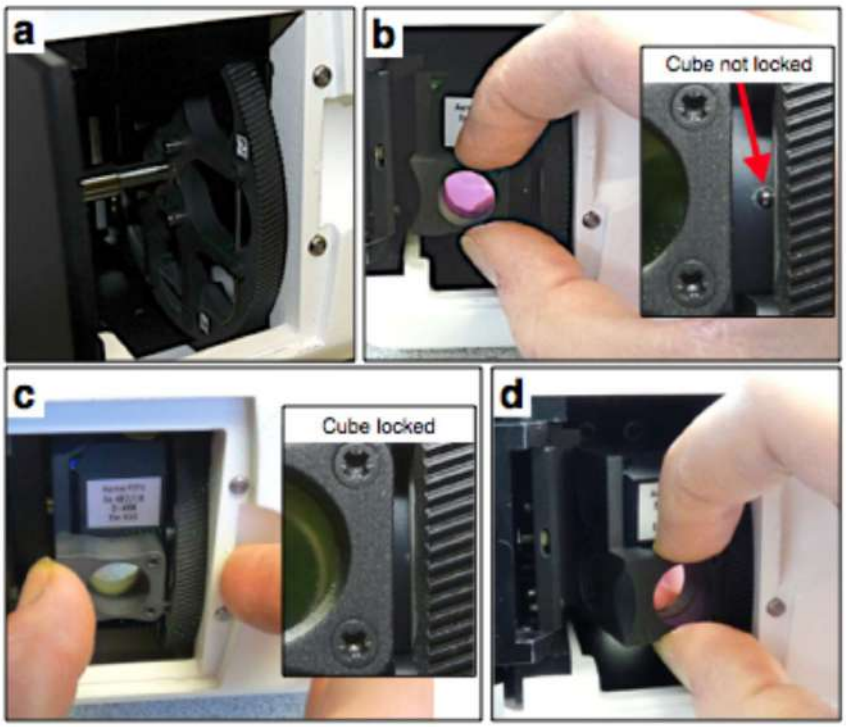

Figure 5.4.4 Inserting and removing filter cubes: (a) filter turret, (b) filter cube insertion, (c) filter cube locking, (d) removing a filter cube

5.4.5 Attaching a light source

To correctly operate the Aurox Clarity, it must be fitted with a light source to provide illumination. For a current list of supported light sources, please contact Aurox Ltd. For operating procedures and safety precautions regarding the light source used, please refer to the manuals and documentation of the manufacturer of the light source.

	**CAUTION – UV RADIATION EMITTED** External light sources may produce intense visible and UV radiation. Never attempt to insert or remove the illumination into the Clarity with the light source switched on!

The light source connection port is found at the rear of the Clarity as shown in figure 5.4.5. Light sources may be directly fitted onto this port or may be attached by means of a liquid light guide.

5.4.5.1 Direct coupling of a light source to the Clarity

The Clarity light source port has a Zeiss type fitting. Any light source to be direct coupled to the Clarity should have a Zeiss adapter installed.

1. Loosen the locking screw on the Clarity light source port as shown in figure 5.4.5 (a).
2. Remove the plastic film dust cover from the Clarity light source port using your fingers or tweezers.

	**NOTE** Do not touch the inside of this port with your fingers or allow dust ingress.

3. Insert the light source aperture, with the correct adapter into the Clarity light source port as shown in figure 5.4.5 (a) and tighten the locking screw to hold it firmly in place.
4. Connect all required power and data cables to the light source.

5.4.5.2 Coupling a light source to the Aurox Clarity by using a liquid light guide

In order to couple a light source to the Clarity with a liquid light guide, you must first attach an illumination collimating light guide adapter to the rear of the Clarity. For information regarding the collimating adapter specifications required, please contact Aurox Ltd.

1. Loosen the locking screw on the Clarity light source port as shown in figure 5.4.5(b).
2. Remove the plastic film dust cover from the Clarity light source port using your fingers or tweezers

	**NOTE** Do not touch the inside of this port with your fingers or allow dust ingress.

3. Insert the collimating light guide adapter into the Clarity light source port as shown in figure 5.4.5(b) and tighten the locking screw to hold it firmly in place.
4. Insert the liquid light guide into the collimating light guide adapter and tighten the thumbscrew to finger tight.
5. Connect all required power and data cables to the light source.

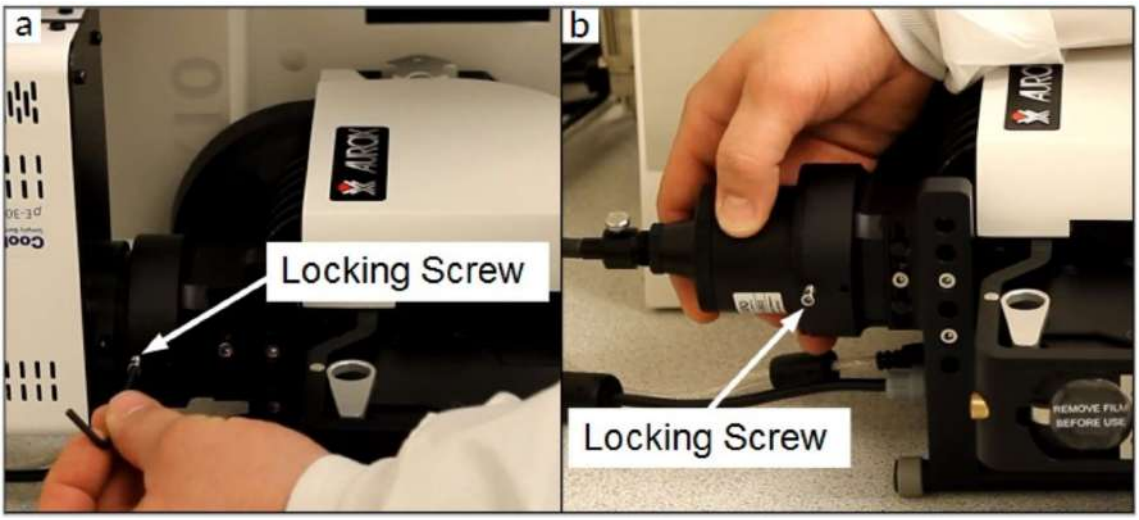

Figure 5.4.5(a) Attaching a Light Source, (b) Direct coupling, Liquid light guide.

5.4.6 Aligning the Clarity to the microscope

Every time the Clarity is attached to the microscope it will be necessary to align the corresponding pupils to ensure that the light from the Clarity is coupled into the microscope objective lens properly.

5.4.6.1 Inverted microscope configuration:

1. Move the microscope objective turret to a position not occupied by an objective lens. Insert the provided microscope target and set the microscope to 100% side port.
2. Make sure the external light source is switched on. Open the light source shutter and observe the image of the pupil on the target. You may have to adjust the brightness of the light source and/or manually change the filter position to achieve the optimal visibility. Note that if this is required the filter door should be left open until alignment is achieved.
3. Make sure that the "pitch" locking screws and "yaw" clamp are loosened before starting adjustment as shown in figures 5.4.6 (d), (e).
4. Adjust the yaw angle between the microscope frame and Clarity by moving the entire unit as shown in figure 5.4.6 (a).
5. Adjust the pitch of the Clarity unit using the fine adjustment screw of the leg support, figure 5.4.6 (b). If the leg must be moved beyond the limits of the fine adjustment screw then the leg support has three coarse height settings, unscrew the two M4 screws to set to the required height.
6. The pupil is correctly aligned when centered at the microscope alignment target, figure 5.4.6 (c).
7. Lock both "pitch" locking screws and the "yaw" clamp.
8. Remove the target and shutter off the light source.

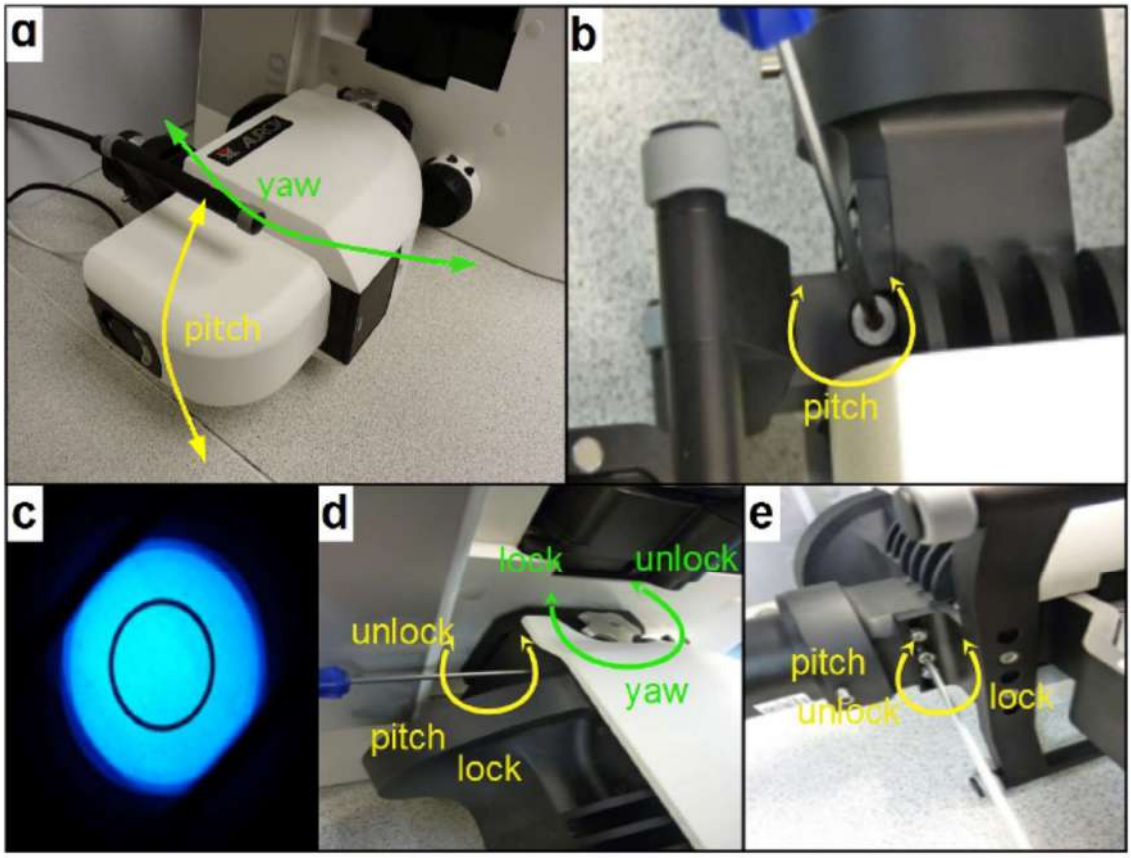

Figure 5.4.6 Pupil alignment: (a) Yaw and pitch definitions, (b) pitch support leg adjustment, (c) correctly aligned pupil on ground-glass alignment tool, (d) microscope clamp pitch and yaw lock, (e) leg support pitch lock

5.4.6.2 Upright microscope configuration:

1. In upright configuration the pitch adjustment on the support leg is not used or not present depending on the Clarity configuration.

2. If the Clarity is mounted in an upright configuration the “yaw” and “pitch” are locked only at the microscope clamp with the “yaw” and “pitch” locking screw as labeled in figure 5.4.6 (d). For further information regarding installation on an upright microscope, please contact Aurox.

5.4.7 Attaching a camera

	NOTE A camera is required for the correct operation of the Clarity. For a current list of supported cameras, please contact Aurox.
	CAUTION Do not touch the optical surface of the camera

1. First remove the lens cover from the camera and attach the Aurox threaded camera adapter by screwing in clockwise until firm, then lock in place with the tool provided.
2. Remove the plastic film dust cover from the camera port of Clarity using your fingers or tweezers

	CAUTION Do not touch the inside of the Clarity camera port or allow dust ingress.

3. Remove the camera adapter cover from the Clarity by sliding towards you as shown in figure 5.4.7 (a) and set aside.
4. Loosen the locking screw as shown in figure 5.4.7 (b).
5. Holding the camera in your left hand, gently pull the spring loaded lever towards you with your right hand and insert the dovetail part of the camera adapter into the camera port of the Clarity as shown in figure 5.4.7 (c). Release the lever and ensure the camera is held in place.
6. Rotate the camera until it is approximately square and use the locking screw to gently lock the camera in place as shown in figure 5.4.7 (d).

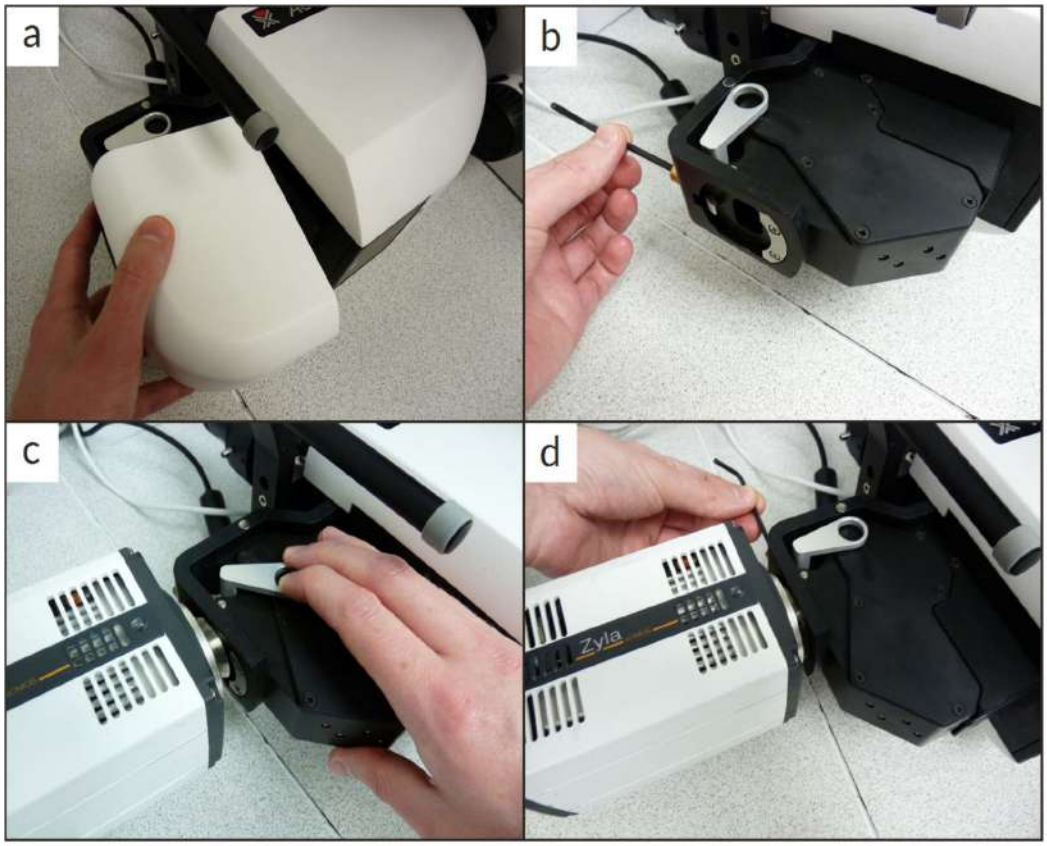

Figure 5.4.7 Attaching camera: (a) slide cover off, (b) unlock adapter, (c) attach camera, (d) camera adapter locking screw.

	NOTE **To achieve the correct operation of the Clarity, it will be necessary to align the camera more accurately at a later stage. This will be done with the aid of the Visionary software supplied with the system.**

5.4.8 Installing Aurox Visionary

The Aurox Visionary software can be found on the USB stick included with your Aurox Clarity system or downloaded direct from the Aurox website at http://www.aurox.co.uk/aurox-confocal-microscope-downloads-software.php.

1. Insert the USB stick into a USB port on your computer and copy the files from the USB stick onto a suitable folder on your computer.
2. Launch the VisionaryInstallRunner.exe application
3. Click Visionary. This will install .Net and Java first, use default settings everywhere. You will then be presented with a menu to install Fiji and Visionary, don't select any options, just click install. Do not launch the application upon the installation, continue installing all the remaining elements
4. Click Micromanager, use default location/settings, create desktop link but do not launch the application upon installation
5. If you are using an Andor Zyla, PCO Edge or Photometrics detector, click the relevant button to install the camera drivers.
6. If you are using Nikon Ti-E, click Nikon Ti-E and install the relevant control application. Once this is complete finish installing Nikon Ti-E drivers by attaching the stand, finding a driverless USB device in Device Manager and pointing to C:/ProgramFiles/Nikon/shared/drivers for driver update
7. If you are using a CoolLED pe300 light source, please install the drivers from the manufacturers website
8. If you are using a Hamamatsu Orca Flash 4 detector, install the DCAM driver package for Hamamatsu Orca Flash 4.0 (USB driver only) by downloading the package from the Hamamatsu website

Once installation is complete, two icons will be present on the computer desktop, MicroManager and Visionary

	**NOTE** For details of other compatible equipment and how to operate them with the Clarity system, please contact Aurox Ltd

5.4.9 Initial Setup, alignment and calibration

The Clarity is activated by plugging in the mains lead of the Power Supply Unit and turning on the power at the mains switch. The Clarity will undergo an initialisation step during which the filter turret will slowly spin and the disc will go to a pre-set position. At this point the Clarity is in standby mode and USB communication is active.

	CAUTION **The power cord should be only removed when the Clarity is in standby mode. This will ensure that the disc is in the correct position.**

1. Turn on all connected devices (Microscope, Camera and Light source etc).

	NOTE **We recommend that you switch on the Clarity and the light source at least 30 minutes before taking the images to allow them to warm up to the stable operating temperatures.**

2. Run Visionary by double clicking the desktop icon. The software will open in the Hardware Setup Screen as shown in Figure 5.4.8

	NOTE **For further detailed instructions for operating the Visionary software, including Hardware Set-up Procedure, please refer to the Visionary User Manual**

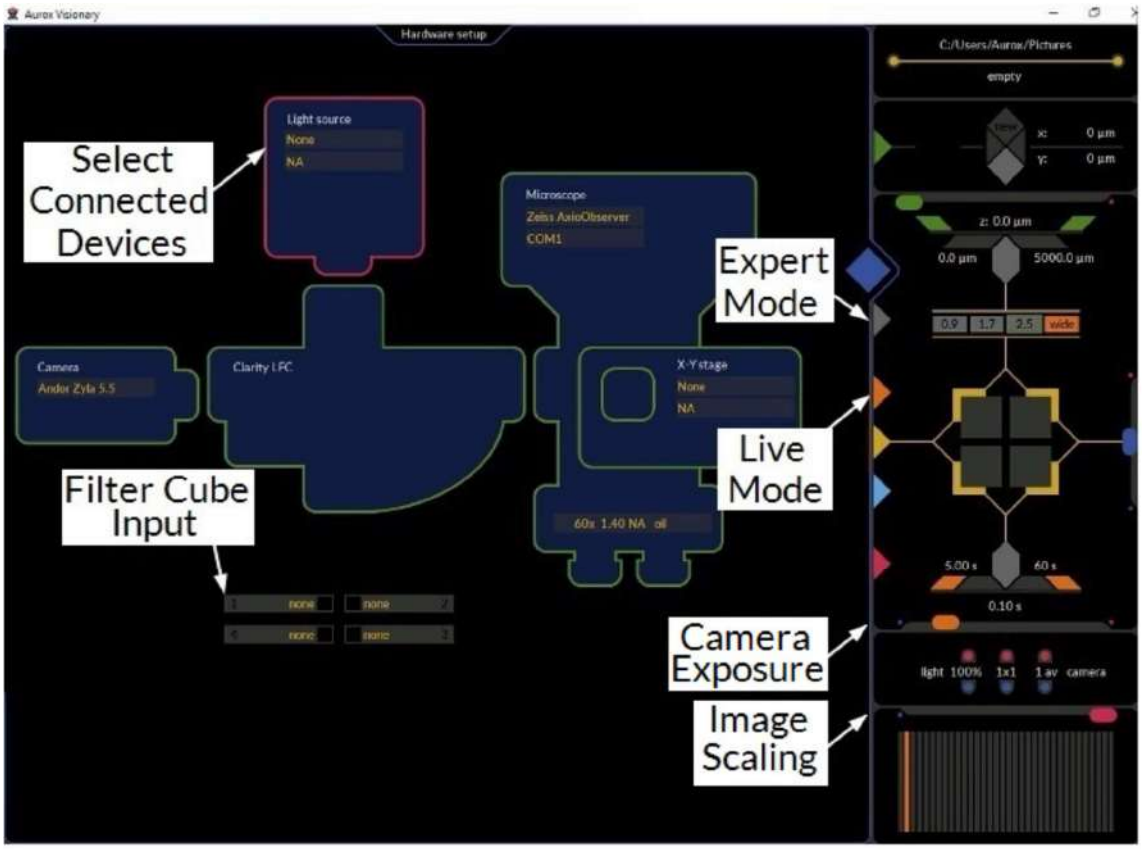

Figure 5.4.8 Visionary Hardware Set up Screen

3. Please refer to Section 5.1 of the Visionary operating manual to ensure all connected equipment and filter cubes are correctly configured in the Hardware Set-up Mode.
4. Enter expert mode by clicking on the grey triangular tab
5. Click the 'illumination on' radio button in Visionary as shown in figure 5.4.9(a). It may be helpful to place a sample on the stage at this point to provide additional contrast.

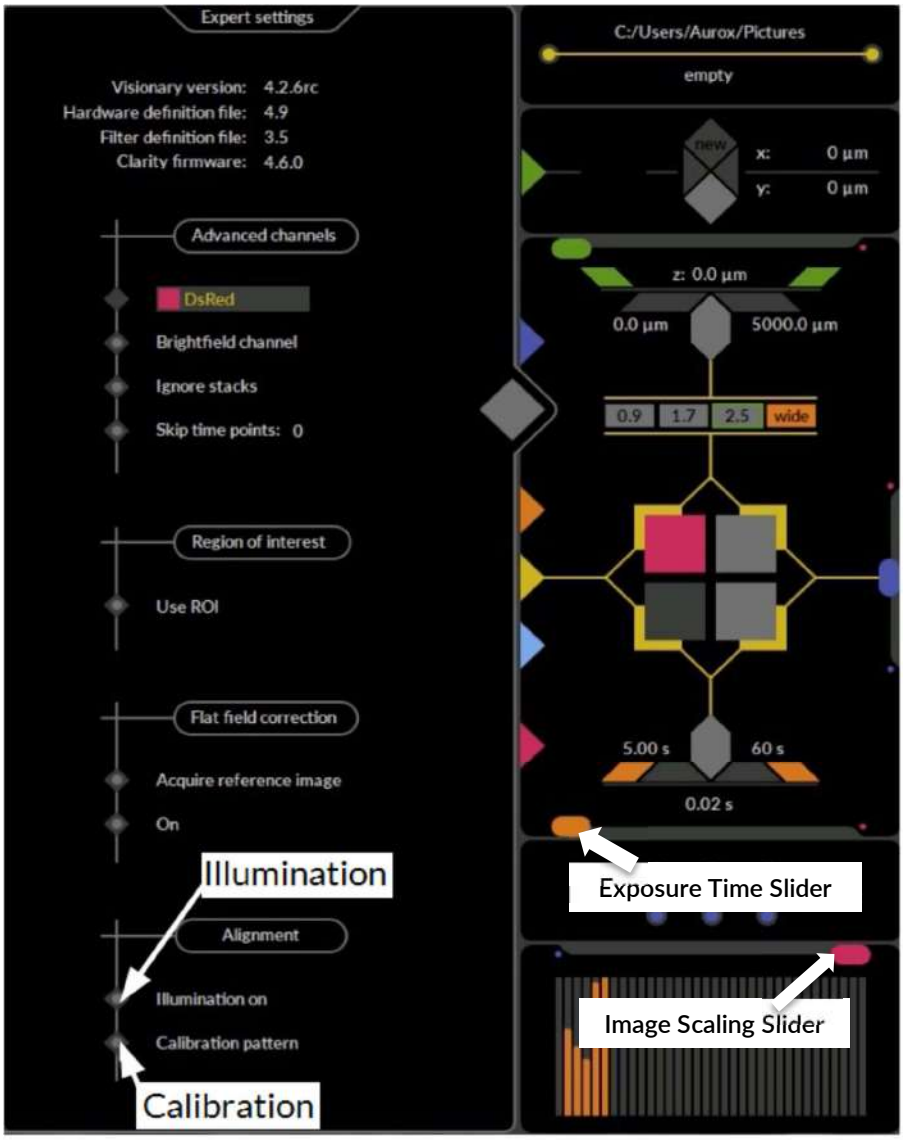

Figure 5.4.9(a)Expert mode controls

6. Two fields of view will now be visible as shown in figure 5.4.9 (c). Rotate the camera by hand until the black central stripe is vertical, as shown in figure 5.4.9 (c). Lock the camera into place using the locking screw shown in figure 4.7.9 (d)
7. Adjust the horizontal camera alignment control screws shown in figure 5.4.9 (b) while rotating the camera until the central edge of the of the left image is vertical and upon the green overlay as per figure 5.4.9 (c).
8. Move both images using the camera alignment control screws shown in figure 5.4.9 (b) until the central edges are approximately ¼ of the distance between the green overlays as shown in figure 5.4.9 (d).

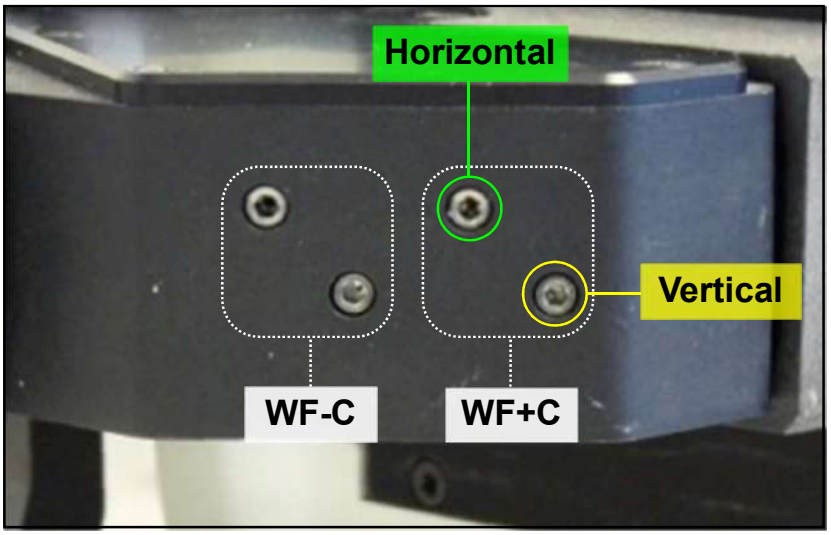

Figure 5.4.9(b)Camera alignment control screws

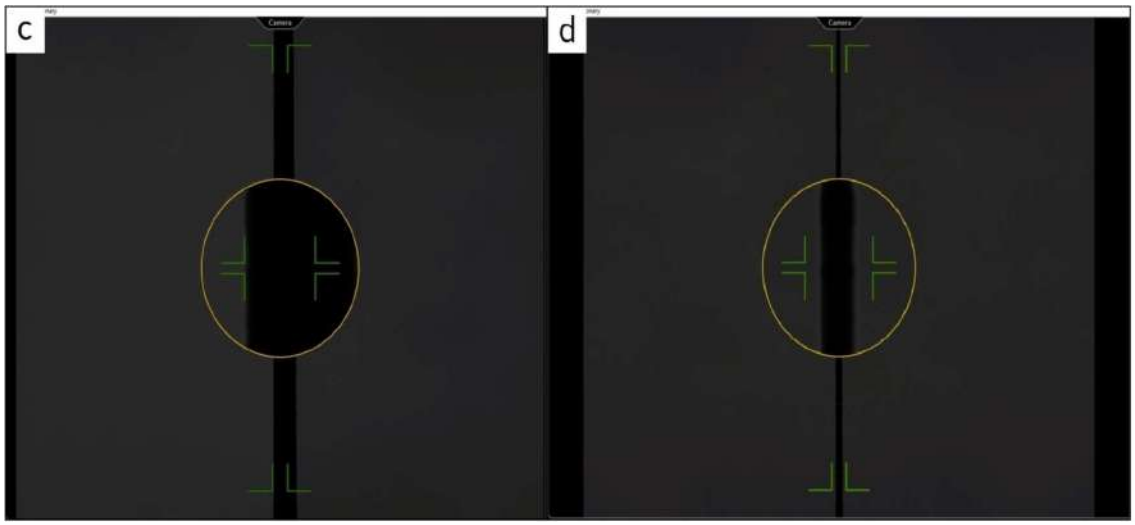

Figure 5.4.9Alignment: (c) Camera aligned rotationally, (d) Images positioned

9. Turn the illumination off and turn on the calibration pattern in Visionary as shown in figure 5.4.9 (a). Adjust the image scaling slider until the pattern is clearly visible. Readjust both images using the horizontal and vertical camera adjustment screws until the pattern is perfectly reflected on both sides as seen in figure 5.4.9 (e).

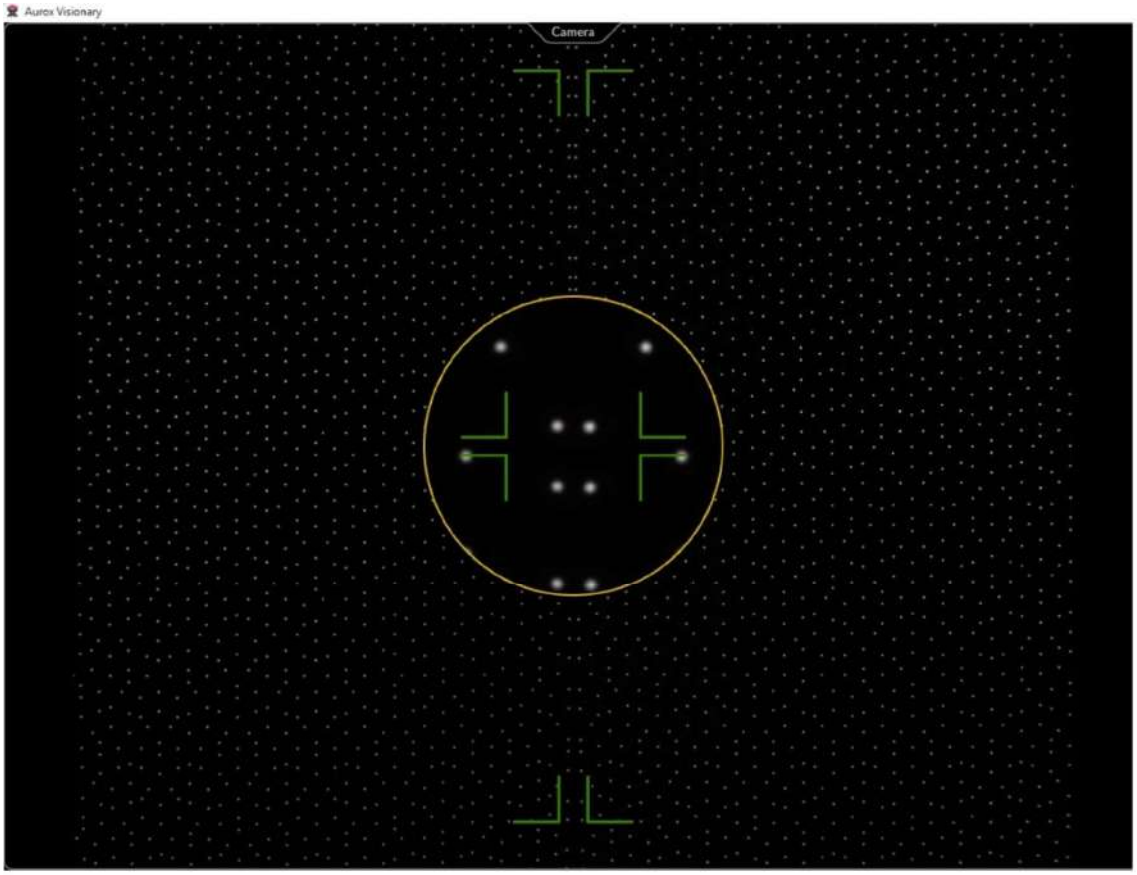

Figure 5.4.9(e)Calibration aligned

10. Now turn off the calibration pattern and select live image by clicking on the orange triangular tab. The Clarity will now enter a calibration routine where it will cycle through all disc and filter cube positions.

Once calibration is complete Visionary will display a live image, at which point your Clarity is ready for use. Please consult our software manual for further instructions on use.

6. OPERATION

For further instructions on how to use Clarity please refer to the Visionary Software manual.

7. MAINTENANCE, TROUBLESHOOTING AND SERVICE

7.1 Instrument care

The care of the Clarity is limited to actions described below:

- After each use, power down the Clarity via software and disconnect from power supply. If not used for prolonged periods store the Clarity in the shipping case.
- Remove dust and loose contamination from visible optical surfaces with compressed air, rubber blower, or optics-cleaning tissue without exerting pressure.

7.2 Instrument maintenance and firmware upgrade

The Clarity has been designed to be maintenance free apart from the preventive measures described above.

From time to time check the power supply leads for excessive wear.

WARNING

Never use the mains lead if it shows excessive wear or obvious signs of damage. Discard the damaged lead and seek a replacement from the supplier

The Clarity is shipped with fully functioning and certified firmware that should not require upgrades under normal circumstances.

A firmware upgrade is a potentially disruptive operation and should not be undertaken by non-qualified personnel. If such an upgrade becomes necessary the user will be contacted by the distributor or the manufacturer.

7.3 Warranty

Please see Aurox Ltd warranty terms and conditions.

7.4 Troubleshooting

Various Clarity states, including some fault conditions, are indicated by the indicator light on the filter turret panel. These indicator states are listed in table 7.4.1.

Table 7.4.1 Clarity Indicator LED Status

Device states:	Indicator LED
Standby	OFF
Run mode	Orange
Door open	OFF
Initialisation	Purple
Initialisation fault	Red

7.5 Spares, consumables and tools

For a full list of spares, please contact Aurox.

7.5.1 Available Filter Cubes (Optional Extras)

For custom filter cubes please contact Aurox. The following table provides a list of currently available filter cubes.

Table 7.5.1 Available Filter Cubes (Optional Extras).

Filter Cube	Product Number	Filter Specifications	Typical Fluorophores
DAPI-LED	0401	381-404 nm Ex1, 417-477 nm Em1	DAPI
DAPI	0301	370-410 nm Ex1, 430-475 nm Em1	DAPI, Hoechst, AMCA
GFP-LED	0406	446-486 nm Ex1, 503-548 nm Em1	GFP
FITC	0302	473-491 nm Ex1, 503-548 nm Em1	GFP, FITC, Alexa 488
YFP	0407	488-512 nm Ex1, 529-556 nm Em1	YFP
PI	0405	511-551 nm Ex1, 582-636 nm Em1	Propidium Iodide
DsRed-LED	0403	543-566 nm Ex1, 582-636 nm Em1	DsRED
DsRed	0303	554-568 nm Ex1, 582-636 nm Em1	RFP, DsRed (not dimer2), TRITC
mCherry	0320	572-594 nm Ex1, 613-649 nm Em1	mCherry
mCherry-LED	0404	568-589 nm Ex1, 604-679 nm Em1	mCherry
Cy5-LED	0408	626-644 nm Ex1, 659-701 nm Em1	Cy-5

7.6 Requesting service

Repairs to the mechanical, optical and electronic components inside the Clarity unit should only be performed by trained service personnel specifically authorised by Aurox Ltd.

Please contact your distributor or Aurox Ltd to request service options.

To contact Aurox Ltd call +44 1865 407814 or email us at support@aurox.co.uk.

8. Additional Information

9. RoHs Statement of Compliance

RoHS Statement of Compliance

Manufacturer: **Aurox Ltd**

Address: 30 Upper High Street
Thame, Oxfordshire
OX9 3EZ, United Kingdom

Device name: **Clarity LFC, Clarity HS, CC88 Spinning Disk Imaging System and accessories**

Part numbers: **CC0x882, CC0x883, CC003xx, CC004xx, CC023xx, CC033xx**

We hereby declare that to full extent of our knowledge of these parts are in compliance with the requirements of the EU Directive **2011/65/EU** (RoHS Directive) with respect to the following substances:

Mercury (Hg)
Cadmium (Cd)
Lead (Pb)
Hexavalent Chromium (Cr(VI))
Deca Brominated Diphenyl Ether (decaBDE)
Polybrominated Biphenyls and Ethers (PBB and PBDE)

This statement is based on Aurox Ltd understanding of RoHS and our knowledge of the materials that go into these products as disclosed by our suppliers. Any modification of the products not authorized by Aurox Ltd will invalidate this declaration.

Abingdon, 12.03.2014

Dr Rimas Juškaitis
MANAGING DIRECTOR

10. CE Conformity Declaration

EC Declaration of Conformity

Manufacturer:	**Aurox Ltd**
Address:	30 Upper High Street Thame, Oxfordshire OX9 3EZ, United Kingdom
Device name:	**Clarity LFC, Clarity HS, CC88 Spinning Disk Imaging System**
Part numbers:	**CC00882, CC00883, CC01882, CC02882, CC03882**

We declare full compliance of this device with the requirements of the Council Directive **2004/108/EC** (EMC Directive) and the Council Directive **2006/42/EC** (Machinery Directive). Any modification of the product not authorized by Aurox Ltd will invalidate this declaration.

Testing standards:

EN 61326	EMC requirements
EN 55011	Radiated emissions
EN 61000-3-2	Harmonic current emissions
EN 61000-3-3	Voltage fluctuations and flicker
EN 61000-4-2	Electrostatic discharge immunity
EN 61000-4-3	RF electromagnetic field immunity
EN 61000-4-4	Electrical fast transient/burst immunity
EN 61000-4-5	Surge immunity
EN 61000-4-6	Immunity to conducted disturbances induced by RF field
EN 61000-4-11	Voltage dips, interruptions and voltage variations immunity
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

Test certificates:

3C13/10435/1	3C Test Ltd, Silverstone Technology Park, Northants NN12 8GX, UK
TR/13/743-2	BSI, Kitemark Court, Davy Avenue, Milton Keynes MK5 8PP, UK

Based on the above the device is marked with CE

Abingdon, 1.04.2014

Dr Rimas Juškaitis
MANAGING DIRECTOR