HYPERION IV
A NEW CLASS OF LED SOLAR SIMULATORS

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HYPERION IV

Greatcell Energy is proud to introduce its fourth series of innovative solar simulators. HYPERION IV is designed utilising LED light sources without focal lens in a single DOT configuration, all integrated in a revolutionary head together with all the driving electronics. HYPERION IV is now available in two sizes: 20cm*20cm (**HYP20**) and 10cm*10cm (**HYP10**).

Both Hyperion models can work either in Continuous than in PWM mode (up to 100 Hz) and they are equipped with a sync in & out port to synchronise acquisition systems and/or pilot the PWM emission frequency.

The system provides a variable output from below 0.1 up to 1.1 SUN over an illumination area larger than 20 cm by 20 cm at an adjustable working distance of 10 cm for **HYP20** (9 cm for **HYP10** model over an area larger than 10 cm X 10 cm).

Hyperion solar simulators are compliant with the most stringent international standards (ASTM E927-05, IEC 60904-9 2007, and JIS C 8912), in particular it matches A++ A+ A++++ class that is more than twice the accuracy of the IEC standard (A++ A A++++ for **HYP10**).

Enjoy a low consumption simulator you can use with a standard single phase home socket. Experience an extended LED life with the optimised light intensity.

The simulator is a low weight compact design with all the electronics installed in the head to allow an easy integration in any test environment and an effortless machine transportation.

With top-of-the-line wide excursion micrometric art for the most precise control in positioning and an even more precise measurement to use with a wider range of sample holders and devices (optional vertical motorisation available).

DIMENSIONS

- Illumination Head:
  - L 42 cm x W 42 cm x H 20 cm (**HYP20**)
  - L 22 cm x W 22 cm x H 12 cm (**HYP10**)
- Precision Arm illumination head excursion 25cm for **HYP20** (20 cm for **HYP10**)
- Distance from the light source to achieve 1 SUN using default configuration: 10 cm for **HYP20** (9 cm for **HYP10**)

SOFTWARE

Dedicated user friendly Software enables the customisation of the LED matrix emission spectrum starting from default (AM1.5G). The end user can dim the output of a single LED family (the dimming range can vary with different LED types) or the entire spectrum in a 1% step (or multiples thereof). LED matrix is divided in 4 emission zone and Each LED family can be turned off or dimmed independently in each one of the 4 emission zones (2 zones for **HYP10**) to simulate different scenarios (sunrise, dusk, indoor, oblique flux, etc.). Unlike Xenon lamp based solar simulators there is no need for expensive filters to simulate specific spectrum. Personalised
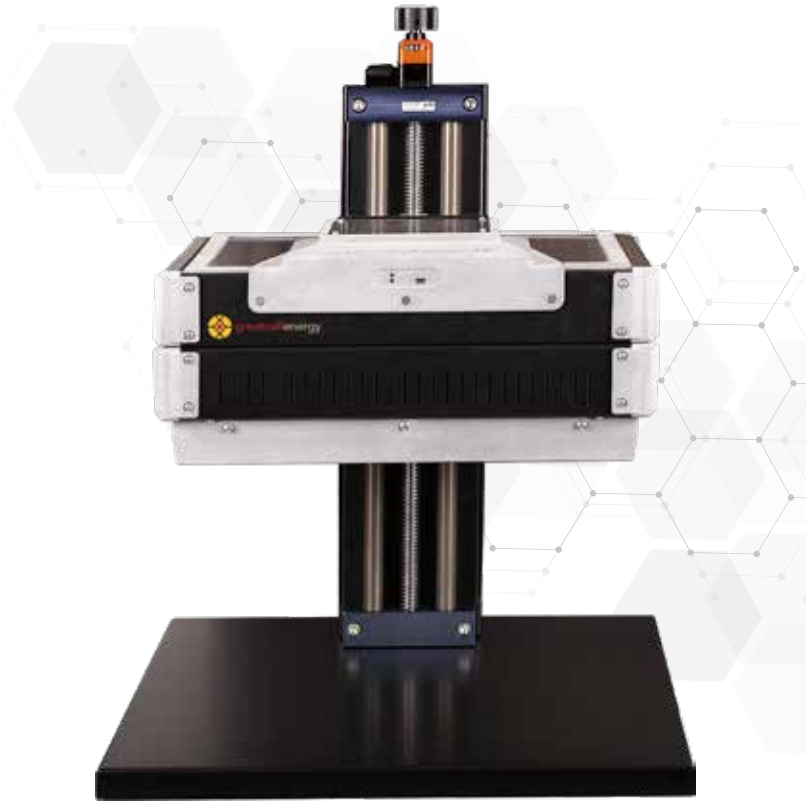
custom spectra can be stored in a repository and then retrieved without any re-alignment or calibration activities.

SOLAR OUTPUT DESCRIPTION:

CLASS A++ A+ A++++

A++ A+ A++++ (more than 2 times the accuracy of A A A class) over an area Larger than 20 cm x 20 cm for **HYP20** (A++ A A++++ over an area larger than 10 cm x 10 cm for **HYP10**)

ENERGY LEVEL	From less than 0.1 SUN up to 1.1 SUN
SPATIAL UNIFORMITY	**HYP20**: Within ±1% on an area larger than 20 cm x 20 cm (Class A+) **HYP10**: Within ±2% on an area larger than 10 cm x 10 cm (Class A)
SPECTRAL MATCH	**HYP20**: Within ±6.5% on an area larger than 20 cm x 20 cm (Class A++) **HYP10**: Within ±6.5% on an area larger than 10 cm x 10 cm (Class A++)
TEMPORAL STABILITY	below ±0.1% (Class A++++)

LAMP SPECIFICATIONS

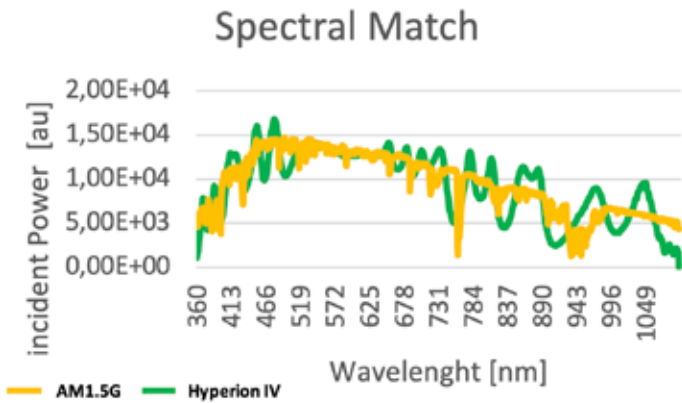| LAMP TYPE WATTAGE	**HYP20**: LED matrix single dot < 450 W **HYP10**: LED matrix single dot < 180 W
LAMP LIFE	> 20,000 hours

POWER SUPPLY SPECIFICATIONS:

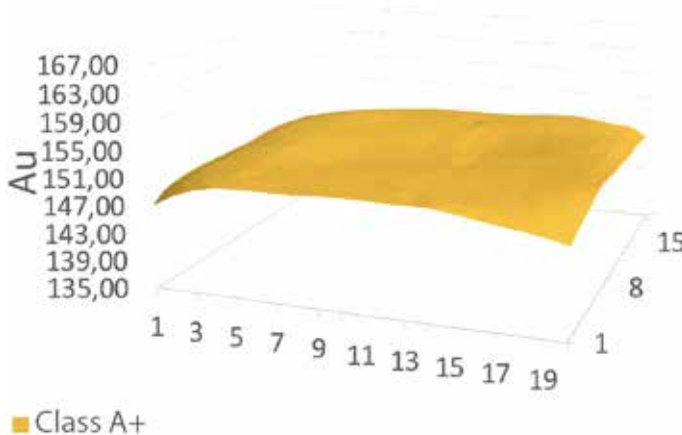| SOURCE	100-260 Vac 50-60Hz
RIPPLE	250mVP-P
RFI/EMI	EN55015 , EN61000-3-2, EN61000-3-3, EN61547,EN55024
LINE REGULATION	+ 0.5%
CURRENT REGULATION	+ 0.5%,
SAFETY	Isolation resistance: 100 Mohm/500vdc 25°C/70% RH
FILTERS:	No filters required to match AIR MASS1.5G (360 nm -1100 nm)

SOLAR SIMULATOR SPECIFICATIONS

SPECTRAL MATCH
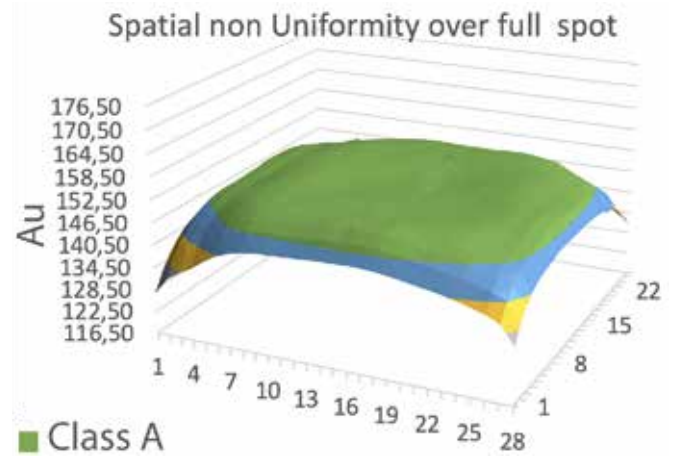
Class A++ spectral performance 360 nm – 1100 nm band

A class over an area larger than 550 cm^2;

TEMPORAL INSTABILITY

Superior Temporal Instability grade, over STI & LTI testing the instability remains within a maximum variation of ±0.1 % with **respect** to the reference value (more than 10 times better than the requirements to be compliant with A+ class).

SPATIAL NON-UNIFORMITY

A+ class (twice the accuracy of the IEC standard) over an area larger than 450 cm^2;
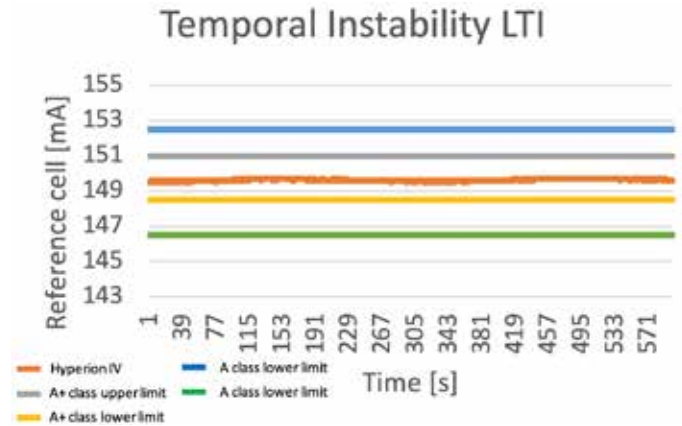
LED MATRIX

HYPERION IV LED Matrix is equipped with 20 LED families to provide a class A++ mapping of the AM1.5G spectrum between 360 nm and 1100 nm. The spectrum can be customised to specific emission bands in the 360 nm – 1100 nm range.

WI-FI MODULE

Operate your solar simulator with a Wi-Fi connection, enjoy the wireless freedom while keeping the immediate machine response for an easier access and management.
No more awkward connecting cables with the freedom to use the simulator where it would be impossible or inconvenient to connect a computer.

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HYPERION IV	SPECIFICATION COMPLIANCE
Type of solar simulator	1. Steady State Continuous 2. Sync TTL 5V up to 100 Hz with trigger output reference signal
Filter	No filter required to match AM1.5 spectrum
Default power output	1000 W/m2 tuneable (from below 0.1 up to 1.1 SUN)
Class (Spectral Match, Spatial non-Uniformity, Temporal Instability)	**HYP20** **A++A+A++++** over an area larger than 450 cm2 A++AA++++ class over an area larger than 550 cm2 A++BA++++ class over an area larger than 600 cm2 **HYP10** **A+A+A+** over an area larger than 25 cm2 A++AA++++ class over an area larger than 100 cm2 A+BA++++ class over an area larger than 144 cm2
International standard	**Complies with TUV Rheinland specification** **Complies with IEC 60904-9-2007, JIS C8912, ASTM E 927-05,**
Min/Max limits of irradiance 400 - 500 nm 500 - 600 nm 600 - 700 nm 700 - 800 nm 800 - 900 nm 900 – 1100 nm	Range A++ Class (Typical value) 17.6% - 19.6% (Typical: 18,6%) 18.7% - 21.4% (Typical: 19.8%) 17.6% - 19.6% (Typical: 18,8%) 14.0% - 15.8% (Typical: 14.2%) 11.8% - 13.3% (Typical: 12,3%) 14.9% - 16,9% (Typical: 16.3%)
Spectral Match Spatial Non-Uniformity Temporal Instability (LTI)	± 6,25 % **HYP20** ± 1 % **HYP10** ± 2 % ± 0,1 %
Type of solar simulator Lamp	LED matrix single dot
LEDs lifetime [h]	>20000
Emission band [nm]	360-1100
Light Emission Angle	Vertical + Oblique
LED Emission Angle	≈ 120°

OPTIONAL

SPECTROMETER

A fibre optically coupled portable instrument for measurements in the 220 nm - 1100nm range can be coupled with HYPERION IV. Its innovative electronics with a high speed 16-bit digitizer allows for fast data acquisition and a signal to noise of 1000:1. It can be powered directly from a PC USB-2 port.

The fibre optic cable or probe assembly delivers its input via a standard SMA 905 fibre optic connector. The spectrograph optics are exceptionally robust in a vibration tolerant modular design, with no moving parts.

An onboard Memory with pre-set calibrations, spectrometer settings and a snap shot memory provides an instantaneous spectral image from the highly sensitive CCD.

WPVS REFERENCE CELL

High efficiency monocrystalline silicon solar reference cells guarantee the most precise and long-term stable certified reference cells available (each of our reference cells is certified by Fraunhofer Institute to guarantee top quality calibration). For different photovoltaic cell technologies and other applications, custom solutions can be provided.

The reference cell is fundamental to check the incident power value at the DUT level and it is an essential piece of equipment if measurements at incident power with values different from 1 SUN are required. The reference cell is equipped with a Pt100 embedded thermocouple to monitor the temperature variation.

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