

Integrating Spheres

Integrating spheres generally function as a light collector. The collected light can be used as a diffuse illumination source or as a measurement source. In the Avantes line of integrating spheres the spheres are mostly used as measurement source. The basic principle of operation is that light enters the integrating sphere through the sample port, goes through multiple reflections and is scattered uniformly around the interior of the sphere. The detection fiber optics are SMA-coupled to the port at the side of the sphere which is viewing illumination on a baffle, independent of the angular properties of the light at the sample port. The baffle prevents first reflections to enter the detection fiber.

The AvaSphere integrating sphere family can be delivered with an active diameter of 30, 50 or 80 mm and an SMA port at 90 degrees for irradiance and reflection measurements. The reflection sphere has an additional SMA- connector port at 8 degrees, for direct illumination, coupling the light into the sphere through a fiber and a COL-UV/VIS collimating lens, connected to a light source. The AvaSphere-30 has a sample port diameter of 6 mm, the AvaSphere-50 10 mm and 15 mm for the 80 mm diameter sphere.

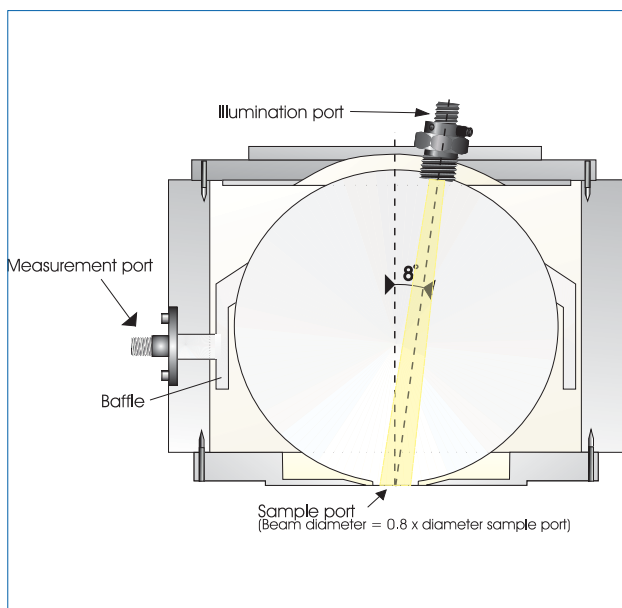
All sample ports are knife-edge, this ensures 180 degree field of view of the sample port. The irradiance version of the integrating sphere can be used to measure light sources (Laser, LED, and Halogen Lamps). For the irradiance measurements of LED's a special adapter was developed to be connected to the AvaSphere-50/80-IRRAD. The adapter can hold 3, 5 and 8 mm LED's in the correct and reproducible position inside the sphere.

AvaSpheres 30-REFL and 50-REFL

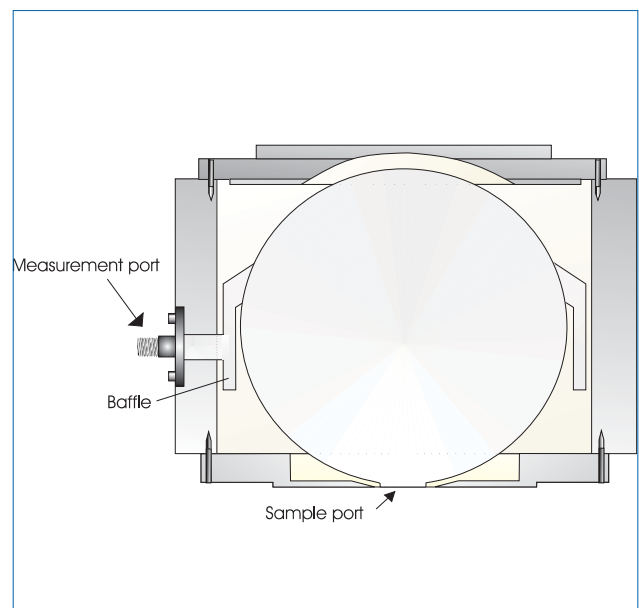


The reflection version is used to measure total integrated reflectance of a surface, as well as for color measurement and fluorescence spectroscopy. The measurement principle is based on direct illumination and indirect reflection. A light source may be connected to the 8 degree SMA-connector port through a fiber optic bundle to make the integrating sphere an ideal uniform light source. The inside of the integrating sphere is made out of highly reflective diffuse material; that gives a light diffuse reflection (>96 %) over a wide wavelength range (250-2500 nm). A special black gloss-trap is available for the AvaSphere-50-REFL reflection sphere to exclude specular reflection in the measurement. This option needs to be ordered together with the sphere. In case specular reflection needs to be included, a white reflective part can be mounted in the position of the gloss trap.

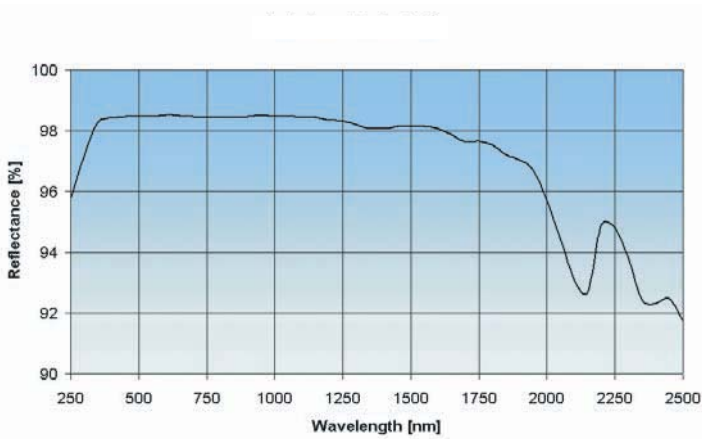
Reflection integrating sphere



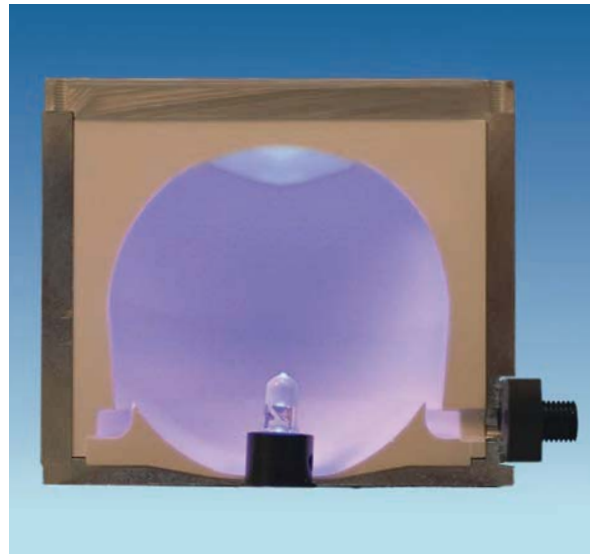
Irradiance integrating sphere



Reflection curve AvaSphere



LED measurement



Technical Data

	AvaSphere-30	AvaSphere-50	AvaSphere-80
Internal diameter (mm)	30	50	80
Sample port diameter (mm)	6	10	15
External Dimensions	59.5 mm diameter 40 mm height	69.5 mm diameter 60 mm height	109 mm diameter 95 mm height

ORDERING INFORMATION

AvaSphere-30-IRRAD	Integrat. Sphere 30mm for light measurements (250-2500nm), Sampleport 6 mm
AvaSphere-50-IRRAD	Integrat. Sphere 50mm for light measurements (250-2500nm), Sampleport 10 mm
AvaSphere-80-IRRAD	Integrat. Sphere 80mm for light measurements (250-2500nm), Sampleport 15 mm
AvaSphere-30-REFL	Integrat. Sphere 30mm for reflection (250-2500nm), Sampleport 6 mm , 2 SMA port
AvaSphere-50-REFL	Integrat. Sphere 50mm for reflection (250-2500nm), Sampleport 10 mm , 2 SMA port including AvaSphere-GT50-W
AvaSphere-80-REFL	Integrat. Sphere 80mm for reflection (250-2500nm), Sampleport 15 mm , 2 SMA port
AvaSphere-LED-ADR	Cylindrical Adapter to hold 3, 5, 8 mm LED's inside the AvaSphere-50-IRRAD
AvaSphere-LED-ADR-80	Cylindrical Adapter to hold 3, 5, 8 mm LED's inside the AvaSphere-80-IRRAD
AvaSphere-GT50	Optional Gloss Trap for AvaSphere-50-REFL, coated with black absorbing material. Only in combination with AvaSphere-50-REFL.
AvaSphere-GT50-W	Gloss Trap coated with white material to include specular reflection. Standard included in AvaSphere-50-REFL.
AvaSphere-50-HOLD	WS-2 Tile holder for AvaSphere-50-REFL

Integrating Sphere with internal halogen light source

The AvaSphere-50-LS-HAL is the ideal combination of an integrating sphere with an internal halogen light source.

The integrating sphere can be used for reflection measurements with diffuse halogen light as illumination and a direct collimated SMA measurement port for reflection signal sampling to connect to the AvaSpec spectrometers.

The advantage of the internal halogen light source is a factor of 160 times more light on the sample than with an integrating sphere and external fiber coupled light source and is therefore mostly suitable for dark, low reflecting materials and NIR spectral measurements.

The AvaSphere-50-LS-HAL is also very well suitable to measure gemstones, see application section of this catalog for a complete setup.

AvaSphere-50-LS-HAL



The AvaSphere-50-LS-HAL has an internal diameter of 50 mm, a sample port of 10 mm and an SMA terminated reference port. The 5W halogen lamp is stabilized and cooled with forced airflow. It comes with a 24V/1.25A power supply.

Technical Data

Wavelength range	360-2500nm
Internal diameter	50 mm
Sample port diameter	10 mm
Color temperature	2700 K
Stability/Drift	< 0.1% / hrs
Bulb life	4.000 hrs
Power requirement	24VDC, 280mA
External Dimensions	70 mm diameter, 75 mm height

ORDERING INFORMATION

AvaSphere-50-LS-HAL	Integrating sphere 50 mm for reflection(360-2500nm), including 5W halogen lightsource, sample port 10 mm diam., 2 SMA ports (reflection and reference) and 24V power supply.
AvaLight-DH-B	Replacement 5W halogen bulb for AvaSphere-50-LS-HAL
AvaSphere-50-HOLD	WS-2-GEM Tile holder for AvaSphere-50-LS-HAL for gemology applications



Large Integrating Spheres

AvaSphere-100 and 150

NEW



For applications where larger size diameters of integrating spheres are required Avantes now offers a range of Barium Sulfate coated spheres with internal diameters of 100, 150, 200 and 300mm. The 100, 150 and 200 spheres come standard with 3 ports, at 0 degrees, 90 degrees, and North Pole (NP). One of these ports is fitted with a baffled SMA 905 connector. The other 2 ports can be used for illumination or as sample ports. The default port size is ca 25% of the sphere's diameter. Port plugs or port reducers are available on request.

AvaSphere-300

NEW



The AvaSphere-300 has three ports and is a sphere that can be opened (two hemispheres) to place a lamp to be measured inside.

All spheres can be offered as irradiance calibrated spheres to measure the total flux of a lamp under test.

Technical Data

	AvaSphere-100	AvaSphere-150	AvaSphere-200	AvaSphere-300
Wavelength range	400-1100nm			
Internal diameter	102 mm	152 mm	203 mm	305 mm
Port diameters	25.4 mm	38.1 mm	50.8 mm	76.2 mm
Port Reducers	10 mm			n.a.
External Dimensions	118 mm	168 mm	218 mm	317 mm

ORDERING INFORMATION

AvaSphere-100	Integrating Sphere, 100mm, 3 ports (0,90,NP), 1baffled SMA port, incl. Postmount
AvaSphere-100-SMA	Additional SMA port for the AvaSphere-100
AvaSphere-100-PR10	Port reducer for the AvaSphere-100 to 10 mm
AvaSphere-100-PP	Port plug for unused ports for the AvaSphere-100
AvaSphere-150	Integrating Sphere, 150mm, 3 ports (0,90,NP), 1baffled SMA port, incl. Postmount
AvaSphere-150-SMA	Additional SMA port for the AvaSphere-150
AvaSphere-150-PR10	Port reducer for the AvaSphere-150 to 10 mm
AvaSphere-150-PP	Port plug for unused ports for the AvaSphere-150
AvaSphere-200	Integrating Sphere, 200mm, 3 ports (0,90,NP), 1baffled SMA port, incl. Postmount
AvaSphere-200-SMA	Additional SMA port for the AvaSphere-200
AvaSphere-200-PR10	Port reducer for the AvaSphere-200 to 10 mm
AvaSphere-200-PP	Port plug for unused ports for the AvaSphere-200
AvaSphere-300	Integrating Sphere, 300mm, opens, 3 ports (0,90,NP), 1baffled SMA port, incl. Mount and port plug
AvaSphere-300-SMA	Additional SMA port for the AvaSphere-300