



PhotoSyn™ User Manual

High power LED Light Hood for Continuous Flow Chemistry

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1. SAFETY:

1.1 General Safety Considerations



PLEASE READ THE USER MANUAL BEFORE USING THIS INSTRUMENT



The Asynt **PhotoSyn™** is designed to work under ambient temperature conditions in a properly ventilated environment only and requires a flowing cold water supply to dissipate the heat generated at the back plates of the high powered LED arrays.

The unit is fitted with safety interlock switches which immediately disable the LEDs should any attempt be made to remove the light hood from its reactor base when operating.

The **PhotoSyn** has been designed to prevent light leakage when in operation and therefore does not need to be used within a light-tight or tinted glass enclosure.



The **PhotoSyn** should only be operated by suitably technically competent users wearing suitable personal protective equipment.



CAUTION! Risk of electric shock and death. The power supply casework and the LED lamp units within the light hood should NOT be opened under any circumstances. This is a high voltage product which uses 220V DC; sufficient to cause cardiac arrest. Any maintenance issues MUST be referred to Uniqsis Ltd in the first instance.



CAUTION! High intensity light source. The **PhotoSyn** is fitted with high intensity LEDs and NO attempt should be made to look at the light source when in operation.



CAUTION! High intensity UV light. Some versions of the **PhotoSyn** are fitted with high intensity UV LEDs. Any attempt to view high intensity UV LEDs in operation, even for short exposure periods, can lead to skin and tissue damage which may be irreversible.

2. INTRODUCTION

Available with a selection of different LED arrays the unit can provide outputs up to 700W from the dedicated programmable power supply. The LEDs available are very high quality and have been chosen to offer high efficiencies and lifetimes with L_{70} s of approximately 3 years in continuous operation (Note: performance is temperature dependent).





The enclosed curved, water (or gas) cooled LED arrays concentrate the available light onto a central coil reactor to maximise the radiated photon flux. The inside of the light hood is polished and chromed coil reactors are available if required to maximise internal reflection.

Although benefiting from convective cooling, the [PhotoSyn](#) has been engineered to completely prevent potentially hazardous light emissions from the unit, and is protected with interlocks that deactivate the light source if any attempt is made to remove the cover whilst in operation. A centrifugal fan draws cooling air through the unit entering through the black circular disks on top of the light hood and exiting from the exhaust port also on the top of the lamp unit.

The [PhotoSyn](#) is compatible with the Asynt [Cold Coil Mk2](#) and [Polar Bear Plus Flow](#) reactor modules. These reactor modules are available separately.

The LED lamp arrays fitted to the [PhotoSyn](#) incorporate a memory chip which is programmed with the specification of the array. In this way, when it is connected, any light hood will be 'recognised' by the power supply. The power supply will then display the appropriate wavelength selection options and ensure that the LEDs are powered within the correct operating voltage and current range to avoid premature damage. The power supply operates at a fixed voltage and variable current. In fact, each LED array is powered by an independent driver within the power supply casework.

3. INSTALLING THE PHOTOSYN LIGHT HOOD

Note: For safety considerations, the [PhotoSyn](#) LED Light Hood has been designed such that it will only operate when it is installed on a suitable reactor base that engages with the embedded interlock switches and thereby allows the unit to be powered 'on'.

Suitable reactor bases are the Asynt Cold Coil Mk2 (UQ1050-M2) standalone reactor module and, when fitted with the Polar Bear [PhotoSyn](#) Adaptor Ring (UQ1080), the Polar Bear Plus Flow reactor module.

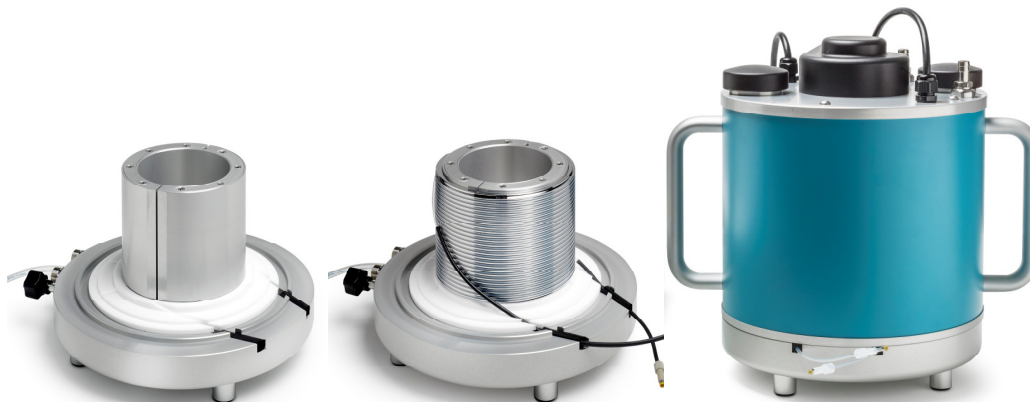
It is necessary to supply independent cooling to the LED lamp arrays. This is because although LED lights are often considered to be 'cold' light sources that produce very little radiation outside of the specified wave band, in fact significant heat is generated at the chip junctions dissipated to the LED backplates. This is especially so in high powered devices such as the [PhotoSyn](#). This heat must be removed because the lifetime of LEDs reduces rapidly if they are operated at higher temperatures. The LED arrays are fitted with temperature sensors that will switch the LEDs 'off' if the array temperature exceeds 60°C.

3.1 Using the PhotoSyn with the Asynt Cold Coil Mk2:

1. Fit a suitable coil reactor or glass static mixer module (GSM) to the Cold Coil Mk2 (Asynt supplies chromed coil reactors if required e.g. UQ2507-C and UQ2508-C which are 5.0 and 52ml respectively and wound with high purity PFA tubing).



- Remove the black foam rubber inserts and fit these around the coil reactor/GSM inlet and outlet tubes. Then relocate the foam inserts in the slots in the reactor base. (Note: ensure that the tubing is not too tight such that it may become crushed or damaged when the light hood is fitted.)



- Fit the **PhotoSyn** light hood over the Cold Coil assembly ensuring that the recess in the base locates correctly over the raised circular upstand that engages with the microswitches in the light hood. (Note: you will hear the microswitches 'click' if the light hood and reactor base are correctly mated together.)
- In order to control the coil reactor temperature, connect a recirculating liquid supply to the Cold Coil Mk2 reactor base.
The temperature sensor for the recirculator is inserted through the hole in the underside of the base of the Cold Coil. The sensor can be inserted through the circular piece of foam in the reactor base.
Generally, it is recommended that this should be a heat transfer fluid and a recirculating heater/chiller should be employed. For example, a Huber Petit Fleur or a Julabo CF41 have been used to reliably reduce the reactor temperature to -20°C when the **PhotoSyn** is operating at 100% power.
- In order to control the temperature of the LED arrays themselves Asynt recommend that the arrays are attached to a cold-water tap (although for low powered use connection to a pressurised gas stream may be adequate). In practise, Asynt recommend that a flowing cold water supply is required to maintain the LED arrays at 20-35°C. When operating at 100% power for extended periods, especially when the coil reactor is heated to elevated temperatures, the flow rate should be at least 200ml/min. (Note: it may be acceptable to connect the LED lamp unit and reactor module to the same water supply in series for 'room temperature' applications.)
- Connect the 12 pin connectors to the rear of the **PhotoSyn** power supply. Rotate the connectors until they can be fully inserted and secured in place using the locking rings.
- Connect the power supply to the mains (110V or 220V AC; 50/60Hz) and switch the mains supply 'on'.
- Remember to start the coolant supply to the light hood flowing before powering 'on' the LED arrays.

3.2 Using the PhotoSyn with the Polar Bear Plus Flow:

1. Fit a suitable coil reactor or GSM to the Polar Bear Plus Flow.
2. Fit the **PhotoSyn** Polar Bear Plus Flow Adaptor Ring (UQ1080) to the Polar Bear Plus Flow. The red clamps should be released and then closed to locate the adaptor ring securely in place. If not, it will not be possible to subsequently fit the **PhotoSyn** light hood in place.



3. Fit the reactor inlet and outlet tubes through the adaptor ring and insert them into the black foam inserts (Note: it is often easier to remove the inserts and then re-fit them after fixing to the reactor tubing).
4. Lift the **PhotoSyn** light hood in to position over the reactor coil/GSM such that the recess in the base of the hood locates with the upstand on the adaptor ring. You will hear the interlock microswitches 'click' when the parts are mated correctly.

5. In order to control the temperature of the LED arrays themselves Uniqsis recommend that the arrays are attached to a cold-water tap (although for low powered use connection to a pressurised gas stream may be adequate). In practise, you will find that only a gentle flow of cold water is required to maintain the LED arrays at 20-30°C even when the unit is operated at 100% power for extended periods. (Note: it may be acceptable to connect the LED lamp unit and reactor module to the same water supply in series for 'room temperature' applications.)



6. Connect the 12 pin connectors to the rear of the PhotoSyn power supply. Rotate the connectors until they can be fully inserted and secured in place using the locking rings.
7. Connect the power supply to the mains (110V or 220V AC; 50/60Hz) and switch the mains supply 'on'.
8. Remember to start the coolant supply to the light hood flowing before powering 'on' the LED arrays.

4. OPERATING THE PHOTOSYN

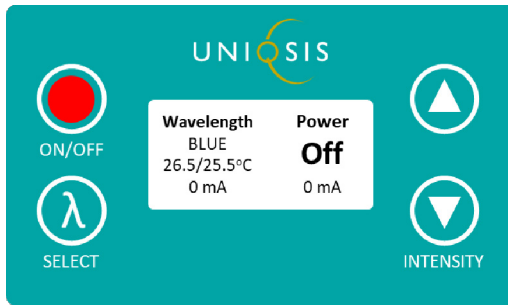


The screen on the control panel of the power supply displays the following parameters:

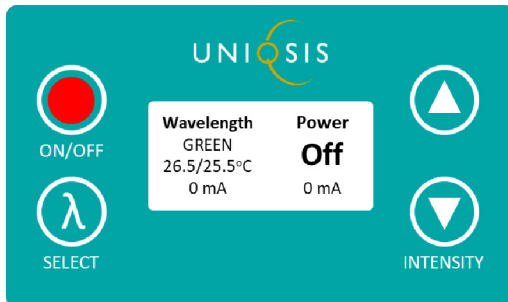
- a. The selected wavelength
- b. The temperature of the LED arrays
- c. The power level selected (INTENSITY)
- d. The current being supplied to each LED lamp array

Note: the LHS and RHS sections of the display corresponds to the left and right 12 pin connectors to the rear of the unit.

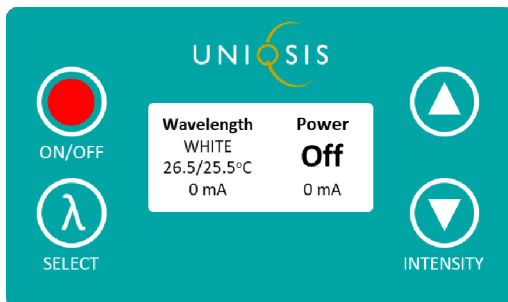
1. Select the desired wavelength (where available) by repeatedly pressing the λ button to scroll through the possible options. (Note: where multiple coloured LEDs are installed, various options for switching 2 colours 'on' simultaneously will be available. Where different colours are selected, these will illuminate in alternate lamp units)
2. Press the <RED> on/off button to switch the LED arrays 'on' or 'off'. The LED arrays will be powered at 10% of their maximum by default. (Note: the power supply ramps the current up gradually to apply a soft start to the LEDs.)
3. Press the \uparrow or \downarrow arrows to adjust the power level.



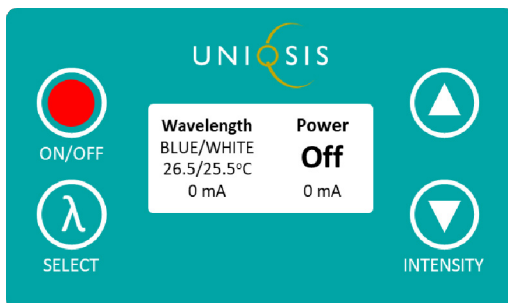
After switching on.
Unit 'off'; current zero
No error messages following start up safety check.



Unit 'off'; current zero.
Scroll through available colour options (unit dependent) by pressing the 'λ' button.



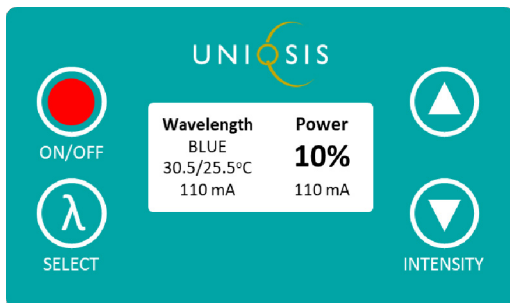
Unit 'off'; current zero.
Scroll through available colour options (unit dependent) by pressing the 'λ' button.



Unit 'off'; current zero.
Scroll through available colour options (unit dependent) by pressing the 'λ' button.

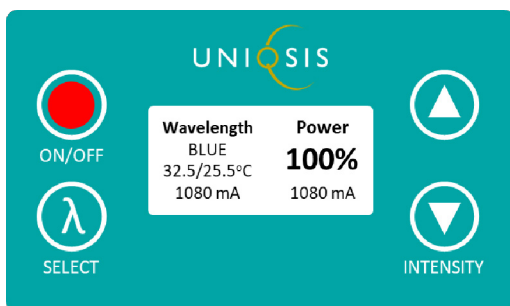


Unit 'off'; current zero. Scroll through available colour options (unit dependent) by repeatedly depressing the 'λ' button.



Switch LEDs 'on' by pressing RED 'on/off' button.

Unit starts with default intensity of 10%
Current readings indicate lamps are operating correctly.



Increase intensity to the desired level (in 5% increments by repeatedly depressing the 'on/off' button.

Note: current readings change accordingly

Note: where different colour LEDs are selected, the current readings are not necessarily the same but reflect the fact that different diodes may be arranged in different quantities and have different PCB layouts dependent upon the specification of the diodes used.

5. ERROR CONDITIONS & SAFETY FEATURES

1. When the PhotoSyn power supply is switched 'on', an internal safety test is performed to check the operation of the relays that control the power supply to the two LED arrays. A message will appear briefly at the bottom of the screen if this is completed successfully.
2. If an attempt is made to remove the light hood from the reactor base when in operation, the interlock microswitches will immediately disable the power supply to the LEDs before any light can escape from the unit. Only 0.5-1.0mm of movement is sufficient to trigger this safety response.
3. If the light hood is replaced within 1 second, then the lamps will remain 'off' for 5 seconds but then restart at the last defined power level.
4. If the light hood is removed for more than 1 second, then the display screen will turn red and an error message will be displayed. This will then reset after 5 seconds but the lamps will remain 'off' until the <ON/OFF> button is depressed. The lamps will then be powered at the last defined power level.
5. If insufficient cooling is applied to the LED arrays and their temperature exceeds 50°C, the LEDs will automatically be switched 'off' by the power supply and cannot be restarted until the PCB temperatures have fallen below the permitted maximum level. An error message will be displayed accordingly.
6. The maximum (100% intensity) observed current values shown on the display should not deviate significantly (+/-10%) from the specified maximum values shown in the Specification Table on Page 10.

Asynt PhotoSyn Photoflow LED Lamp Unit © 2019

6. SPECIFICATION

Part No.	Description
UQ1074	PhotoSyn™ Blue HP LED photoreactor, 455nm; 220/110V, 50/60Hz
UQ1075	PhotoSyn™ UVA HP LED photoreactor 365nm/455nm; 220/110V, 50/60Hz
UQ1076	PhotoSyn™ Tricolour HP LED photoreactor 455nm/555nm/White: 220/110V, 50/60Hz
UQ1050-M2	Cold Coil™ standalone coil reactor module (requires separate recirculating chiller)
UQ1080	Polar Bear Plus Flow Adaptor Ring for PhotoSyn™
UQ2508-C	Coil Reactor, chromed, PFA, 52ml, 3.25mm OD x 2.41mm ID
UQ2507-C	Coil Reactor, chromed, PFA, 5.0ml, 1.57mm OD x 1.00mm ID

6.1 Power Supply

Width x Depth x Height	190 mm x 460 mm x 140 mm
Weight	8.3 kg

6.2 LED Light Hood

Diameter x Height	360 mm x 280 mm
Weight	11.5 kg

LED PCB Configuration	λ (nm)	Current (max mW)	No. of diodes	Total Output *
Blue	455	1080	720	200W
UVA	368	900	240	226W
Blue	455	540	360	100W
Blue	455	540	240	70W
Green	530	540	240	7560lm
White	4000K**	810	240	17496lm

* Corrected to take account of respective diode efficiencies

** 4000K white light source emitting from 420 to 750nm with peaks at 450 and 580nm.



6.3 PhotoSyn Power Specification

100-240V, 50-60Hz, <0.9A

Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal supply voltage.

6.4 Electrical Supply

The device is intended for use with AC power networks of 120–240 V and 50-60Hz.

Check that the supply voltage marked on the serial number label, and the type of mains plug, are correct for your mains supply outlet, which must have a ground connector.

6.5 Conditions of Use

Operating environment:	Indoor use only
Pollution degree:	2
Installation category:	II
Temperature	5 to 40°C
Maximum relative humidity	80 % r.h. in room temperatures up to 31°C decreasing linearly to 50 % r.h. at 40 °C
Altitude	Up to 6,500 feet (2,000 m) above sea level
Operating Environment:	Indoor use only

The unit should be protected from exposure to direct sunlight.

7. WARRANTY

The PhotoSyn is covered by a warranty for 12 months from the date of delivery.

The warranty does not include:

- Accidental or wilful damage
- Fair wear and tear.
- Damage caused by incompatible solvents or substrates
- Blockages caused by precipitation in the system (See user maintenance)
- Use outside of the parameters of the conditions of use (see conditions of use)

Warranty includes:

- Protection against faulty materials or workmanship
- Shipment costs if unit is required to go back to base for repair

All warranty claims shall be invalid if any unauthorised changes are made to the unit or any attempt is made to open the power supply or LED lamp array casework.

Asynt PhotoSyn Photoflow LED Lamp Unit © 2019

8. CLEANING & CARE



Risk of electrical shock or short circuit if cleaning solutions enter the inside of the [PhotoSyn](#) power supply. Do not over-moisten the cleaning cloth.

All external surfaces of the instrument can be cleaned using a cloth moistened either with a dilute aqueous soap solution or isopropanol.

Corrosive reagents and solvents should not be left in contact with any painted or anodised external surfaces for extended periods of time.

9. SERVICE & SUPPORT

For service and support please call Asynt via the details below.

