Solstice™

Compact, high power, multi-position LED photoreactor

UNIQSIS

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Solstice™ LED photoreactor

Solstice high power, multi-position photoreactor

- 12 x 8ml (max) Septum sealed, glass tube reactors with efficient vortex stirring
- Ideal for small-scale photochemistry reaction optimisation
- 365nm, 385nm, 405nm, 425nm, 455nm and 525nm Borealis™ LED lamp options
- Choice of digital (180W) or analogue (120W) power supplies
- Temperature controlled reactors and high-power LEDs
- Fits magnetic stirrers with 135mm top plates
- Safety interlock and thermal cut-out

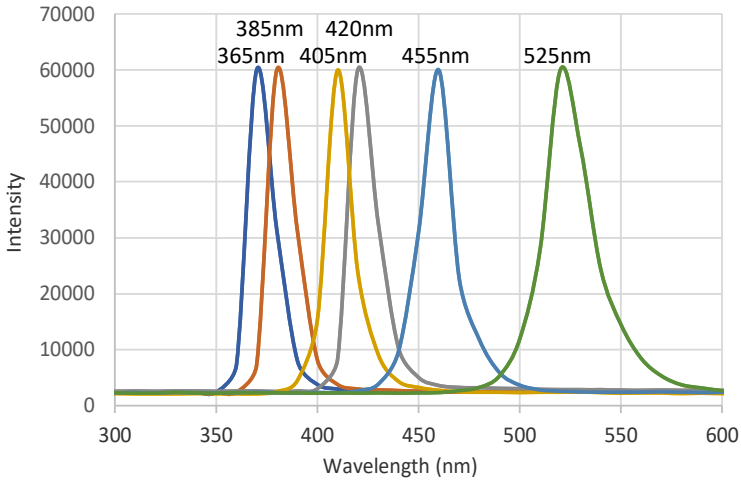
Introduction:

The Uniqsis Solstice™ is a 12-position, temperature-controlled tube adaptor that, in combination with the Uniqsis Borealis™ LED lamp unit, converts a standard laboratory magnetic stirrer (135mm dia. top plate) into a high power multi-position batch photoreactor.

It is fitted with 12 x 8ml glass tube reactors that are septum-sealed to facilitate sampling, reaction sparging/de-gassing and oxygen exclusion.

Connection to an external thermoregulating recirculator (or water supply) ensures that reactions can be performed reliably at a set temperature and that the high-power LEDs are efficiently cooled.

Borealis LED lamp modules & power supplies:



Matching fixed wavelength Borealis LED lamp units are available with wavelengths of 365, 385, 405, 420, 455 and 525nm. These can be specified in both 120W or 180W versions that are powered either by a compact 120W Borealis Scholar™ analogue power supply (PSU), or the 180W Borealis digital PSU.

The lamp module switches off automatically to avoid damage if the LED backplate temperatures exceed 50°C (automatic reset after cooling). The complete assembly is light-tight and a safety interlock prevents illumination of the LEDs when the lamp is removed from the Solstice tube adaptor.

120W Borealis LED lamp & Scholar power supply:

120W Borealis MAXI LED lamp & Scholar PSU

120W Borealis Scholar PSU detail

120W Borealis LED lamps are fitted with 120x high-power LEDs and are designed for use with the Borealis Scholar analogue PSU. This compact and affordable PSU is ideal for standalone use where fume cupboard space is at a premium.

It is a constant current device and is fitted with over-current protection.

Intensity can be varied in 20% increments using the rotary control knob. The internal reactor temperature can be monitored with a separate digital thermometer.

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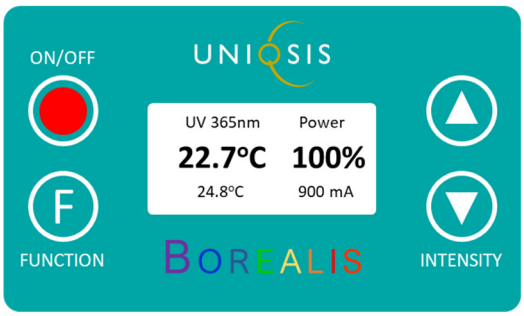
180W Borealis LED lamp & digital power supply:

180W Borealis MAXI LED lamp & Digital PSU



180W Borealis digital PSU display detail

180W Borealis LED lamps are fitted with 10x high-intensity LEDs and connect to the larger Borealis power supply. Lamp intensity can be varied with digital control of current (10 - 100% in 5% increments).

The digital PSU automatically detects the wavelength of the lamp unit connected; it also monitors and displays current, and the internal reactor temperature which is measured using a temperature probe inserted directly into one of the tube reactors.

Ethernet, RS232 and USB comms are provided for remote control and external system integration.

Precise temperature control:

Reactor temperature:

Solstice incorporates a cooling jacket that allows control of reactor temperatures. Although this can be achieved by connection to a flowing water supply, more precise temperature control is possible by connection to a suitable thermoregulating recirculator.

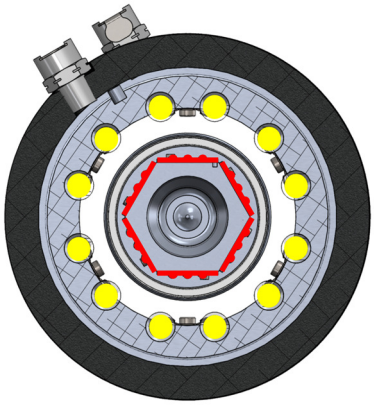
For photochemical reactions performed close to room temperature (15 - 60°C) Uniqsis recommend the Huber Piccolo™. The Piccolo is a compact and portable (16kg) temperature control module that uses solid-state stacked-Peltier cooling technology.

LED cooling: The high-power Borealis LED lamp units require effective liquid cooling. This can be achieved by connection to a cooled flowing water supply, or more conveniently when reactor temperatures close to room temperature are desirable, by connecting in series with the Piccolo recirculator.

All tube reactors are maintained at the same temperature.

Solstice with 120W Borealis LED module inserted

Borealis LED lamp units have a hexagonal central core. Each face of which is fitted with identical, *symmetrically* spaced LEDs (shown in red). This, combined with the geometrical arrangement of the individual tube reactors (shown in yellow) ensures that all tubes are irradiated *equally*. Locating studs ensure that the Borealis LED lamp is always fitted in the same position; thereby ensuring meaningful comparison between different reactions when Solstice is used for optimisation of reaction conditions and catalyst screening.



Solstice symmetrical tube & LED arrangement

SOLSTICE MAXI™ Photoreactor Components	
UQ8214	SOLSTICE™ Parallel Photochemical Batch Reactor Tube Holder, complete including stirrer, 12x 8ml reactor tubes & septa, 12x stir bars & temp. sensor
UQ8214-B	SOLSTICE™ Parallel Photochemical Batch Reactor Tube Holder, BARE
120W Borealis LED Lamps & SCHOLAR PSU	
UQ8204	Borealis LED Lamp Unit, UVA (365nm), **120W**, LED
UQ8222	Borealis LED Lamp Unit, UVA (385nm), **120W**, LED
UQ8223	Borealis LED Lamp Unit, PURPLE (405nm), **120W**, LED
UQ8203	Borealis LED Lamp Unit, BLUE (420nm), **120W**, LED
UQ8202	Borealis LED Lamp Unit, BLUE (455nm), **120W**, LED
UQ8200	Borealis LED Lamp Unit, GREEN (525nm), **120W**, LED
UQ8226-V	Borealis SCHOLAR™ Power Supply, variable intensity, **120W**; 110/230V
180W Borealis LED Lamps & Digital PSU	
UQ8204-HP	Borealis™ HP LED Lamp Unit, UVA (365nm), **180W**, LED
UQ8222-HP	Borealis™ HP LED Lamp Unit, UVA (385nm), **180W**, LED
UQ8223-HP	Borealis™ HP LED Lamp Unit, PURPLE (405nm), **180W**, LED
UQ8203-HP	Borealis™ HP LED Lamp Unit, BLUE (420nm), **180W**, LED
UQ8202-HP	Borealis™ HP LED Lamp Unit, BLUE (455nm), **180W**, LED
UQ8200-HP	Borealis™ HP LED Lamp Unit, GREEN (525nm), **180W**, LED
UQ8206	Borealis™ Digital Power Supply, variable intensity, **180W**; 230/110V

Thin-film Tube Inserts:

Thin-film tube inserts are available for the Solstice. These are manufactured from chemically inert PTFE and have a central hole to allow both the introduction of reagent solutions and the withdrawal of samples for analysis.

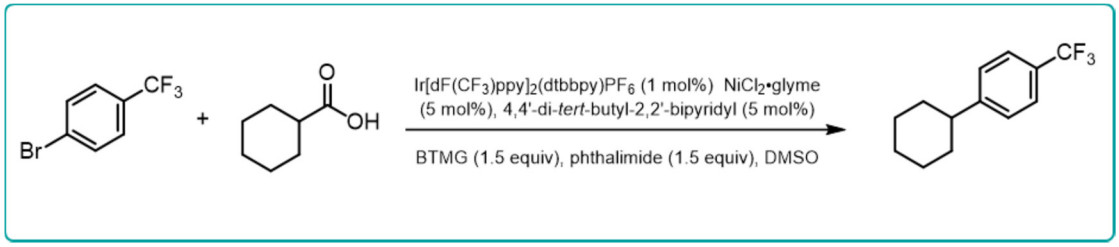
They do not interfere with stirring.

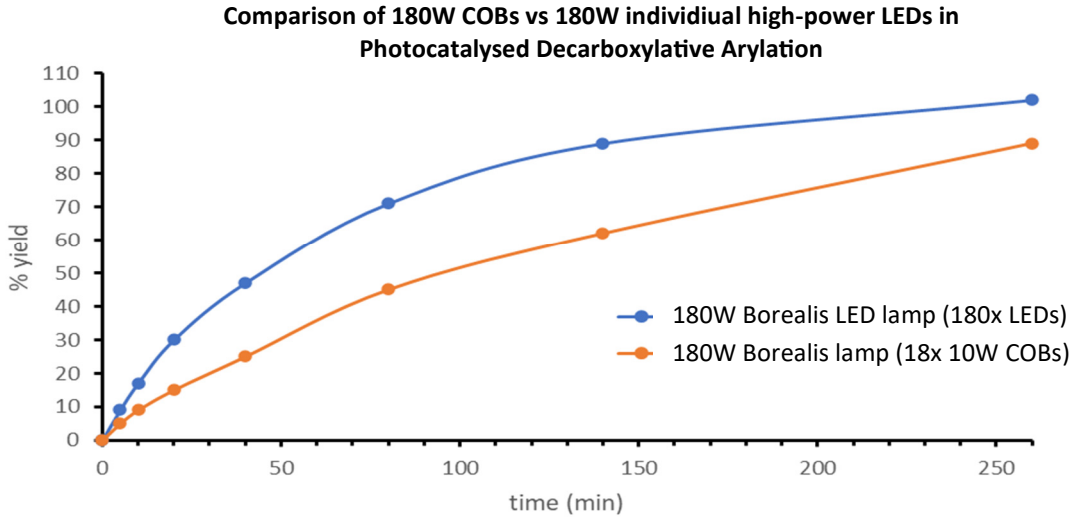
As can be seen in the image opposite, the insert significantly increases the thin-film surface area presented to the lamp.

This helps to improve light absorption Light absorption is improved and the rate of reaction increased.

Solstice reactor tubes with and without Thin-film insert (1.5ml solution volume)

Borealis LED lamps fitted with LEDs vs COBs:





The latest versions of Uniqsis Borealis LED lamps (both 120W and 180W versions) are fitted with individual high-power LEDs, as opposed to COBs ('chip-on-board'). Both versions use the same power supplies.

However, although slightly more expensive, under similar reac on condi ons, the higher efficiency LEDs were found to increase the rate of reac on in a metal-catalysed decarboxyla ve cross-coupling example.