Instrument Systems
KONICA MINOLTA Group

PTFE Integrating Spheres

UV Measurement for Laboratory and Production

We bring quality to light.

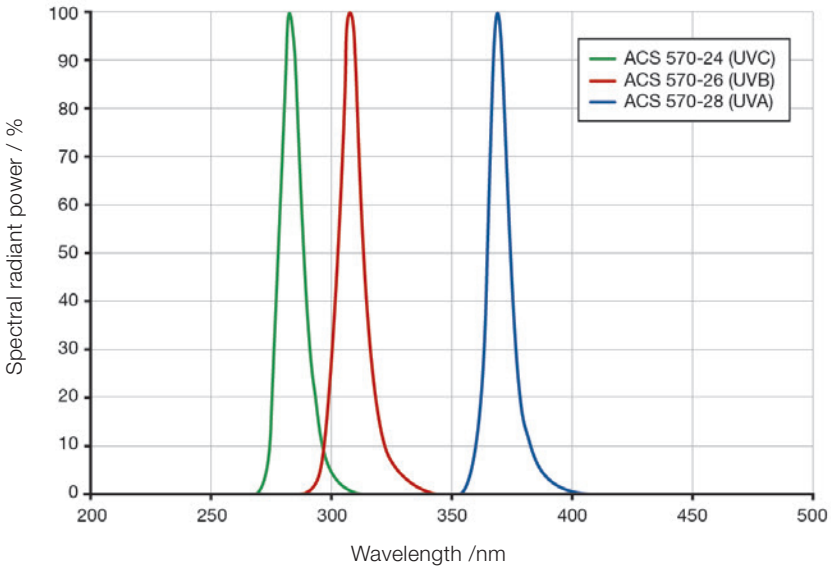
Key features at a glance

- Complete UV measurement solutions
- High sensitivity measurements for UV radiation from 200 nm
- Integrating spheres suitable up to 2500 nm (IR)
- New PTFE material with permanently negligible fluorescence
- PTB traceable calibration

01 \\ Solutions for UV-A/B/C measurement

Instrument Systems offers complete measurement solutions for UV-A, -B and -C radiation starting from 200 nm. The operation of the proven Instrument Systems spectroradiometers, e.g. CAS series, with integrating spheres made of PTFE (Polytetrafluoroethylene), facilitate high sensitivity measurements of UV radiant flux. The absolute values can be audited and monitored with the UV-LED calibration standards ACS-570-2x.

The PTFE integrating spheres of the new generation have a black surface in order to minimize reflexions. They provide better mechanical stability and optical quality of the PTFE material. Improved optical quality of the PTFE material results in permantly negligible fluorescence.

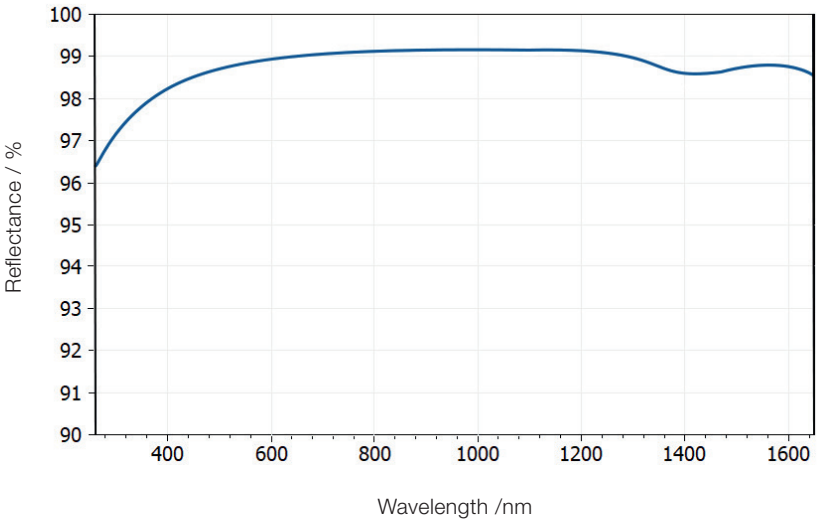


Normalized spectra of UV-LED calibration standards with peak wavelengths at 280, 305 and 365 nm measured with CAS 140D and PTFE integrating spheres at Instrument Systems.

02 \\ High Throughput and Sensitivity for UV

Instrument Systems' integrating spheres for UV measurements of radiant flux use Polytetrafluoroethylene (PTFE) as a reflective material. PTFE is highly reflective in the UV spectral range down to 200 nm and provides increased temperature stability up to 150 °C. It therefore allows high throughput, even for challenging UV-B and UV-C emitters down to 200 nm where other reflective materials, such as barium sulfate ($BaSO_4$), have a very low throughput.

The combined use of Instrument Systems PTFE integrating spheres and high-end CAS array spectroradiometers permits high sensitivity measurements with high dynamic measuring range in the entire UV spectral region.

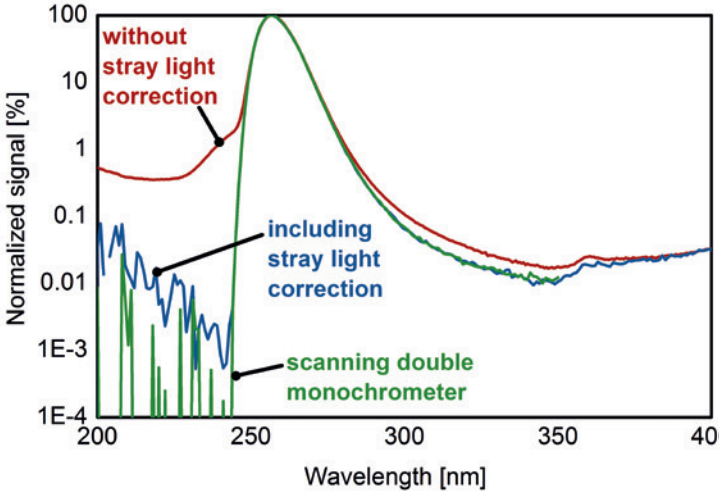


Reflectance of the PTFE material is very high over a broad wavelength range.

03 \\ PTB Traceability and Stray Light Correction

All Instrument Systems UV measurement solutions with PTFE integrating spheres are delivered with PTB traceable calibration.

In addition to the very low stray light design of the CAS spectrographs, state-of-the-art numerical stray light correction is optionally available for CAS spectroradiometers. This routine achieves very low noise and high measurement accuracy down to 200 nm, which additionally facilitates high accuracy measurements in the UV spectral range.



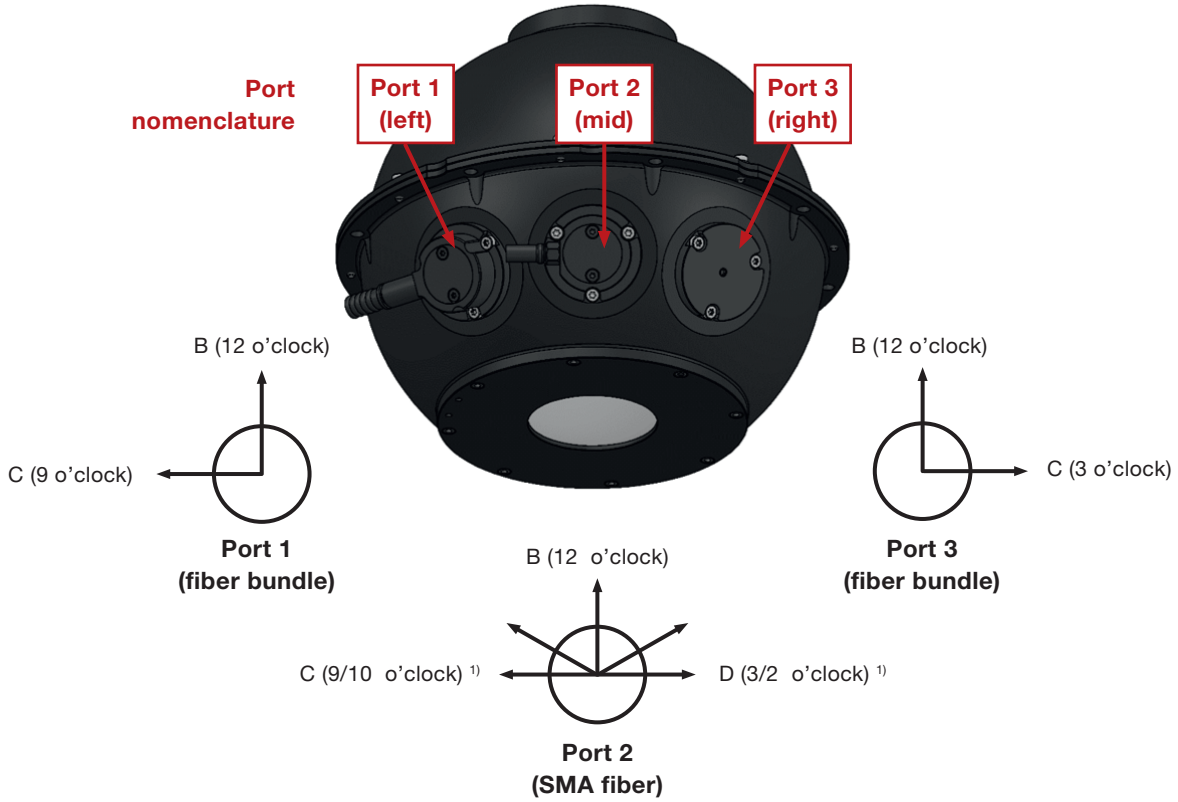
Numerical stray light correction applied to a 260 nm UV LED spectrum measured with CAS 140D. Stray light is significantly suppressed to a level close to a scanning double monochromator.

04 \\ Flexible optical Ports and Equipment Design

The Instrument Systems PTFE integrating spheres (sizes 75 mm to 250 mm inner diameter) are provided with three customizable adapter ports. They can be equipped individually with a fiber bundle adapter on ports 1 and 3 (see image below) for an Instrument Systems spectroradiometer, or an SMA fiber adapter on port 2 (see image below) for an auxiliary light source (e.g. Instrument Systems' LS 500, combined deuterium and halogen lamp to cover entire spectral range, for self absorption correction). Positioning of all ports on one sphere side away from equator improves measurement accuracy. The adapters can be aligned either perpendicular (12 o'clock position) or parallel (3 [1] or 9 [1] o'clock position) to the measuring plane as desired. The customer has an assortment of measurement port accessories at his disposal to suit all respective applications in laboratory and production. Flat protective windows and protective domes prevent contamination in the integrating sphere [2] and can be expanded with adapter plates for a variety of LED test sockets.

The ISP 50-PTFE is equipped with a quartz protective window and one connector for fiber bundle as standard. It provides high optical throughput for fast production testing.

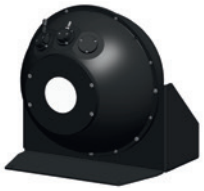
Port nomenclatuture for PTFE spheres with sizes 75 mm to 250 mm:



For PTFE ISPs with size 75 mm to 150 mm, the fiber bundle and SMA adapters can be oriented either perpendicular (12 o'clock position) or parallel (9 or 3 o'clock) to the measuring plane as displayed above. For the ISP 250-PTFE SMA adapter, 10 and 2 o'clock are available in addition to the perpendicular orientation (12 o'clock).

[1] For the SMA port of ISP 250-PTFE, 2 and 10 0'clock is available (instead of 3 and 9).
[2] For PTFE integrating spheres, it is strongly recommended to use either a protective window or dome to avoid contamination.

05 \\ Technical specifications

Model	ISP 50-PTFE	ISP 75-PTFE [3]	ISP 100-PTFE	ISP 150-PTFE	ISP 250-PTFE
Integrating sphere main unit					
Inner diameter	50 mm	75 mm	100 mm	150 mm	250 mm
Usable wavelength	200 - 2500 nm	200 - 2500 nm	200 - 2500 nm	200 - 2500 nm	200 - 2500 nm
Application	Production (e.g. wafer probing, chip testing)	Production (e.g. wafer probing, chip testing)	Production (e.g. wafer probing, chip testing)	Laboratory and production (e.g. single- / multi-chip testing)	Laboratory and production (e.g. multi-die / - chip testing)
Fiber bundle/SMA fiber ports					
Possible rotations* See explanatory graphic, page 4	-	**Port 1** (fiber bundle adapter): 12 or 9 o'clock **Port 2** (SMA connector): 12, 9 or 3 o'clock **Port 3** (fiber bundle adapter): 12 or 3 o'clock	**Port 1** (fiber bundle adapter): 12 or 9 o'clock **Port 2** (SMA connector): 12, 9 or 3 o'clock **Port 3** (fiber bundle adapter): 12 or 3 o'clock	**Port 1** (fiber bundle adapter): 12 or 9 o'clock **Port 2** (SMA connector): 12, 9 or 3 o'clock **Port 3** (fiber bundle adapter): 12 or 3 o'clock	**Port 1** (fiber bundle adapter): 12 or 9 o'clock **Port 2** (SMA connector): 12, 10 [1] or 2 [1] o'clock **Port 3** (fiber bundle adapter): 12 or 3 o'clock
Entrance port adapters					
Protective flat window (front side view)	Always included				
Port diameter	15 mm	25 mm	33 mm	50 mm	72 mm / 45 mm
Protective dome (back side view)	-				
Port diameter		20 mm	26 mm	45 mm	45 mm
LED adapter plate for LED test sockets with 25 mm diameter including protective dome and aperture set					
Port diameter		Without aperture: 25 mm With aperture: 7, 10, 15, 20 mm [3]	Without aperture: 25 mm With aperture: 7, 10, 15, 20 mm	Without aperture: 25 mm With aperture: 7, 10, 15, 20 mm	Without aperture: 25 mm With aperture: 7, 10, 15, 20 mm
Base					
Base		Optional 	Optional 	Optional 	Always included 

[3] Note: Use of ACS-570-24 (~280 nm) and ACS-570-26 (~305 nm) not possible with the ISP75PTFE.

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06 \\ Ordering information

Order number	Description				
Integrating spheres					
ISP50PTFE-100	Integrating sphere with 50 mm internal diameter; PTFE reflection material; measurement port with 15 mm diam., with protective quartz window; incl. connector for fiber bundle				
ISP75PTFE- [port 1][port 2][port 3] [measuring port] [base]	**[port 1] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position	**[port 2] – SMA connector** [A] no fiber bundle adapter [B] 12 o'clwock position [C] 9 o'clock position [D] 3 o'clock position	**[port 3] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 3 o'clock position	**[measuring port]** [A] open version of the measuring port, 25 mm diameter [B] protective window, 25 mm diameter [C] protective dome, 20 mm diameter	**[base]** [A] without base [B] with base
ISP100PTFE- [port 1][port 2][port 3] [measuring port] [base]	**[port 1] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position	**[port 2] – SMA connector** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position [D] 3 o'clock position	**[port 3] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 3 o'clock position	**[measuring port]** [A] open version of the measuring port, 33 mm diameter [B] protective window, 33 mm diameter [C] protective dome, 26 mm diameter	**[base]** [A] without base [B] with base
[ISP150PTFE- [port 1][port 2][port 3] [measuring port] [base]	**[port 1] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position	**[port 2] – SMA connector** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position [D] 3 o'clock position	**[port 3] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 3 o'clock position	**[measuring port]** [A] open version of the measuring port, 50 mm diameter [B] protective window, 50 mm diameter [C] protective dome, 45 mm diameter	**[base]** [A] without base [B] with base
ISP250PTFE- [port 1][port 2][port 3] [measuring port]	**[port 1] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 9 o'clock position	**[port 2] – SMA connector** [1] [A] no fiber bundle adapter [B] 12 o'clock position [C] 10 o'clock position [1] [D] 2 o'clock position [1]	**[port 3] – fiber bundle** [A] no fiber bundle adapter [B] 12 o'clock position [C] 3 o'clock position	**[measuring port]** [A] open version of the measuring port, 72 mm diameter [B] open version of the measuring port, 45 mm diameter [C] protective window, 72 mm diameter [D] protective window, 45 mm diameter [E] protective dome, 45 mm diameter	**Base always included**
Integrating sphere accessories					
ISP75PTFE-140	Protective window for measurement port of ISP75PTFE; quartz window, 25 mm diam.				
ISP75PTFE-143	Protective dome for measurement port of ISP75PTFE; quartz dome; 20 mm diam.				
ISP75PTFE-211 [3]	Adapter plate for LED test sockets with 25 mm diameter for measurement port of ISP75PTFE; incl. baffles with 7, 10, 15 and 20 mm; for version w/ or w/o protective window or dome				
ISP75PTFE-901	Base for ISP75PTFE				
ISP100PTFE-140	Protective window for measurement port of ISP100PTFE; quartz window, 33 mm diam.				
ISP100PTFE-143	Protective dome for measurement port of ISP100PTFE; quartz dome; 26 mm diam.				
ISP100PTFE-211	Adapter plate for LED test sockets with 25 mm diameter for measurement port of ISP100PTFE; incl. baffles with 7, 10, 15 and 20 mm; for version w/ or w/o protective window or dome				
ISP100PTFE-901	Base for ISP100PTFE				

Integrating sphere accessories	
ISP150PTFE-140	Protective window for measurement port of ISP150PTFE; quartz window, 50 mm diam.
ISP150PTFE-143	Protective dome for measurement port of ISP150PTFE; quartz dome; 45 mm diam.
ISP150PTFE-211	Adapter plate for LED test sockets with 25 mm diameter for measurement port of ISP150PTFE; incl. baffles with 7, 10, 15 and 20 mm; for version w/ or w/o protective window or dome
ISP150PTFE-901	Base for ISP150PTFE
ISP250PTFE-140	Protective window for measurement port of ISP250PTFE; quartz window, 72 mm diam.; incl. PTFE Inlay
ISP250PTFE-141	Protective window for measurement port of ISP250PTFE; quartz window, 45 mm diam.; incl. PTFE Inlay
ISP250PTFE-143	Protective dome for measurement port of ISP250PTFE; quartz dome; 45 mm diam.; incl. PTFE Inlay
ISP250PTFE-145	Adapter for open version of ISP250PTFE measuring port; diameter 72 mm; incl. PTFE inlay
ISP250PTFE-146	Adapter for open version of ISP250PTFE measuring port; diameter 45 mm; incl. PTFE inlay
ISP250PTFE-211	Adapter plate for LED test sockets with 25 mm diameter for measurement port of ISP250PTFE; incl. baffles with 7, 10, 15 and 20 mm; for open version of ISP250PTFE with 45 mm measuring port diameter or protective window/dome with 45 mm diameter
Fibers, connectors, auxiliary light source	
OFG-424	Fiber bundle; 1.5 mm diameter; 2 m length; quartz; spectral range 190 to 1350 nm
PLG-422	Fiber bundle adapter optimized for NON-VIS; spectral range 190 to 3200 nm; supports accessary recognition with CAS 140D
LS500-110	Dual light source with tungsten 20 W halogen lamp and 26 W deuterium lamp; incl. power supply; SMA connector; spectral range 210 to 1700 nm
OFG-323	Optical fiber guide with SMA plug; 1000 µm diameter; 2 m length; quartz; spectral range 190 to 1350 nm; e.g. for connection of LS500-110
Calibrations and stray light correction	
CAL-141	Factory calibration of luminous flux for integrating spheres from Instrument Systems up to 1000 mm diameter (absolute value with standard LED at the measurement port of the sphere); wavelength range UV and VIS/NIR; with final test and test certificate according to DIN EN ISO 17025
CAL-145	Factory calibration of integrating spheres to irradiance with conversion to luminous flux/radiant flux; wavelength range UV and VIS/NIR; with final test and test certificate according to DIN EN ISO 17025
CAL-191	Spectral factory calibration of the UV density filters; spectral range UV/VIS/NIR
CAL-195	Creation of stray light correction matrix for CAS140CT/CTS/D; accessory calibration separately

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