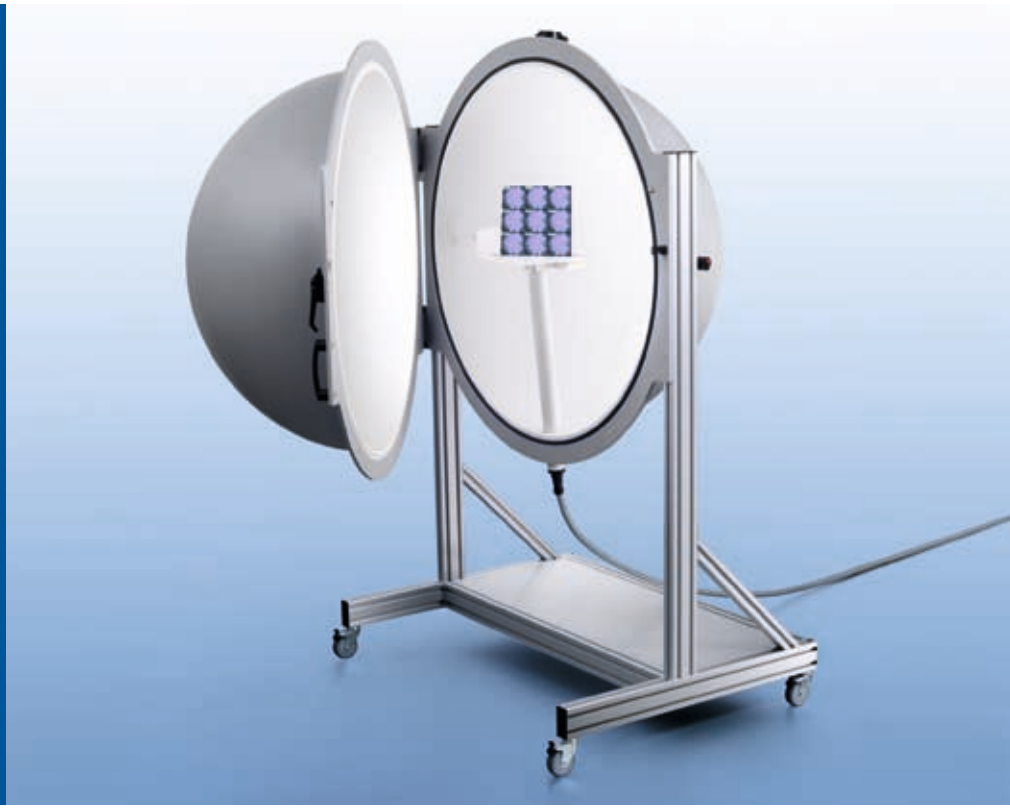
ISP 1000

Integrating Sphere for measuring radiant power and luminous flux

Product highlights

- Measurement of total radiant power and total luminous flux of high-power LEDs, LED modules, and lamps
- Robust sample stage for mounting LED modules and SSL products
- Lamp post for measuring light sources positioned in an upright or suspended configuration
- 300 mm measurement port for launching light radiation from outside
- Auxiliary lamp to compensate for self-absorption



The ISP 1000 has been designed with a diameter of one meter specifically for taking precise measurements of radiant power and luminous flux of the larger and more powerful light sources used for solid-state lighting applications and for lamps in general. Two geometries are defined according to the type of test specimen and the test data required: In the 4π configuration[1], the samples are mounted inside the sphere, while in the 2π configuration[2] the light radiation is launched from outside through a port in the side of the sphere wall.

The innovative design of the ISP 1000 minimizes interference from baffles and ports and therefore permits more accurate measurements. The interior surface of the sphere is coated with barium sulfate ($BaSO_4$) and has a reflectance of approximately 97%. The light radiation is guided through a detector port and an optical fiber to the spectrometer. All spectrometers supplied by Instrument Systems can be linked to the sphere. The ISP 1000 has a strong aluminum frame fitted with castors and can be opened completely.

[1] Light radiation is emitted in all directions
[2] Light radiation is only emitted forward (one hemisphere)

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light measurement

Sample stage

ISP1000 opened with lamp post suspended

Adapter for E27 socket

Sample stage

The internal sample stage is ideal for taking precise measurements of large LED modules. The platform of the sample stage measuring 200 x 200 mm is height-adjustable. This allows the test sample to be precisely positioned at the center of the sphere. The M5 threads at 50 mm centers provide secure fixing for the specimen in the desired position. Power supply and data control for the specimen is delivered conveniently through a 16-pole terminal strip.

Lamp post

The universal lamp post is available for traditional measurement of total luminous flux of lamps in 4π configuration. It comprises a base body with plug-in adapters for different types of LEDs and lamps, e.g. 5 mm type T 1¾ LEDs, as well as type G4/GX5.3/G6.35 halogen lamps, and lamps with E27 or E14 socket. This allows fittings in the sphere to be changed fast and cost-effectively. The lamp post can also be positioned in an upright or suspended configuration in order to conform with the required burning position of the lamp.

300 mm measurement port

A side port with 300 mm diameter allows luminous flux to be measured without opening the sphere. An innovative design feature has been implemented for this configuration: Baffles or ports have been eliminated from the hemisphere opposite the measurement port to prevent interference and improve measuring accuracy. However, this configuration is only suitable for light sources with forward radiation only.

Since the radiation is launched into the sphere from the outside, the test specimens can be changed quickly. Moreover, the heat dissipated from light sources is kept out of the sphere and the interior remains free of contaminants. This makes the side port of the sphere particularly ideal for testing high-power LED modules and light engines for solid-state lighting applications.

A universal mounting flange with thread inserts is located at the 300 mm measurement port in order to facilitate configuration of different test specimens. A range of adapter plates is also supplied, e.g. for the LED-850 high-power LED test fixture with TEC temperature control. The adapter plate has a strong mechanical base with clamp jaws to ensure reliable positioning of the LED-850 test fixture.

300 mm measurement port

Adapter plate with LED-850

Calibration

The internal lamp post with the adapter for halogen lamps is necessary for spectral and absolute calibration of the ISP 1000. Instrument Systems also supplies a 50 W calibration lamp and precision power supply for customers who want to carry out their own recalibrations. This allows on-site calibrations without having to transport the sphere.

50 W halogen lamp at the lamp post

Auxiliary lamp

Interference from baffles and sample holders that could compromise the measurement results were kept to a minimum when the ISP 1000 was designed. However, the influence exerted by the specimen itself needs to be taken into account. The radiation emitted by the specimen is reflected a number of times at the interior surface of the sphere and bounces back indirectly on the surface of the specimen. Particularly large and dark test specimens absorb a considerable amount of light. Since the ISP 1000 has been designed for measuring larger lamps and modules, this effect known as self-absorption can change the measuring result significantly.

The ISP 1000 is equipped with an auxiliary lamp to compensate for this phenomenon. The auxiliary lamp allows the spectral absorption characteristics of the specimen to be determined and the actual measurement to be corrected by the absorption spectrum. A 50 W halogen lamp featuring a convenient connection to an external power supply is used as an auxiliary lamp in the ISP 1000. The power supply should be very stable, similar to the PS 120 from Instrument Systems, in order to ensure reliable operation of the auxiliary lamp.

Auxiliary lamp

Temperature sensor

The ISP 1000 has a PT 100 temperature sensor which projects from the top of the sphere into the interior. It allows the temperature in the sphere to be measured and heat dissipated from the light source to be assessed. Any measuring instrument with a PT 100 input can be connected to the temperature sensor from the outside.

Temperature sensor

Data and technical specifications

	ISP1000-100
Internal diameter	1000 mm
Coating	Barium sulfate ($BaSO_4$)
Spectral range	240 – 2600 nm
Diameter of the measurement port	300 mm
Connection to the spectrometer	Fiber bundle
External dimensions (W, D, H), closed	1200 x 1025 x 1790 mm
External dimensions (W, D, H), 90° open	1665 x 1710 x 1790 mm
External dimensions (W, D, H), 180° open	2350 x 845 x 1790 mm
Power supply for the auxiliary lamp	12 V / 50 W
Weight	approx. 76 kg

Ordering information

Order number	Description
ISP 1000 Integrating Sphere	
ISP1000-100	Integrating sphere with 1 m diameter; for measurement of luminous flux and radiant power at lamps, LEDs and LED modules. ↗ Hinges for opening and closing the sphere ↗ Barium sulfate coating ↗ Measurement port with 300 mm diameter for mounting the test specimen outside the sphere; port can be closed ↗ Auxiliary lamp and temperature sensor ↗ Adapter for fiber bundle (without fiber bundle)
ISP1000-124	ISP 1000 complete system consisting of ISP1000-100, ISP1000-300, ISP1000-400, OFG-444 and PLG-420
Options	
ISP1000-211	Adapter for the 300 mm measurement port; including flange for LED test sockets with 25 mm diameter
ISP1000-220	Adapter for the 300 mm measuring port; including flange for LED test sockets with 50 mm diameter
ISP1000-300	Internal lamp post for mounting the test specimen in the center of the sphere; suspended or upright position possible; including ISP1000-305 adapter for halogen lamp types G4/GX5.3/G6.35
ISP1000-305	Adapter for halogen lamp types G4/GX5.3/G6.35; for mounting on the internal lamp post ISP1000-300
ISP1000-310	Adapter for 3 mm T1 and 5 mm T1 ¾ LEDs with 2.54 mm leads; for mounting on the internal lamp post ISP1000-300
ISP1000-320	Adapter for lamps with E27 socket; for mounting on the internal lamp post ISP1000-300
ISP1000-321	Adapter for lamps with E14 socket; for mounting on the internal lamp post ISP1000-300
ISP1000-400	Height-adjustable sample stage (200 x 200 mm) for mounting larger test specimens inside the sphere; including 16-pole terminal strip for electrical connection
PS-120	Highly stabilized compact power supply 0-30 V, 0-10 A for the auxiliary lamp

Instrument Systems
light measurement

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