PerkinElmer
LAMBDA 850+/1050+

Accessory Brochure

The LAMBDA High Performance Spectrophotometer Series

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THE LAMBDA HIGH PERFORMANCE SPECTROPHOTOMETER SERIES

The PerkinElmer LAMBDA™ High-Performance Series, featuring the LAMBDA 850+ UV/Vis and LAMBDA 1050+ UV/Vis/NIR spectrophotometers, delivers precision and reliability for even the most demanding applications. Engineered for exceptional performance, LAMBDA 850+/1050+ set the standard for accuracy, sensitivity, and versatility in spectroscopic analysis.

The LAMBDA series of research-grade spectrophotometers are the most widely used instruments in peer-reviewed studies, with more publications citing them than any other.

Renowned for their unrivalled performance across the UV, Visible, and Near-Infrared regions, these spectrophotometers are the top choice for researchers requiring the highest performance for samples measured in a variety of ordinate modes.

As well as performance, flexibility is a key feature of the LAMBDA series instruments, with a second sampling area opening up a world of possibilities for detectors, integrating spheres, optical benches and more.

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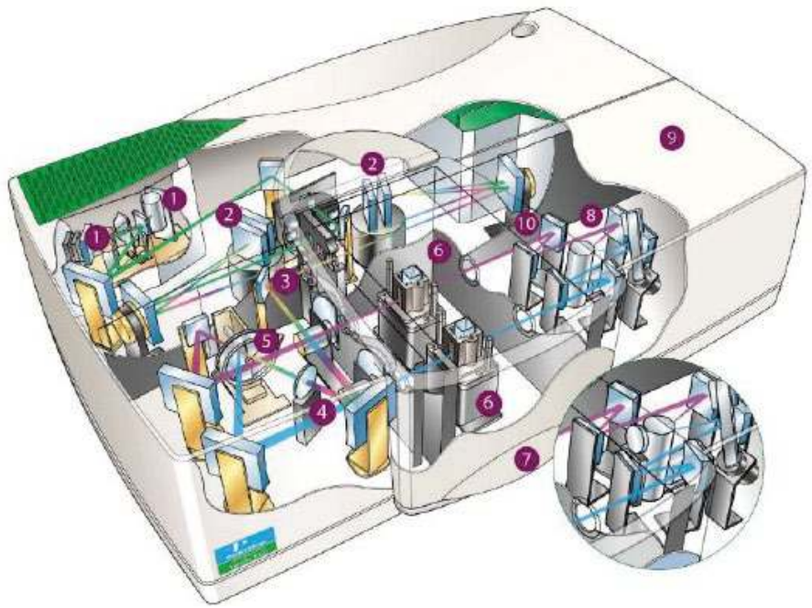
DIAGRAM OF THE LAMBDA **HIGH PERFORMANCE SYSTEMS**

1. **Deuterium & Tungsten Halogen Light Sources**
   Prealigned and prefocused for quick replacement and maximum uptime. Source doubling mirror (1050+ only) for ultrahigh sensitivity
2. **Double Holographic Grating Monochromators**
   Ultra-low stray light
3. **Common Beam Mask**
   Precise adjustment of beam height to match samples of different dimensions
4. **Common Beam Depolarizer (Optional)**
   Corrects for inherent instrument polarization to allow accurate s- and p- polarized measurements
5. **Chopper**
   Four-segment design provides individual blank readings for sample and reference, increasing sensitivity
6. **Sample and Reference Beam Attenuators**
   Allows for extremely sensitive and accurate measurements of highly absorbing samples
7. **Large Sample Compartment**
   Easy access to a wide variety of sampling accessories and sample types
8. **High Sensitivity PMT/PbS (2D) and PMT/InGaAs/PbS (3D) Detector Modules (1050+ Only)**
   Best-in-class sensitivity and signal-to-noise ratio across the full UV/Vis/NIR range, from 175-3300 nm
9. **Second Sampling Area**
   Housing a range of snap-in sampling modules including detector modules (shown), integrating spheres and automated accessories



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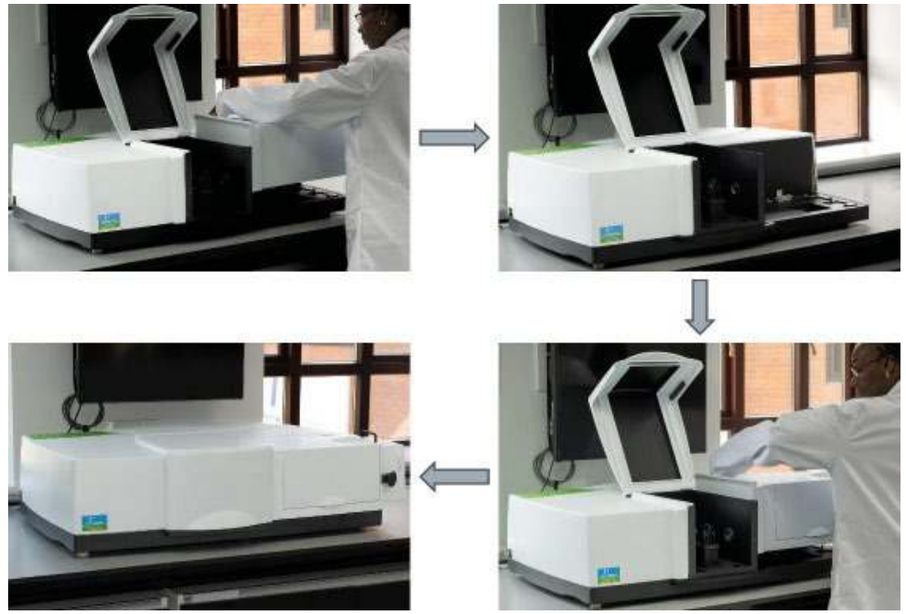
HIGH PERFORMANCE **VERSATILITY**

The LAMBDA series of high-performance UV/Vis & UV/Vis/NIR spectrophotometers provides the most convenient and flexible approach to sampling of any system on the market with dual sampling compartments. The primary sampling compartment is used for a range of standard cuvette measurements, it can also accommodate transmittance and reflectance accessories as well as polarizers. The second sampling compartment is able to house a wide variety of detector modules including standard detector modules, integrating spheres, universal reflectance accessory (URA) total absolute measurement system (TAMS) and many more, offering the ability to fulfil an unmatched variety of applications.



Seamless switching between plug-and-play accessories offering unparalleled flexibility.

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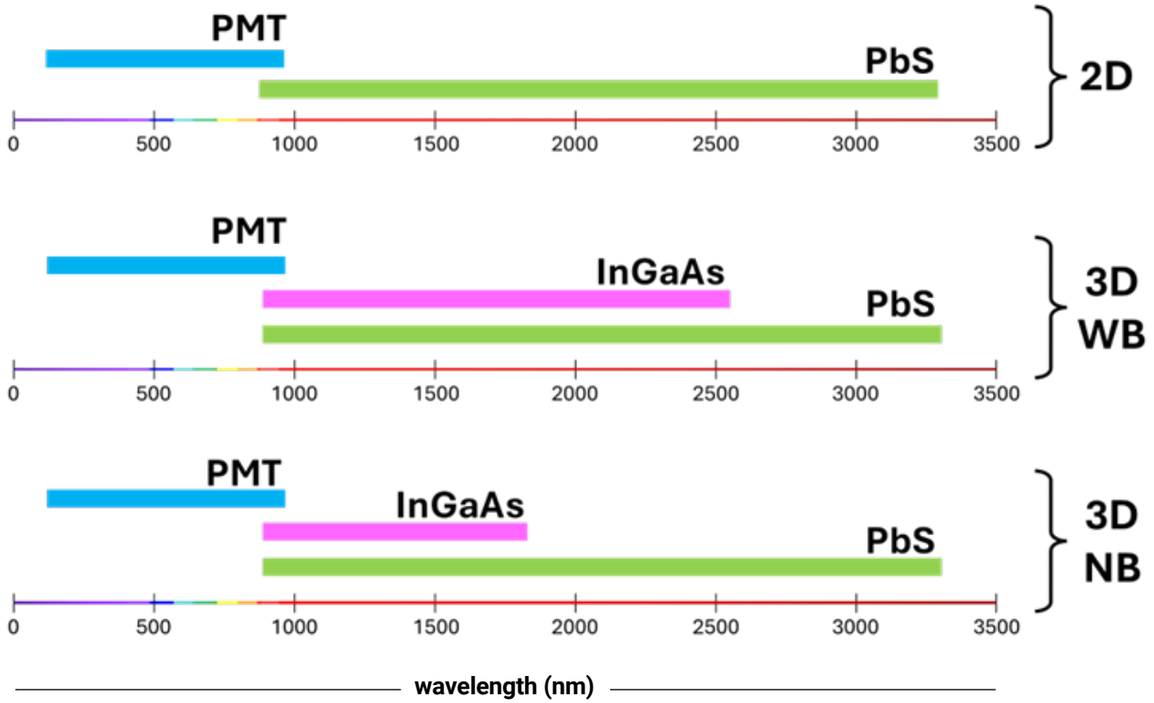
STANDARD
DETECTOR MODULES

For UV/Vis/NIR measurements, there is a choice between a 2-detector (2D) and 3-detector (3D) module. The 2D option includes PMT (UV/Vis) and PbS (NIR) detector modules. A 3D module includes a further InGaAs detector, providing increased performance in the NIR region. The graph shows the ideal spectral range for each detector material.



Wavelength Ranges of 2D, WB (wideband) and NB (narrowband) 3D Detector Modules

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STANDARD DETECTOR **CONFIGURATIONS**

InGaAs detectors offer the best sensitivity and signal-to-noise ratio in the NIR region with two options available, (NB) narrowband (800 – 1900 nm) and (WB) wideband (800 – 2600 nm).

PerkinElmer High-End UV/Vis & UV/Vis/NIR Standard Detector Module Configurations.

Configuration	Detector	P/N[1]	Range
LAMBDA 850+	PMT (175 – 900 nm)	**L6020035**	175 – 900 nm
LAMBDA 1050+ 2D	PMT (175 - 900 nm) PbS (860 - 3300 nm)	**L6020055**	175 - 3300 nm
LAMBDA 1050+ 3D WB	PMT (175 - 900 nm) InGaAs **WB** (800 - 2600 nm) PbS (860 - 3300 nm)	**L6020087**	175 - 3300 nm
LAMBDA 1050+ 3D NB	PMT (175 - 900 nm) InGaAs **NB** (800 - 1800 nm) PbS (860 - 3300 nm)	**L6020086**	175 - 3300 nm

[1]The P/Ns refer to the combination of instrument + detector module.

The following are the P/Ns for the detector modules only:

- **L6030206** – LAMBDA 850+ Detector Module (PMT)
- **L6030201** – LAMBDA 1050+ 2D Module (PMT | PbS)
- **L6030325** – LAMBDA 1050+ Wide Band 3D Module (PMT | **WB** InGaAs | PbS)
- **L6030320** – LAMBDA 1050+ Narrow Band 3D Module (PMT | **NB** InGaAs | PbS)

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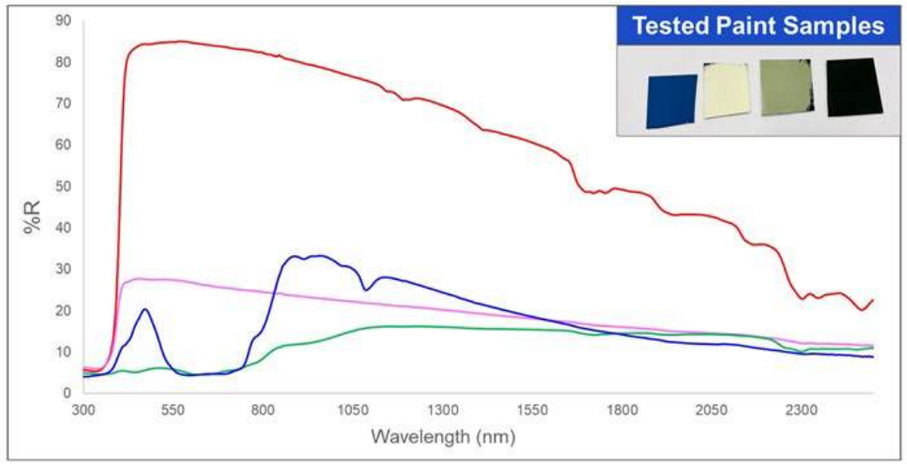
INTEGRATING **SPHERES**

Integrating sphere accessories conveniently snap into the secondary sampling compartment of the spectrophotometer allowing collection of diffuse and specular reflectance and transmittance measurements.

Integrating spheres are essential for measuring the transmittance or reflectance of any sample that scatters light. The figure shows the reflectance spectra obtained from integrating sphere measurements of various paint samples according to ASTM E903-20.



Data obtained from the 150 mm integrating sphere measurements of paint samples. The equations in UVWinLab™ software can quickly determine important parameters such as total solar reflectance (TSR).

PerkinElmer offers two integrating sphere sizes—100 mm and 150 mm—with Spectralon® as the interior coating material, providing higher diffuse reflectance, extended spectral-range uniformity, and improved long-term stability compared to barium sulfate.

150 mm Integrating Sphere

100 mm Integrating Sphere

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UNDERSTANDING **INTEGRATING SPHERES TECHNOLOGY**

While a number of routine analyses using mid-range spectrophotometers measure the transmittance of clear solutions, instruments with the performance of the high-end LAMBDA spectrophotometers have a wider range of uses, including the measurement of solid samples.

Integrating sphere measurements fall into three main categories:

- **Transmittance** measurements of scattering and non-scattering samples
- **Diffuse reflectance** measurements
- **Specular reflectance** measurements of mirror-like materials

Each of these measurements can be achieved with an optimized PerkinElmer configuration of a high-end LAMBDA spectrophotometer equipped with an integrating sphere. By capturing reflected or transmitted radiation over a full solid angle, the system effectively integrates light from all directions, rather than relying on a single, narrowly defined optical path. This light integration minimizes measurement errors caused by variations in beam geometry, surface roughness, or sample inhomogeneity. It is also possible to use an integrating sphere in place of a conventional detector for the measurement of samples placed in the sampling compartment, especially those which may cause convergence, divergence or scattering of the sample beam.

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150 mm INTEGRATING SPHERE

The 150 mm sphere is a research grade accessory offering a port fraction (< 4%) in line with that required to comply with all relevant CIE and ASTM standards. Carefully designed baffles prevent first strikes and therefore reduces the incidence of erroneous data. As a result, the 150 mm sphere delivers high measurement accuracy for demanding optical applications.

PerkinElmer offers three high-performance instrument configurations with 150 mm integrating spheres:

Configuration	Detector	P/N [1]	Range
LAMBDA 850+ with 150 mm Integrating Sphere	PMT (190 – 900 nm)	**L6020058**	190 – 900 nm
LAMBDA 1050+ with 150 mm PMT/InGaAs Integrating Sphere	PMT (190 - 900 nm) InGaAs (800 - 2500 nm)	**L6020114**	190 – 2500 nm
LAMBDA 1050+ with 150 mm PMT/PbS Integrating Sphere	PMT (190 - 900 nm) PbS (860 - 2500 nm)	**L6020159**	190 – 2500 nm

[1]The P/Ns refer to the combination of instrument + integrating sphere.

PerkinElmer LAMBDA® 850+/1050+ with 150 mm integrating sphere

The following are the P/Ns for the Integrating Spheres only:

- **L6030001** – 150 mm PMT|InGaAs Integrating Sphere
- **L6030002** – 150 mm PMT|PbS Integrating Sphere

Both the InGaAs and PbS integrating spheres offer a PMT detector for the 190 – 900 nm wavelength range with the key difference being the detector used to measure the near-infrared region (in the case of integrating spheres, 900 – 2500 nm). For higher performance in the near-infrared region, the InGaAs version is recommended.

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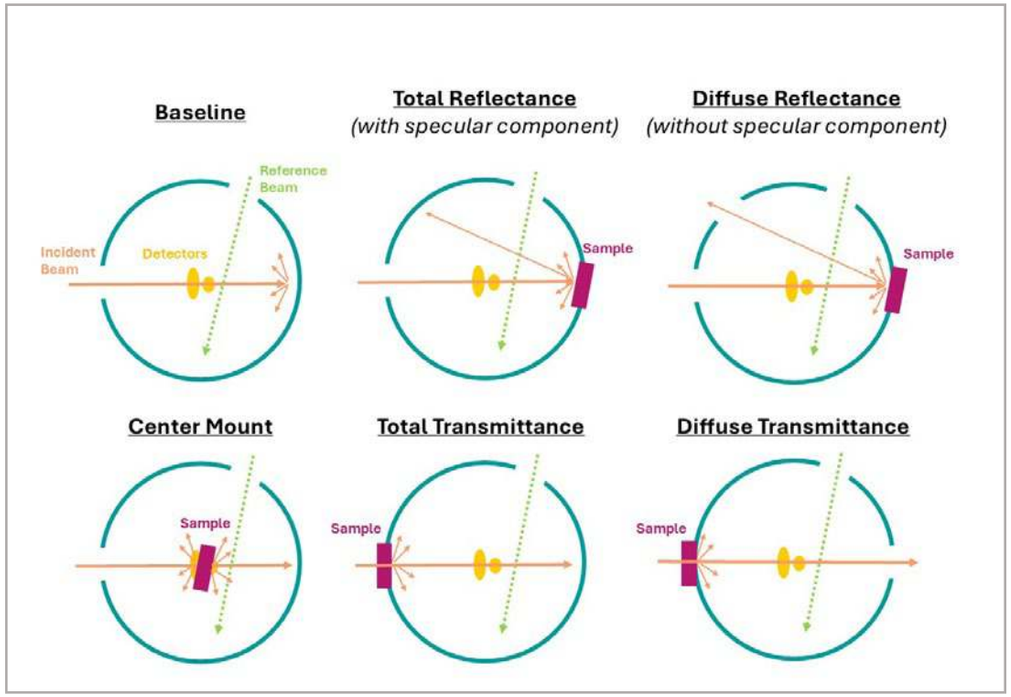
150 mm INTEGRATING SPHERE **MEASUREMENTS**



A key benefit of the 150 mm sphere is the variety of measurements possible. With the addition of the 'gloss' port (allowing for exclusion of the specular component) and 'center mount' accessories, a huge number of different measurement configurations are available.

When measuring transmittance, scattering by the sample causes some of the transmitted beam to deviate from the optical path of the instrument. In a conventional analytical setup, this scattered light would not reach the detector resulting in an artificially low transmittance value. By using an integrating sphere, all light transmitted in the forward direction can be measured by positioning a reflectance standard using the same material as the coating of the integrating sphere (Spectralon®) in the reflectance port (total transmittance). Diffuse transmittance can be measured by simply removing the standard from the reflectance port.

Another benefit of the 150 mm integrating sphere is the flexibility and ease of switching between different reflectance measurements. With the sample positioned in the reflectance port at an 8° angle of incidence, both diffuse and total reflectance measurements can be achieved by simply removing (diffuse) or including (total) the reflectance standard positioned at the 'gloss' port.

In addition to this, further applications can be achieved using 'center mount' accessories, allowing solid samples or cuvettes to be suspended in the center of the integrating sphere.

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150 mm INTEGRATING **SPHERE ACCESSORIES**

The 150 mm integrating sphere supports a wide range of sampling accessories, including variable-angle sample mounts, small-spot kits significantly enhancing the flexibility of the system.

Center Mount Sample Holders

The center mount accessories allow for “transflectance” (combined transmittance and reflectance measurements), of semi-opaque materials such as polymers, films or turbid liquids placed in the middle of the integrating sphere.

Jaw-style Center Mount Sample Holder *- PELA9038*

A clamp for holding samples such as glass, filters or prisms in the middle of the integrating sphere.

Clip-style Center Mount Sample Holder *- PELA9039*

Clip for holding samples such as film or paper in the middle of the integrating sphere.

Center Mount Cuvette Holder - *PELA9041*

An accessory to hold cuvettes in the middle of the integrating sphere in order to measure total absorbance of light scattering solutions.

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150 mm INTEGRATING **SPHERE ACCESSORIES**

Powder Cell Sample holder *- N4100233*

For applications that require reflectance measurements of powders or pastes, the powder sample holder allows the user to seal the sample into an enclosure with a quartz window, making it compatible with the vertical reflectance sample mounting orientation.

Reflectance Port Light Trap *- PELA9026*

For diffuse transmittance measurement. Traps the light exiting the reflectance port eliminating errors due to back reflection. Efficient to 0.1 %T. The trap fits into the ring of the sample holder.

Variable Angle Transmittance Holder *- PELA9042*

Intended for non-scattering samples. A manual rotary stage positioned in front of the sphere, using the integrating sphere as a homogeneous detector.

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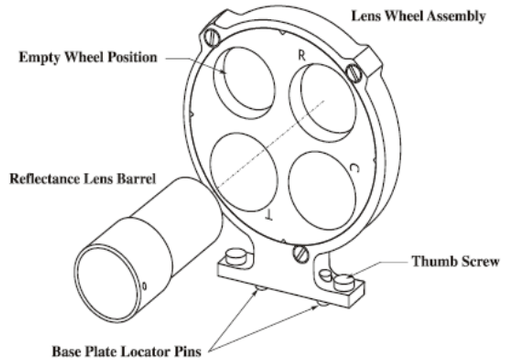
150 mm INTEGRATING **SPHERE ACCESSORIES**

Small Spot Kit

Small spot accessory kit for the 150 mm integrating sphere *L6020211*

A lens kit that reduces the beam size to the transmittance, center mount or reflectance positions.



Reflectance only small spot kit *- L6020313*

Single lens assembly for the sample beam to measure at the reflectance port.

Sample Compartment Iris Assembly *- L6020316*

Comprising of an iris assembly that mounts in the sample compartment at the cuvette position. Reduces the spot size at reflectance port of the 150 mm sphere. Can be combined with lens systems like L6020313 to get smaller spot size or more light intensity.

Reflectance Aperture Kit *- L6020314*

Comprising of 3 High Performance coated apertures (3, 6, 9 mm) that mount at the reflectance port to reduce the port diameter for small spots and small samples. Compatible with all 150 mm sphere accessories.

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100 mm INTEGRATING SPHERE

The 100 mm sphere provides a lower-cost alternative to the 150 mm integrating sphere. While it does not achieve the same level of measurement accuracy as the 150 mm sphere, it still offers good accuracy and is well suited for sensitive analyses, benefiting from its smaller internal volume.

PerkinElmer offers three high-performance instrument configurations with 100 mm integrating spheres:

Configuration	Detector	P/N [1]	Range
LAMBDA 850+ with 100 mm Integrating Sphere	PMT (190 – 900 nm)	**L6020057**	190 – 900 nm
LAMBDA 1050+ with 100 mm PMT/InGaAs Integrating Sphere	PMT (190 - 900 nm) InGaAs (800 - 2500 nm)	**L6020157**	190 – 2500 nm
LAMBDA 1050+ with 100 mm PMT/PbS Integrating Sphere	PMT (190 - 900 nm) PbS (860 - 2500 nm)	**L6020156**	190 – 2500 nm

[1]The P/Ns refer to the combination of instrument + integrating sphere.

PerkinElmer LAMBDA® 850+/1050+ with 100 mm integrating sphere

The following are the P/Ns for the Integrating Spheres only:

- **L6030003** – 100 mm PMT|InGaAs Integrating Sphere
- **L6030004** – 100 mm PMT|PbS Integrating Sphere

Both the InGaAs and PbS integrating spheres offer a PMT detector for the 190 – 900 nm wavelength range with the key difference being the detector used to measure the near-infrared region (in the case of integrating spheres, 900 – 2500 nm). For higher performance in the near-infrared region, the InGaAs version is recommended.

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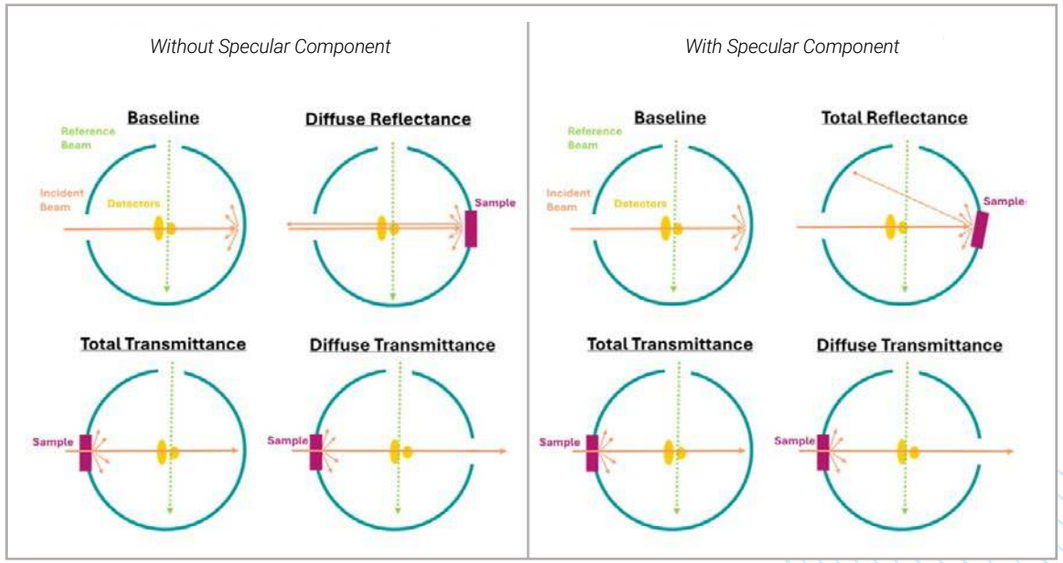
100 mm INTEGRATING SPHERE **MEASUREMENTS**

The 100 mm sphere is capable of a number of different types of measurement, depending on whether the specular reflectance component or the direct transmittance component are of interest.



Transmittance measurements are conducted in a similar manner to the 150 mm sphere, with the inclusion of the direct component driven by the presence of the diffuse reflectance standard in the reflectance port. In order to measure only the diffuse component of transmitted light, this standard can be removed allowing the direct component to escape via the reflectance port.

Diffuse reflectance measurements can be obtained by positioning the sample at a normal (0°) angle of incidence, allowing specular reflected light to escape via the transmission port. For total reflectance measurements, the sample must be placed at an angle (8°) in order to direct specular reflected light into the wall of the integrating sphere, thus capturing this component in the overall measurement. This can be achieved by placing the 8° adapter (included with the 100 mm sphere) in the reflectance port.

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100 mm INTEGRATING **SPHERE ACCESSORIES**

While the 100 mm integrating sphere is not the research-grade offering, PerkinElmer still offers a number of sampling accessories to expand its versatility and flexibility.

Cuvette Cell Holder - L6022022

An accessory to hold cuvettes to measure light scattering solutions.

Powder Cell Holder - L6022025

Includes a holder for both powder/paste samples and a high-performance reflectance standard.

Small Spot Kit

Transmittance Port – *L6022023*

For small spot transmittance integrating sphere measurements. Includes apertures for 10, 5 and 3 mm beam size.

Reflectance Port – *L6022024*

For small spot reflectance integrating sphere measurements. Includes apertures for 10, 5 and 3 mm beam size.

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UL270 - INTEGRATING SPHERE
LARGE DIFFUSE MEASUREMENT SYSTEM

The only commercially available 270 mm integrating sphere for diffuse transmittance and reflectance measurements of highly diffuse materials such as those used in solar cells and buildings. The UL270 is the only readily available integrating sphere capable of meeting the requirements of NFRC standards such as NFRC 300, which requires an integrating sphere larger than 250 mm.

UL270 Integrating Sphere Accessory

KEY FEATURES

- **Wavelength Range**: 300 - 2450 nm
- **Angle of Incidence**: 8° (transmission and reflection)
- **Accuracy**: <0.2%T and 0.5% R (specular sample)
- **Sphere Entrance Port Size**: 100 mm (50 mm with insert)
- **Max Sample Size**: 430 x 250 x 50 mm with standard cover (larger samples possible with customized covers)
- **Detectors**: PMT and Wideband InGaAs

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TAMS - TOTAL ABSOLUTE **MEASUREMENT SYSTEM**

A key area of high-performance UV/Vis/NIR is angular dependent measurements. For a wide variety of materials, including architectural glass, optoelectronics and specialised pigments, it is important to understand their optical properties when measuring at a variety of angles. While this can be achieved with lower-cost manual accessories, for applications requiring the highest angular precision and measurement sensitivity, the TAMS is the gold standard.

As with the LAMBDA series itself, a key benefit of the TAMS platform is the flexibility. The system is built around a TAMS 'flex' platform with an inner rotating stage where the sample can be placed, and an outer stage for the moving detector. A range of detector options may then be added depending on the desired sensitivity and wavelength range.

PerkinElmer LAMBDA 850+/1050+ with TAMS Accessory.

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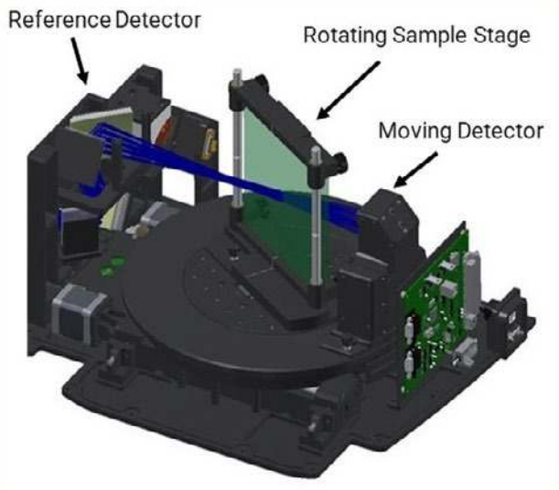
TAMS **DETECTORS**

Type	Description	Range	P/N	Recommended Application
Integrating Sphere	**Si/InGaAs Sphere Detector**	200 – 2600 nm	**L6310242**	Directional reflectance and transmittance measurements. Works on thick, coated and slightly curved samples as well as prisms and beam splitter cubes.
	Enhanced Si/InGaAs Sphere Detector	200 – 2500 nm	**L6310255**	
	Enhanced Si Only Sphere Detector	190 – 1150 nm	**L6310244**	
Direct Detector	**Enhanced Si/InGaAs Direct Detector**	200 – 2500 nm	**L6310254**	BRDF/BTDF and other scattering measurements on diffusors, patterned coatings. Directional transmittance on thin foils. Angular colour measurements and measurement of optical filters.
	Enhanced Si Direct Detector	190 – 1150 nm	**L6310247**	



TAMS module highlighted

Each option comprises paired reference and sample detectors.

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TAMS **FEATURES**

The TAMS system utilizes a goniometer system to position samples at an angle relative to the measurement beam with an incredibly high level of accuracy (0.02°). With this solution, transmittance measurements can be carried out between 0 and 85° and reflectance measurements between 7.5° and 85° with total automated independent control of sample and detector stages.

KEY FEATURES

- No additional bench space required – the TAMS fits into the sample compartment of the LAMBDA Series of instruments without overhanging or blocking walkways
- Interchangeable detectors that can be swapped out by the end user
- Software input allows for total automation and only ONE baseline measurement is required
- Measurement of both transmittance and reflectance without moving the sample
- A choice of different polarizers and depolarizers for in-depth sample analysis

The TAMS offers a variety of sample holders to fulfil every application:

- **TAMS Autosampler** – automated measurements of up to 19 samples
- **Automated Tilt Holder** – measure samples at different tilts (Tilt +/- 75° or higher depending on the sample with angle accuracy 0.1°) as well as angles of incidence
- **Wafer Holder** (L6310252) – measurement of wafers up to 200 mm in size
- **Small Sample Holder** (L6310249) - for small round samples from 25.4 mm up to 38.1 mm (from 1” to 1.5”) in diameter

TAMS Autosampler

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URA - UNIVERSAL
REFLECTANCE ACCESSORY

The PerkinElmer URA enables high-sensitivity, absolute reflectance automated measurements at multiple angles. Depending on the desired spectrophotometer, two models of the URA are available:

- ***L6020208*** – UV/Vis URA for LAMBDA 850+
- ***L6020358*** – UV/Vis/NIR URA for LAMBDA 1050+

KEY FEATURES

- **Measurement Angles**: 8°- 65° in 0.5° steps
- **Range UV/Vis Model**: 185 - 900 nm
- **Range UV/Vis/NIR Model**: 185 - 3100 nm
- **Spot Size**: from 2x2 mm to 5x5 mm (max size 4x4 mm above 60°)
- **Max Sample Size**: 150 mm diameter (using included covers). No limits if precautions are taken to minimize stray light

PerkinElmer LAMBDA 850+/1050+ with URA Accessory.

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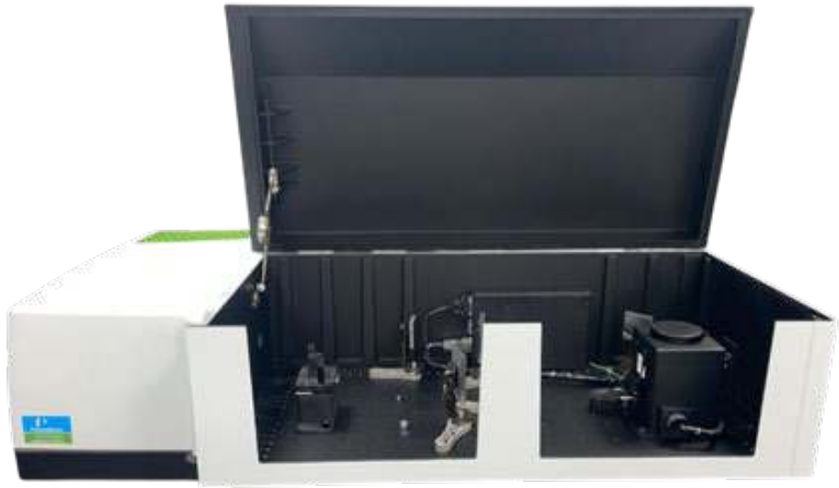
GPOB - GENERAL PURPOSE **OPTICAL BENCH**

The GPOB **(L6030005)** is used for setting up customizable optical measurements of transmittance or reflectance in a number of different geometries. This accessory includes an optical chamber, 100 mm InGaAs integrating sphere, 7 mirrors allowing for sample and reference beams to be directed in various geometries. The accessory includes a grid overlayed on the baseplate which allows for custom experiments to be accurately replicated.

Applications of the GPOB are limitless. The accessory can be configured to measure a variety of different samples, from laser crystals to telephoto lenses as well as simpler samples such as automotive glass.



PerkinElmer LAMBDA 850+/1050+ with GPOB Accessory.

KEY FEATURES

- **Detectors**: PMT (200 – 860 nm) and InGaAs (860 – 2500 nm)
- **Absorbance range**: ca. 0 – 5 A for both PMT and InGaAs
- **Optical Bench Dimensions**: 793.5 x 391.5 mm

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SPECIALIZED **ACCESSORIES**

PerkinElmer's specialized accessories broaden the capability of its spectrophotometers, giving researchers greater control over complex optical measurements. They're designed to deliver consistent, accurate results when characterizing surfaces, coatings, and other challenging materials. By improving precision, stability, and flexibility, these tools make it easier to adapt the instrument to specific experimental needs. The result is reliable, high-quality data that supports deeper insight and more confident interpretation across a wide range of applications.

Absolute Directional VW Specular Reflectance Accessory

L6310205

The absolute directional VW specular reflectance accessory is intended for flat specular samples with a reflectance above 25% such as reflectance standards, laser mirrors, optical solar reflectors and beam splitters. A Glan-Thompson (250 - 2500 nm) polarizer is included. This accessory allows for the calibration of reference mirrors with a reflectance above 80%, absorption measurements of laser mirrors and characterization of beam splitters.

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SPECIALIZED **ACCESSORIES**

Relative Directional Reflectance/Transmittance Accessory
L6310201

The directional relative R/T accessory allows for accurate transmittance and relative reflectance measurements at angles from near-normal up to 85° in transmittance and 75° in reflectance (depending on sample characteristics). A Glan-Thompson (250 - 2500 nm) polarizer is included. This accessory allows for measurement of directional reflectance and transmittance, colour shift as a function of angle of incidence and characterization of coatings.

Absolute Directional IV Reflectance Accessory
L6310206

The absolute directional IV reflectance accessory is intended for flat specular samples with a reflectance above 25% such as reflectance standards, laser mirrors, optical solar reflectors and beam splitters. A Glan-Thompson (250 - 2500 nm) polarizer is included. This accessory allows for the calibration of reference mirrors with a reflectance above 80%, absorption measurements of laser mirrors and characterization of beam splitters. With this accessory, an absolute reflectance can be calculated as the ratio between the measurement in I-mode (the baseline) and V-mode (the sample measurement).

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SPECIALIZED **ACCESSORIES**

Praying Mantis Accessory
L6310211

The Praying Mantis™ accessory is ideal for diffuse reflectance measurements of powders and rough solids. With a wavelength range of 200 – 3300 nm, the praying mantis allows for studies of advanced materials, catalysis, gas-solid interactions and photochemical reactions. For a number of applications, accessories such as the reaction chamber and temperature controller are required.

High Temperature Reaction Chamber for the Praying Mantis
L6310215

The Praying Mantis™ high temperature (up to 910 °C) reaction chamber boasts a working pressure range from high vacuum (10^{-6} torr) to high pressure (1 ktorr with KBr windows, 11 ktorr with ZnSe windows and up to 25 ktorr with the optional high-pressure dome). This accessory also includes three inlet/outlet ports for evacuating the cell and introducing gases for gas-solid interaction studies.

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STANDARD **MATERIALS**

Calibrated diffuse reflectance white standards - traceable to NIST standard

- **PELA9057** - 1.25” calibrated Spectralon® 99% reflectance standard, 250-2500 nm, reference values every 50 nm. Electronic version provided with data each 1 nm.
- **PELA9058** - 2.00” calibrated Spectralon® 99% reflectance standard, 250-2500 nm, reference values every 50 nm. Electronic version provided with data each 1 nm.

Uncalibrated diffuse reflectance white standards

- **L6020318** - 1.25” uncalibrated Spectralon® 99% reflectance standard
- **L6020319** - 2.00” uncalibrated Spectralon® 99% reflectance standard

Calibrated diffuse reflectance white/grey standard sets - traceable to NIST standard

Calibrated 250-2500 nm reported each 50 nm. Electronic version included with data each 1 nm.

- **PELA9010** - Set of 4 calibrated 1.25” diameter diffuse reflectance standards, Reflectance Factors: 99%, 75%, 50%, 2%
- **PELA9011** - Set of 4 calibrated 2.00” diameter diffuse reflectance standards, Reflectance Factors: 99%, 75%, 50%, 2%
- **PELA9012** - Set of 8 calibrated 1.25” diameter diffuse reflectance standards, Reflectance Factors: 99%, 80%, 60%, 40%, 20%, 10%, 5%, 2%
- **PELA9013** - Set of 8 calibrated 2.00” diameter diffuse reflectance standards, Reflectance Factors: 99%, 80%, 60%, 40%, 20%, 10%, 5%, 2%

Calibrated diffuse color reflectance standards set - traceable to NIST standard

Calibrated 250-2500 nm reported each 50 nm. Electronic version included with data each 1 nm.

- **PELA9021** – Set of 8 calibrated 2” diameter diffuse color standards. Colors: red, green, blue, yellow, orange, purple, cyan, violet.

Calibrated reflectance mirror standards - traceable to NIST standard

- **N1010504** - Flat Al mirror with MgF_2 protective layer, 40 mm x 40 mm. Calibrated 250-2200 nm data reported every 50 nm. Electronic version included with data every 1 nm.

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