

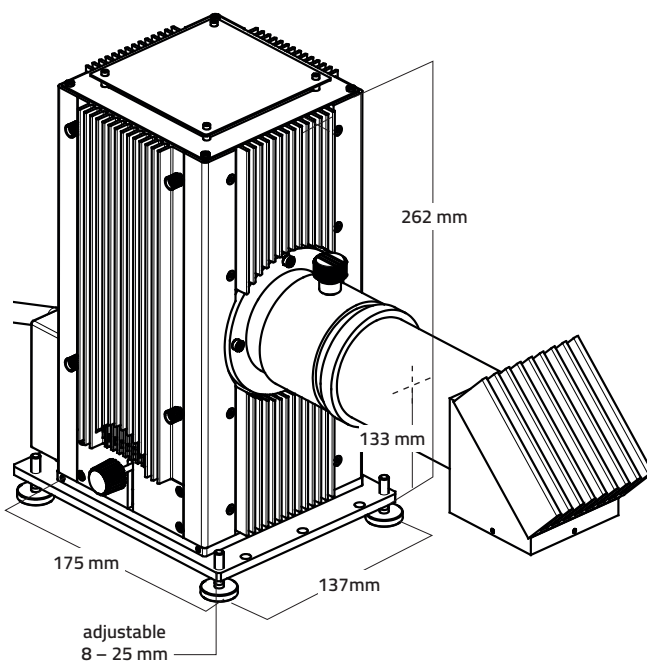
# Solar simulator

## 25 mm diameter field

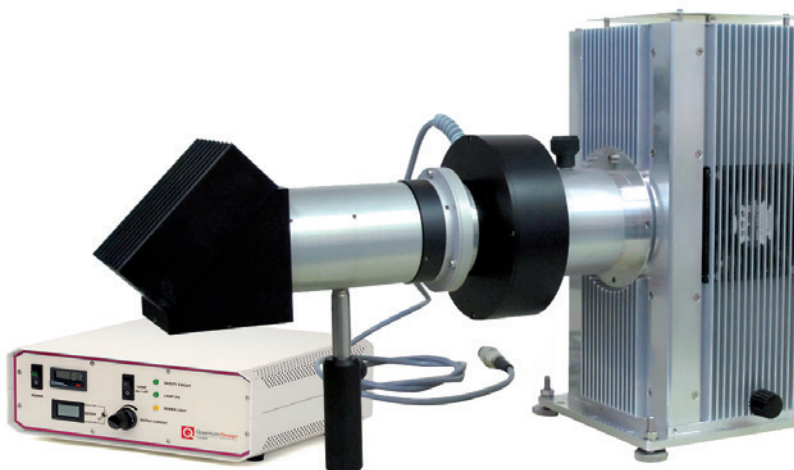
- 1 sun ( $1000 \text{ W/m}^2$ ) irradiance
- 25 mm diameter uniform field
- Compact size
- Optional manual or electronic shutter
- $90^\circ$  beam turner,  $360^\circ$  rotatable for beam output upwards, downwards and horizontally

This solar simulator is a low-cost alternative to the fully-featured and more expensive solar simulators, whenever only a small illuminated field is required. The optical system of this source produces a uniform, collimated output beam with a diameter of 25 mm.

The system is designed to produce output power equivalent to 1 sun ( $1000 \text{ W/m}^2$ ). This full spectrum system comes with a  $90^\circ$  beam turner and Al-mirror. The beam turner can be rotated  $360^\circ$  around the optical axis to produce a horizontal or vertical beam. The recommended working distance is 160 mm from the end of the optical system. The optical system includes a closed filter holder for mounting the AM1,5G air mass filter that meets IEC class A specifications. For your convenience, all optics in the optical system are fixed, so no optical adjustments are necessary.



Dimensions solar simulator 25 mm diameter field



Solar simulator 25 mm diameter field with optional electronic shutter and power supply

### Housing and lamp

The lamp housing is a free standing unit that contains the arc lamp, arc lamp ignitor, collecting and collimating optics, external lamp adjusters and required electronics. The ignitor is built into the housing, minimizing stray radiated and conducted EMI. The lamp is a high pressure 150 W xenon short arc lamp. It is ozone-free and has a negligible output below 260 nm.

### Power supply

The highly regulated power supply provides constant current to the xenon lamp. The current is adjustable to maintain constant light output.

### Spectral match

No solar simulator matches the spectrum of the Sun exactly, and the simulator's spectrum changes with the age of the lamp. The terrestrial solar spectrum itself varies with solar altitude and atmospheric constituents. The Xe lamp spectrum must be filtered to match standard air mass spectra. However, air mass filters are only an approximation of an average of atmospheric conditions.

Care should be taken to measure the beam power in the primary spectral regions of interest in order to reduce the effects of this mismatch. For solar cell applications, it is best to use a calibrated solar reference cell of the same general type as the test cell being used. Thus, the measurement is made with a sensor that has essentially the same spectral response as the test cell. This allows for variation in spectral output of the source without significant error in the results.

# Solar simulator

## 25 mm diameter field

### Accessories

By adding filters to the optical path a great variety of spectral output shapings become possible. We offer open and closed filter holders which directly mount into the solar simulator beam path.

### Shutter

Optionally the solar simulator can be equipped with either a manual or electronic shutter integrated into the optical beam path. The shutter closes off the beam and especially prevents organic cells from heating. The electronic shutter with driver has an open/close switch on the front panel and a TTL input (via BNC), that can be used to control the shutter from another source. Optional software allows for external control via USB and includes a development kit with C++, VB and LabView code examples.

### Reference cell

The solar simulator output varies. Lamp power is decreasing over its lifetime (typically 20%). Therefore, the system is designed to reach one sun (1000 W/m<sup>2</sup>) at the end of lamp lifetime, respectively the starting current for a new lamp is 20% lower than the rated current, which allows compensation. In addition, the beam is never perfectly collimated and the irradiance varies slightly with distance. With our calibrated reference cell LS0042, the simulator can be set to 1 sun in the working plane. With the integrated shunt, the reading is in mV and suitable for any handheld digital multimeter.

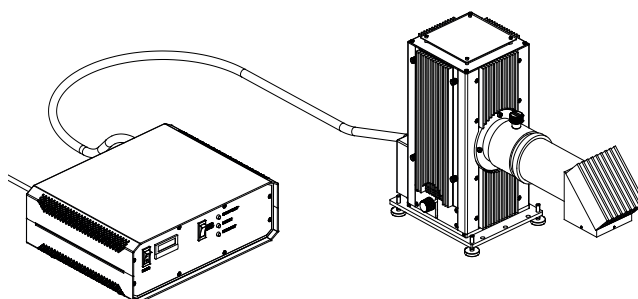
### Safety

Our solar simulators emit dangerous levels of UV radiation harmful to the eyes and skin. Personnel working near the source should wear UV protective goggles and avoid direct exposure of the output beam to the skin!

Learn more about UV safety: "[Ultraviolet safety considerations](#)".

Specification solar simulator	
Illumination field	25 mm diameter
Irradiance uniformity	± 10%
Working distance	160 mm (recommended)
Irradiance	1 sun (min.) @ working distance
Spectral match	AM1,5 G, IEC 60904-9, class A
Temporal stability	1% RMS, typ.
Lamp type	Xenon short arc, 150 W, ozone free, average life: 900 h
Input	90 - 250 VAC, 48 - 63 Hz

Ordering information	
The LS106 solar simulator <b>includes</b> everything needed for proper operation (lamp housing, power supply, lamp, cables and adapters).	
Part number	Description
LS0106	Full spectrum solar simulator, AM1,5G filter, 90° beam turner, 25 mm illuminated area
Shutter (optional)	
LSZ158	Manual shutter, condenser Ø 25/35 mm
LSZ166	Electronic shutter with driver, condenser Ø 25/35 mm
LSZ165	Shutter control software and USB relais with modi: manual - count down - interval switching and software development kit (C++, VB, LabView)
LS0042 (optional)	Si reference cell
LSB521	Replacement lamp, 150 W Xenon, ozone free



Solar simulator 25 mm diameter field with power supply