

Sun 2000 Solar Simulators

Innovative Optical Design

High Optical Efficiency puts more photons to work

Uniform Illumination to 8x8 inch and beyond

Working distances to 48 inches and beyond

Long life lamps

OEM Ready



The “optical engine” of Sun 2000 Solar Simulators

Introducing Sun 2000: The next step in Solar Simulation

Innovative

The Abet Gen II optical design dramatically increases the percentage of photons reaching the work plane.

Standard maintenance, lamp or filter replacement, does not require any tools. Locking indicator dials on all the system controls, located together for ease of alignment, provide for a reproducible setup. A beam imaging accessory makes alignment even faster.

All electronics are packaged in the lamp house – no clutter of high power cables to deal with.

The self-contained optics bench design of the Sun 2000 systems make OEM adaptations a breeze. Just drop it into your instrument and save on the NRE (non recurring engineering) costs.

Adaptable

Abet Technologies offers a number of spectral and field size options to match your application. The Sun 2000 family offerings range from 2x2 to 8x8 inch uniformly illuminated field versions for Photovoltaic and UV applications. The same optical train design also allows production of Hg and HgXe lamps based exposure systems.

Additional filters can be accommodated to fine tune the spectral characteristics of the source for your particular application.

A low profile optical alignment system leaves the space below the system wide open for any material positioning equipment or large samples. Unit mounting options allow from above suspension leaving space below totally free if needed.

Compact, Integrated, Efficient, Safe, Convenient to use and maintain

The entire source, power supply, control electronics, shutter, lamp, and optical compartment are housed in a compact enclosure, approximately 13.75" deep X 23.75" high X 27.5" long (350X600X700 mm). A selection of simple bases allows positioning the various models at their design working distances. The Sun 2000 design produces a well balanced unit which is usually used free standing. It can also be suspended from above, and the base removed, for applications requiring more space around the illuminated work plane.



S2000-6 Solar Simulator with universal inch/metric compatible base

Gen II Optical System – more than 2x throughput improvement

The high efficiency illumination homogenizer is housed in the optical compartment which also contains a securely mounted Xe arc lamp, a light collection reflector, an electronic shutter, a condenser lens, optics cooling fan, precision optics adjusters, as well as filters, dichroics, mirrors, apertures, and attenuators needed to produce the desired spectral shape, uniformity and irradiance level.

Replacing the long life Xe arc lamp is a no tools required operation. Focusing the lamp does not expose the operator to any unsafe light levels (the exception possibly being the usual high irradiance level in the work plane).

All of the optical compartment adjustments are conveniently located on the rear of the source enclosure. They are equipped with lockable indicator dials that provide positive feedback on alignment status and assure stable operation once aligned.

Clean Cooling

Any dust or dirt particles introduced into an optical system can degrade system performance and shorten the life of critical optical components. Sun 2000 sources utilize a HEPA filtered cooling fan to extend the life of the delicate optical components.

Extra Stability Option

Sun 2000 systems equipped with the digital power and shutter controls option also allow addition of the photofeedback option. This option incorporates a light detector housed in the optical compartment which monitors the irradiance being delivered to the work plane. As the lamp or optical components age, and received signal diminishes, an electronic feedback loop automatically adjusts lamp wattage to assure a constant level of irradiation to the work plane.

Self Contained Electronics

The electronics compartment houses all the required power supplies, the electronics cooling fan, the shutter driver electronics, the digital controls (or the Elapsed Time Meter for preset operating point systems) and the system interlocks.

Having the complete source in a single enclosure assures that any EMI generated during ignition is contained inside the housing. It also eliminates the need for costly shielded cables and connectors.

Safety

Thermal interlocks shut the power supplies down in case of a fan failure to prevent damage that system overheating can cause. Door interlocks shut the lamp power down to prevent user exposure to hazardous voltage, current or radiation if the system door is accidentally opened during system operation.

Specifications

Abet Technologies produces too many models of Sun 2000 Solar Simulators to fully describe in this summary information sheet. A typical system performance is presented below based on one of the available models:

S2000-6 with an AM 1.5G filter

| | |
|-------------------------|----------|
| Illuminated field | 6x6 inch |
| Irradiance (typ.) | 1.3 suns |
| Irradiance uniformity | ~ 5% |
| ASTM 927-91 | Class B |
| IEC 904-9 | Class B |
| AM 1.5G spectral match | |
| ASTM 927-91 | Class A |
| IEC 904-9 | Class A |
| Temporal stability | 1% RMS |
| ASTM 927-91 | Class A |
| IEC 904-9 | Class A |
| Xe Arc Lamp, ozone free | 550 W |
| Typical life | 1500 Hrs |

Standards

Abet Technologies strives to meet customers' requirements for Solar Simulator performance, including standards compliance. Please let our sales department know which standard is critical to your application and if you require any certifications. Sun 2000 systems can be configured to meet the requirements of standards like ASTM 927-91, IEC 904-9, JIS C 8912, COLIPA and many others.

General Specifications

| | |
|---|--------------------------------------|
| Irradiance uniformity | ~ 5% or better |
| Nominal working distance | 8 inches |
| Irradiance uniformity stays well behaved for long distances, e.g. to 48 inch for a 6x6 system | |
| Standard systems illuminate | Horizontal surfaces |
| Optional straight output systems | Vertical surfaces |
| Electronic shutter | Included |
| Integrated power supply, power factor corrected, 1% RMS (typ.) light ripple | 90 / 250 V, 50-60 Hz universal input |
| HEPA filtered cooling fan | |
| Ozone free Xe arc lamp | |
| Elapsed time meter | |
| Optional digital controls module allows lamp power and shutter timing controls. | |
| Optional built in photofeedback system (for systems with digital controls option). | |

OEM systems

The single frame mounted integrated Sun 2000 optical engine has been designed with easy OEM integration in mind.

A power supply can be attached to the same frame or located elsewhere in the system. Accessible and lockable alignment controls produce stable performance.

High optical throughput design, more than two times that of older designs, produces a high level irradiance from moderately sized lamps lowering electrical costs, lamp replacement costs and heat load on the total system.

Ordering Information:

Please order the full spectrum or UV version by illuminated field size and then add any options like digital controls, photofeedback, filters, spare lamps and accessories.

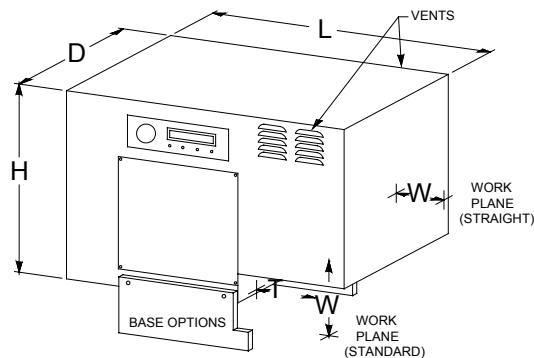
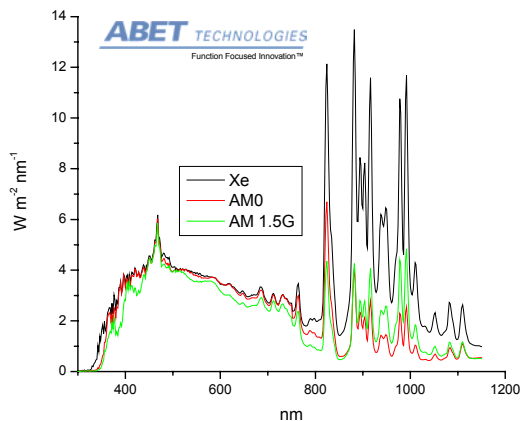
Full spectrum systems ship normally with a borosilicate condenser lens to minimize UV exposure. UV systems ship with a UV fused silica condenser lens. If UV output is required from the full spectrum simulator fused silica condensers can be substituted.

An atmospheric absorption filter is used to provide UV edge match to the terrestrial solar spectrum. Many other filter options available – please ask your sales representative for information on items you need.

| | |
|----------|--|
| S2000-4 | Full spectrum 4x4 inch solar simulator |
| S2000-6 | Full spectrum 6x6 inch solar simulator |
| S2000-8 | Full spectrum 8x8 inch solar simulator |
| S2000U-4 | UV 4x4 inch solar simulator |
| S2000U-6 | UV 6x6 inch solar simulator |
| S2000U-8 | UV 8x8 inch solar simulator |
| AM0 | Filter |
| AM1.5G | Filter |
| ATM | Atmospheric absorption filter |
| C2000 | COLIPA grade UV filter |
| D2000 | Digital controls option |
| P2000 | Photofeedback option |
| Xe 550 | Replacement lamp |
| A(XX) | Attenuator (XX% transmission) |

Please inquire about the Sun 2000 optics train based Hg and HgXe lamps UV exposure systems.





Irradiance of a S2000-6 full spectrum Solar Simulator, with a borosilicate glass condenser lens, with and without spectral shaping filters

Dimensional schematic of a Sun 2000 system

Typical values

Manufacturer reserves the right to modify the designs

Please consult your sales representative for specific dimensions of models you are interested in

| Nominal Field size | Nominal Working distance | Working distance (closest) | Working distance (farthest) | Divergence full angle (typ) | Nominal Working distance straight out |
|--------------------|--------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------------------|
|--------------------|--------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------------------|

Metric

| | | | | | |
|---------|-----|----|------|-----|-----------------|
| 50x50 | 20 | 0 | 50 | 8.1 | Consult factory |
| 100x100 | 100 | 0 | 1500 | 4.5 | 160 |
| 150x150 | 200 | 50 | 2000 | 3.4 | 200 |
| 200x200 | 200 | 50 | 2500 | 2.8 | 200 |
| 250x250 | 150 | 50 | 3000 | 2.3 | 150 |

English

| | | | | | |
|-------|-------|-------|---------|-----|-----------------|
| 2x2 | 0.787 | 0.000 | 1.969 | 8.1 | Consult factory |
| 4x4 | 3.937 | 0.000 | 59.055 | 4.5 | 160.0 |
| 6x6 | 7.874 | 1.969 | 78.740 | 3.4 | 200.0 |
| 8x8 | 7.874 | 1.969 | 98.425 | 2.8 | 200.0 |
| 10x10 | 5.906 | 1.969 | 118.110 | 2.3 | 150.0 |

Dimensions

| H | D | L | W | T | Straight out | |
|-----|-----|-----|-----|-----|-----------------|-----|
| | | | | | L | W |
| 600 | 300 | 700 | 20 | 100 | Consult factory | |
| 600 | 300 | 700 | 100 | 141 | 700 | 160 |
| 600 | 300 | 700 | 200 | 141 | 760 | 200 |
| 680 | 300 | 700 | 200 | 141 | 892 | 200 |
| 840 | 400 | 750 | 150 | 225 | 1105 | 150 |

Dimensions

| H | D | L | W | T | Straight out | |
|------|------|------|-----|-----|-----------------|-----|
| | | | | | L | W |
| 23.6 | 11.8 | 27.6 | 0.8 | 3.9 | Consult factory | |
| 23.6 | 11.8 | 27.6 | 3.9 | 5.6 | 27.6 | 6.3 |
| 23.6 | 11.8 | 27.6 | 7.9 | 5.6 | 29.9 | 7.9 |
| 26.8 | 11.8 | 27.6 | 7.9 | 5.6 | 35.1 | 7.9 |
| 33.1 | 15.7 | 29.5 | 5.9 | 8.9 | 43.5 | 5.9 |