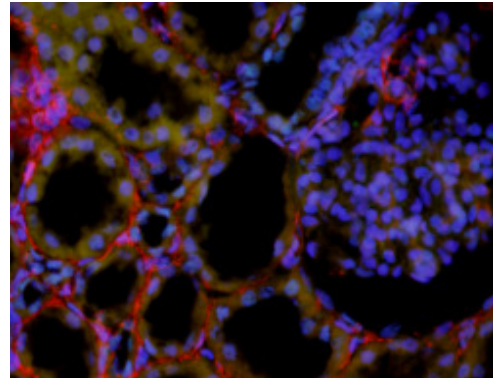
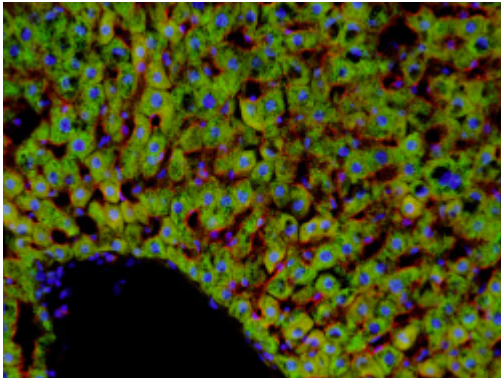
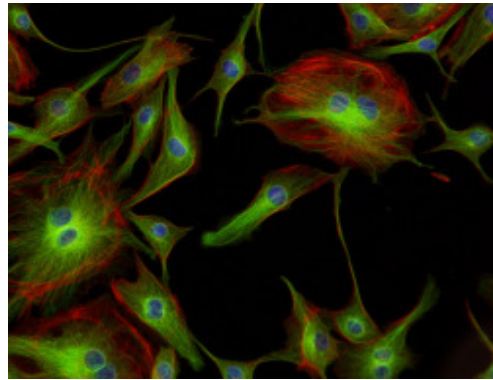
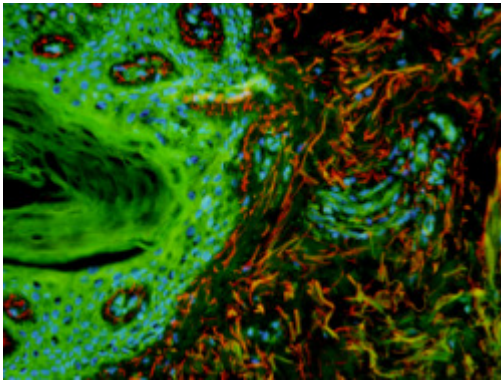


# User Manual

**pE-4000**

**Universal Fluorescence Excitation Source**



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## **1 Introduction**

This manual should give you all the information required to install and operate your new light source.

Additional information can be found on our website at [www.coolled.com](http://www.coolled.com)

## 2 Safety Precautions

While LEDs are a much safer light source than the mercury and metal halide lamps that they replace in the application of fluorescence microscopy, precautions should still be taken with this product.

When operating or maintaining this product, please observe the following safety precautions at all times. Failure to do so may result in personal injury or damage to other items.

- 2.1 UV light is emitted from this product. Avoid eye and skin exposure. Never look directly into the light output beam from the LED head, the light guide output or the output beam from the collimator. The emissions could damage the cornea and retina of the eye if the light is observed directly.
- 2.2 Always ensure that the collimator is securely attached to the microscope, one end of the light guide inserted into the collimator and the other end inserted into the LED head output and fixed with the grub screw prior to turning on the power to the unit. This will minimise the risk of injury and damage.
- 2.3 If for any reason the unit is to be operated with the collimator not attached to a microscope, all personnel should wear eye shielding and clothing to protect the exposed skin.
- 2.4 Disconnecting the mains supply is achieved by unplugging the power cord from the power supply block. Only plug in the power cable, once the unit is attached to the microscope.
- 2.5 There are no serviceable parts within the unit. Removing any of the screws and covers will result in the safety of the unit being impaired.
- 2.6 Any electronic equipment connected to this product must comply with the requirements of EN/IEC 60950.
- 2.7 To clean the exterior of the unit, use a slightly dampened cloth with a simple water/detergent solution only. Avoid the optical surfaces and lenses. Cleaning of optics should only be carried out using optical wipes and fluids.

### 3 Getting Started – System Components

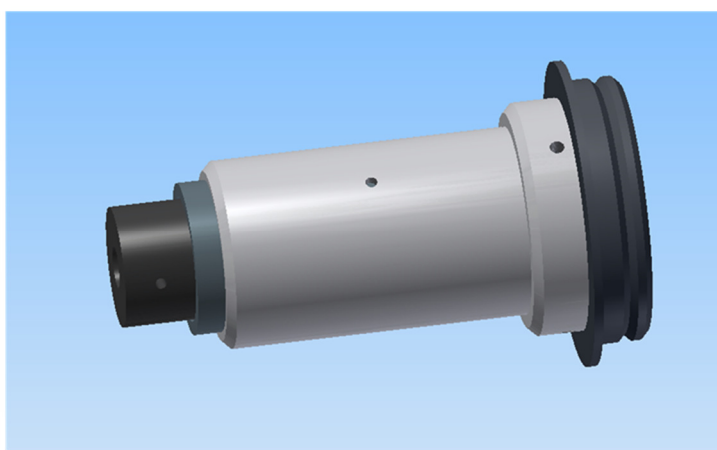
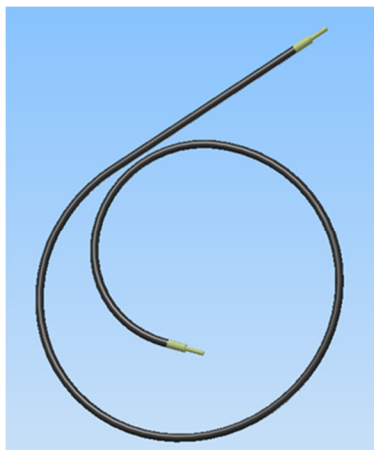
The CoolLED *pE-4000* Universal Light Source is supplied with the following components

Liquid Light Guide Version

1. Main LED Head with Optical Output for 3mm Liquid Light Guide
2. Manual Control Pod
3. DC Power Supply Type GS160 A12
4. IEC Power Cable (not shown)
5. USB cable (not shown)
6. User Guide (not shown)



In addition to this list, it is likely that a light guide and Universal Collimator will also be supplied although there may be certain circumstances where this is not necessary as the user already has these components.

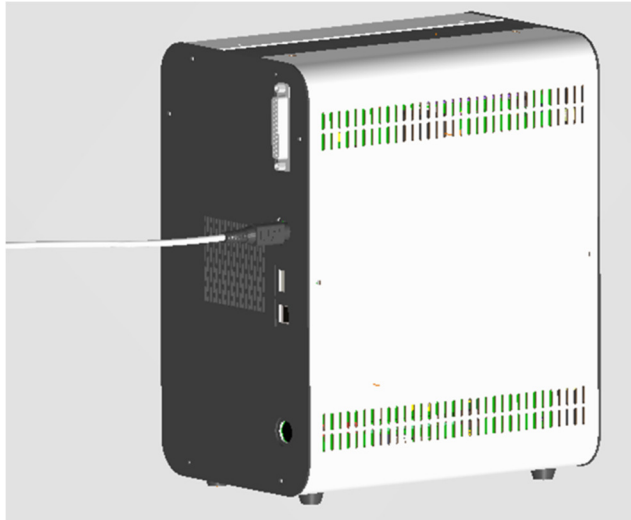


When un-packing the system, it is important to check the contents against the delivery note.

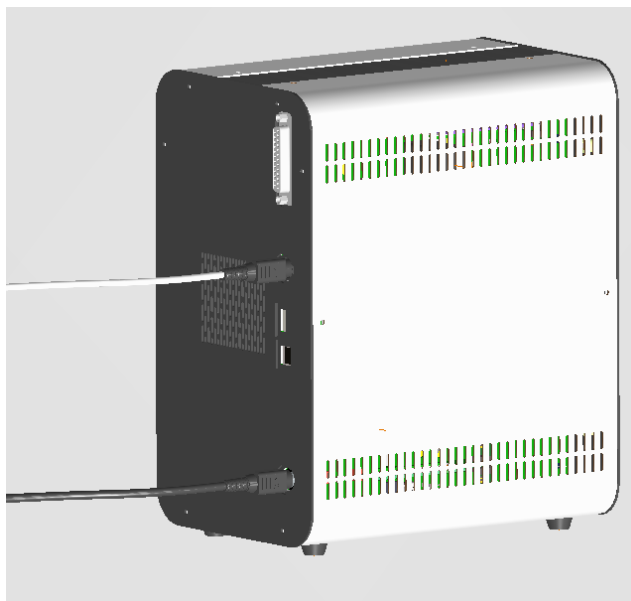
If any components are missing or appear damaged, please contact CoolLED or the distributor who supplied the equipment immediately.

## 4 Installation and setup

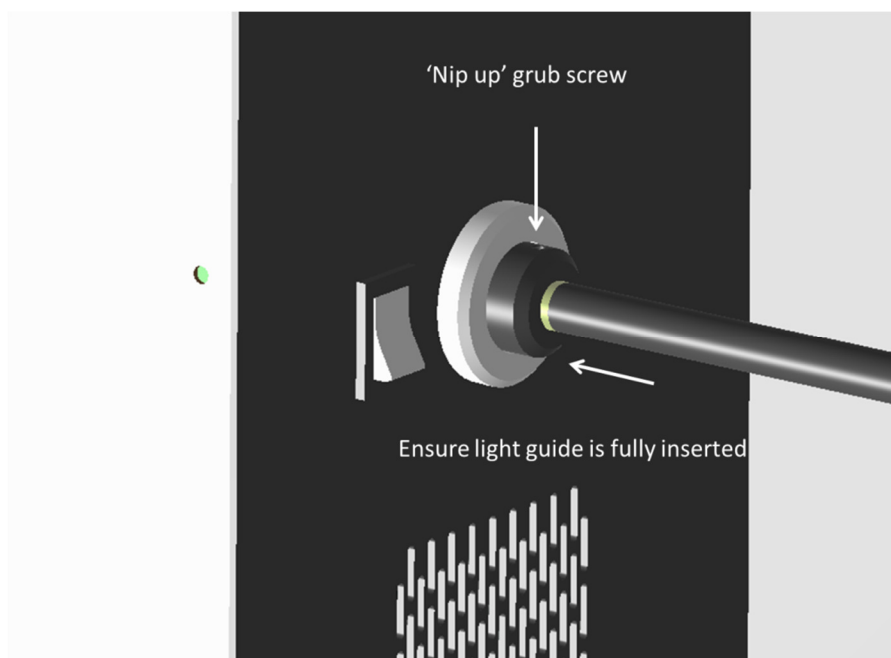
- 4.1 Carefully unpack the components from the shipping cartons.
- 4.2 Remove the protective cap from the end of the Pod Cable connector.
- 4.3 Insert the Pod cable into the LED head with the flat on the connector body on the outer side.



- 4.4 Connect the power connector from the DC power supply as shown, again with the flat on the connector body on the outer side. At this stage do not connect the mains power lead to the DC power supply.



- 4.5 Insert the liquid light guide into the light output port on the front panel of the head as shown. Ensure that the end of the light guide is fully inserted and 'nip up' the grub screw to retain it in position. See section XXX when using fibre and other light delivery systems.

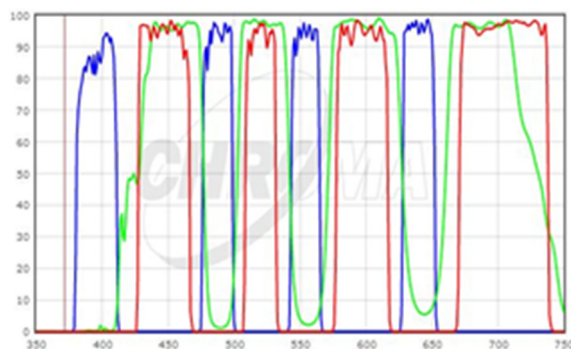


- 4.6 Ensure that there is free airflow in front and behind the LED head so that the cooling system is not impaired. Air is drawn in from the front through the two grills and blown out through the single grill on the back of the head. A gap of 200mm on either side is sufficient. All the images show the head in the correct orientation, seated on its four rubber feet. It should not be operated sitting on its side or upside down.
- 4.7 Connect the second end of the liquid light guide into the microscope requiring illumination. If using the CoolLED Universal Collimating Adaptor, refer to the User Manual for the correct installation.
- 4.7 With the light guide correctly fitted between the LED head and the microscope, it is safe to connect the mains power. Connect the mains lead supplied to a convenient socket, plug in the IEC connector into the DC power supply and switch the power on at the socket. The pE4000 can now be switched on using the power switch on the front of the head.



## 5 LEDs in a Universal Light Source

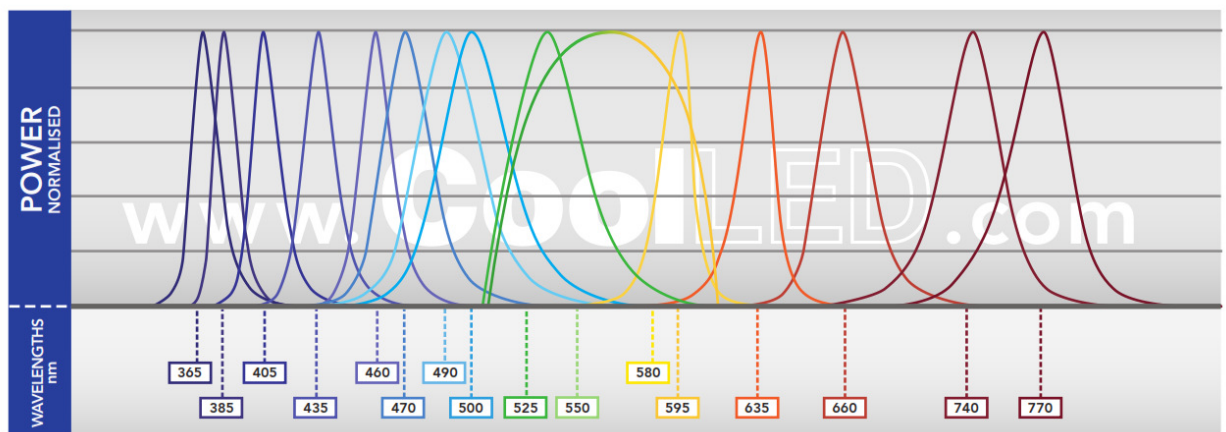
- 5.1 Conventional 'white light' sources used for fluorescence microscopy (e.g. mercury lamps), have a single element which emits light in a series of peaks across the spectrum, giving the effect of white light. LEDs are different in that a single LED element will emit light in a particular colour. To create a white light source that is useable in this application, LEDs of different wavelengths have to be combined together with the peaks selected to match the fluorescence stains being used by the biologist. This combination process requires the light from an individual LED wavelength to be collected by collimating optics and then either transmitted through, or reflected by a dichroic mirror. While it is technically feasible to use multiple sets of LEDs, optics and dichroics to combine many different wavelengths, the costs and efficiencies of these components limits the number of wavelengths that can be included into a commercially viable product. Where work on a fluorescence microscope is limited to four or six different stains, LED sources have been used but there has been reluctance by many users to take advantage of all the benefits that LEDs provide due to the limited range of stains that can be excited. The pE4000 Universal Light Source overcomes these limitations.
- 5.2 The design concept of the pE4000 was based around the realisation that while the microscopist wants to be able to access a broad range of excitation wavelengths, there will never be a need to use more than four at any one time. What is more, any chosen group of four will have each wavelength selected from one of 4 separate groups as it is necessary to space out the wavelengths to prevent their excitation and emission spectra from overlapping.



Channel A	Channel B	Channel C	Channel D
365nm	460nm	525nm	635nm
385nm	470nm	550nm	660nm
405nm	490nm	580nm	740nm
435nm	500nm	595nm	770nm

In the above example a DAPI/FITC/TRITC/Cy5 quad filter is excited by 405nm, 470nm, 550nm and 635nm.

- 5.3 The pE4000 is a 4 channel light source with each channel having one of four different wavelengths that can be selected by the user. There are only four sets of optics, drive electronics and thermal management elements and only three dichroics to combine the four channels. When a different wavelength is selected for a particular channel, the LEDs are physically moved automatically by an internal mechanism so that swapping wavelengths can be achieved by a simple push of a button in less than 2 seconds.
- 5.4 The pE4000 provides the user with 16 selectable wavelengths spread across 4 separate channels. Each channel can be individually controlled, both in terms of intensity and rapid switching.



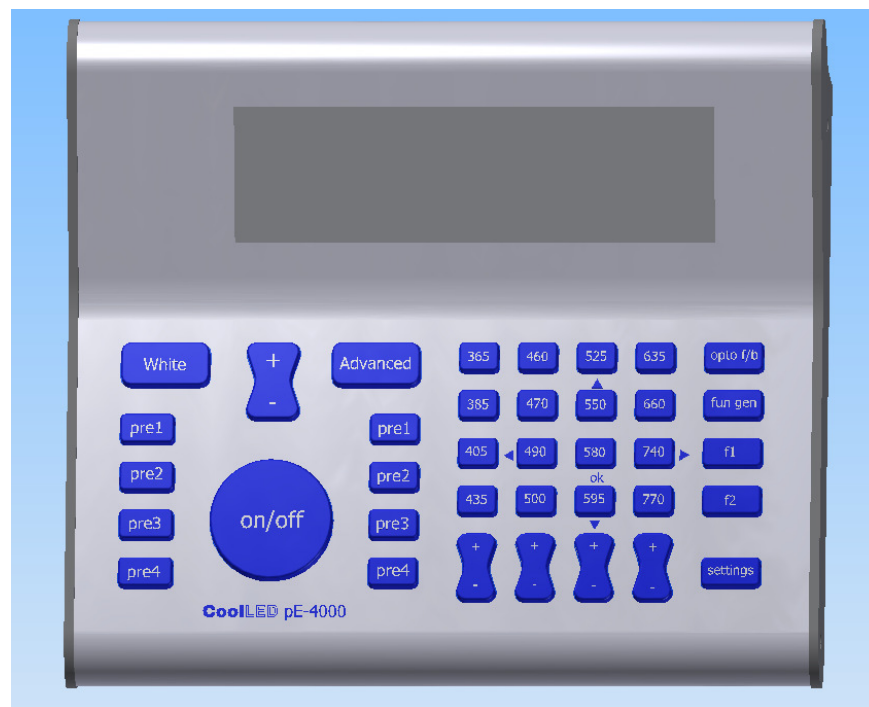
- 5.5 The wavelengths range from UV at 365nm for DAPI, through the visible spectrum and then out to IR at 770nm so that all the existing and up and coming stains can be excited by this single universal light source.

## 6 Two modes of operation

- 6.1 To be a truly Universal Light Source the pE4000 needs to fulfil the needs of all users. Those engaged in fluorescence microscopy have very different needs. There are biologists, not skilled in fluorescence microscopy who want a simple to use, reliable and repeatable excitation source. Multi user laboratory managers are particularly keen to keep the light source controls simple so teaching their users is easy. There are other microscopists involved in research where precise control of the excitation source is paramount.
- 6.2 The pE4000 control Pod has been arranged to fulfil these needs of these different groups by providing two modes of operation
  - a: White Mode for those users only needing basic controls
  - b: Advanced Mode where precise control of excitation is required.
- 6.3 In White Mode the Pod control is limited to 4 presets, an on/off button and an up/down intensity control. Each preset can be pre-programmed to give the best wavelengths to use with the filter cubes on a particular microscope. All the user has to do is to select the appropriate preset and switch those LEDs on when required, altering the overall intensity if needed. The preset settings are stored in non-volatile memory and so will not be lost when the mains supply is removed.
- 6.4 In Advanced Mode, the user has full control of wavelength selections, individual intensity controls and a broad range of additional features to allow the performance of the light source to be matched to the specific fluorescence work being undertaken. A full description of these features is given in later sections of this user manual.

## 7 Manual Control Pod

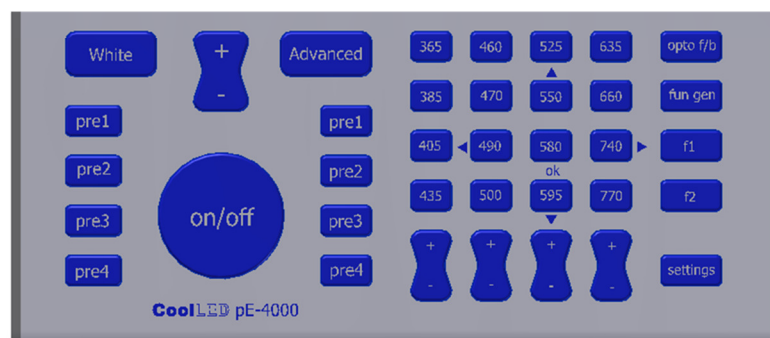
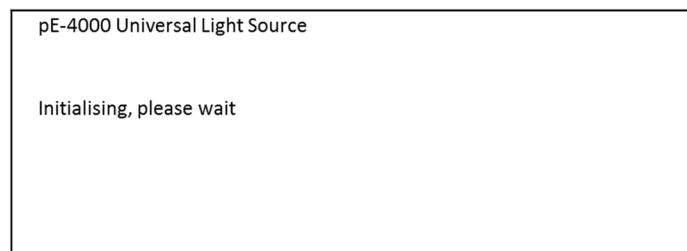
- 7.1 The manual control pod has been designed to give the user easy control of the LEDs within the light source. There is a series of push button switches and a wide LCD display providing information on the status of the LEDs.



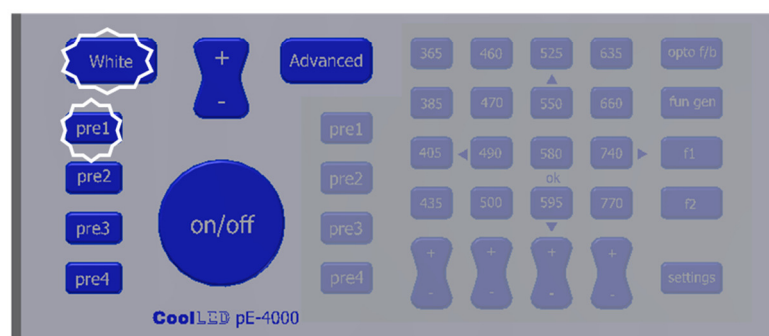
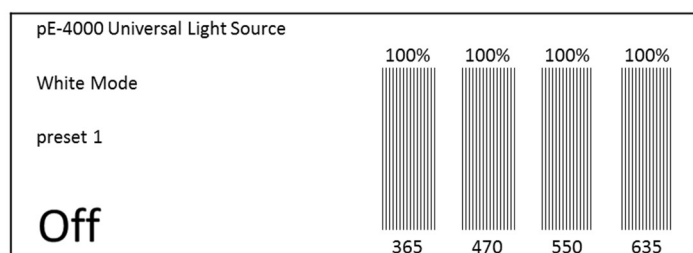
- 7.2 The Pod allows the user to operate the system in either of the two modes outlined in section 6. Pressing the White button sets the light source into White Mode. Pressing the Advanced button changes the mode into Advance.
- 7.3 On power up, the system will always start in White Mode
- 7.4 While the Pod has many control buttons, they have been laid out to provide easy and intuitive control of the light source. The next few sections of this manual provide a guide of how to operate the Pod. Once running the light source for the first time, it is recommended to run through the sequences to become familiar with the controls and to see how easy it is to make changes. Having been designed as a universal light source, it does cover a wide range of applications. However it is still fundamentally a simple system and most users should find it only takes a short time to become fully conversant with its controls.

## 8 Pod Control Initialisation and White Mode

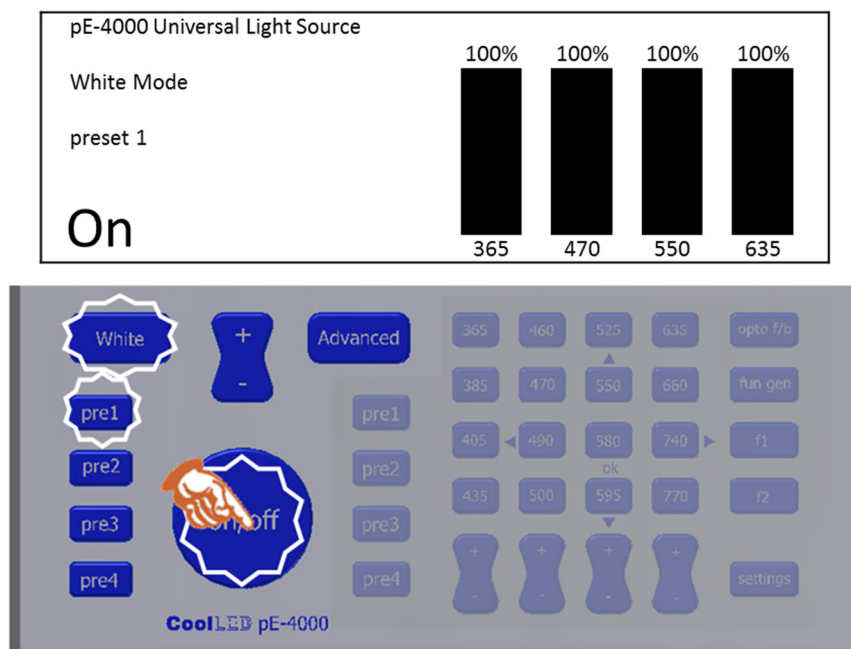
- 8.1 When the pE4000 is first switched on there is an initial product recognition screen followed by the following. This will last the time it is necessary to initialise the stepper motors and system – normally around 10 second. During this period all buttons will be disabled.



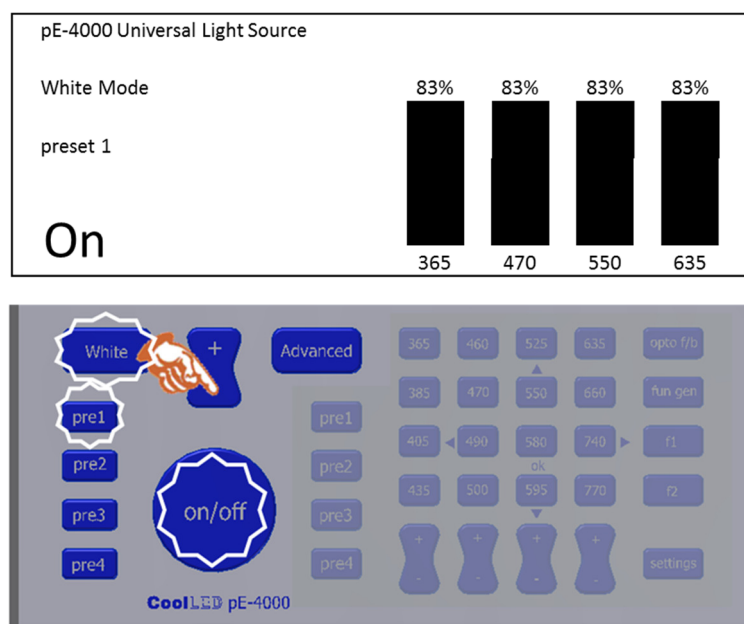
- 8.2 Once initialised, the system defaults to White Mode and to the preset that was last used at previous power down. There will always be one preset active. The buttons which are active are backlit. In White Mode all the advanced buttons are disabled (except for 'Advanced'). The display indicates the wavelength selection and their intensities for the active preset.



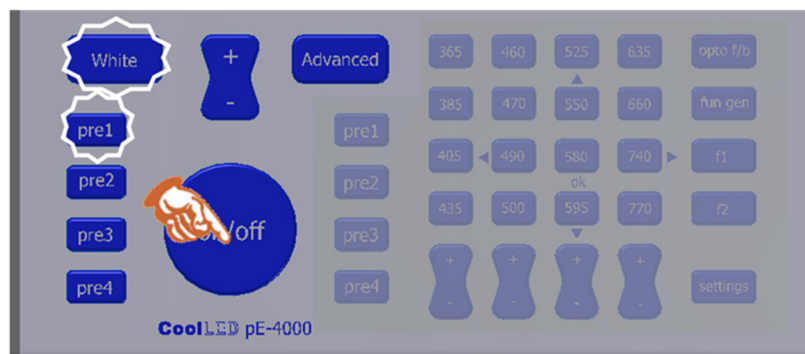
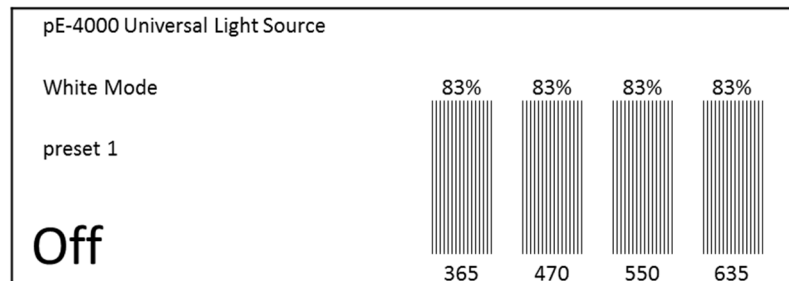
- 8.3 Press the on/off button once to switch on the LEDs. The display bars go solid to indicate that the preset LEDs are on.



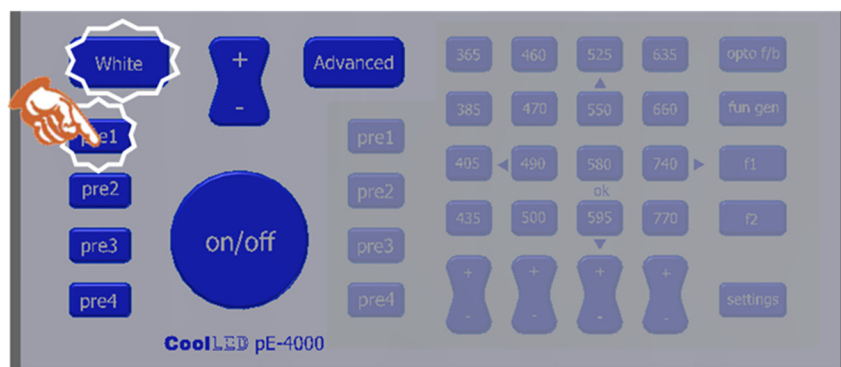
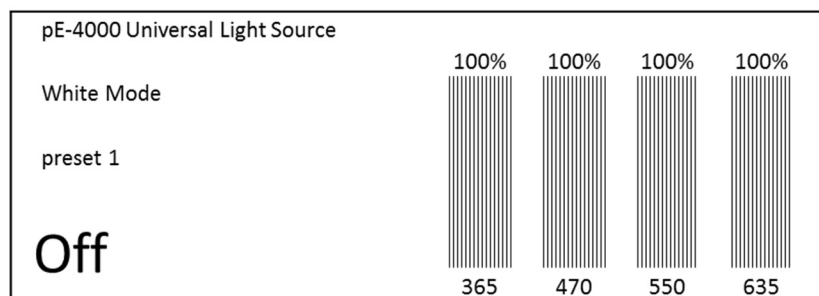
- 8.4 Use master intensity control to vary all intensities in 1% steps. The display indicates the variation from the preset value. If the intensities are set at different values, then the balance between the channels will be maintained. The range of the adjustment is limited to the lowest intensity reaching 0% and the highest intensity reaching 100%.



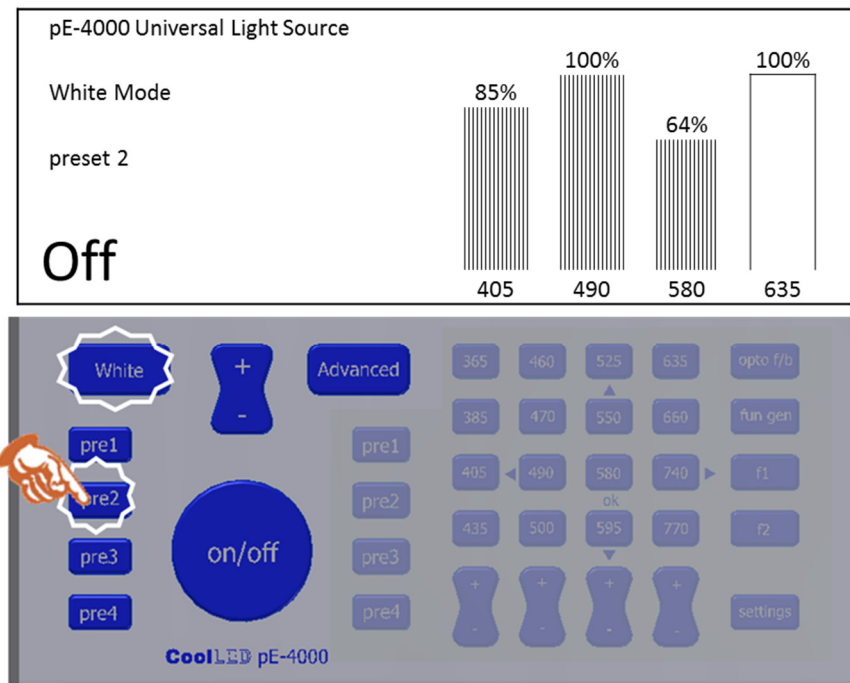
8.5 Press the on/off button again to switch off the LEDs



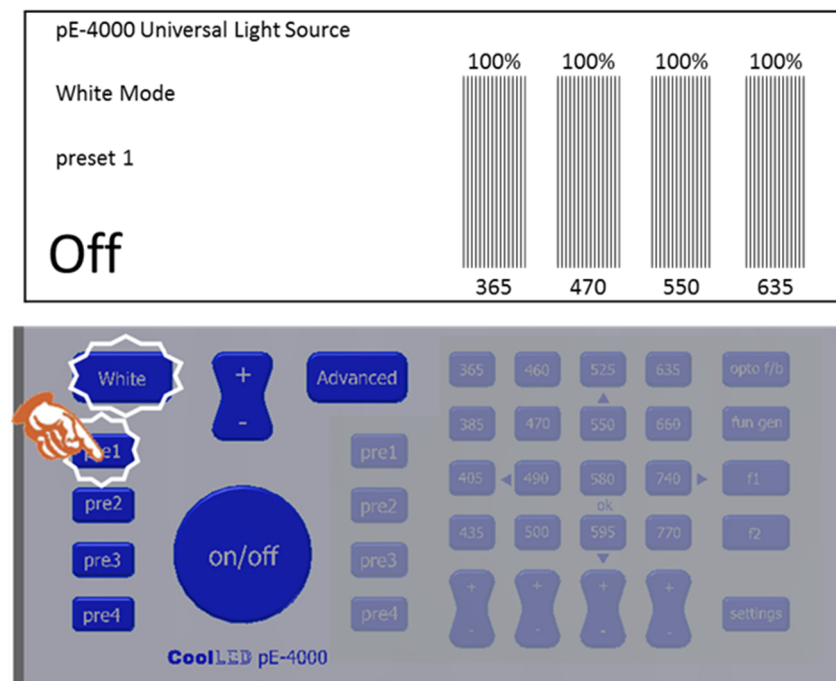
8.6 Press the pre1 button to revert to the preset 1 intensity settings



- 8.7 Press another preset button to change to a white light matched to another filter cube set.



- 8.8 To revert to preset 1, simply press the pre1 button again.

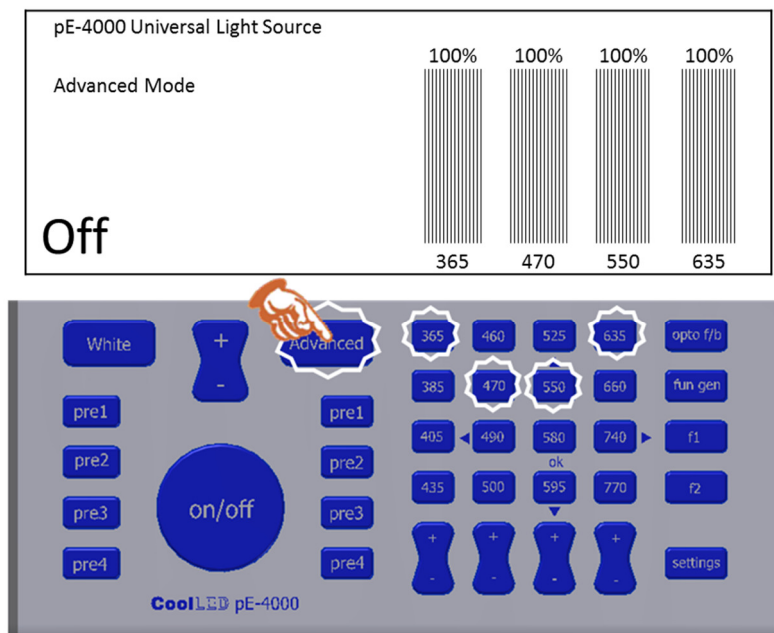


- 8.9 For instructions on how to program the presets, see section 10.

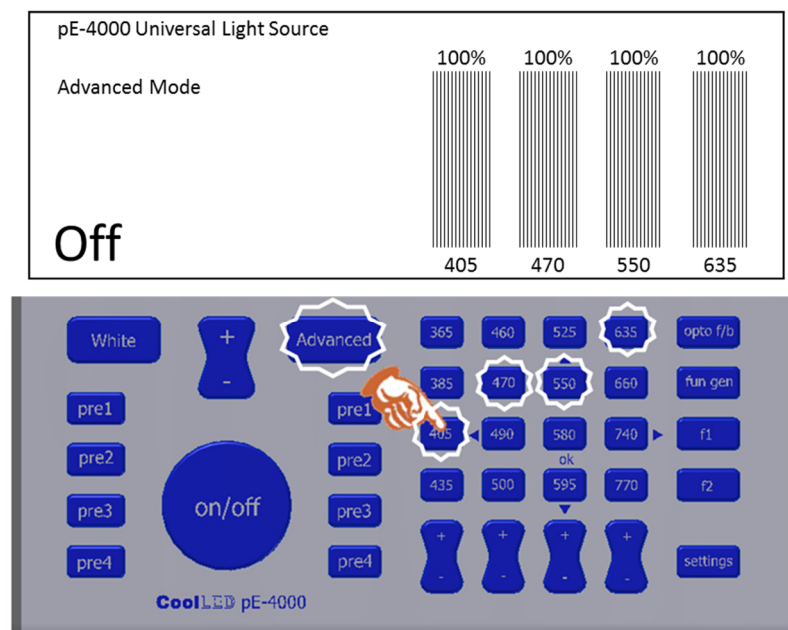


## 9 Advanced Mode Pod Control

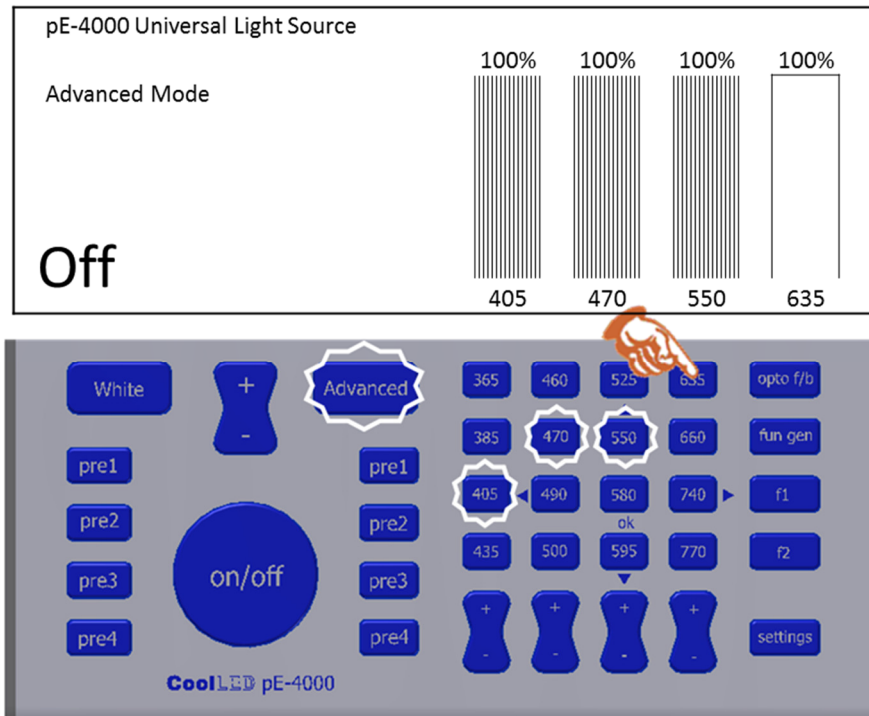
- 9.1 Press the Advanced button to change to Advanced Mode. All the buttons are now enabled. Previous settings remain unchanged in moving from White to Advanced, including the status of the on/off. If under White Mode, the LEDs were on, then in pressing the Advanced button, they will remain on, and visa versa.



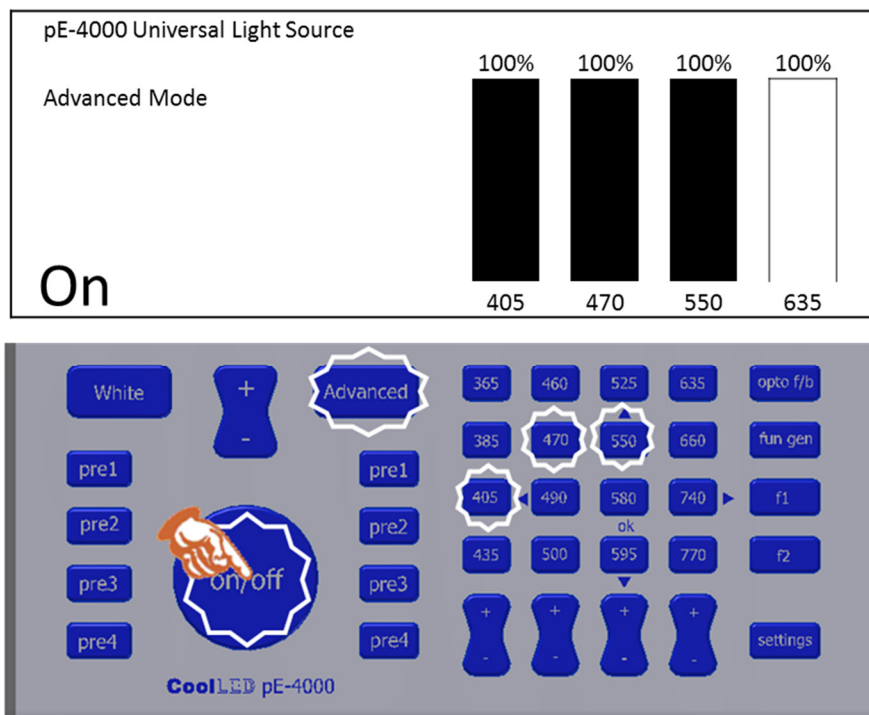
- 9.2 Press alternative wavelength to change channel selection. The intensity of the newly selected wavelength will be the same as it was, the last time it was selected in Advanced Mode.



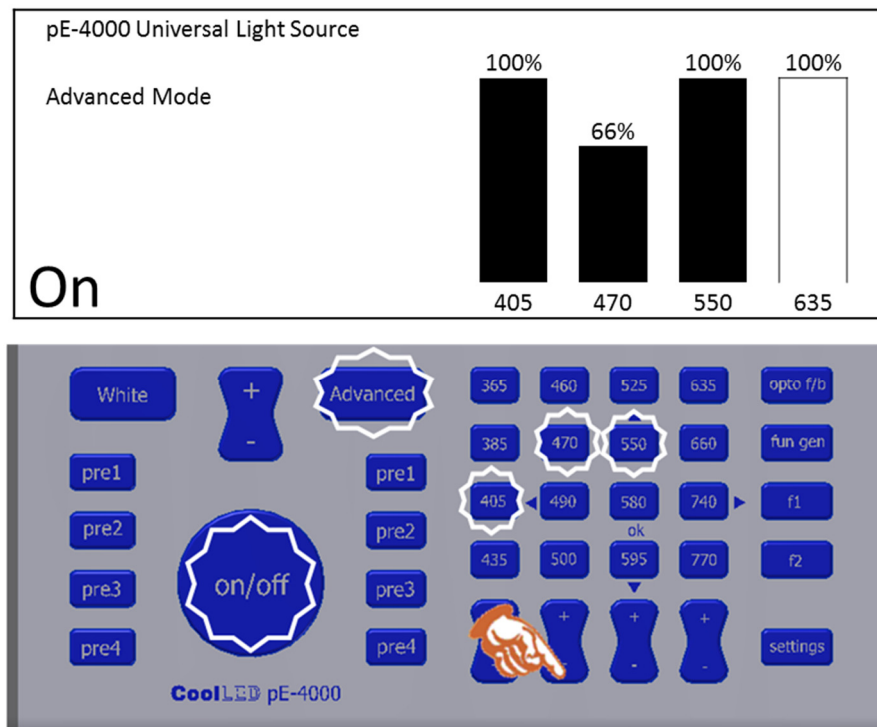
9.3 Press a wavelength button to deselect it.



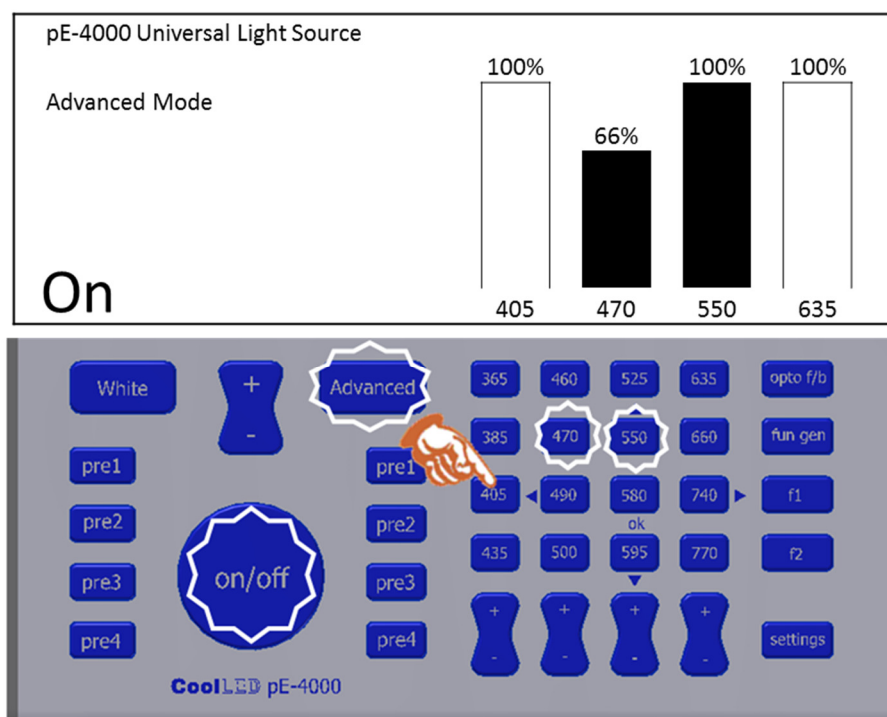
9.4 Press on/off button to switch on selected LEDs



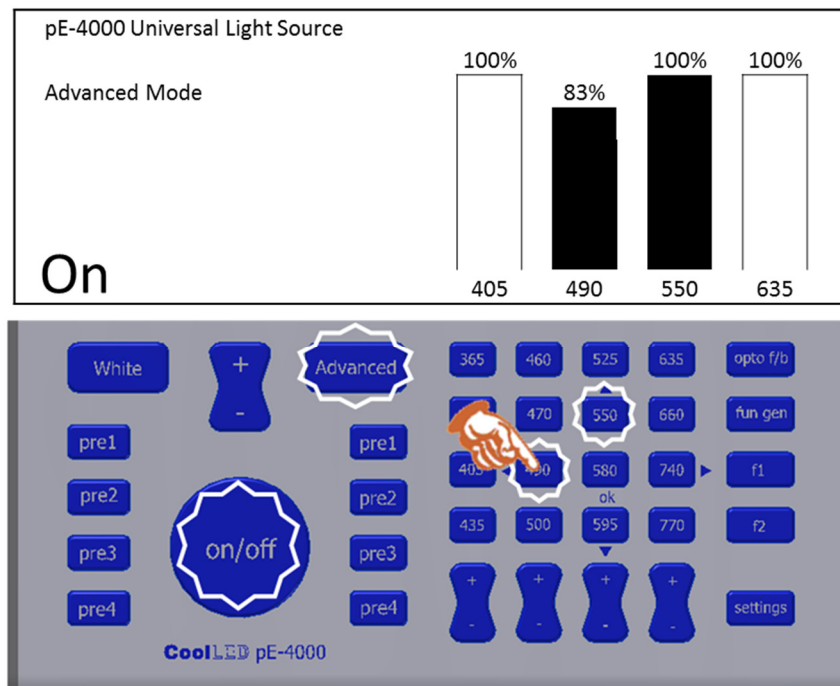
## 9.5 Vary intensity of channel selected wavelength in 1% steps



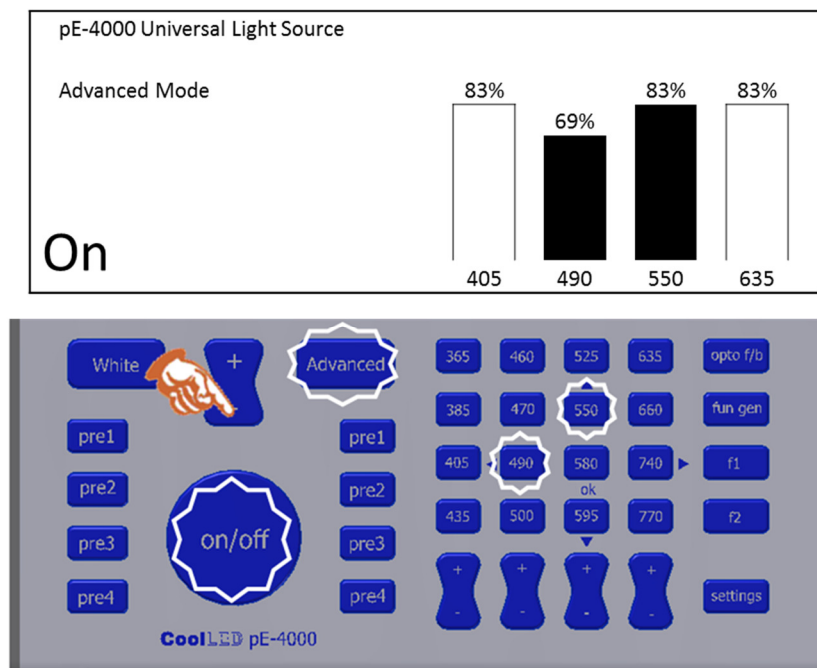
## 9.6 Press selected wavelength button to switch off that wavelength



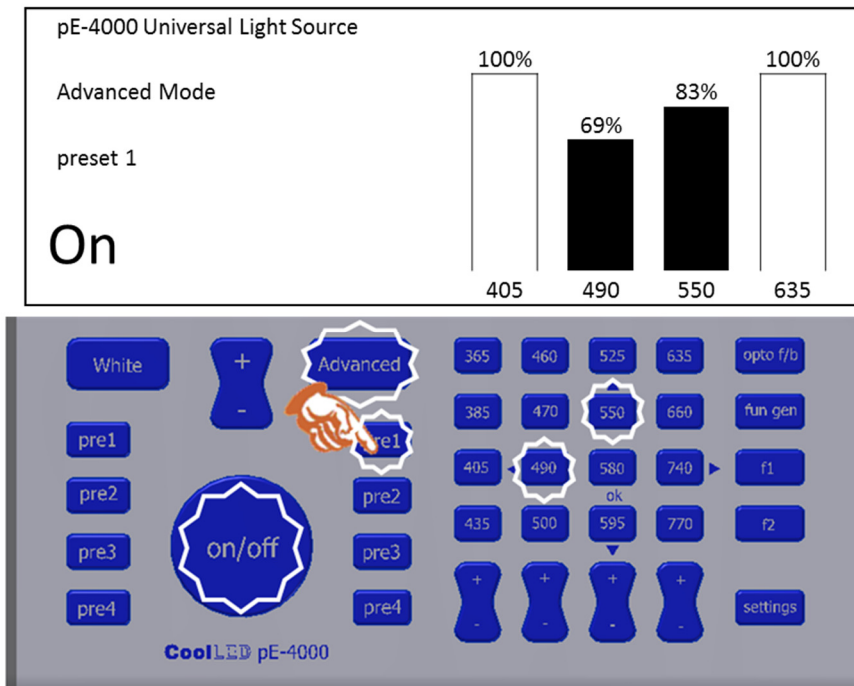
- 9.7 Change wavelength selected in channel. Intensity of new wavelength is set at the value last used when selected in advanced mode.



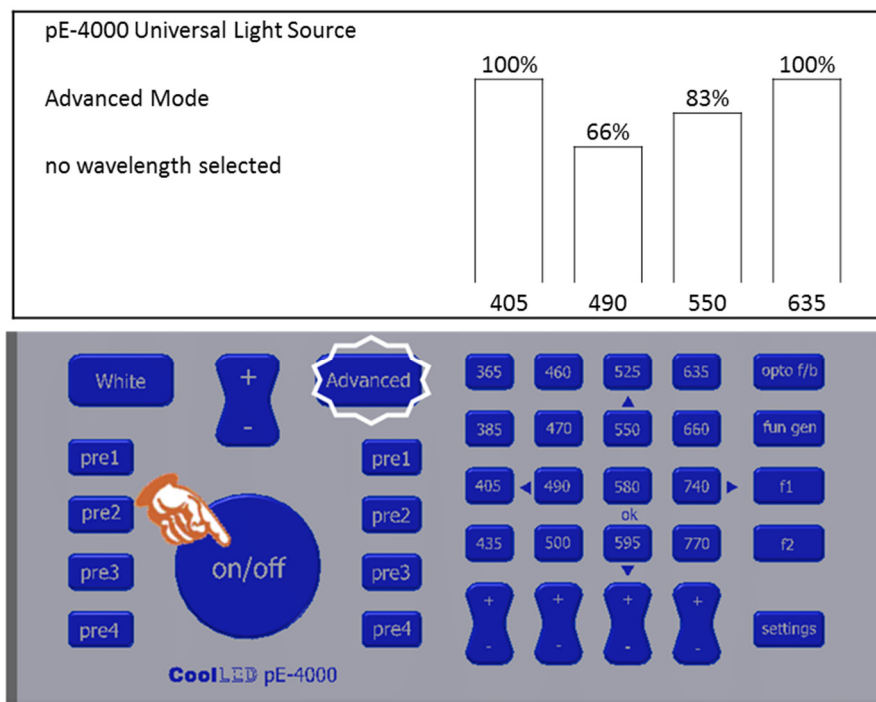
- 9.8 Reduce the intensities of all channels in 1% steps with the use of the master intensity button. The balance between channels will be maintained.



- 9.9 To save wavelength and intensity selection, press and hold for 3 seconds one of the advanced preset buttons. The display will indicate once the selection has been saved to the specific preset button.



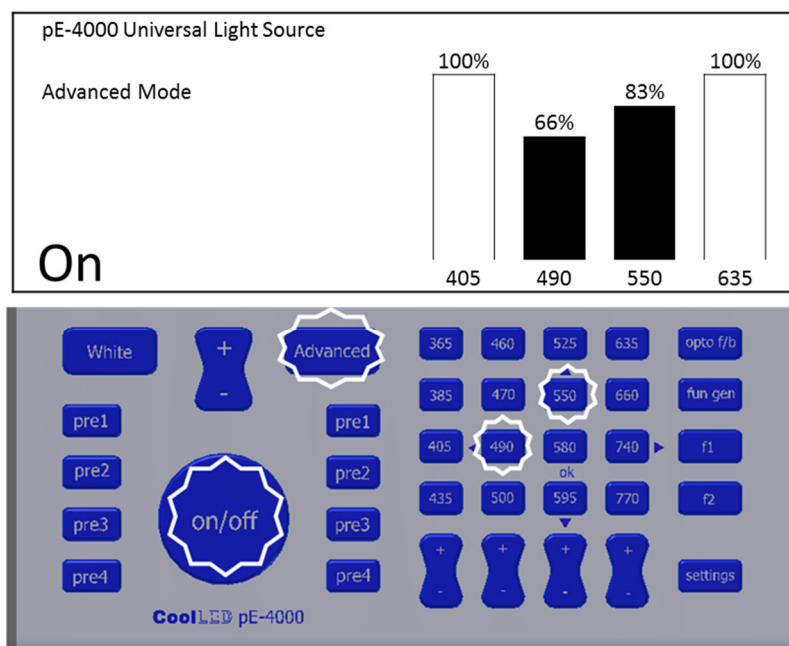
- 9.10 With no wavelength selected, pressing the on/off button will have no effect except the display will indicated that no wavelength is selected.



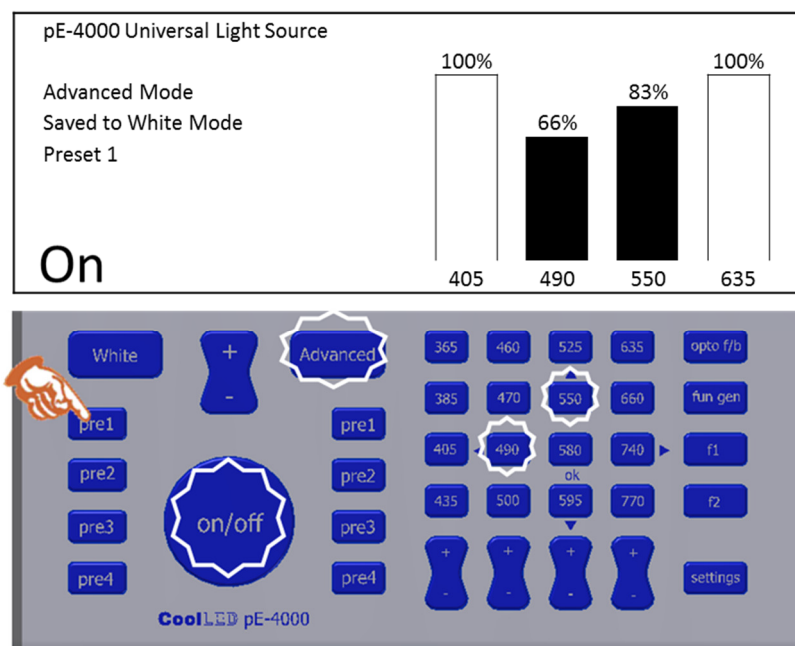
## 10 White Mode Preset programming

10.1 Programming the White Mode Presets is carried out via the Advanced Mode.

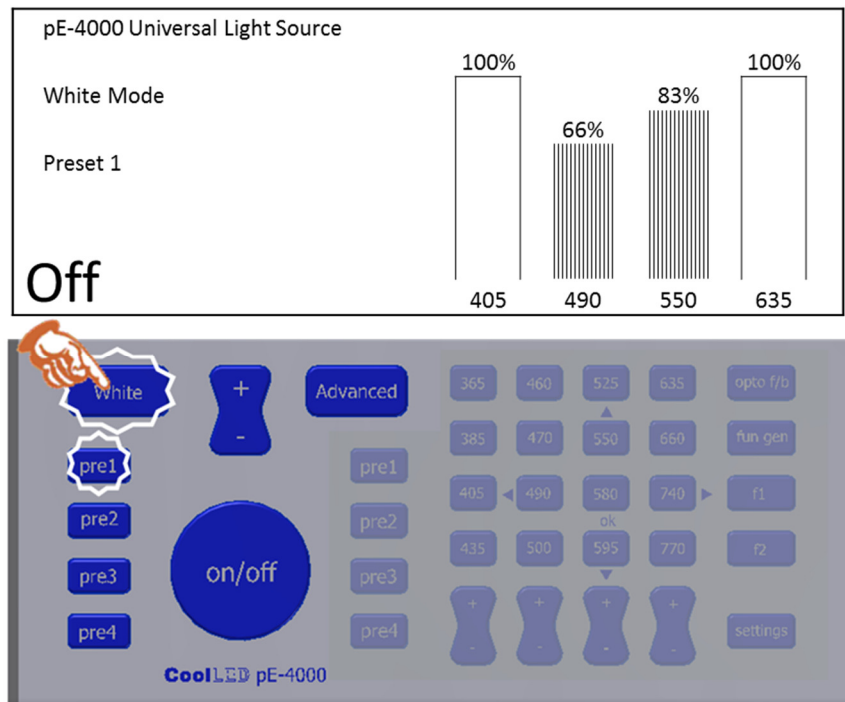
Enter the Advanced Mode and set up the wavelengths and intensities to match the filter sets being used on the microscope.



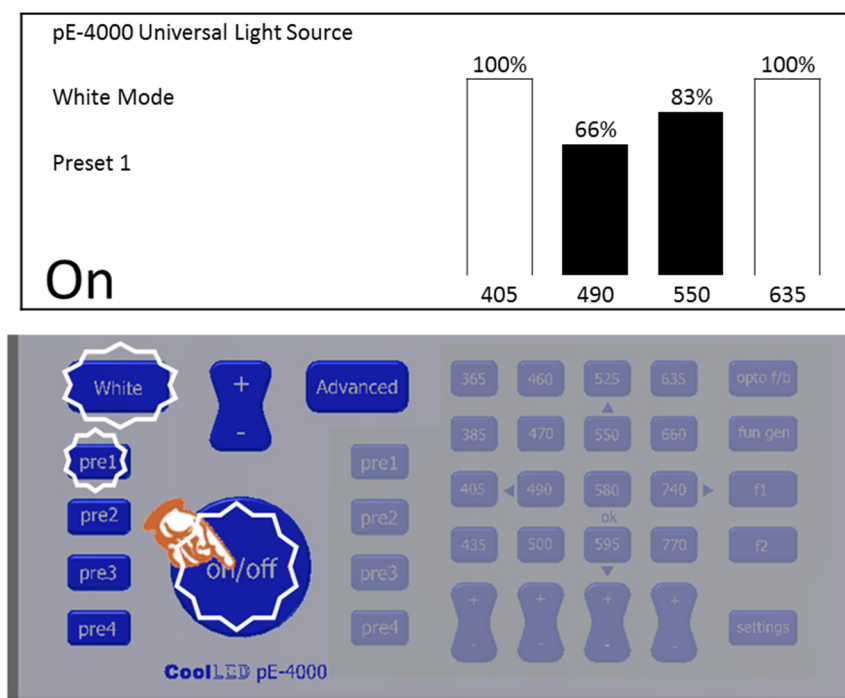
10.2 Press and hold a White Mode preset button for 3 seconds. On releasing the button the display will temporarily indicate that the selection has been saved to that specific White Mode preset.



- 10.3 Press 'White' button to change to White mode. The last pre-set button used becomes the selected one. In going from 'Advanced' mode to 'White' mode the on/off status automatically goes to off.



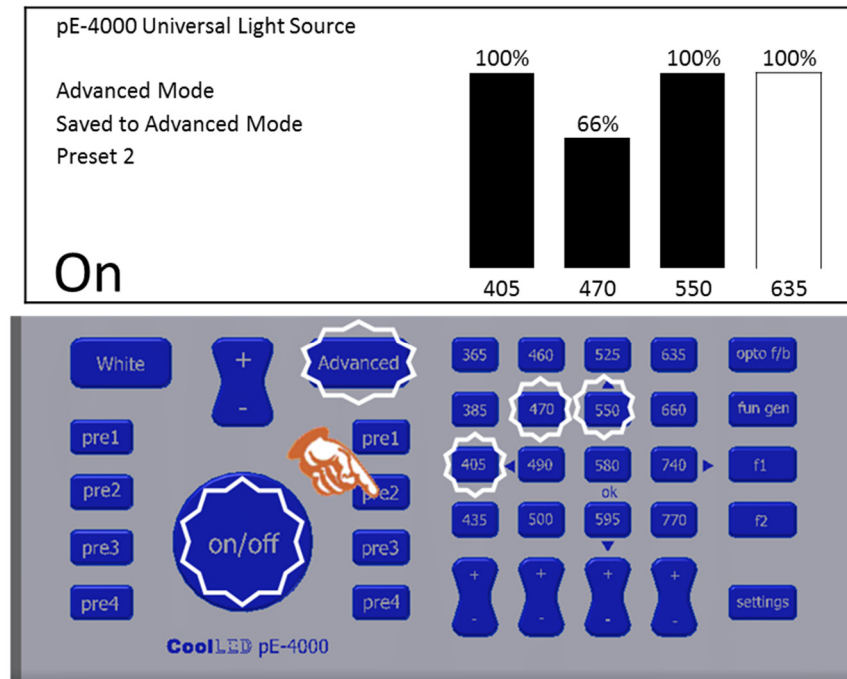
- 10.4 Press the on/off button to switch on the LEDs and operate the pod as per section 8.



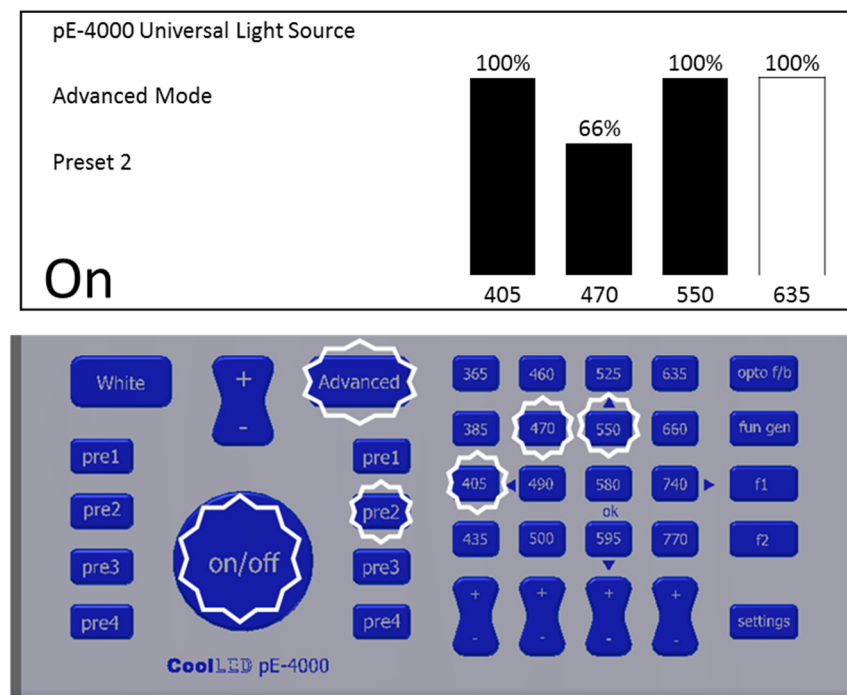


## 11 Advanced Mode Pre-set Programming

- 11.1 When in Advanced Mode, it is possible to save the wavelength selection and intensities by pressing and holding for 3 seconds one of the Advanced pre-sets.



- 11.2 The system will stay in Pre-set 2 until there is a change to intensity, a change in wavelength selection, a change in pre-set or a change to White Mode



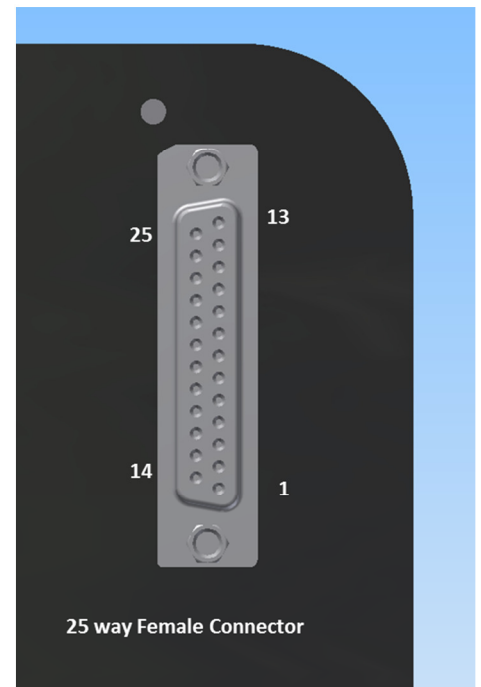


## 12 Remote control

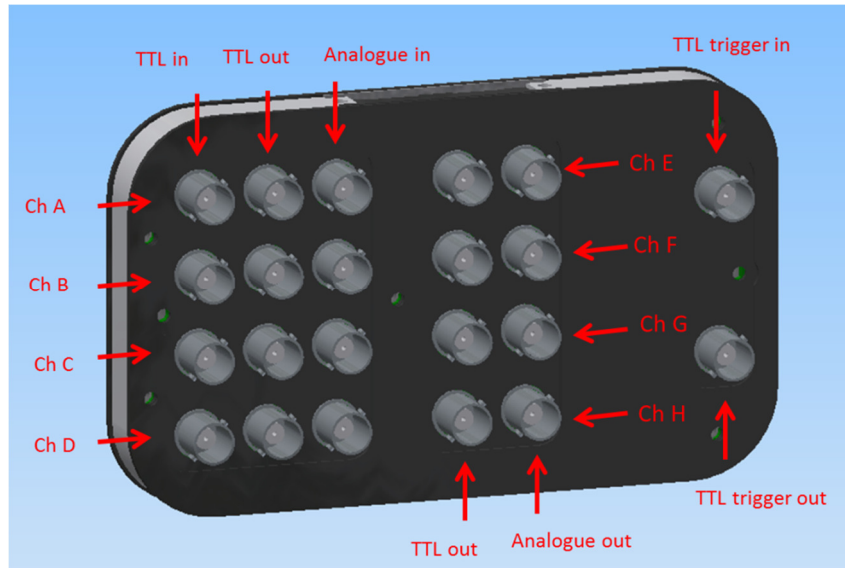
- 12.1 The pE-4000 can be controlled remotely in a number of ways:
- under software controls via a USB interface
  - via digital TTL signals
  - via analogue voltages
- 12.2 A USB B socket is positioned on the rear panel of the light source. The interface is a 'virtual com port' style and a setup procedure is necessary to enable communication between a PC and the light source. See appendix 1 for more details.
- 12.3 There is a comprehensive range of TTL inputs and TTL outputs provided via a 25way 'D-type' connector on the rear panel of the light source. Section 5 of this User Guide describes how the pE4000 is structured around 4 channels, labelled as Channel A, Channel B, Channel C and Channel D. Each channel has an individual TTL input control and a mirrored TTL output. In addition there is a single TTL input which works in parallel with the on/off switch such that a 'high' on this input will switch on all the LEDs which are selected on the Pod. To compliment this TTL input, there is a mirrored TTL output, labelled as 'Sync Out' which can be used to trigger cameras etc.
- 12.4 For those users who wish to modulate or remotely control the intensity of the LEDs, each of the four channels are provided with an analogue input. Varying these inputs between 0-10V controls the output intensities from 0 to 100%. (See section 13 for instructions on how to set this mode of operation.)
- 12.5 To extend the ways of integrating the pE4000 into imaging systems and applications, four additional channels of control are provided, Channels E, F, G and H. Each channel has both a TTL and an Analogue output which can be set by external imaging software via the pE4000 USB interface. These signals can be used to control additional light sources, e.g. the CoolLED pE100-white for transmitted illumination, or other elements of the microscope imaging system.

12.6 All the TTL and Analogue input and output connections are provided via a 25 way 'D-type' female connector. The connections are as follows:

Pin No	Pin Function
1	Channel H Analogue Output
2	Channel F Analogue Output
3	Channel D Analogue Input
4	Channel B Analogue Input
5	Gnd
6	TTL Trigger Output
7	Channel H TTL Output
8	Channel F TTL Output
9	Channel D TTL Output
10	Channel B TTL Output
11	Channel D TTL Input
12	Channel B TTL Input
13	5 V
14	Channel G Analogue Output
15	Channel E Analogue Output
16	Channel C Analogue Input
17	Channel A Analogue Input
18	Gnd
19	TTL Trigger Input
20	Channel G TTL Output
21	Channel E TTL Output
22	Channel C TTL Output
23	Channel A TTL Output
24	Channel C TTL Input
25	Channel A TTL Input

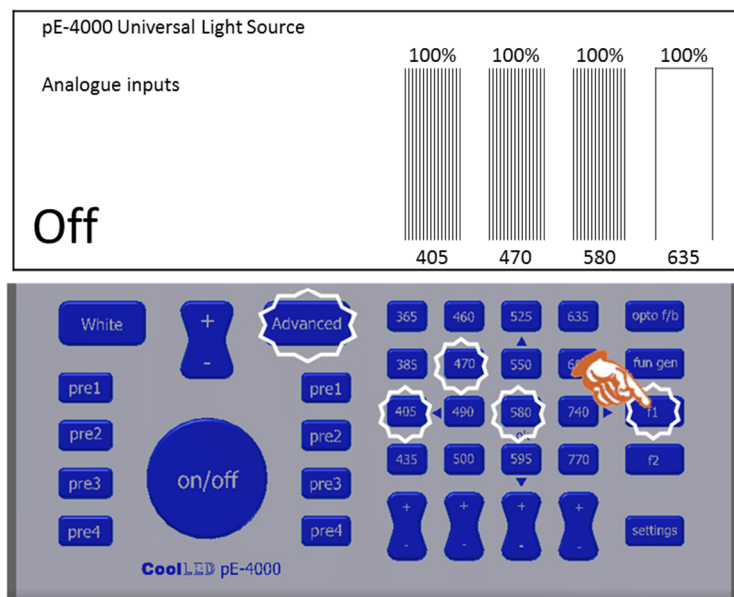


- 12.7 For those users who are set up to use BNC cables, an additional 25way Rear Expansion Box is available which fits on the back of the pE4000. See Appendix 2 for more information.

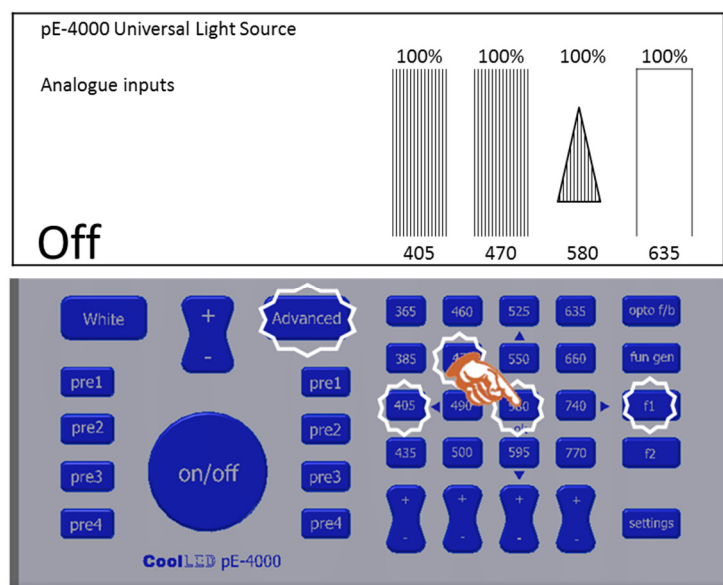


## 13 Analogue Mode Setup

- 13.1 Each wavelength can be set to be controlled from an analogue input voltage rather than the pod controls or the individual channel TTL inputs. The setup process is accessed via the Advanced Mode.
- 13.2 Press the Advanced button to access the Advanced Mode.
- 13.3. Press the f1 button to access the Analogue Inputs setup.



- 13.3 Press the wavelength button corresponding to the wavelength which is required to be under analogue control. The symbol on the screen will change to an icon representing analogue control.

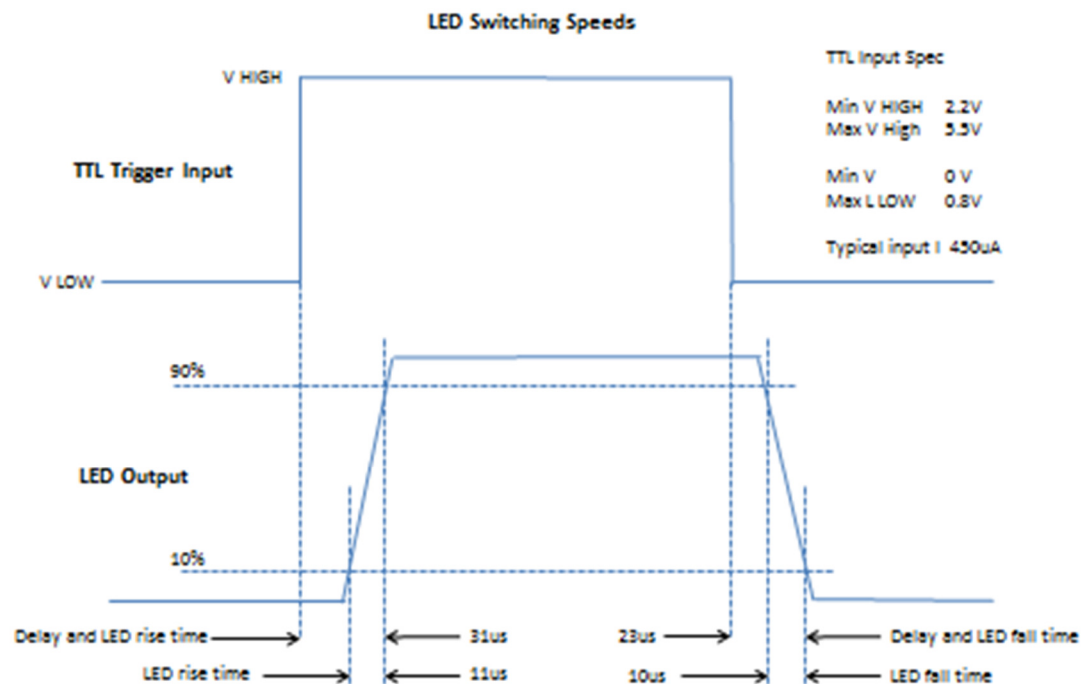


Press the f1 button or the Advanced button to revert to Advanced Mode operation but with the specific wavelength set for analogue control. In the example shown, the 580nm LED will now only be controllable from a voltage between 0-10V applied to the Channel C Analogue Input pin of the 25 way connector. For the LED to operate there is an additional requirement to press the on/off button or to apply a TTL signal to the TTL trigger in pin.

- 13.4 It is possible to have a mixture of LEDs under analogue control and standard pod control at the same time.
- 13.5 To change a wavelength back from analogue control to standard pod intensity control, from the Advanced Mode, press the f1 button again followed by the wavelength button changing and the display will revert to the vertical bars. Press the Advanced Mode button again to return to Advanced Mode operation.

## 14 TTL Switching Performance

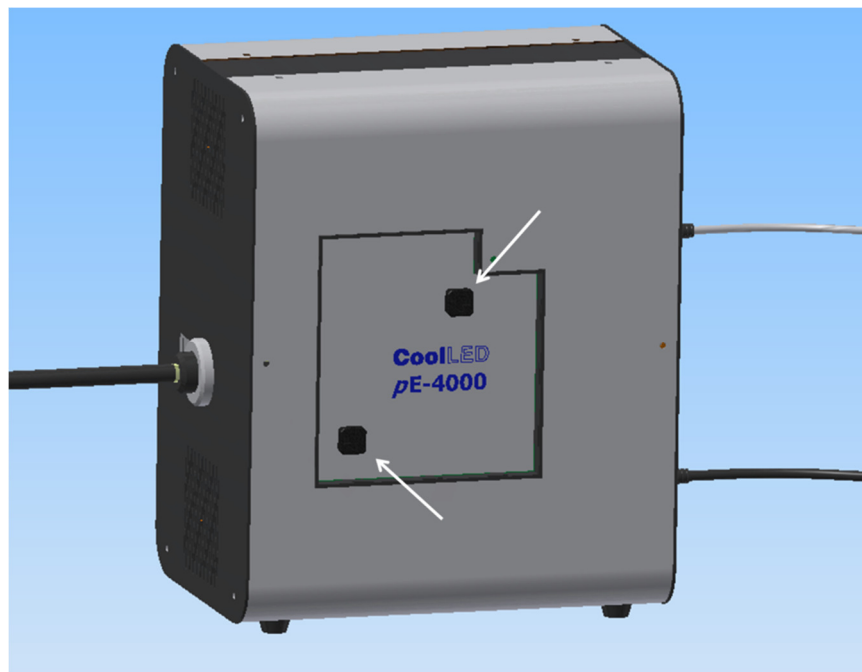
- 14.1 For applications where the fastest switching times of the LEDs is required, TTL signals should be used as they are not limited by the operation speed of the USB connection and software.
- 14.2 The wavelengths and their intensities should be selected manually by the Pod. Alternatively the intensities can be controlled via the USB with the appropriate imaging software.
- 14.3 The following diagram provides the threshold values for the TTL input together with the switching speeds. It is important that the maximum input of 5.5V is not exceeding as this could result in damage to the internal circuitry.



- 14.4 With fast repetitive switching, the pod display will not be able to respond at the same speed and so can get out of synch. If after a train of pulsing, the display on the Pod indicates that the LEDs are on while they are actually off, simply press the on/off button to reset the display correctly.

## 15 Fitting Excitation Filters

- 15.1 Excitation filters can be added to each of the four channels prior to their combination by the internal dichroics. This means that simple single band filters can be used for each wavelength in a multiband imaging system.
- 15.2 The filter slides do not come as standard but can be procured separately either at the time of purchasing the pE4000 or at a later date. See ordering codes in section 22
- 15.3 To access the slots for the filter sliders, use a coin or similar tool to rotate and release the catches on the side of the light source.



- 15.4 The four slots for each of the four channels are clearly marked. The arrows at the side of the slots indicate the direction of the light to help with the correct orientation of the filters when they are being installed.

## 16 Settings / Additional Information

### 16.1 Display Backlight and Contrast settings

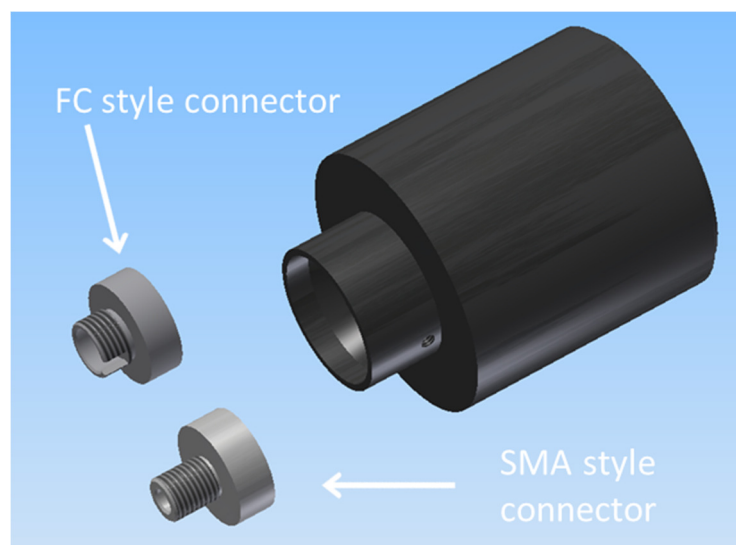
The Pod display settings can be adjusted to suit the lighting environment that the instrument is being operating in.

From the Advanced Mode, press the Settings button and then adjust the display backlight brightness and contrast to suit the lighting conditions. Press the Settings button again to return to the Advanced Mode.

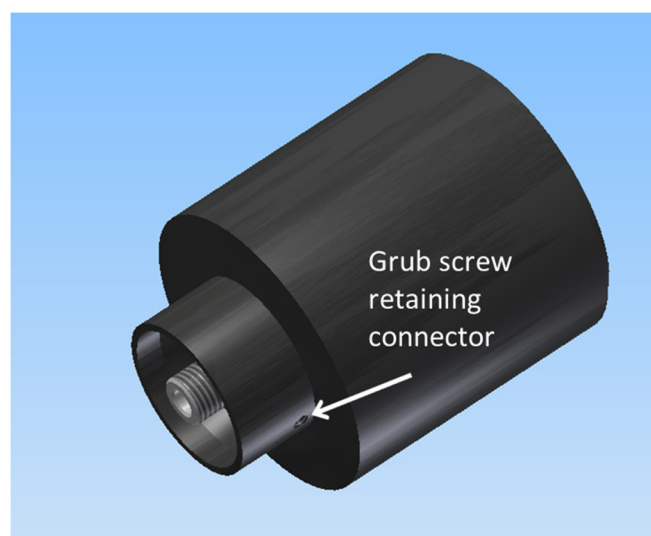


## 17 Fiber options

- 17.1 The pE-4000 has a number of options for light delivery from the light source to the microscope or other systems requiring illumination. The standard method is via a 3mm dia liquid light guide. Fibers with either SMA or FC connectors can also be used with the pE4000. The light source can either be supplied with this option fitted, or the additional optics module can be bought separately and changed over following the instructions below.
- 17.2 The fiber optics module is supplied with two interchangeable connector options to suit the commonly used connectors in fluorescence microscopy.



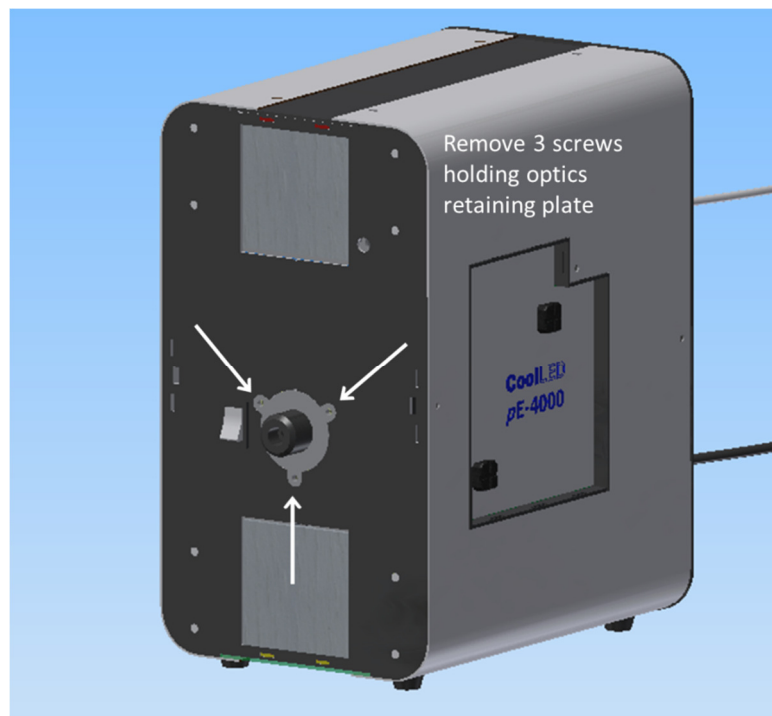
- 17.3 To change between SMA and FC, simply release the grub screw on the side of the collar which releases the connector and replace with alternative, ensuring that it is fully inserted before tightening up the grub screw.



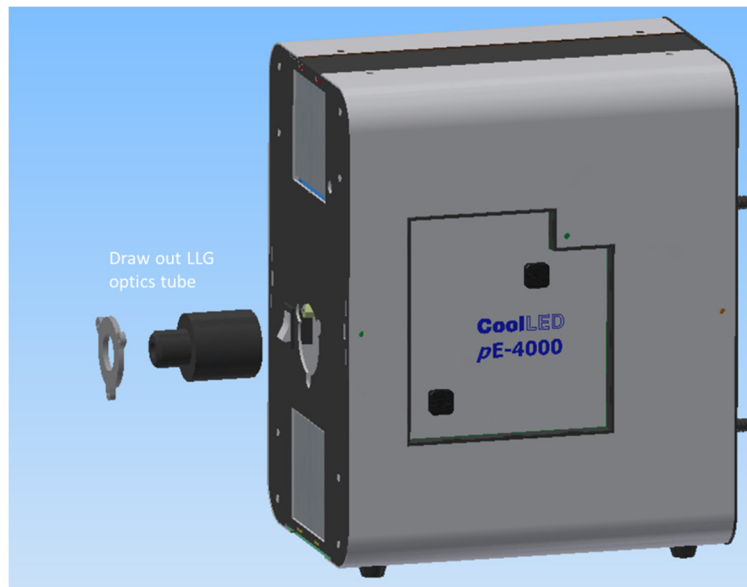
- 17.4 To change between the liquid light guide optics module and the fiber optics module a simple procedure needs to be followed. First disconnect the light source from the power supply and remove any liquid light guide or fiber that is fitted.
- 17.5 Remove the outer front panel as shown.



- 17.6 Now with access to the inner front panel, remove the three screws holding the optics retaining plate in position.



- 17.7 Release the fitted liquid light guide or fiber optics module as shown, taking care not to touch the lenses.



- 17.8 Now fit the alternative optics module, ensuring that it has been fully located on its back internal edge.
- 17.9 Re-assemble the optics module retaining plate and front cover, taking care to ensure that the air filters are retained over the fronts of the fans.

## 18 Software Updates

- 18.1 By designing the pE-4000 as a Universal Light Source, one of the goals was to create an instrument that could be easily adapted to the very wide range of techniques used in fluorescence microscopy. As the light source contains a sophisticated microprocessor which controls all its internal and external processes, it is very easy to add features and functions over a period of time through software updates. Once you have purchased a pE-4000, you will have free access to these new features as they are developed and they will be down loadable from the CoolLED website.
- 18.2 To ensure that you are notified of when these updates become available, make sure that the product registration card is completed and returned to CoolLED Ltd at the address given in the back of this manual.
- 18.3 To download the software updates, the pE4000 will need to be connected via the USB interface to a PC connected to the internet. See the website [www.coolled.com](http://www.coolled.com) for more information.
- 18.4 The following features are in the 'pipeline' and special feature keys have been added to the Pod to simplify their use.

Opto feedback to give tighter control over intensity over short periods of time

Fun Gen (function generator) to provide internally programmable sine, square and ramp controls over intensity for special optogenetics and electrophysiology applications.

Additional security access to Advanced Mode through PIN numbers

## 19 Troubleshooting

The *pE-4000* is a relative simple system and is easy to operate. The following is a checklist if the product does not operate as expected.

- |      |          |  |
|------|----------|--|
| 19.1 | Symptom: | Unit does not power up – nothing appears on the Pod screen.  |
|      | Check:   | <p>Is the power pin connector fully inserted in the <i>pE-4000</i> light source?</p> <p>Is the mains lead fully inserted in the DC power supply?</p> <p>Is the mains supply switched on?</p>   |
| 19.2 | Symptom: | Display does not respond to any button presses.  |
|      | Check:   | <p>Is the Pod connector full inserted in the <i>pE-4000</i> light source?</p> <p>Was the Pod connector inserted after power up? If so, power down and power up again once Pod connector is full inserted to reboot the system.</p>   |
| 19.3 | Symptom: | LEDs fail to switch on with message on screen ‘Hot Lams’.  |
|      | Check:   | <p>LEDs are over heating so check that there is sufficient clearance for airflow around the <i>pE-4000</i> (see section 4).</p> <p>Check that the ambient temperature is below the maximum operating temperature (see section XXXXXX). Check that there are no local heat sources close to the light source.</p> |
|      | Check:   | <p>Listen for the fans switching on. They does not run continuously – only when necessary. If the fans do not operate with the LEDs on, then there is an internal fault and the unit must be returned to CoolLED for repair.</p>   |
| 19.4 | Symptom: | Illumination appears to be weak  |
|      | Check:   | <p>Are the intensity settings on the Pod are turned up? Is the microscope set up correctly? Check for shutters and apertures being open and for appropriate filters and cubes. If the microscope previously used a mercury or metal halide lamp, check for damage or frosting of optics in light path.</p>       |
| 19.5 | Symptom: | Illumination on sample is not flat and even.   |
|      | Check:   | Has the Universal Collimator been setup correctly?   |

- 19.6    Symptom:        The Illumination is not centralised over the field of view
- Check:           Carefully slacken off the fixing retaining the Universal Collimator on to the epi-port and rotate it while viewing the field of view. If the illumination offset follows the rotation, then the optics within the collimator have lost their alignment, possibly through mis-handling and the product will need to be returned to CoolLED for re-aligning. If the illumination offset remains unchanged with rotating the collimator, then the problem is within the microscope and a competent person with servicing microscopes will need to investigate the cause of the problem.

## 20 Routine Care and Maintenance

- 20.1 Apart from cleaning or replacing air filters, the pE-4000 will require little or no maintenance throughout its life.
- 20.2 The light source is cooled by internal fans which draw air in from the front panel grills. The air is forced through two channels into which those components that get hot are thermally linked. The warmed air is then vented through the single rear grill. The forced air is isolated from the optical parts of the light source to prevent a build-up of dust on these components which would impair their performance. To maintain the performance of the internal heat-sinks, two air filters are retained in front of each fan. It is recommended that every 12 months these filters should be removed and cleaned. To gain access to the filters, first remove the white circular ring around the light guide input by releasing the grub screw on its lower edge. Then unscrew the 4 front giving them a good beating with an object such as a pencil. If there is an excessive build up of dust, replacement filters are available from CoolLED.
- 20.3 Cleaning of the external surfaces can be carried out with a mild soap and water used to lightly dampen a lint-free cloth. Ensure that no liquid is allowed to enter the product through vents and panel edges. Avoid optical surfaces.
- 20.4 Cleaning of optical surfaces maybe necessary if debris or finger prints accidentally come into contact with the lens during installation.
- 20.5 In the first instance remove any loose debris with an air duster (aerosol or rubber blower)
- 20.6 Finger prints or other liquid type contaminants should be removed using standard lens cleaning procedures. Do not flood the lens surfaces and fluid as liquid could enter the product and cause damage.

## 21 Product specifications

21.1 Power requirements  
110-240Va.c 50/60Hz 2.8A

21.2 Power consumption

Standby (i.e. no LEDs on)	Max 7W
Single wavelength operation	Max 41W
Dual wavelength operation	Max 75W
Triple wavelength operation	Max 93W
Quad wavelength operation	Max 130W

21.3 Dimensions

Light Source	150mm (w) x 220mm (d) x 260mm (h)
	-weight 3.5kg
Control Pod	154mm (w) x 135mm (d) x 40mm (h)
	- weight 0.95kg
Power Supply	164mm (w) x 64mm (d) x 35mm (h)
	- weight 0.58kg

21.4 Environmental Operating Conditions

Operating 5 – 35 deg C



## 22 Product options and order codes

See website [www.cooled.com](http://www.cooled.com) for full details of product options and order codes

## 23 Warranty and Repairs

This product is supplied with a 12 month warranty which is calculated from the date of invoicing, covering defects in materials and workmanship. It does not cover or form the basis for any claims for damages or consequential losses. In addition the warranty covering the LEDs is extended from 12 months to 36 months or 25,000 hours whichever is first. Any repair that is carried out by CoolLED Ltd, or its approved agent is warranted for 100 days.

The warranty does not cover excessive wear and tear, poor handling or any fault caused by operating the product outside the advice of this User Guide.

In the event of the product developing a fault, make contact with [support@cooled.com](mailto:support@cooled.com) and provide a brief description of the problem. It is useful to have the product serial number available. If a repair is required, a support team member will provide a RMA number to log the incident. All returned units, including warranty claims should be packed up carefully and adequately (preferably in the original packaging), and sent postage and carriage paid to the service centre as specified by the support team member.

## 24 Contact Details

CoolLED Ltd  
Westmarch Business Centre  
Andover  
Hampshire  
SP10 1NS  
UK

Phone            ++44 (0)1264 323040    (Worldwide)  
                     1-800-877-0128        (USA + Canada)

Email            [info@cooled.com](mailto:info@cooled.com)

Online           www.cooled.com

## Appendices