

# pE-4000

Flexible  
Microscopy  
Illumination



4 Channels  
16 Selectable Wavelengths

**CoolLED**   
Simply Better Control

# pE-4000

## Flexible Microscopy Illumination

## Cell Viability

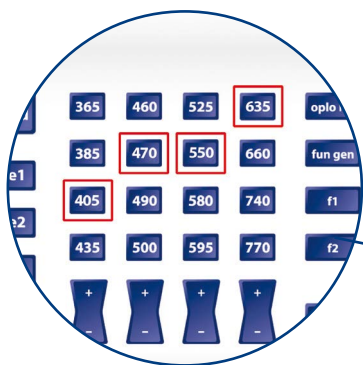
- Optimal illumination through control features to extend fluorescence of cells
- Reduced photobleaching and phototoxicity
- Microsecond switching
- Variable pulse duration on/off

“When you can only control intensity of ‘white’ light (rather than individual channels), the level of photobleaching can be high. With the pE-4000, we can control the excitation of the individual channels. It is possible to optimise the excitation intensity according to the labelling, greatly reducing photobleaching and phototoxicity in a live experiment.”

**Dr. Yan Gu,**  
University of Sussex

## Selectability

- Choice of 256 wavelength combinations from 16 installed LEDs (365 nm-770 nm)
- Choose 1 of 4 wavelengths for each of 4 channels on the control pod
- Unique wavelength grouping concept
- Optimum wavelength to suit your experiment
- Specific wavelength characterisation for optimal optogenetic control of cell responses



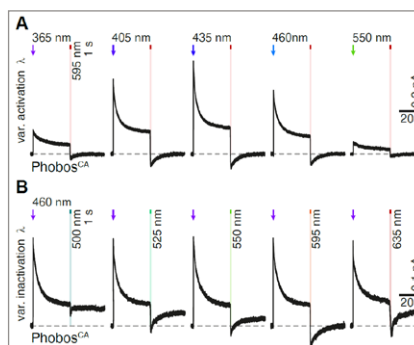
DAPI/FITC/TRITC/Cy5  
Quad filter excited by  
pE-4000 at matched  
wavelengths shown  
above

The pE-4000 allows multiple experiments with varying wavelengths on the same sample, as shown here.

(A) Representative photocurrent traces of a PhobosCA expressing CA1 cell evoked with different activation wavelengths and shutoff with 595 nm light.

(B) Photocurrent traces in the same cell evoked with 460 nm light and shutoff with indicated wavelengths (10 mW/mm<sup>2</sup>).

Wietek J et al (2017) Anion-conducting channelrhodopsins with tuned spectra and modified kinetics engineered for optogenetic manipulation of behaviour. Scientific Reports volume 7, Article number: 14957(2017) doi:10.1038/s41598-017-14330-y

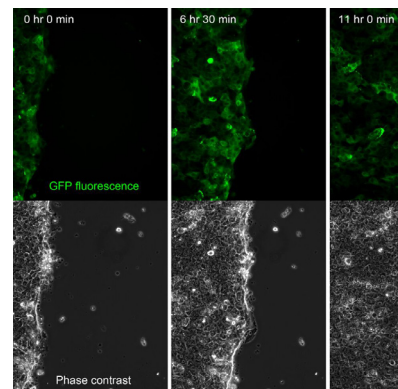


## Sustainability

- Lowest power consumption - other LED technology uses 120 W to 350 W
- Long lifetime
- Highly stable, repeatable award-winning single chip LED technology
- Market leading energy efficiency

### Power Consumption

Standby (no LEDs on)	Max 7 W
Single wavelength	Max 25 W
Dual wavelength	Max 44 W
Triple wavelength	Max 53 W
Quad wavelength	Max 60 W



Time series of a confluent sheet of keratinocytes on an Olympus IX83 microscope equipped with the pE-4000 at the Institute of Medical Biology, A\*STAR, Singapore.

# Your Ability to Flourish!

"Suddenly we were able to offer users uninterrupted extended live cell experiments of 100+ hours, without worrying about brightness fluctuations, lamps burning, room heating, etc. Also, users have reported markedly reduced bleaching and phototoxicity in their samples, both from the prokaryotic and the eukaryotic research fields"

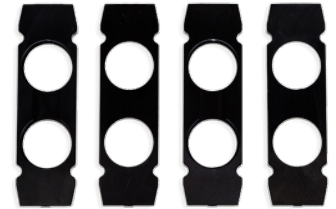
**Dr. Jens Eriksson,**  
Oslo University Hospital

## Adaptability

- Fits to all major research and clinical microscopes
- Delivers light through a liquid light guide or fibre
- Offers inline removable excitation filter holders
- Uses the Universal Collimator



pE-Universal Collimator



Removable inline excitation filter holders



Pod functions:  
Presets, white light and intensity control

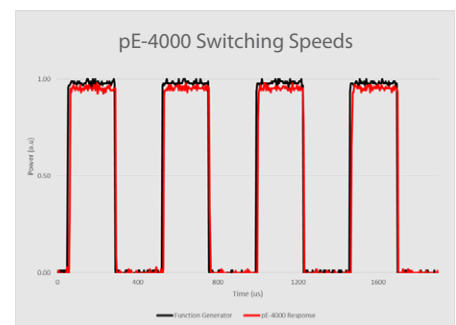


## Controllability

- Advanced integration into major microscope software platforms
- Save wavelength combinations and return to previous set-up
- USB interface
- High Speed TTL triggering
- Analogue control - dynamic intensity sinusoidal control option
- White light control
- Expansion box
- Individual channel intensity control
- Pre-determined intensity saving option



pE-4000 Expansion Box



## Visibility

- High signal to noise ratio which gives cleaner images and data

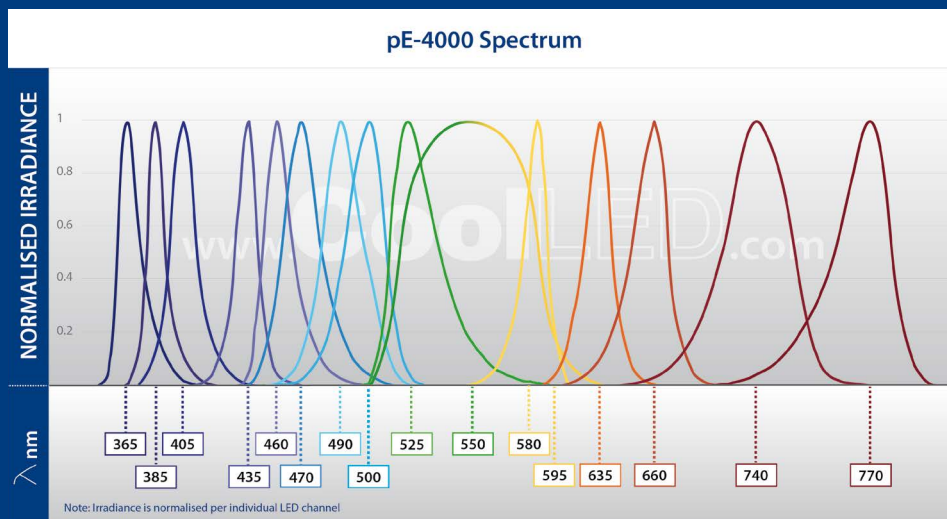
"Striking, bright fluorescence images with a strong signal to noise ratio even when using a low magnification objective"

**Graham Wright, Institute of Medical Biology, A\*STAR, Singapore**

Cells migrating during a live-cell imaging outgrowth assay, acquired with a CoolLED pE-4000 Illumination System. Scale bar = 150 µm.

## Reliability

- Through experience and QA assured processes
- 3 year Warranty
- First year Warranty swap



## Specification

### pE-4000 illumination system:

Light source with complete set of wavelengths, manual control pod, and power supply

### Light delivery:

Single liquid light guide or fibre options

### Collimating optics:

pE-Universal Collimator for use with a liquid light guide. Requires microscope adaptor

### LED wavelengths:

LED wavelengths are divided across 4 channels with each channel having individual control

Due to a programme of continual development, please contact CooLED (<https://www.cooled.com/contact/contact-form/>) for performance data

## Control & Interface

### Manual:

Dual function remote manual control pod for White/Simple mode or Advanced mode

### Remote:

Via USB for independent on/off and intensity control of each channel. Triggering speed <1 ms

Via 4 TTL inputs for independent on/off control of each channel. Triggering speed <20  $\mu$ s

Via single TTL for on/off control of manual or software selected channels

Via 4 analogue inputs 0-10 V, 0-300 kHz for dynamic control of intensity from external analogue signals

### Synch Out:

4 TTL outputs for each channel – active high

1 TTL output for any channel – active high

### Programmable Interface:

4 TTL outputs for on/off control of peripherals (transmitted illuminators, stages etc.)

4 Analogue outputs for intensity control of peripherals (can be programmed to mirror LED intensities for channel control) 0-10 V full scale.

### Function Generator:

Internally generated sine, pulse and ramps for each channel programmed via control pod.

### Connectivity:

USB (B type) for PC connection. All other TTL and Analogue inputs/outputs via 25-way 'D-type' female connector (optional rear mounting pE-Expansion Box available for BNC connectivity).

### Imaging Software:

Micromanager, MetaMorph, cellSens, NIS Elements, ImagePro, LAS X, Zen etc. <https://www.cooled.com/product-detail/imaging-software/>

## To Order

### pE-4000-L-SYS-ZZ:

pE-4000 Light Source with manual control pod, and power supply for liquid light guide delivery

### pE-4000-F-SYS-ZZ:

pE-4000 Light Source with manual control pod and power supply for fibre delivery

### pE-4000-EB25D:

Rear mounting pE-Expansion Box for 25-way D-type to BNC connectivity  
Excitation filter holder (4)

### pE-4000-EFH-4

1 m long, 3 mm diameter liquid light guide

### pE-1904:

3 m long, 3 mm diameter liquid light guide

### pE-1908:

Universal collimator for use with a single liquid light guide. Requires microscope adaptor

### pE-10400:

To customer-specified microscope

### pE-ADAPTOR-YYY

A range of fibres is available from CooLED. See Accessories (<https://www.cooled.com/product-detail/accessories/>)

To specify microscope code (YYY), see Adaptors (<https://www.cooled.com/product-detail/adaptors-new/>)

To specify Power Cable (ZZ): 10 = Australia, 20 = Europe, 30 = UK, 40 = USA

### Warranty:

System Warranty: 36 months.

LED Warranty: 36 months.

## Power

**Power requirements:** 110-240 V a.c. 50/60 Hz, 2.5 A

**Power consumption:** See table under Sustainability

## Dimensions

**pE-4000 Light Source:** 150 mm (w) x 220 mm (d) x 260 mm (h) Weight 3.5 kg

**pE-4000 Control pod:** 154 mm (w) x 135 mm (d) x 40 mm (h) Weight 0.95 kg

**pE-4000 Power Supply:** 164 mm (w) x 64 mm (d) x 35 mm (h) Weight 0.58 kg

**pE-Expansion Box:** 151 mm (w) x 18 mm (d) x 95 mm (h) Weight 0.34 kg

## Environment & Safety

LED products help laboratories become more sustainable, saving energy and reducing the carbon footprint when compared with conventional illuminators. CooLED's products have the following benefits:

- Mercury-free and laser-free
- Energy Efficient
- Long lifetime
- No bulb replacements
- Reduced risk of eye damage
- Quiet operation
- No special disposal regulations or issues



### Distributor:

**AHF analysentechnik AG**  
Kohlplattenweg 18  
DE-72074 Tübingen  
Germany

Tel.: +49 (0)7071 970 901-0  
Fax: +49 (0)7071 970 901-99  
info@ahf.de  
www.ahf.de

