

Oriel® Sol-UV™ Series

UV SOLAR SIMULATORS



- CTFASA/COLIPA/JCIA/CTFA/FDA/ISO Compliant
- Variable Output (10-100%) of max available Solar Constants
- Large area illumination for In-Vivo or In-Vitro SPF testing methods
- Standard output beam sizes: 2"x2", 4"x4" and 6"x6"
Specialty sizes may be available upon request
- Calibration certificate validating compliance from Rapid Precision Testing Laboratories
- Easy lamp replacement
- Non-reflective black finish reduces stray light
- Temperature sensors and interlocks ensure operator safety
- Universal AC mains operation

With over 40 years of experience in building solar simulator products for PV applications, Newport Corporation's Oriel® Sol-UV™ takes solar simulation into demanding applications in photobiology. The Oriel SOL-UV simulators incorporate a patent pending design that allow them to be compliant with FDA CFR Part 201.327, ISO 24444:2010(e) First Edition, and the International SPF Test Method (CTFASA/COLIPA/JCIA/CTFA): May 2006 for Spectral Match. Non-Uniformity of Irradiance is <5% over the entire sampling area. Output power can be varied from 10-100% of the maximum available solar constant with a uniquely, integrated attenuating device. The Oriel Sol UV simulators use a black, non-reflective finish to minimize stray light. Safety interlocks prevent inadvertent exposure to UV light. The Oriel Sol-UV simulators rugged design is backed by the Newport Corporation's world wide organization. These large area UV sources use a xenon lamp and proprietary filter to meet, efficiently and reliably, all performance parameters. The result is a cost-effective system designed for laboratory or production environments – all backed by our global service and support network.

WHICH STANDARDS DOES THE SOL-UV SERIES COMPLY WITH?

FDA: 21 CFR Part 201, Labeling and Effectiveness Testing; Sunscreen Drug Products for Over-the-Counter Human Use. § 201.327(i)(i) SPF test procedure. (1) UV source (solar simulator). (i) Emission spectrum. Federal Register / Vol. 76, No. 117 / Friday, June 17, 2011 / Rules and Regulations page 35661.

ISO: 24444:2010(e), First edition 2010-11-15, Sun protection test methods - In vivo determination of the sun protection factor (SPF), Annex B, Definition of UV solar simulator output. Specifically section B.2.5 Solar simulator and filtration and section B.3.1 UV solar simulator acceptance limits.

COLIPA: International Sun Protection Factor (SPF) Test Method (CTFASA/COLIPA/JCIA/CTFA: May 2006) COLIPA, 223 Rue de la Loi 223/2, Bte 2, B-1040 Brussels, Belgium (www.colipa.com).

Oriel® Sol-UV Series UV Solar Simulators

SPATIAL UNIFORMITY OF IRRADIANCE

The irradiance uniformity over the work area is important to achieve and maintain. Hot spots can lead to errors in delivered MED. The Sol-UV simulators' spatial uniformity performance standard is designed to minimize hot spots and deliver less than 5% non uniformity across the entire work area.

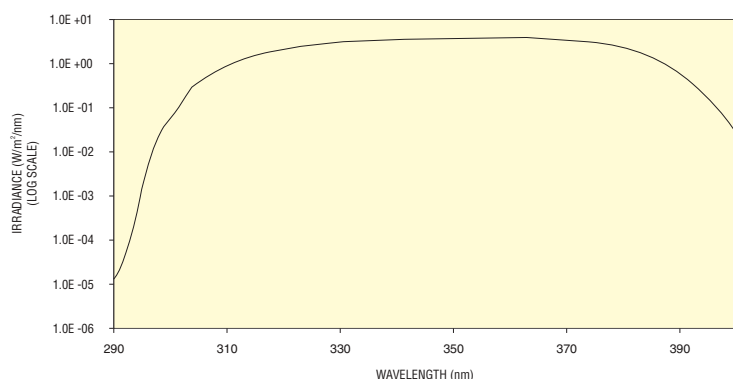
TEMPORAL STABILITY

Temporal stability is also important in minimizing dosage errors. Oriel instrument's experience in designing ultra stable power supplies ensures that the output light is stable over time and that the lamp fluctuations do not impact delivery of the erthema dose desired. The typical drift over 24 hour is less than 2% (Max-Min) / (Max + Min)

Table 1: Sun protection test methods:

In vivo determination of the sun protection factor, ISO 24444:2010

Spectral Range (nm)	Description	Description
	Measured % RCEE* (Lower Limit)	Measured % RCEE (Upper Limit)
<290		<0.1
290-300	1	8
290-310	49.0	65.08
290-320	85.0	90.0
290-330	91.5	95.5
290-340	94.0	97.0
290-400	99.0	100.0
UVA II (320-340)	≥ 20.0	
UVA I (340-400)	≥ 60.0	



Colipa Irradiance Response Curve

* Relative cumulative erythema effectiveness.

ORIEL SOL-UV SIMULATOR KEY COMPONENTS

Illuminator Housing

The Sol-UV housing provides a safe enclosure for the lamp. It is equipped with safety interlock systems to ensure operator and system safety. Fans and filter blowers provide forced air-cooling to maintain optimal lamp, optics, and housing temperature. A lamp hour indicator has also been integrated for easy monitoring of lamp usage.

Integrated Shutter

The Oriel Sol-UV Simulator includes a shutter that is a rugged, single-blade shutter design specified for 1 million cycles. Real-world performance has exceeded 10 million cycles. The shutter has a minimum exposure time of 200 ms and can be controlled via a contact closure or logic level input, or a convenient push-button switch on the illuminator housing.

Xenon Arc Lamp

All Sol-UV model simulators are equipped with an ozone-free Xenon arc lamp with output varied using the integrated variable attenuator aperture which provides the ability to vary the output from 10- 100% of the maximum available solar constants.

The combination of lamp and filters produces the characteristic COLIPA/FDA/ISO compliant output. The filters retain their optical properties through the life of the lamp. Replacement filters are sold separately.

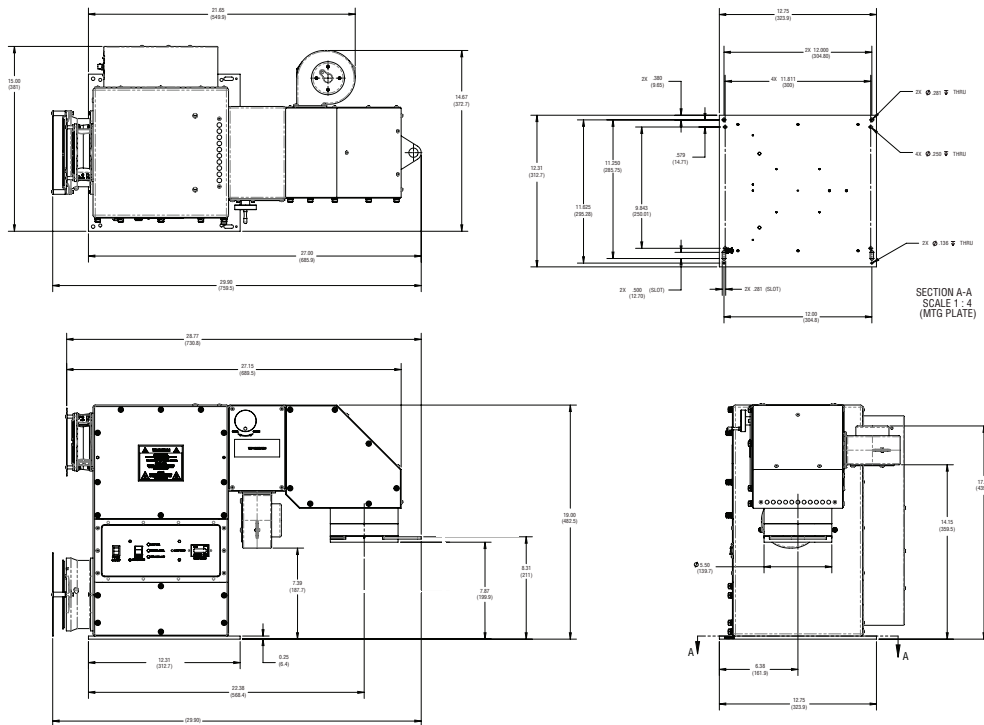
Power Supply

The highly regulated power supply provides constant electrical power to the Xenon lamp. Lamp usage can be monitored in accumulated hours from the power supply. It is important to replace the lamp at the end of its rated life to maintain appropriate spectral match. The lamp's output and spectral match cannot be assured with continued use beyond the specified lifetime (@1000 hours).

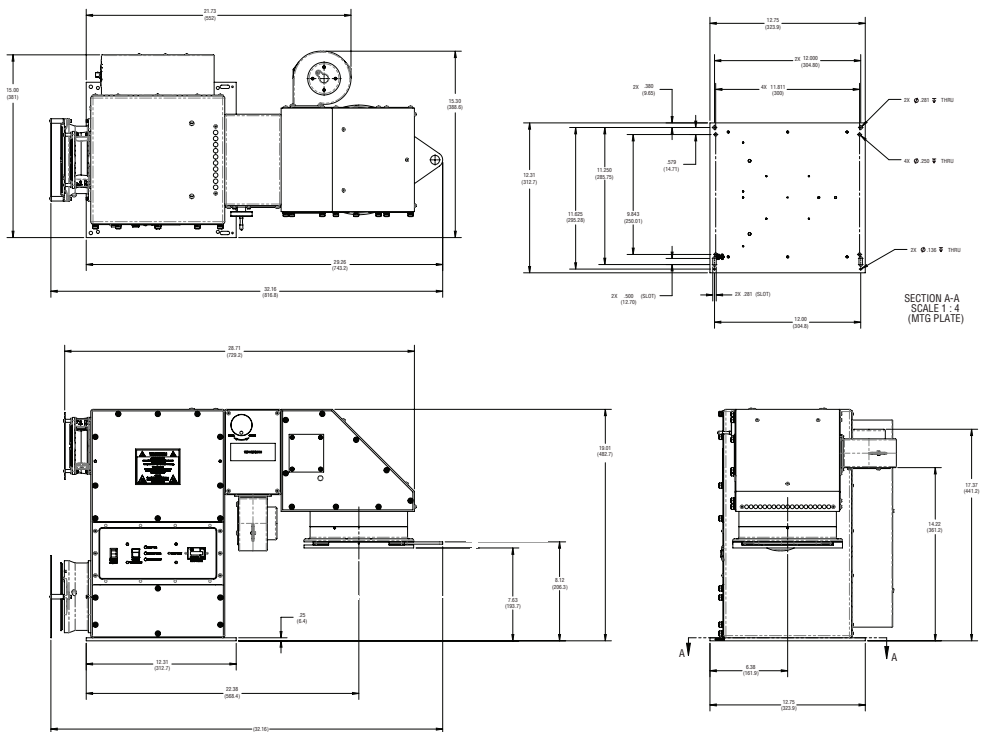
MAINTAINING AN ORIEL SOL-UV SOLAR SIMULATOR

Oriel SOL-UV series maintain compliance during the rated "performance lifetime" of the lamp. For re-certification to CTFASA/COLIPA/SCIA/CTFA/FDA/ISO standards, factory service is required.

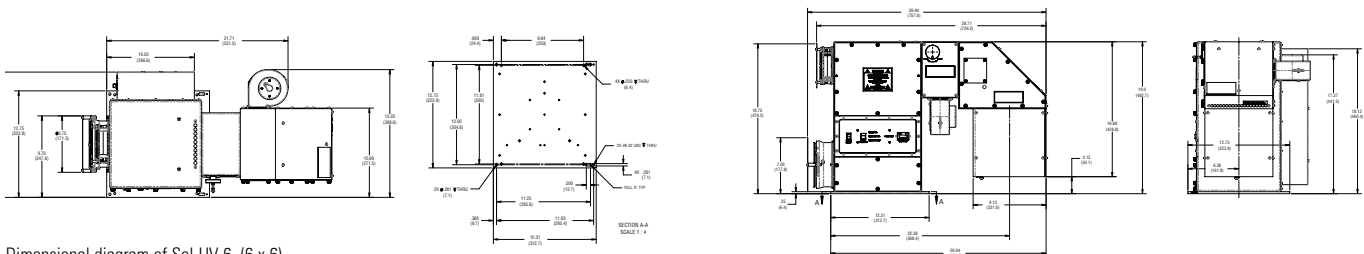
Oriel® Sol-UV Series UV Solar Simulators



Dimensional diagram of Sol-UV-2 (2 x 2)



Dimensional diagram of Sol-UV-4 (4 x 4)



Dimensional diagram of Sol-UV-6 (6 x 6)

Oriel® Sol-UV Series UV Solar Simulators

Specifications

SOL-UV SOLAR SIMULATOR SPECIFICATIONS

Model	SOL-UV-2	SOL-UV-4	SOL-UV-6
Beam Size	2 x 2 (50.8 x 50.8) [in. (mm)]	4 x 4 (101.6 x 101.6) [in. (mm)]	6 x 6 (152.4 x 152.4) [in. (mm)]
Collimation Angle	(half angle) $\leq \pm 4^\circ$	(half angle) $\leq \pm 4^\circ$	(half angle) $\leq \pm 3^\circ$
Uniformity Classification	$< 5\%$ non-uniformity	$< 5\%$ non-uniformity	$< 5\%$ non-uniformity
Spectral Match Classification	FDA CFR Part 201.327, ISO 24444:2010(e), Intl SPF Test Method (CTFASA/COLIPA/JCIA/CTFA: May 2006	FDA CFR Part 201.327, ISO 24444:2010(e), Intl SPF Test Method (CTFASA/COLIPA/JCIA/CTFA: May 2006	FDA CFR Part 201.327, ISO 24444:2010(e), Intl SPF Test Method (CTFASA/COLIPA/JCIA/CTFA: May 2006
Working Distance	4 inches (50mm)	4 inches (50mm)	6 inches (150mm)
Lamp Wattage	1000 Watt	1000 Watt	1600 Watt
Typical time (seconds) to reach SED (Standard Erythema Dose) @ Max output power	40	40	59
Typical Power Output (solar constants)	8	6	4

POWER SUPPLY SPECIFICATIONS

	69920 PS for Sol-UV-2 and Sol-UV-4	69922 PS for Sol-UV-6
Line Regulation	0.01%	0.01%
Power Requirements	95 - 264 VAC	190 - 264 VAC
Input Frequency	47 - 63 Hz	47 - 63 Hz
Input Current	15 A	12 A
Ambient Operating Temperature	0 - 45 °C	0 - 45 °C
Line Regulation	0.01 %	0.01 %
Light Ripple	$< 1\%$ rms	$< 1\%$ rms
Operating Mode	Constant current or constant power	Constant current or constant power
Output Power	350 - 1200 W	800 - 1800 W
Output Current	17.5 - 55 A	25 - 70 A
Weight	20 (9) [lb (kg)]	20 (9) [lb (kg)]

Oriel Lamp Housing is designed to operate in a typical laboratory environment (68 to 76 degrees F, up to 45% relative humidity). Temperature and humidity outside of typical laboratory range can contribute to cooling and ignition faults. Cooling issues will cause the over temperature sensor to open, and ignition problems will result from high humidity. Contact Newport technical representative for more information if operating outside the suggested range.

Ordering Information

ORIEL SOL-UV SOLAR SIMULATORS

Model	Description
SOL-UV-2	Sol-UV-2 Solar Simulator 1000 Watt Xenon, 2 x 2
SOL-UV-4	Sol-UV-4 Solar Simulator 1000 Watt Xenon, 4 x 4
SOL-UV-6	Sol-UV-6 Solar Simulator 1600 Watt Xenon, 6 x 6

* The lamp supply power can be adjusted to maintain spectral requirements throughout the life of the lamp.

Contact a Sales Engineer for pricing of optional accessories.

Note: Please check our product web pages for more technical information at www.newport.com.

REPLACEMENT PARTS AND ACCESSORIES

Model	Description
6272	1000 Watt Xenon, Ozone Free Arc Lamp
62726	1600 Watt Xenon, Ozone Free Arc Lamp
70380NS	Total UV (A&B) Solar UV Meter
70381NS	UVB Solar UV Meter
70382NS	Solar Index Solar UV Meter
70384NS	Eeff/Ery Solar UV Meter
Sol-UV-A-F	UVA Filter for Sol-UV Simulators >320mm
Sol-UV-A-Long-F	UVA Filter for Sol-UV Simulators >360mm
Sol-UV-1A-F	UVA1 Filter for Sol-UV Simulators >340mm



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www.newport.com

Newport Corporation, Irvine, California and Franklin, Massachusetts; Evry and Beaune-la-Rolande, France and Wuxi, China have all been certified compliant with ISO 9001 by the British Standards Institution. Santa Clara, California is DNV certified.

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