

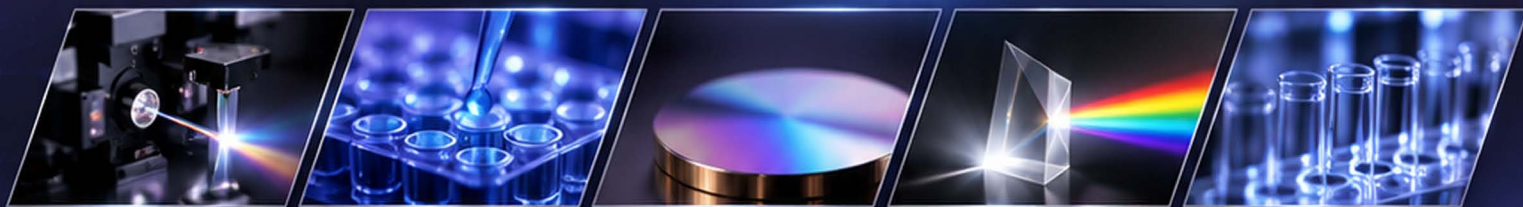


MEASURE
ANALYSE
DISCOVER
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 **HOLMARC**
OPTO-MECHATRONICS LTD



ANALYTICAL INSTRUMENTS



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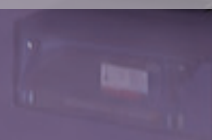


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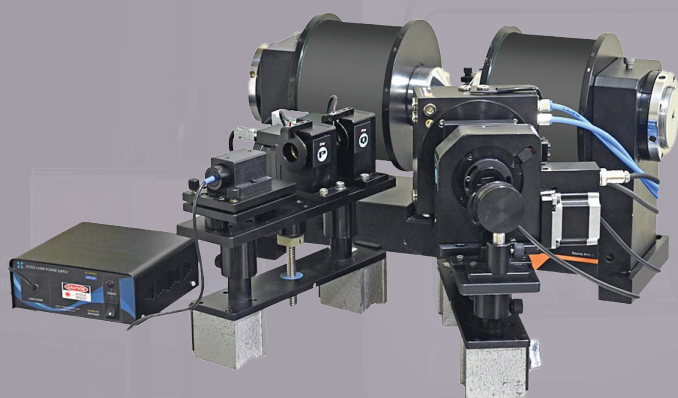
272	ANALYTICAL INSTRUMENTS
274	Spectrophotometer
274	CCD Spectrophotometer / Fluorometer
278	Single Beam Visible Spectrophotometer
280	Single Beam Visible Spectrophotometer with Thin film characterization
282	Single Beam Visible Spectrophotometer with Thin film & DRS
284	Single Beam UV-Visible Spectrophotometer
286	Single Beam UV-Visible Spectrophotometer with Thin film characterization
288	Single Beam UV Visible Spectrophotometer Thin film & DRS
292	Double Beam Visible Spectrophotometer
294	Double Beam Visible Spectrophotometer with Thin film characterization
296	Double Beam Visible Spectrophotometer with Thin film & DRS
298	Double Beam UV-Visible Spectrophotometer
300	Double Beam UV-Visible Spectrophotometer with Thin film characterization
302	Double Beam Visible Spectrophotometer with Thin film & DRS
304	Theta 2 Theta Advanced scanning Spectrophotometer
305	Diffuse Reflectance Spectrophotometer
306	Theta 2 Theta Advanced Spectrophotometer
308	Diffused Reflectance Spectrophotometer
309	Modular Spectrophotometer
310	Scattering Photometer Single Channel Light Detection
312	Ellipsometer
312	Variable Angle Laser Ellipsometer



ANALYTICAL INSTRUMENTS



- | | | | |
|-----|--|-----|--|
| 314 | Variable Angle Spectroscopic Ellipsometer | 352 | System with Keithley SMU |
| 316 | Magneto Optic Ellipsometry | 354 | Schlieren Imaging System |
| 318 | MOKE | 354 | Standard Models with different Mirror sizes |
| 318 | High Sensitivity Laser-Based Magneto-Optical Kerr Effect (MOKE) Station | 356 | Schlieren Imaging System |
| 320 | High Sensitivity Laser-Based Magneto-Optical Kerr Effect (MOKE) Station 4T | 358 | Others |
| 322 | Spectroscopic Magneto - Optic Rotation Measurement System | 358 | Confocal Micro Laser Ablation with integrated galvano scanning unit |
| 324 | Magneto Optic Spectrometer | 362 | Automated Multi-wavelength Laser Scribing/ablation/Cutting station with Micro Inspection Camera |
| 324 | Spectroscopic Kerr / Faraday / Ellipsometry | 364 | Laser Induced Current Measurement |
| 326 | Polarimeter | 364 | Confocal Real-time Laser Beam Induced Current and Photoluminescence Measurement Unit |
| 326 | Digital Polarimeter | 366 | Light Beam Induced Current (LBIC) Measurement |
| 327 | Spectroscopic Polarimeter | 368 | Lees Disc Apparatus |
| 328 | Refractometer | 370 | Z - Scan Characterization Kit |
| 328 | Automatic Refractometer | 370 | Characterization of Transparent Optical Materials |
| 329 | Spectroscopic Digital Refractometer | 372 | Electronic Speckle |
| 330 | Reflectometer | 372 | Pattern Interferometer (ESPI) |
| 330 | Near Normal Spectroscopic Reflectometer | 374 | Cyclical Force Generator |
| 331 | Near Normal Spectroscopic Reflectometer 2 | 376 | Contact Angle Meter |
| 332 | Quantum Efficiency | 376 | Contact Angle Meter - Base Model |
| 332 | Quantum Efficiency & IV Measurement System | 377 | Contact Angle Meterwith Rotatable Substrate Holder & Automated Dispenser |
| 334 | Quantum Efficiency & Spectral Response Measurement System | 378 | Contact Angle Meterwith Rotatable Substrate Holder, Automated Dispenser & Temperature Control |
| 336 | Quantum Efficiency Measurement System - VIS IR | 380 | Contact Angle Meter with Dispenser to camera positioning unit, Motorized Substrate Holder, Automated Dispenser & Temperature Control |
| 338 | Solar Cell / Photo-detector Characterization System | 382 | Contact Angle Meter |
| 340 | Spectral Response Measurement Apparatus | 384 | Contact Angle Instrument for Under -Liquid Low Energy Surfaces |
| 342 | Photodetector Characterization Setup | 386 | Acoustic Impedance Tube |
| 344 | Solar Simulator | 388 | Custom Impedance Tube |
| 344 | LED Solar Simulator | | |
| 346 | Solar Simulator 1 | | |
| 348 | Solar Simulator 2 | | |
| 350 | Solar Simulator with IV Measurement System | | |
| 352 | Solar Simulator & IV Measurement | | |



Spectrophotometer

- **Measure absorbance, transmittance, fluorescence etc.**
- **Perform equilibrium studies of absorbance vs. time or absorbance vs. concentration.**



CCD Spectrophotometer / Fluorometer

Spectra Analyte Plus

Model No: HO-SP-SCCD2080FC

HOLMARC has developed cost-effective high-performance fiber optic coupled UV/VIS CCD spectrophotometer instrument that allows analysts to collect a full wavelength spectrum absorbance, transmittance or intensity in less than one second. Standard interface to the spectrophotometer is USB 2.0 compatible with 16-bit extended dynamic range. Spectra Analyte Windows-based spectral acquisition and analysis software is supplied along with the instrument.

The device use high-quality optics and single-piece aluminum optical bench. This design allows continuous stable operation of the instrument. It uses dual spectrum of deuterium and halogen lamp as light source. Emerging light goes through a high-quality diffraction grating, then the diffracted light is collected and sorted by the CCD array detector.

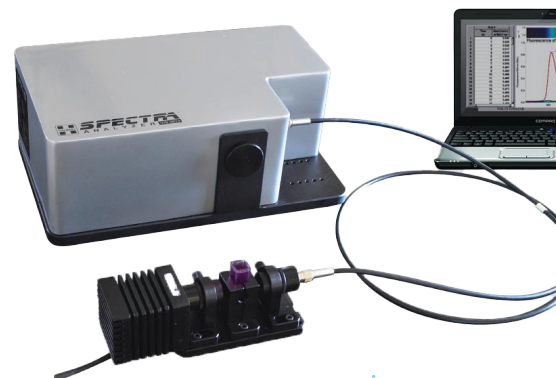
The standard sensor arrays used in the spectrometer is Toshiba TCD1304DG B/W board-level line CCD camera, based on a single-line, 3648-pixel CCD chip. The array driver electronics designed and developed by Holmarc ensures sensitive and stable operation. UV spectrophotometer models use windowless CCD to increase the UV sensitivity down to 200nm. It helps the signal sensitivity below 380nm to get improved (~20 - 50% more) in general.

Spectra Analyte UV-VIS spectrophotometer can also be used as fluorometer or in combination with spectrophotometer. Fluorometer is a device used to measure parameters of fluorescence : its intensity and wavelength distribution of emission spectrum after excitation by certain spectrum of light. It can quantitatively measure the fluorescence spectra of many compounds such as chlorophyll, fluorescein, GFP, and more.

- Measure absorbance, transmittance, fluorescence etc.
- Perform equilibrium studies of absorbance vs. time or absorbance vs. concentration.
- Perform colorimetric measurements.
- Measure emissions of gas discharge tubes, flame tests or other light sources.

Uses Dual Spectrum

Continuous and stable operation



Standard Spheres

Model No.	HO-CT216-UV	HO-CT216-4065	HO-CT216-2010	HO-CT216-3010
Wavelength Range	200 ~ 400 nm	400 ~ 700 nm	200 ~ 1000 nm	320 ~ 1,050 nm
Resolution*	0.25 nm	0.29 nm	1 nm	0.9 nm
Optical Platform	Czerny-Turner			
Effective Spectral Range	200 to 1050 nm			
Input Fiber Connector	SMA 905			
Input Fiber NA	0.22			
Stray Light	< 0.06 % @ 532 nm (< 0.1% overall)			
Detector	Toshiba TCD1304AP Linear CCD Array			
Pixel Number	3648			
Pixel Size	8 x 200 μ m			
Pixel Well Depth	100,000 electron			
Signal-to-noise Ratio	1,000:1 (at full scale)-			
A / D Resolution	16 bit			
Integration Time	0.1 to 6,500 ms			
Frame Rate	up to 138 fps			
Trigger Input	Optional			
PC interface	USB 2.0			
Software	Spectra Analyte			
	Includes DLL libraries and SDKs for easy custom application development			

Accessories for Fiber optic coupled Spectra Analyte Plus

Fiber Optic Dip Probe



NV16 spectrophotometer fiber optic model extend their capabilities to the use of dip probes for facilitating analysis while lending themselves to real-time monitoring of kinetic reactions.

The probe body material is built entirely of 316 stainless steel construction and lined with a quartz or glass. Fiber optic cable lengths can also be configured to meet customer needs.

Flow Through Cells



Our Fiber optic flow through cells are ideal for demanding applications including process control, chromatography and when monitoring reactions in remote locations. The flow through cell is built entirely of 316 stainless steel construction and lined with a quartz or glass, the flow through cell is virtually maintenance free.

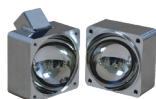
Small size and variable length fiber optic cables allow the flow through cell to be mounted just about anywhere.

Fiber Optic Reflectance Probes



Reflectance Probes are ideal for measuring the absorption characteristics of solid surfaces, powdered substrates and liquids.

Integrating Spheres for Reflectance Measurements



Fiber optic coupled integrating sphere attachments for uniform, diffused illumination and total reflectance measurements of sample.

They are suitable for solid surface analysis, color analysis and for the measurement of samples of varying gloss texture.

Cuvette holder with fiber collimator unit



Fiber optic cuvette holders are for standard 10mm path length cuvettes. They are designed to work in UV-VIS-NIR spectral range. They have two terminals and one slot for transmittance / absorbance measurements.

SPE 3000 Series Spectrophotometer

UV VIS NIR
ACCESSORIES



The SPE 3000 series spectrophotometers offer highly accurate measurement over a wide range of sample. The Czerny-Turner monochromator design with high quality blazed holographic gratings offer low stray light and greater stability over the entire spectral range. The system is equipped with 7-inch touch screen which helps easy use of all the functions like wavelength scan, Photometric measurement etc. and saving the measurements. It comes with a replaceable sample holder for thin film coated glass slides & 10 mm path length cuvette holder for liquids.

Accessories

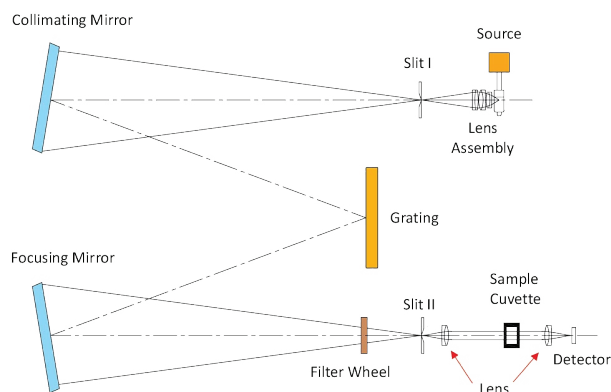
Cuvettes, Cuvette holders, Light sources, optical fiber patch cords, calibration samples, long path cuvettes, reflection probes

Customized accessories are available to address individual application requirements. Model SPE-3000 comes with 10 mm path length cuvettes. Cuvettes of smaller path lengths are available as optional accessory.

For most (99%) absorbance measurements 10 mm path length cuvettes are suitable. Cuvettes of shorter path lengths allow the measurement of concentrated samples without dilution



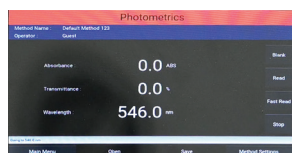
- Wavelength range between 190 to 1100nm
- Selectable scan wavelength interval 1 to 50 nm
- Analyzer to find out absorbance and wavelength of peaks and valleys
- Absorbance/Transmittance, Concentration & Kinetics measurements
- Single and multi-wavelength photometry
- Fast and Accurate measurement
- Live plotting of parameters on colour display and PC software
- Cuvette holder, Thin Film sample holder & Integrating Sphere.
- Band gap measurement
- Thin Film thickness measurement
- Integrating Sphere for Solid and Powder samples
- Automatic dark correction
- Automatic baseline correction



Multiple Measurement Modes

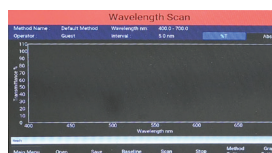
Photometric

Photometric scanning mode enables precise absorbance and transmittance measurements at single or multiple wavelengths



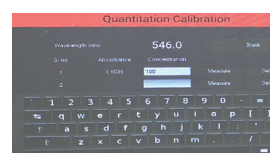
Wavelength

Wavelength scanning mode enables users to obtain detailed sample spectra by scanning across a range of wavelengths



Quantitation

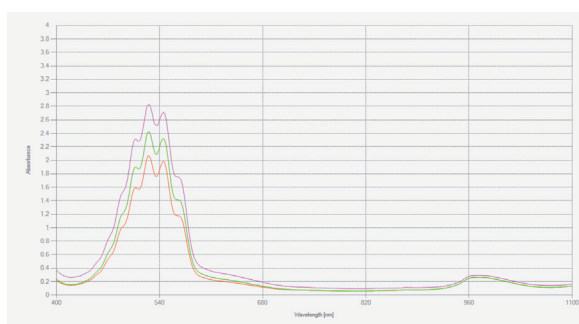
Generates a calibration curve from the measurement of standards and then calculates the concentrations of unknowns.



Single Beam Visible Spectrophotometer

Model: SPE 3000

The SPE 3000 is a robust and user-friendly single beam visible spectrophotometer designed for reliable and precise analysis in a wide range of applications. Whether for educational purposes, routine quality control, or clinical analysis, the SPE 3000 delivers consistent results in a compact, durable package. Its intuitive interface and stable optical system make it the ideal choice for laboratories seeking efficiency and accuracy.



Key Features

- Wide Wavelength Range :**
Covers the full visible spectrum from 360 nm to 1100 nm, accommodating a vast array of analytical tests.
- Intuitive Operation :**
Features a 7 inch large touch screen for easy setup and navigation through various measurement modes, including Absorbance (A), Transmittance (%T), Concentration (C) and Wavelength Scan.
- Automatic Wavelength Setting**
Simply input the desired wavelength and the instrument automatically positions the grating for fast and error-free measurements.
- High-Quality Optics :**
The Czerny-Turner optical design with a 1200 lines/mm holographic grating ensures low stray light and high resolution. A long-life tungsten halogen lamp provides stable illumination.

Applications

- Environmental monitoring
- Clinical & Biochemical analysis
- Food & Beverage testing
- Industrial QC
- Education & Research





Specifications



Type of Spectrophotometer	:	VISIBLE
Type of Optical System	:	Single Beam Czerny-Turner design with 1200 l/mm holographic grating optical system
Light Source	:	Quartz Halogen Lamp 20 W
	:	

Wavelength



Range	:	360 to 1100 nm
Resolution	:	0.1 nm
Accuracy	:	± 0.5 nm
Wavelength Setting	:	Auto
Photometric Accuracy	:	± 0.5 % T
Photometric Repeatability	:	± 0.3 % T
Photometric Range	:	0 - 2.5 A, 0 - 100 % T
Scanning Speed	:	Low, Medium & High
Stray Light	:	< 0.5 % T
Stability	:	$\pm 0.002A / h@500$ nm

Display

Mode	:	Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)



Detector	:	Silicon Photodiode
PC Interface	:	USB
Software	:	Holmarc Spectrophotometer
Sample holder	:	10 mm pathlength Cuvette holder (up to 50 mm)
Input Voltage	:	230V / 110V 50Hz
Dimension	:	505 x 430 x 300 mm
Weight	:	20 Kg

Single Beam Visible Spectrophotometer with Thin film characterization

Model: SPE 3000 T

The 3000 T Single Beam Visible Spectrophotometer is a precision analytical instrument designed for reliable and accurate measurements in the visible NIR spectrum. Engineered for simplicity and performance, it is an ideal choice for laboratories, academic institutions, and industrial quality control environments. This model includes a rotatable thin film sample holder, enabling comprehensive thin film characterization across the VIS-NIR spectral range. Both the sample and detector can be precisely positioned to accommodate various angles of incidence, allowing accurate reflection measurements. The integrated Thin Film Pro software supports advanced analysis, including thin film thickness and refractive index determination, making it an essential tool for optical material research and surface studies.



Key Features

- **Optical configuration :**
Single beam system with 1200 l/mm optical holographic grating
- **Versatile Thin Film Analysis :**
A fully rotatable sample holder and detector system allows for precise transmittance and reflectance measurements of thin films
- **Wavelength Coverage :**
Perform measurements across a broad spectral range from 360 nm to 1100 nm (VIS-NIR), enabling a wide variety of analytical applications.
- **Wavelength accuracy :**
 ± 0.5 nm ensures dependable readings.
- **Touchscreen Operation :**
Features a large 7-inch touchscreen interface for effortless instrument setup and navigation. Seamlessly switch between measurement modes, including Absorbance (A), Transmittance (%T), Concentration (C) and wavelength scan.
- **Automated Wavelength Selection**
Simply enter the target wavelength and the instrument's automated system precisely positions the grating, ensuring rapid, repeatable and error-free measurements.

Applications

The versatility of the SPE 3000 T makes it an essential tool in various fields :

- Environmental Monitoring
- Clinical & Biochemical
- Food & Beverage
- Industrial QC
- Education & Research



Specifications

Type of Spectrophotometer	:	VISIBLE
Type of Optical System	:	Single Beam Czerny - Turner with 1200 l/mm holographic grating
Light Source	:	Quartz Halogen Lamp 20W

Wavelength

Range	:	360 to 1100nm
Resolution	:	0.1 nm
Accuracy	:	± 0.5 nm
Wavelength Setting	:	Auto

Photometric Accuracy	:	± 0.5 % T
Photometric Repeatability	:	± 0.3 % T
Photometric Range	:	0 - 2.5 A, 0 - 100 % T
Scanning Speed	:	Low, Medium & High
Stray Light	:	< 0.5 % T
Stability	:	$\pm 0.002A / h$ @ 500 nm

Display

Mode	:	Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)
Detector	:	Silicon Photodiode
PC Interface	:	USB
Software	:	Holmarc Spectrophotometer & Thin Film Pro



Sample holder	:	10 mm path length Cuvette Standard thin film sample holder
Dimension	:	505 x 430 x 300 mm
Weight	:	20 Kg

Thin film characterization

Film Thickness range	:	100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	:	0 - 100 %
Standard Sample for calibration	:	ITO thin film
Measuring modes	:	Curve fitting / Regression Algorithms
Dispersion formulas	:	Cauchy's, Sellmeiers & Empirical Models
Material Library	:	Extendable Material user library

Single Beam Visible Spectrophotometer with Thin film & DRS

Model: SPE 3000 TD

The 3000 TD Single Beam Visible Spectrophotometer is a comprehensive, all-in-one system designed for high-precision optical measurements across a wide range of sample types - including liquids, solids, thin films, and diffuse reflectance samples.

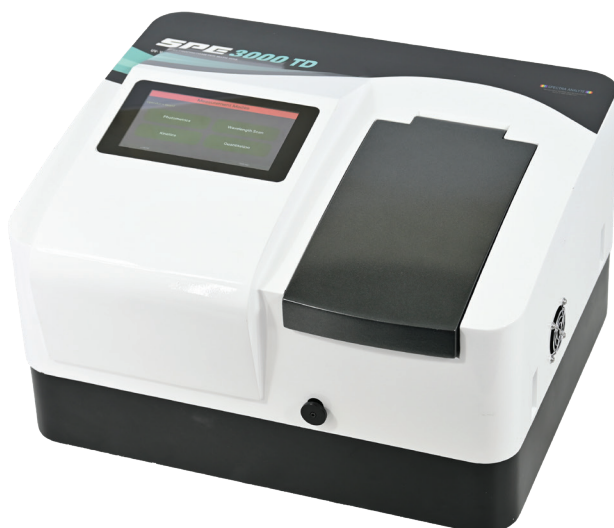
It comes equipped with three specialized sample holders :
 A standard cuvette holder for liquid samples
 A rotatable thin film holder for angle-dependent measurements
 A 50 mm integrating sphere for Diffuse Reflectance Spectroscopy (DRS)
 Both the sample and detector positions are fully adjustable, enabling precise control over the angle of incidence and detection - ideal for accurate reflection and angular-resolved measurements.

DRS with Integrating Sphere

The integrated 50 mm integrating sphere is purpose-built for DRS applications, allowing high-accuracy reflectance measurements of opaque, scattering, and non-transparent samples - where traditional transmission techniques are ineffective. To facilitate safe and efficient handling of powder samples, the system includes quartz-window-based powder holders, offering both protection and ease of placement.

Diffuse Reflectance Spectroscopy (DRS)

DRS is a powerful technique used to measure the reflectance properties of solid or powdered samples. Unlike direct reflectance, DRS captures scattered light from all angles using an integrating sphere, enabling accurate analysis of samples with irregular surfaces or complex textures.



Key Features

- **Diffuse Reflection measurement :**
Enabling accurate analysis of samples with irregular surfaces or complex textures
- **Integrating Sphere :**
High-reflectance coated sphere for uniform light collection.
- **Thin Film Analysis :**
A fully rotatable sample holder and detector system allows for precise transmittance and reflectance measurements of thin films
- **Optical configuration :**
Single beam system with 1200 l/mm optical holographic grating.
- **Wavelength Coverage :**
Perform measurements across a broad spectral range from 360 nm to 1100 nm (VIS-NIR), enabling a wide variety of analytical applications.
- **Touchscreen Operation :**
Features a large 7-inch touchscreen interface for effortless instrument setup and navigation. Seamlessly switch between measurement modes, Including Absorbance (A), Transmittance (%T), Concentration (C) and wavelength scan.
- **Automated Wavelength Selection :**
Simply enter the target wavelength and the instrument's automated system precisely positions the grating, ensuring rapid, repeatable, and error-free measurements.

Applications

The versatility of the SPE 3000 TD makes it an essential tool in various fields :

- Pigment and dye characterization
- Surface coating analysis
- Pharmaceutical powder evaluation
- Food texture and color studies
- Textile and polymer reflectance testing
- Academic research in material optics



Specifications

Type of Spectrophotometer	:	VISIBLE
Type of Optical System	:	Single Beam Czerny - turner with 1200 l/mm holographic grating
Type of Optical System	:	Single Beam Czerny - turner with 1200 l/mm holographic grating
Light Source	:	Quartz Halogen Lamp 20W

Wavelength

Range	:	360 to 1100 nm
Resolution	:	0.1 nm
Accuracy	:	± 0.5 nm
Wavelength Setting	:	Auto
Photometric Accuracy	:	± 0.5 % T
Photometric Repeatability	:	± 0.3 % T
Photometric Range	:	0 - 2.5 A, 0 - 100 % T
Scanning Speed	:	Low, Medium & High
Stray Light	:	< 0.5 % T
Stability	:	± 0.002 A / h @ 500 nm

Display

Mode	:	Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)



Detector	:	Silicon Photodiode
PC Interface	:	USB
Software	:	Holmarc Spectrophotometer & Thin Film Pro
Sample holder	:	10 mm pathlength Cuvette holder (upto 50 mm)
	:	Standard thin film sample holder (Rotatable)
	:	Integrating sphere with powder sample holder
Input Voltage	:	230V / 110V 50Hz
Dimension	:	505 x 430 x 300 mm
Weight	:	20 Kg

Diffuse reflection Measurements (DRS)

Integrating Sphere	:	50 mm
Coating	:	High reflective BaSO ₄ Mix
No of ports	:	3 Nos
Sample placing	:	From the top side
Wavelength range	:	360 - 1100
Sample types	:	Thin film, Powder, Solids etc.
Reference sample	:	30 mm BaSO ₄ mix coated

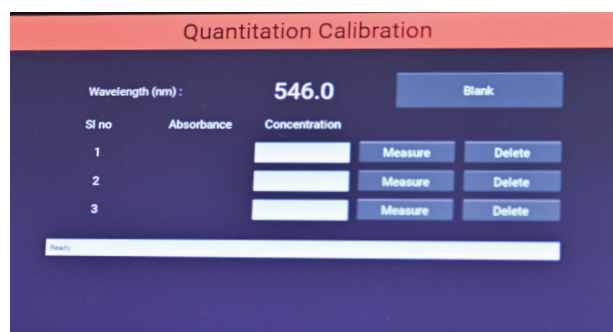
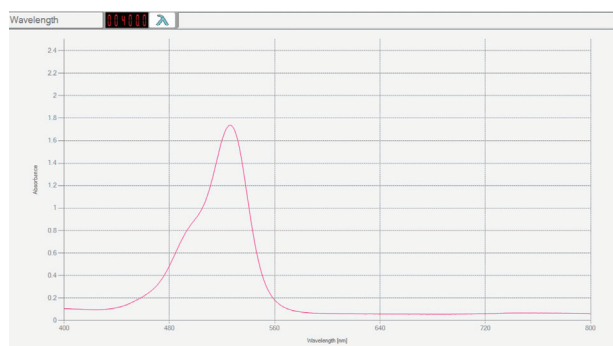
Thin Film characterization

Film Thickness	:	100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	:	0 - 100 %
Standard Sample for calibration	:	ITO thin film
Measuring modes	:	Curve fitting / Regression Algorithms
Dispersion formulas	:	Cauchy's, Sellmeiers & Empirical Models
Material Library	:	Extendable Material user library

Single Beam UV-Visible Spectrophotometer

Model: Model: SPE 3000 UV

The SPE 3000 UV is a powerful and easy-to-use single beam UV-visible spectrophotometer engineered for accurate and dependable performance across diverse analytical needs. From academic research and routine quality assurance to clinical diagnostics, the SPE 3000 UV consistently delivers precise results in a compact, rugged design. Its user-friendly interface and highly stable optical system make it an excellent choice for laboratories that prioritize both efficiency and precision.

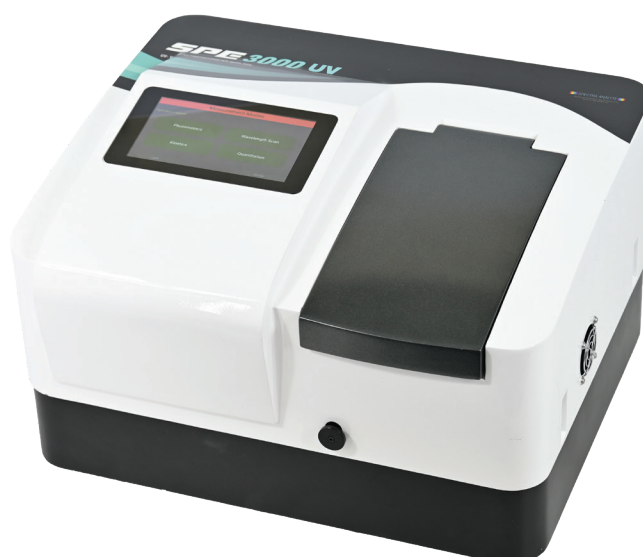


Key Features

- Wide Wavelength Range :**
Covers 190 - 1100 nm for comprehensive UV and visible light analysis.
- Compact & Durable Design:**
Built to withstand rigorous lab environments without compromising performance.
- Intuitive Operation :**
Features a 7 inch large touch screen for easy setup and navigation through various measurement modes, including Absorbance (A), Transmittance (% T), Concentration (C) and Factor (F).
- High-Quality Optics :**
The Czerny-Turner optical design with a 1200 lines/mm UV blazed holographic grating ensures low stray light and high resolution. A long-life tungsten halogen lamp provides stable illumination.

Applications

- Environmental Monitoring
- Clinical & Biochemical
- Food & Beverage
- Industrial QC
- Education & Research



UV VIS NIR
ACCESSORIES

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SPECTRA
INSTRUMENTS



Specifications



Type of Spectrophotometer	: UV VISIBLE
Type of Optical System	: Single Beam Czerny - turner with 1200 l/mm UV blazed holographic grating
Light Source	: 20 W Deuterium & 20 W Quartz Halogen Lamp

Wavelength



Range	: 190 to 1100 nm
Resolution	: 0.1 nm
Accuracy	: ± 0.5 nm
Wavelength Setting	: Auto



Photometric Accuracy	: ± 0.5 % T
Photometric Repeatability	: ± 0.3 % T
Photometric Range	: 0 - 2.5 A, 0 - 100 % T
Scanning Speed	: Low, Medium & High
Stray Light	: < 0.5 % T
Stability	: $\pm 0.002A / h@500$ nm

Display



Mode	: Colour Touchscreen
Size	: 7 Inch
Memory	: 1 GB (Expandable)

Detector	: Silicon Photodiode
PC Interface	: USB
Software	: Holmarc Spectrophotometer
Sample holder	: 10 mm pathlength Cuvette holder (up to 50 mm)
Input Voltage	: 230V / 110V 50Hz
Dimension	: 505 x 430 x 300 mm
Weight	: 20 Kg

Single Beam UV-Visible Spectrophotometer with Thin film characterization

Model: SPE 3000 UV T

The 3000 UV T Single Beam UV Visible Spectrophotometer is a precision analytical instrument designed for reliable and accurate measurements in the UV visible & NIR spectrum. Engineered for simplicity and performance, it is an ideal choice for laboratories, academic institutions, and industrial quality control environments. This model includes a thin film sample holder, enabling comprehensive thin film characterization across the VIS-NIR spectral range. Both the sample and detector can be precisely positioned to accommodate various angles of incidence, allowing accurate reflection measurements. Paired with the powerful Thin Film Pro software, the 3000 UV T offers advanced analytical capabilities, including thin film thickness and refractive index determination. It's an indispensable tool for researchers focused on optical materials, coatings and surface science.

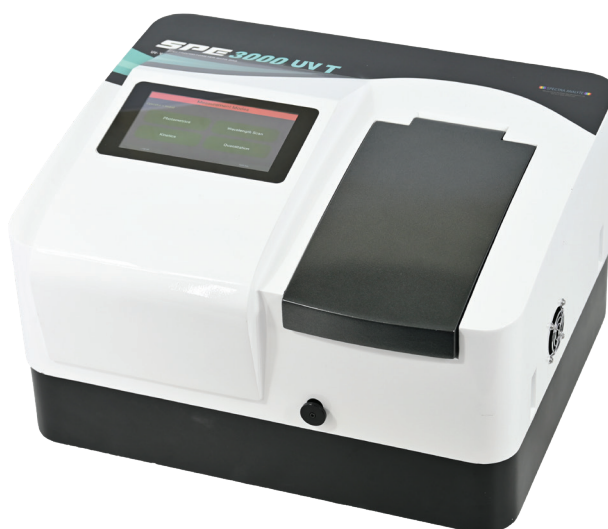


Key Features

- **Optical configuration :**
Single beam system with 1200 l/mm optical holographic grating
- **Versatile Thin Film Analysis :**
A fully rotatable sample holder and detector system allows for precise transmittance and reflectance measurements of thin films at variable angles of incidence.
- **Wavelength Coverage :**
Perform measurements across a broad spectral range from 360 nm to 1100 nm (VIS-NIR), enabling a wide variety of analytical applications.
- **Wavelength accuracy :**
 ± 0.5 nm ensures dependable readings.
- **Touchscreen Operation :**
Features a large 7-inch touchscreen interface for effortless instrument setup and navigation. Seamlessly switch between measurement modes, including Absorbance (A), Transmittance (%T), Concentration (C) and wavelength scan.
- **Automated Wavelength Selection :**
Simply enter the target wavelength and the instrument's automated system precisely positions the grating, ensuring rapid, repeatable and error-free measurements.

Applications

- Environmental Monitoring
- Clinical & Biochemical
- Food & Beverage
- Industrial QC
- Education & Research



Specifications

Type	:	UV VISIBLE
Type of Optical System	:	Single Beam Czerny - turner with 1200 l/mm UV blaze holographic grating
Light Source	:	20 W Deuterium & 20W Quartz Halogen Lamp

Wavelength

Range	:	190 to 1100nm
Resolution	:	0.1 nm
Accuracy	:	± 0.5 nm
Wavelength Setting	:	Auto

Photometric Accuracy	:	± 0.5 % T
Photometric Repeatability	:	± 0.3 % T
Photometric Range	:	0 - 2.5 A, 0 - 100 % T
Scanning Speed	:	Low, Medium & High
Stray Light	:	< 0.5 % T
Stability	:	$\pm 0.002A$ / h @ 500 nm

Display

Mode	:	Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)



Detector	:	Silicon Photodiode
PC Interface	:	USB
Software	:	Holmarc Spectrophotometer & Thin Film Pro

Sample holder	:	10 mm path length Cuvette & Standard thin film sample holder
Input Voltage	:	230V / 110V 50Hz
Dimension	:	505 x 430 x 300 mm
Weight	:	20 Kg

Thin film characterization

Film Thickness range	:	100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	:	0 - 100 %
Standard Sample for calibration	:	ITO thin film
Measuring modes	:	Curve fitting / Regression Algorithms
Dispersion formulas	:	Cauchy's, Sellmeiers & Empirical Models
Material Library	:	Extendable Material user library

Single Beam UV Visible Spectrophotometer Thin film & DRS

Model: SPE 3000 UV TD

The 3000 UV TD Single Beam Visible Spectrophotometer is a comprehensive, all-in-one system designed for high-precision optical measurements across a wide range of sample types - including liquids, solids, thin films, and diffuse reflectance samples.

It comes equipped with three specialized sample holders :

- A standard cuvette holder for liquid samples
- A rotatable thin film holder
- A 50 mm integrating sphere for Diffuse Reflectance Spectroscopy (DRS)

Both the sample and detector positions are fully adjustable, enabling precise control over the angle of incidence and detection - ideal for accurate reflection and angular-resolved measurements.



DRS with Integrating Sphere

The integrated 50 mm integrating sphere is purpose-built for DRS applications, allowing high-accuracy reflectance measurements of opaque, scattering and non-transparent samples - where traditional transmission techniques are ineffective. To facilitate safe and efficient handling of powder samples, the system includes quartz-window-based powder holders, offering both protection and ease of placement.

Diffuse Reflectance Spectroscopy (DRS)

DRS is a powerful technique used to measure the reflectance properties of solid or powdered samples. Unlike direct reflectance, DRS captures scattered light from all angles using an integrating sphere, enabling accurate analysis of samples with irregular surfaces or complex textures.

Key Features

- **Diffuse Reflection measurement :**
Enabling accurate analysis of samples with irregular surfaces or complex textures
- **Integrating Sphere :**
High-reflectance coated sphere for uniform light collection.
- **Thin Film Analysis :**
A fully rotatable sample holder and detector system allows for precise transmittance and reflectance measurements of thin films at variable angles of incidence.
- **Wavelength Coverage :**
Perform measurements across a broad spectral range from 190 nm to 1100 nm (VIS-NIR), enabling a wide variety of analytical applications.
- **Touchscreen Operation :**
Features a large 7-inch touchscreen interface for effortless instrument setup and navigation. Seamlessly switch between measurement modes, including Absorbance (A), Transmittance (%T), Concentration (C) and wavelength scan.
- **Automated Wavelength Selection :**
Simply enter the target wavelength and the instrument's automated system precisely positions the grating, ensuring rapid, repeatable, and error-free measurements.

Applications

The versatility of the SPE 3000 UV TD makes it an essential tool in various fields :

- Pigment and dye characterization
- Surface coating analysis
- Pharmaceutical powder evaluation
- Food texture and color studies
- Textile and polymer reflectance testing
- Academic research in material optics



Specifications

Type of Spectrophotometer	:	UV VISIBLE
Type of Optical System	:	Single Beam Czerny - turner with 1200 l/mm holographic grating
Light Source	:	20 W Deuterium & Quartz Halogen Lamp

Wavelength

Range	:	190 to 1100 nm
Resolution	:	0.1 nm
Accuracy	:	± 0.5 nm
Wavelength Setting	:	Auto
Photometric Accuracy	:	± 0.5 % T
Photometric Repeatability	:	± 0.3 % T
Photometric Range	:	0 - 2.5 A, 0 - 100 % T
Scan Speed	:	Low, Medium & High
Stray Light	:	< 0.5 % T
Stability	:	± 0.002 A / h @ 500 nm

Display

Mode	Colour Touchscreen
Size	7 Inch
Memor	1 GB (Expandable)



Detector	:	Silicon Photodiode
PC Interface	:	USB
Software	:	Holmarc Spectrophotometer & Thin Film Pro
Sample holder	:	10 pathlength Cuvette holder (upto 50 mm) Standard thin film sample holder Integrating sphere with powder sample holder



Input Voltage	:	230V / 110V 50Hz
Dimension	:	505 x 430 x 300 mm, 20 Kg
Weight	:	20 Kg

Diffuse reflection Measurements (DRS)

Integrating Sphere	:	50 mm
Coating	:	High reflective BaSO ₄ Mix
No of ports	:	3 Nos
Sample placing	:	From the top side
Wavelength	:	220 - 1100
Sample types	:	Thin film, Powder, Solids etc.
Reference sample	:	30 mm BaSO ₄ mix coated

Thin film characterization

Film Thickness range	:	100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	:	0 - 100 %
Standard Sample for calibration	:	ITO thin film
Measuring modes	:	Curve fitting / Regression Algorithms
Dispersion formulas	:	Cauchy's, Sellmeiers & Empirical Models
Material Library	:	Extendable Material user library

SPE 6000 Series Spectrophotometer

Easy to Use Interface
Ergonomic Hardware
Design
Low Stray Light



UV VIS NIR
ACCESSORIES



The SPE 6000 S Spectrophotometer comes inbuilt colour touch screen which helps easy use of all the functions like wavelength scan, Photometric measurement etc. and saving the measurements. It utilizes a double lamp Czerny turner design to achieve high light throughput and best spectral performance over the 190 nm to 1100nm wavelength range. The high-quality optical grating, detector and control electronics assure low stray light and greater stability over the entire spectral range. The 7-inch touch screen integration provides easy use of the system with all the software functions.

The user-friendly spectra software provided with the instrument to use with any computer through the USB communication.

Accessories

Cuvettes, Cuvette holders, Light sources, optical fiber patch cords, calibration samples, long path cuvettes, reflection probes

Customized accessories are available to address individual application requirements. Model SPE-3000 comes with 10 mm path length cuvettes. Cuvettes of smaller path lengths are available as optional accessory.



- Double beam optical system
- Low noise and Low stray light
- Absorbance, Concentration & Kinetics measurements
- 7" Colour Touch screen display
- Automatic wavelength and photometric calibration
- Separate Login For Administrator And User
- Automatic Dark Correction
- Automatic Baseline Correction
- Live plotting of parameters on front panel display and PC software
- Cuvette and Glass slide holder
- Thin Film Thickness measurement*
- Integrating Sphere for Solid powder samples*
- Compact Design
- Precise measurements over a wide photometric range.
- Step scan function provides reliable peak assignment of samples with sharp or narrow absorption peaks.
- User-friendly graphical interfaces.
- Excellent signal-to-noise ratio for the entire UV to NIR spectral range.

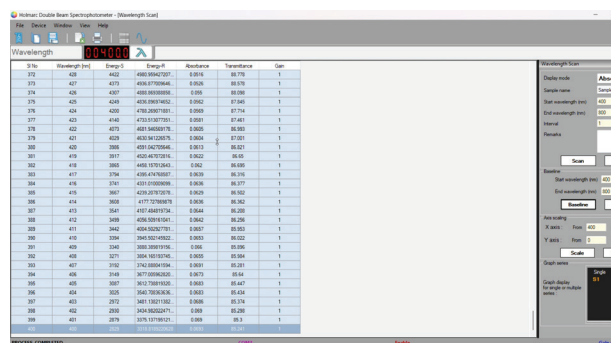
Custom Glass Cuvettes

We can manufacture quartz cells and cuvettes of custom specifications for spectrometer, spectrophotometer, colorimeter, and other instruments

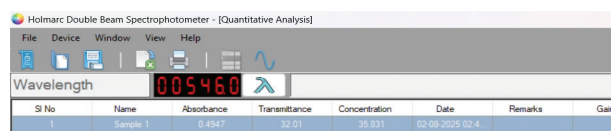
For Custom Glass Cuvettes, please Specify the Material, Optical path, Dimensions (mm), Volume (ml), Beam width (mm)

Software

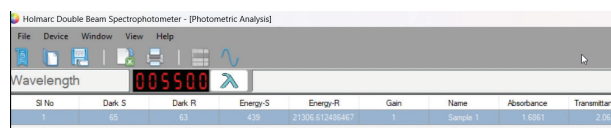
Spectrum scanning
Photometric measurements
Kinetic measurements
Quantitative determination
Multi component analyses
Powerful data processing
Printing report



Wavelength Scan



Quantitation Analysis



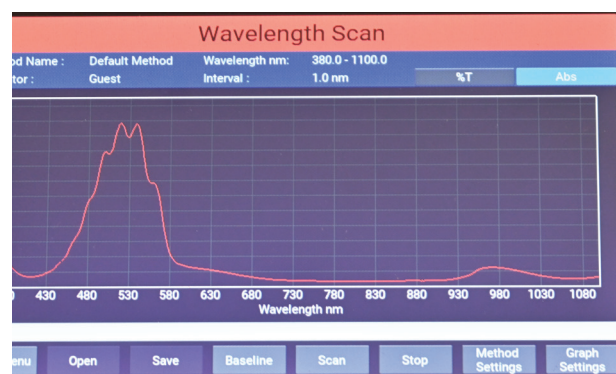
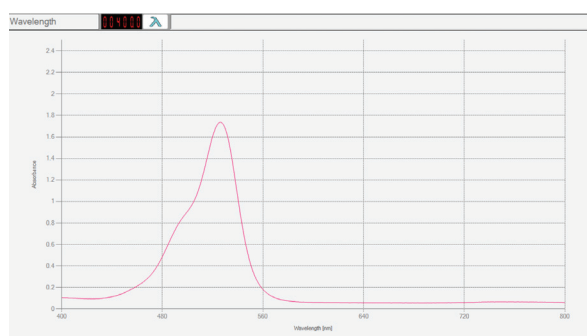
Photometric

Double Beam Visible Spectrophotometer

Model: SPE 6000

The SPE 6000 from Holmarc is a cutting-edge double beam visible spectrophotometer designed to deliver exceptional accuracy, stability, and throughput across the 340–1100 nm spectral range. Engineered for high-performance environments, it's the ideal solution for kinetic studies, photometric analysis, and thin film characterization.

Whether you're conducting advanced research or managing high-volume workflows, The Holmarc SPE6000 offers the precision, flexibility and analytical power to elevate your spectroscopic and thin film measurement capabilities.



Key Features

- Double Beam Configuration**
 Simultaneous measurement of sample and reference signals ensures superior precision by compensating for light-source fluctuations and electronic drift.
- Czerny-Turner Monochromator**
 The most trusted design in modern spectrophotometry, offering high-resolution wavelength selection in a compact and versatile form factor.
- Tungsten-Halogen Light Source**
 Optimized for the visible to near-infrared range (340–1100 nm), delivering consistent illumination for accurate spectral readings.
- Touchscreen Interface**
 A built-in 7-inch color touchscreen simplifies operation—scan wavelengths, perform photometric measurements, and save data with just a few taps.
- Holmarc Spectra Scan Software**
 Seamlessly connect via USB to any computer for advanced control, data management, and analysis. The software empowers users to conduct detailed spectral investigations with ease.

Applications

- Material science & Nanotechnology
- Biomedical Research
- Academic & Research
- Quality control in manufacturing





Specifications



Type of Spectrophotometer	:	Visible
Type of Optical System	:	Double Beam, Czerny - Turner design with 1200 l/mm Holographic Grating
Wavelength Range	:	340 to 1100nm
Spectral Bandwidth	:	1 nm
Wavelength Accuracy	:	± 0.25 nm
Wavelength Repeatability	:	≤ 0.2 nm
Wavelength Setting	:	Automatic, Resolution 0.1 nm
Photometric Range	:	0 - 100 % T, 0 - 2.5 A
Photometric Accuracy	:	± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)
Photometric Repeatability	:	≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)
Stray Light	:	$\leq 0.05\%$ T (220 / 360 nm)
Scanning Speed	:	High, Medium, Low. Max. 1000 nm / minute
Baseline Flatness	:	± 0.0015 A
Stability	::	± 0.002 A/h (500 nm, 0A)
Sample Compartment	:	10 mm Pathlength Cuvette
Detector	:	Dual Silicon Photodiode
Lamp	:	20 W Quartz Halogen lamp
Display	:	In-built display
Mode	:	LCD - Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)
Output Port	:	USB Port
Printer	:	USB Printer
PC Software	:	Holmarc Spectra scan
Power Requirements	:	AC 90-250 V, 50/60 Hz
Dimension	:	505 x 430 x 300 mm, 21 Kg
Weight	:	21 Kg

Double Beam Visible Spectrophotometer with Thin film characterization

Model: SPE 6000 T

The SPE6000 T from Holmarc is a cutting-edge double beam visible spectrophotometer designed to deliver exceptional accuracy, stability and throughput across the 340 - 1100 nm spectral range. Engineered for high-performance environments, it's the ideal solution for kinetic studies, photometric analysis and thin film characterization. The integrated Thin Film Pro software supports advanced analysis, including thin film thickness and refractive index determination, making it an essential tool for optical material research and surface studies. Whether you're conducting advanced research or managing high-volume workflows, the Holmarc SPE6000T offers the precision, flexibility, and analytical power to elevate your spectroscopic and thin film measurement capabilities.

Thin Film Thickness Measurement

Precision Analysis Using Fresnel Equations & Interference Patterns

The SPE 6000T isn't just a spectrophotometer - it's a powerful tool for thin film characterization. By analyzing transmittance spectra and applying Fresnel equations, users can accurately determine film thickness based on interference principles.

How It Works

- **Interference Pattern Analysis** Transmittance spectra reveal interference fringes, which are used to calculate film thickness with high precision
- **Variable Thickness Range** Suitable for films ranging from nanometers to micrometers, depending on :
 - Refractive index of the film and substrate
 - Wavelength of incident light
 - Angle of incidence
- **Thin Film Pro Software** Designed for robust thin film analysis, this software delivers highly accurate and repeatable results across a wide range of materials and applications



Key Features & Optical Design

- **Double Beam Configuration**
Simultaneous measurement of sample and reference signals ensures superior precision by compensating for light-source fluctuations and electronic drift
- **Czerny-Turner**
Monochromator The most trusted design in modern spectrophotometry, offering high-resolution wavelength selection in a compact and versatile form factor.
- **Tungsten-Halogen Light Source**
Optimized for the visible to near-infrared range (340 - 1100 nm), delivering consistent illumination for accurate spectral readings.
- **Touchscreen Interface**
A built-in 7-inch color touchscreen simplifies operation - scan wavelengths, perform photometric measurements and save data with just a few taps.
- **Holmarc Spectra Scan Software**
Seamlessly connect via USB to any computer for advanced control, data management, and analysis. The software empowers users to conduct detailed spectral investigations with ease.

Applications

- Material science & nanotechnology
- Optical coatings & semiconductors
- Biomedical research
- Academic & research
- Quality control in manufacturing



Specifications



Type of Spectrophotometer

Type of Spectrophotometer	: Visible
Type of Optical System	: Double Beam, Czerny - Turner design with 1200 l/mm Holographic Grating
Wavelength Range	: 340 to 1100nm
Spectral Bandwidth	: 1 nm
Wavelength Accuracy	: ± 0.25 nm
Wavelength Repeatability	: ≤ 0.2 nm
Wavelength Setting	: Automatic, Resolution 0.1 nm
Photometric Range	: 0 - 100 % T, 0 - 2.5 A
Photometric Accuracy	: ± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)
Photometric Repeatability	: ≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)
Stray Light	: $\leq 0.05\%$ T (220 / 360 nm)
Scanning Speed	: High, Medium, Low. Max. 1000 nm / minute
Baseline Flatness	: ± 0.0015 A
Stability	: ± 0.002 A/h (500 nm, 0A)
Sample Compartment	: 10 mm path length Cuvette & Standard thin film sample holder
Detector	: Silicon Photodiode
Lamp	: Tungsten Lamp
Display	: In-built display
Mode	: LCD - Colour Touchscreen
Size	: 7 Inch
Memory	: 1 GB (Expandable)
Output Port	: USB Port
Printer	: USB Printer
PC Software	: Holmarc Spectra scan
Power Requirements	: AC 90 - 250 V, 50/60 Hz
Dimensions	: 505 x 430 x 300 mm
Weight	: 21 Kg

Thin film characterization



Film Thickness range	: 100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	: 0 - 100 %
Standard Sample for calibration	: ITO thin film
Measuring modes	: Curve fitting / Regression Algorithms
Dispersion formulas	: Cauchy's, Sellmeiers & Empirical Models
Material Library	: Extendable Material user library

Double Beam Visible Spectrophotometer with Thin film & DRS

Model: SPE 6000 TD

Spectral Analysis, Thin Film Measurement & diffuse reflection spectroscopy

The SPE 6000 TD is a versatile, high-precision visible double beam spectrophotometer designed for advanced optical characterization across solid, liquid, and thin film samples. Engineered with a high-efficiency integrating sphere, precision optics, and modular sample handling, it's the ideal solution for laboratories demanding accuracy, flexibility and speed. Diffuse Reflectance Spectroscopy (DRS) DRS is a powerful technique used to measure the reflectance properties of solid or powdered samples. Unlike direct reflectance, DRS captures scattered light from all angles using an integrating sphere, enabling accurate analysis of samples with irregular surfaces or complex textures.



Thin Film Thickness Measurement

By analysing transmittance spectra and applying Fresnel equations, users can accurately determine film thickness based on interference principles. Thin Film Pro Software Designed for robust thin film analysis, this software delivers highly accurate and repeatable results across a wide range of materials and applications.

DRS with Integrating Sphere

The integrated dual integrating sphere is purpose-built for DRS applications, allowing high-accuracy reflectance measurements of opaque, scattering, and non-transparent samples-where traditional transmission techniques are ineffective. To facilitate safe and efficient handling of powder samples, the system includes quartz-window-based powder holders, offering both protection and ease of placement.

Key Features

- **Diffuse Reflection measurement :**
enabling accurate analysis of samples with irregular surfaces or complex textures
- **Integrating Sphere :**
High-reflectance coated sphere for uniform light collection.
- **Thin Film Analysis :**
A fully rotatable sample holder and detector system allows for precise transmittance and reflectance measurements of thin films at variable angles of incidence.
- **Double Beam Configuration**
Simultaneous measurement of sample and reference signals ensures superior precision by compensating for light-source fluctuations and electronic drift.
- **Czerny-Turner Monochromator**
The most trusted design in modern spectrophotometry, offering high-resolution wavelength selection in a compact and versatile form factor.
- **Holmarc Spectra Scan Software**
Seamlessly connect via USB to any computer for advanced control, data management, and analysis. The software empowers users to conduct detailed spectral investigations with ease.

Applications

- Material science & nanotechnology
- Optical coatings & semiconductors
- Biomedical research
- Academic & research
- Quality control in manufacturing



Specifications

Type of Spectrophotometer

	:	VISIBLE
Type of Optical System	:	Double Beam, Czerny - Turner design with 1200 l/mm Holographic Grating
Wavelength Range	:	340 - 1100 nm
Spectral Bandwidth	:	1 nm
Wavelength Accuracy	:	± 0.25 nm
Wavelength Repeatability	:	≤ 0.2 nm
Wavelength Setting	:	Automatic, Resolution 0.1 nm
Photometric Range	:	0 - 100 % T, 0 - 2.5 A
Photometric Accuracy	:	± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)
Photometric Repeatability	:	≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)
Stray Light	:	$\leq 0.05\%$ T (220 / 360 nm)
Scanning Speed	:	High, Medium, Low. Max. 1000 nm / minute
Baseline Flatness	:	± 0.0015 A
Stability	:	± 0.002 A/h (500 nm, 0A)
Sample Compartment	:	10 mm Pathlength Cuvette
Detector	:	Silicon Photodiode
Lamps	:	Tungsten Lamp
Display	:	In-built display
Mode	:	LCD - Colour Touchscreen
Size	:	7 Inch
Memory	:	1 GB (Expandable)
Output Port	:	USB Port
Printer	:	USB Printer
PC Software	:	Holmarc Spectra scan
Power Requirements	:	AC 90 - 250 V, 50/60 Hz
Dimension	:	505 x 430 x 300 mm
Weight	:	21Kg

Diffuse reflection Measurements (DRS)

Integrating Sphere	:	50 mm
Design	:	Dual integrating sphere (one for reference & other for sample)
Coating	:	High reflective BaSO ₄ Mix
No of ports	:	3 Nos
Sample placing	:	From the top side
Wavelength range	:	220 - 1100
Sample types	:	Thin film, Powder, Solids etc.
Reference sample	:	30 mm BaSO ₄ mix coated

Thin film characterization

Film Thickness range	:	100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	:	0 - 100 %
Standard Sample for calibration	:	ITO thin film
Measuring modes	:	Curve fitting / Regression Algorithms
Dispersion formulas	:	Cauchy's, Sellmeiers & Empirical Models
Material Library	:	

Double Beam UV-Visible Spectrophotometer

Model: SPE 6000 UV

Engineered for precision, the Holmarc SPE6000UV is a cutting-edge spectrophotometer tailored for laboratories that demand uncompromising accuracy, long-term stability, and effortless usability. Its advanced double-beam Czerny-Turner optical configuration, paired with dual light sources, delivers exceptional light throughput and consistent spectral performance across a wide wavelength range of 190 nm to 1100 nm.



A built-in 7-inch color touchscreen streamlines operation, offering intuitive access to key functions such as wavelength scanning, photometric analysis, and direct data storage. The system's high-grade optical grating, sensitive detector, and precision electronics work in harmony to minimize stray light and maintain superior stability throughout the spectrum.

Holmarc's Spectra Scan PC software, designed for seamless data acquisition, analysis, and reporting via USB connectivity. Whether you're in research, education, or industrial quality control, the SPE6000UV stands out as a reliable and versatile solution for a wide range of analytical applications.



Key Features

- High-Performance Double Beam Optics**
 Utilizes a Czerny-Turner design with a 1200 l/mm Holographic Grating and dual Tungsten & Deuterium lamps for superior light throughput and optimal spectral performance across 190 nm to 1100 nm.
- Exceptional Accuracy and Stability :**
 Benefit from remarkably low stray light, excellent baseline flatness and high stability, ensuring highly reliable and reproducible results for even the most demanding applications.
- Comprehensive PC Software Included**
 The user-friendly 'Holmarc Spectra Scan' software is provided, allowing seamless USB communication for advanced data acquisition, analysis, quantitative determination, kinetics studies, and professional report generation on any computer.
- Intuitive 7-inch Color Touch Screen :**
 Navigate all instrument functions with ease, including wavelength scans, photometric measurements, and direct data saving. The large, responsive display enhances user experience and workflow efficiency. Features 1 GB of built-in memory.

Applications

The Holmarc SPE6000 UV Double Beam Spectrophotometer is an indispensable tool across numerous fields, including :

- Pharmaceutical Research & Quality Control Drug discovery, dissolution testing, active pharmaceutical ingredient (API) analysis
- Biotechnology & Life Sciences : DNA / RNA and protein quantification, enzyme kinetics, cell density measurements.
- Environmental Monitoring : Water quality analysis, pollutant detection and quantification
- Food & Beverage Analysis : Quality assurance, nutrient analysis, color assessment.
- Chemical & Material Science : Purity assessment, reaction monitoring, thin-film characterization.
- Academic Research & Educational Laboratories : General quantitative and qualitative analysis, method development, and student training.





Specifications

Type of Spectrophotometer

: UV VISIBLE



Wavelength

Range : 190 - 1100 nm

Spectral Bandwidth : 1 nm

Optical System : Double Beam, Czerny-Turner design with 1200 l/mm Holographic Grating

Wavelength Accuracy : ± 0.25 nm

Wavelength Repeatability : ≤ 0.2 nm

Wavelength Setting : Automatic, Resolution 0.1 nm

Photometric Range : 0 - 100 % T, 0 - 2.5 A

Photometric Accuracy : ± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)

Photometric Repeatability : ≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)

Stray Light : $\leq 0.05\%$ T (220 / 360 nm)

Scan Speed : High, Medium, Low. Max. 1000 nm / minute

Baseline Flatness : ± 0.0015 A

Stability : ± 0.002 A/h (500 nm, 0A)

Noise : $\leq 0.2\%$ T / 3 min (250 / 500 nm, 0% T); $\leq 0.5\%$ T / 3 min (250 / 500 nm, 100% T)

Sample Compartment : 10 mm Pathlength Cuvette

Detector : Dual Silicon Photodiode

Lamps : 20 W Deuterium & 20W Quartz Halogen Lamp

Light Source Switching : Automatic switching selectable for 325 - 370 nm range

Display : In-built LCD - Colour Touchscreen (7 Inch, 1 GB Memory)

Output Port : USB Port

Printer : USB Printer compatible

PC Software : Holmarc Spectra Scan

Power Requirements : AC 90-250 V, 50/60 Hz

Dimension : 505 x 430 x 300 mm

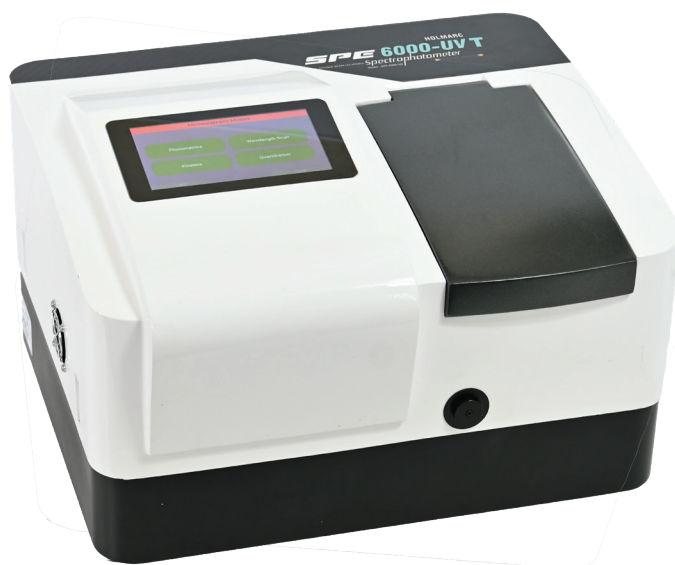
Weight : 21 Kg



Double Beam UV-Visible Spectrophotometer with Thin film characterization

Model: SPE 6000 UV T

The Holmarc SPE6000 UV-T is a high-performance double beam spectrophotometer engineered for laboratories that demand exceptional accuracy, stability, and versatility. Designed with a robust Czerny-Turner optical system and dual light sources (Tungsten and Deuterium), it delivers superior spectral performance across a wide wavelength range of 190 nm to 1100 nm. Now enhanced with thin-film characterization capabilities, the SPE6000 UV-T empowers researchers and engineers to analyze film thickness, refractive index, and optical constants with precision - making it an indispensable tool for material science, semiconductor development, and advanced coatings research.



Key Features

- **Double Beam Czerny-Turner Optics**
Ensures high light throughput and minimal stray light using a 1200 l/mm holographic grating.
- **Thin-Film Measurement Module**
Analyze thin films via transmission or reflection spectra to determine thickness, refractive index, and more.
- **Advanced Touchscreen Interface**
A 7-inch color display offers intuitive control over wavelength scanning, photometric analysis, and data storage.
- **Holmarc Spectra Scan Software**
Includes dedicated thin-film analysis tools for modelling, curve fitting, and report generation.
- **Exceptional Stability & Accuracy Low noise,**
high repeatability, and baseline flatness ensure reliable results across demanding applications.

Applications

- The Holmarc SPE6000 UV T Double Beam Spectrophotometer is an indispensable tool across numerous fields, including :
- Thin-Film & Coating Analysis Characterize optical coatings, semiconductor layers, and nanostructured films
- Pharmaceutical & Life Sciences Quantify DNA / RNA, proteins, and active ingredients with precision.
- Environmental Monitoring Detect pollutants and assess water quality.
- Food & Beverage Quality Control Perform colorimetric and nutrient analysis.
- Academic & Industrial Research Ideal for method development, student training, and advanced material studies.



Specifications

Type of Spectrophotometer	: UV VISIBLE
Measurement Modes	: Transmittance, Reflectance, Absorbance, Thin film thickness
Type of Optical System	: Double Beam, Czerny-Turner design with 1200 l/mm Holographic Grating
Wavelength	
Range	: 190 to 1100nm
Spectral Bandwidth	: 1 nm
Wavelength Accuracy	: ± 0.25 nm
Wavelength Repeatability	: ≤ 0.2 nm
Wavelength Setting	: Automatic, Resolution 0.1 nm
Photometric	
Photometric Range	: 0 - 100 % T, 0 - 2.5 A
Photometric Accuracy	: ± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)
Photometric Repeatability	: ≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)
Stray Light	: $\leq 0.05\%$ T (220 / 360 nm)
Scanning Speed	: High, Medium, Low. Max. 1000 nm / minute
Baseline Flatness	: ± 0.0015 A
Stability	: ± 0.002 A/h (500 nm, 0A)
Noise	: $\leq 0.2\%$ T / 3 min (250 / 500 nm, 0% T); $\leq 0.5\%$ T / 3 min (250 / 500 nm, 100% T)
Sample Compartment	: 10 mm Pathlength Cuvette, Rotatable thin film sample holder
Detector	: Dual Silicon Photodiode
Lamps	: 20 W Deuterium & 20W Quartz Halogen Lamp
Light Source Switching	: Automatic switching selectable for 325 - 370 nm range
Display	: In-built LCD - Colour Touchscreen (7 Inch, 1 GB Memory)
PC Software	: Holmarc Spectra Scan
Dimension	: 505 x 430 x 300 mm, 21 Kg

Thin film characterization

Film Thickness range	: 100 nm - 3.5 μ m
Absolute Transmittance / Reflectance range	: 0 - 100 %
Standard Sample for calibration	: ITO thin film
Measuring modes	: Curve fitting / Regression Algorithms
Dispersion formulas	: Cauchy's, Sellmeiers & Empirical Models
Material Library	: Extendable Material user library

Double Beam Visible Spectrophotometer with Thin film & DRS

Model: SPE 6000 UV-TD

The SPE 6000 UV-TD is a high-performance double beam spectrophotometer designed for advanced research in optical spectroscopy, material science, and thin film analysis. With its robust optical design, integrated Diffuse Reflectance Spectroscopy (DRS) module, and rotatable thin film characterization system, this instrument offers unmatched versatility and precision for both academic and industrial applications.

It features a 50 mm dual integrating sphere assembly for high-sensitivity Diffuse Reflectance Spectroscopy, enabling non-destructive analysis of opaque, powdered, and solid samples. This configuration enhances light collection efficiency and minimizes angular dependence, making it ideal for:

- Band gap estimation
- Colorimetric and pigment studies
- Material identification and quality control

The dual sphere design ensures accurate reflectance measurements by compensating for specular and diffuse components, delivering reliable data even for challenging sample geometries.

For thin film analysis, the instrument incorporates a rotatable sample holder and detector assembly, allowing angle-resolved measurements of transmission and reflection spectra. This setup enables precise determination of:

- Film thickness (100 nm – 3.5 μm)
- Refractive index (n) and extinction coefficient (k)
- Optical constants and dispersion profiles
- Multilayer structure modeling

The rotatable geometry supports variable angle spectroscopy, essential for characterizing anisotropic films, interference coatings, and layered materials.

Key features

- The instrument is based on a double-lamp Czerny-Turner optical design with 1200 l/mm Holographic grating, which ensures high light throughput and delivers outstanding spectral performance across a wide wavelength range of 190 nm to 1100 nm.
- The use of a high-quality optical grating, a sensitive detector, and precise control electronics ensures low stray light and excellent stability throughout the entire spectral range.
- Thin film characterization
- Diffuse reflection measurement



Specifications

Type of Spectrophotometer	: UV VISIBLE
Measurement Modes	: Transmittance, Reflectance, Absorbance, Thin film thickness
Type of Optical System	: Double Beam, Czerny-Turner design with 1200 l/mm Holographic Grating

Wavelength

Range	: 190 to 1100nm
Spectral Bandwidth	: 1 nm
Wavelength Accuracy	: ± 0.25 nm
Wavelength Repeatability	: ≤ 0.2 nm
Wavelength Setting	: Automatic, Resolution 0.1 nm

Photometric

Photometric Range	: 0 - 100 % T, 0 - 2.5 A
Photometric Accuracy	: ± 0.002 A (0~0.5A), ± 0.003 A (0.5~1A), $\pm 0.3\%$ T (0~100% T)
Photometric Repeatability	: ≤ 0.001 A (0~0.5A), ≤ 0.002 A (0.5~1A), $\leq 0.2\%$ T (0~100% T)



Stray Light	: $\leq 0.05\%$ T (220 / 360 nm)
Scanning Speed	: High, Medium, Low. Max. 1000 nm / minute
Baseline Flatness	: ± 0.0015 A
Stability	: ± 0.002 A/h (500 nm, 0A)
Noise	: $\leq 0.2\%$ T / 3 min (250 / 500 nm, 0% T); $\leq 0.5\%$ T / 3 min (250 / 500 nm, 100% T)
Sample Compartment	: 10 pathlength Cuvette holder (up to 50 mm) Standard thin film sample holder Integrating sphere with powder sample holder
Detector	: Dual Silicon Photodiode
Lamps	: 20 W Deuterium & 20W Quartz Halogen Lamp
Light Source Switching	: Automatic switching selectable for 325 - 370 nm range
Display	: In-built LCD - Colour Touchscreen (7 Inch, 1 GB Memory)
PC Software	: Holmarc Spectra Scan
Dimension	: 505 x 430 x 300 mm, 21 Kg

Thin film characterization

Thin Film	
Thickness	: 100 nm - 3.5 μ m
Transmittance	: 0 - 100 %
Standard	: ITO thin film
Measuring modes	: Curve fitting / Regression Algorithms

Diffuse reflection Measurements (DRS)

DRS	: 50 mm
Design	: Dual integrating sphere (one for reference & other for sample)
Coating	: High reflective BaSO4 Mix
No of ports	: 3 Nos
Sample placing	: From the top side
Wavelength	: 220 - 1100
Sample types	: Thin film, Powder, Solids etc.
Reference	: 30 mm BaSO4 mix coated

Theta 2 Theta Advanced scanning Spectrophotometer



Model: SPA-SP300C2

Reliable measurement techniques for optical characterization of thin film is a must for any laboratory. HOLMARC's Theta 2 Theta Spectrophotometer is a useful tool for characterizing absorption, transmission, and reflectivity of a variety of materials such as pigments, coatings, windows, and filters. Automated Theta 2 Theta goniometer tool is used for measuring absolute reflectance and transmittance of samples at different angles for characterization of the optical or electronic properties of materials. Reflectance measurements can identify the color of a sample or examine differences between objects for sorting or quality control. Integrating sphere attachment also provided for solid and powder sample measurements.

Specifications

Wavelength range	: 275 - 2400 nm
Optical system	: Czerny Turner
Wavelength resolution	: 0.1 nm
Wavelength Accuracy	: ± 0.1 nm
Transmittance range	: 0 - 100 %
Transmittance resolution	: 0.1 %
Transmittance Accuracy	: ± 0.1 %
Absorbance range	: 0 - 2A
Absorbance resolution	: 0.001 A
Reflectance range	: 0 - 100 %
Film thickness range	: 35 - 3500 nm
Concentration range	: 0 to 999
Spectral bandwidth	: 0.1 nm, 0.5 nm, 1 nm & 5 nm variable bandwidth Operation
Detector	: Si-Photodiode & InGaAs IR detector
Source	: 50W Quartz Halexon & 30W deuterium combined source
Theta 2 theta stage	: Goniometer based
Sample holder	: 20 x 50 mm size, Custom size Available
Cuvette holder	: 10 mm standard cuvette holder
Angular measurement range	: 30 - 180 degree
Input Voltage	: 230V 50Hz
Control mode	: PC control

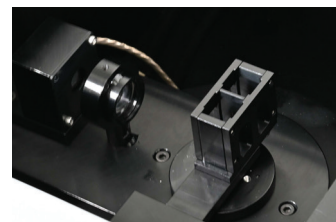
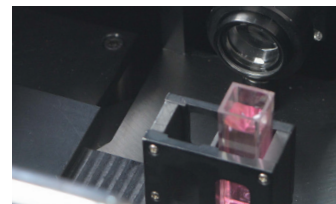
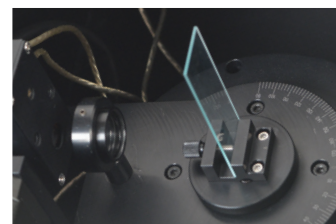


System Features

- Specially designed for optical characterization
- Ideal for reflectance, transmission, absorption and optical density measurements
- Design optimized for low stray light
- Interchangeable holders for solid, liquid and thin film samples

Software designed for photometry

- Spectrum Scanning
- Photometric measurements
- Quantitative determination
- Multi component analysis
- Powerful data processing abilities



Diffuse Reflectance Spectrophotometer

Model HO-SP-DRS 100

Diffuse reflectance spectroscopy is a well-established technique for studying the spectral characteristics of opaque solid samples, based on the principle that not only does light reflected from the material come from the surface (specular reflection) but some is reflected internally (diffuse reflectance). Diffuse reflectance spectroscopy is most readily applicable to powders, any sample that scatters radiation can be characterized using this technique.

Diffuse reflectance UV-visible spectroscopy is mostly used in the applied sciences for the analysis of dyestuffs, printing inks, paints and pigments, paper, ceramics, and so on. For color matching/analysis, visible diffuse reflectance spectroscopy is used for denture materials, tiles, cosmetics, and medicinal tablets, to name a few applications.

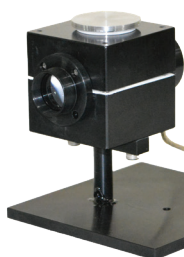
Specifications



Wavelength Range	: 380 to 1100 nm
Resolution	: 1 nm
Accuracy	: ± 1 nm
Spectral bandwidth	: 2 nm
Integrating Sphere	: 100 mm
Attachment size	
Coating	: Barium Sulphate (BaSO ₄)
Angle of incident light	: 0°
Maximum size of sample	: 25 mm Dia
Detector	: Si Photodiode
Active Area	: 5.8 x 5.8 mm
Light Source	: 50W Quartz Halogen Lamp
PC Interface	: RS232 - USB
Input Voltage	: 230V 50Hz

Integrating Sphere

With 100mm Attachment size support



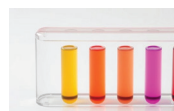
Wavelength

200 to 1100 nm



Sample Size

25mm Maximum



Light Source

Quartz Halogen



Coating

Barium Sulphate (BaSO₄)



Detectors

Silicon – Photodiode,



Theta 2 Theta Advanced Spectrophotometer

Reliable measurement techniques for optical characterization of thin film is a must for any laboratory. HOLMARC's Theta 2 Theta Spectrophotometer is a useful tool for characterizing absorption, transmission, and reflectivity of a variety of materials such as pigments, coatings, windows, and filters. Automated Theta 2 Theta goniometer tool is used for measuring absolute reflectance and transmittance of samples at different angles for characterization of the optical or electronic properties of materials. Reflectance measurements can identify the color of a sample or examine differences between objects for sorting or quality control.

SPA216 Series spectrophotometer gives precise measurements of spectral parameters such as reflection, transmission, and optical density in all spectral range of UV, VIS and NIR. Spectral transmission and reflection measurements at any desired angle with a resolution of 0.5° can be carried out with this spectrophotometer. Two models are available for angular photometric measurements HO-SPA-1990P & HO-SPA-3411D. HO-SPA-1990P is a scientific grade photometer equipped with high sensitive photo multiplier tube. Model : HO-SPA-3411D uses Si-Photodiode as detector. Angles for illumination and measurement can be set independently. The system is provided with motorized polarizer and analyzer to generate polarization curve of the sample at various angles.

The software developed for this instrument has facilities for setting up and calibration in addition to scanning and manual readout. Scanning is possible for a desired wavelength range too. This feature can save time whenever full wavelength range scan is not necessary. The software stores and displays the data acquired on MS Excel sheet. This helps to plot graph with ease whenever required. We hold expertise in designing and manufacturing custom models. Wide variety of accessories (optional) such as test tube holder, long path cuvettes holder and multiple cell holder can be included depending upon the varying application needs of the customer.

Features

- Specially designed for optical characterization
- Ideal for reflectance, transmission, absorption and optical density measurements
- Design optimized for low stray light
- Interchangeable holders for solid, liquid and thin film samples
- Wide range of accessories such as polarizers, filters etc.



Specifications

Model	HO-SPA-3411D	HO-SPA-1990P
Bandwidth	1 nm	0.5 nm
Optical system	C-T monochromator, 1200 l/mm holographic grating	
Wavelength range	340 ~ 1100 nm	190 ~ 900 nm
Photometric method	Transmittance, Absorbance, Concentration	Transmittance, Absorbance, Concentration
Wavelength accuracy	± 0.5 nm	± 0.5 nm
Wavelength repeatability	± 1 nm	± 1 nm
Absorbance range	0 ~ 2Abs	0 ~ 2Abs
Photometric accuracy	± 0.002 A (0 ~ 0.5 A), ± 0.004 A (0.5 ~ 1A), ± 0.3% T	± 0.002 A (0 ~ 0.5 A), ± 0.004 A (0.5 ~ 1A), ± 0.3% T
Photometric repeatability	≤ 0.001 A (0 ~ 0.5 A), ≤ 0.002 A (0.5 ~ 1 A), ± 0.1% T	≤ 0.001 A (0 ~ 0.5 A), ≤ 0.002 A (0.5 ~ 1 A), ± 0.1% T
Stray light	≤ 0.05% T	≤ 0.05% T
Baseline straightness	± 0.002 A	± 0.002 A
Detector	Si - Photodiode	PMT
Light source	Quartz Halogen Lamp	Deuterium / Halogen
Cell holder	Two-position 10mm standard cuvette holde	Two-position 10mm standard cuvette holde
Theta 2 Theta measurement	Goniometer for Angular Measurements Type : Theta 2 Theta Measuring Stage Sample Holder : Up to 50 x 50mm size, Custom Size Available Angular Measurement Range : 30° - 180° Positioning Resolution : 0.5°	Goniometer for Angular Measurements Type : Theta 2 Theta Measuring Stage Sample Holder : Up to 50 x 50mm size, Custom Size Available Angular Measurement Range : 30° - 180° Positioning Resolution : 0.5°
Control Mode	PC control (Software : PhotoANALYTE-G)	PC control (Software : PhotoANALYTE-G)
Dimensions (L x W x H) mm	606 x 352 x 135	606 x 352 x 230
Software	Spectra Photo ANALYTE	

Light Source

Quartz Halogen

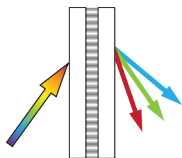


Measurements

Transmittance, Absorbance, Concentration

Holographic Gratings

1200 l/mm holographic grating



UV VIS NIR
ACCESSORIES

Wavelength

HO-SPA-3411D
340 ~ 1100 nm

HO-SPA-1990P
190 ~ 900 nm



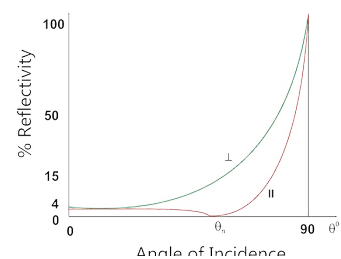
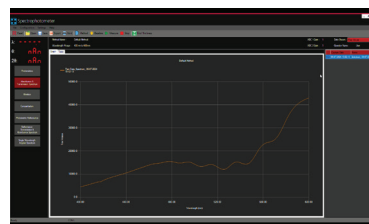
Detectors

Option A
Model HO-SPA-3411D
Si - Photodiode

Option B
Model HO-SPA-1990P
PMT

Software

- Powerful software designed for Photometry
- Spectra Photo ANALYTE
- Powerful software designed for Photometry
- Spectrum scanning
- Photometric measurements
- Quantitative determination
- Multi component analyses
- Powerful data processing abilities
- Printing report



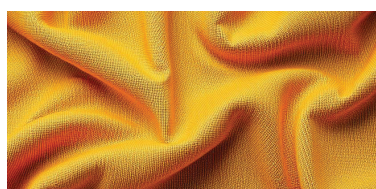
Diffused Reflectance Spectrophotometer

Model : HO-SP-DRSP100

Solid & liquid sample measurement

Diffuse reflectance spectrophotometer is designed for measuring the spectral characteristics of opaque solid samples, Liquid, solids and thin film samples. Diffused reflectance measurement is based on the principle that not only does light reflected from the material come from the surface (specular reflection) but some is reflected internally (diffuse reflectance). Diffuse reflectance spectroscopy is most readily applicable to powders, any sample that scatters radiation can be characterized using this technique. While spectrophotometer setup in the instrument that measures the amount of light intensity absorbed after it passes through sample. Multi-angle spectral photometric measurements / Absolute variable angle reflectance and transmission accessory can be provided on request. Model : HO-SP-DRSP100 provides researchers with more experimental information than conventional spectroscopy.

Wavelength Range	Resolution	1 nm
	Accuracy	± 1 nm
	Spectral bandwidth	2 nm
Transmittance	Range	0 to 100 %
	Resolution	0.1 %
	Accuracy	± 1 %
	Noise Level	± 1 %
	Noise Level	< 1 %
	Stability	1% / Hr after warm-up
Absorbance	Range	0 to 2 A
	Resolution	0.001 A
Concentration	Range	0 to 999
	Calibration with 1 or 2 known standards	
	Direct factor entry	
Sample compartment Nos		2 Nos(one for 10 mm standard cuvette and other for integrating sphere)
Integrating Sphere Attachment size		100 mm
Coating		Barium Sulphate (BaSO ₄)
Angle of incident light		0°
Maximum size of sample		25 mm Dia
Detector		Si Photodiode
Active Area		5.8 x 5.8 mm
Light Source		50W Quartz Halogen Lamp
PC Interface		USB
Input Voltage		230V 50Hz



Food Colour

Integrating Sphere

with 100mm attachment size



Modular Spectrophotometer

Model HO-SP-SQR-MS200F

Holmarc's Modular spectrophotometer model no HO-SP-SQR-MS200F is designed for flexible analysis of spectrophotometric applications & angular based thin film transmittance via multimode fibre. This system comes up with Monochromator model no SQR200F, Deuterium & Halogen lamps with power supply unit, spectrophotometric chamber unit, multimode fibre 1500 μ m with coupling unit & UV enhanced Si photo detector. Holmarc's customized type spectrophotometer is ease to operation by arranging the spectrophotometer in different modules. Chamber unit can placed either in input /output according to the customer needs. Holmarc's modular spectrophotometer is easy for cleaning solutions which spill over chamber unit. Customized Software is available with mode selection for lamps & wavelength base scanning. Light from deuterium lamp (200nm to 380nm) & halogen (380nm to 1100nm) enters to the input slit of the Czerny turner monochromator which collects the light at output slit via multimode fibre which then directs light to the spectrophotometric chamber which detects by the Si photo detector.

- Ease of Usage - Modules of optical units
- Easy for cleaning of sample chamber
- Mode selection (UV-VIS) scanning for sample analysis
- High stabilized UV enhanced Si photo detector with control box
- Research grade cuvette samples
- Standalone monochromator unit
- High core sized Multimode fibre (with SMA) for light collection
- Mounting & dismantling of cuvette holder & Angle based goniometric sample holder unit.

Specifications

Monochromator	Czerny Turner Design, 200F Mirrors, grating density : 1200 l/mm, Wavelength range 200-1100 nm, wavelength Resolution : 0.5 nm
Source	Halogen - Deuterium combined light source, halogen 12V, 20W
Fiber	Multimode 1500 μ m, Core glass, Cladding plastic
Chamber unit	Rectangular type, With Cuvette holder & Angle based stage unit for thin film slides
Software	Customized software

Deuterium Halogen Source

Holmarc's Deuterium Halogen source is a specially designed light source that covers 200 nm to 2500 nm wavelength range. In this compact lamp house both Deuterium and Halogen lights are combined to a single optical path using and motorized rotation mechanism. Output port provided with SMA connector for fiber coupling. High quality optical design delivers maximum light coupling to the optical fiber.

Model No.	HO-HDL-01
Wavelength Range	190 nm - 2.5 μ m
Source	Deuterium & Tungsten Halogen
Lamp Wattage	20W Deuterium & 20W halogen
Input Voltage	230 V

This light source can be used as a UV-VIS-NIR source for different spectroscopic applications. Filter holder, shutter, cuvette / sample holder can be provided optionally.



Customizable software



Scattering Photometer

Environmental research – monitoring particle scattering in air.

Spectroscopic analysis – precision measurement of scattered light.

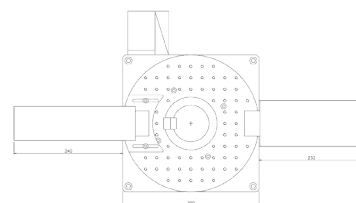
Automated data collection – multi-angle particle characterization system.

Scattering Photometer Single Channel Light Detection

Model : HO-IAD-SG-01

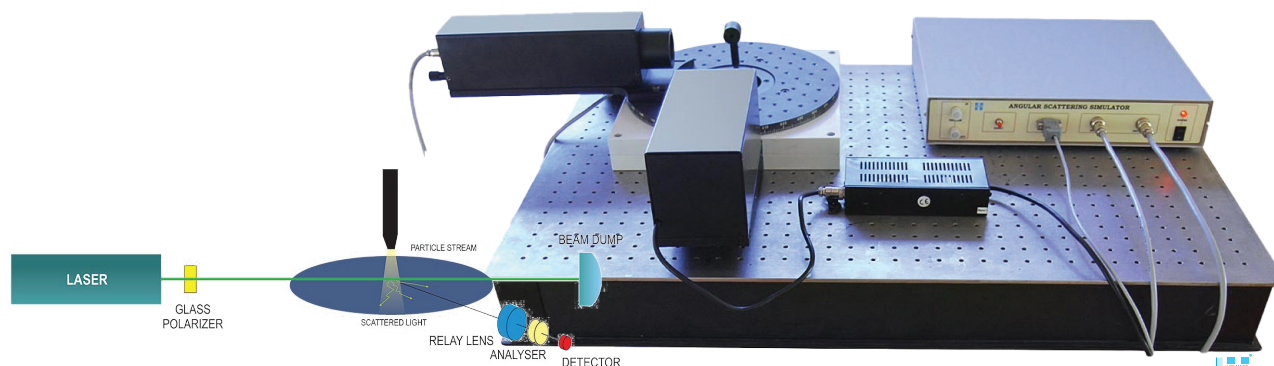
A scattering photometer for measuring the intensity of light scattered by particles has been developed by Holmarc for environmental research. It is a precision instrument designed for spectroscopic measurements of scattered light. This goniometer based instrument provides controlled multi angle measurement of particles. A 100mw laser beam (532nm) is directed first to a linear polarizer and then into a scattering compartment containing the particles under study. The scattered light is focused onto APD (Avalanche Photo Diode) detector to generate an electrical signal indicating the amount of scattered light at that position. The motorized rotation stage helps to take reading at different angles. The entire operation is automated through a personal computer. Custom developed software and interfacing electronics are supplied along with the system. Laser source is mounted on a precision rotation stage with central access hole. The stage is driven by stepper motor. Sample is introduced through the center hole of the stage. As the stage along with the laser source rotates, output data from the detector is collected automatically and saved in the computer with reference to the angular position of the rotation stage.

Note : Model : HO-IAD-SG-01 comes with 100mW DPSS 532nm laser with APD Detector. Other laser and detectors can also be integrated with the system on special request



Specifications

Resolution	0.01 degree
Maximum Speed	10 degree / sec
Traverse	280°
Actuator	Stepper Motor (DPM60SH86 - 2008AF)
Load Capacity	50 Kg
Material	Aluminium
Turn Table Dimension	500 x 500 x 65 mm
Net. Weight	37 Kg

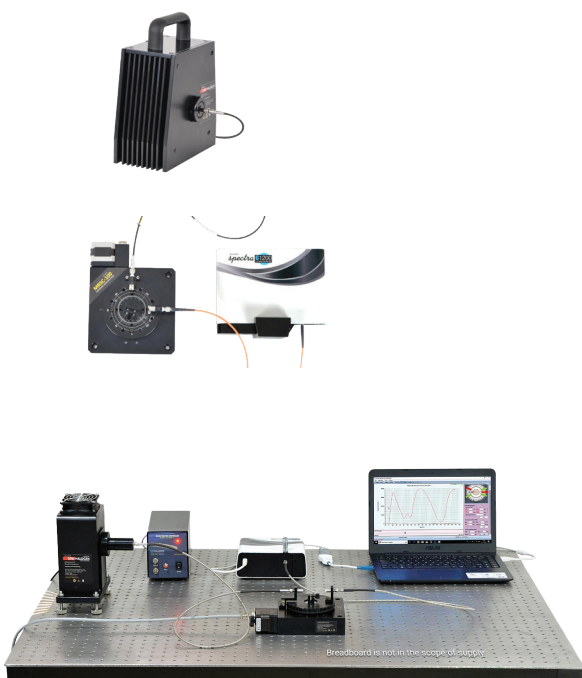


Scattering Photometer Spectral Light Detection

Model : HO-IAD-SG-02

Spectrometer (Model : HO-IAD-SG-02) has been developed for measuring the intensity of light spectrum (ranging from 350 - 1050nm) scattered by particles. It is a precision instrument designed for research applications where spectroscopic measurements need to be carried out from scattered light. Goniometer based design helps in multi angle spectral measurements.

A 50W fiber coupled Quartz halogen lamp is used as the light source for scattering measurements. Light from halogen lamp is coupled to the optical fiber which collimates it into the scattering compartment / sample chamber (containing particles under study) using precision lens system. The scattered light is focused onto a fiber optic cable connected to a compact CCD spectrometer. Software provided with the spectrometer analyze the amount of scattered light at different wavelength and position. The motorized rotation stage helps to take the reading at different angles. The entire operation is automated through a personal computer. Custom developed software and interfacing electronics are supplied along with the system.



Goniometer Specifications

Resolution	0.05 degree
Maximum Speed	10 degree / sec
Traverse	280°
Actuator	Stepper Motor (DPM60SH86 - 2008AF)
Load Capacity	10 Kg
Material	Aluminium
Turn Table Dimension	150 x 150 x 50 mm

Spectrometer Specifications

Spectrograph f #	2.9
Optical Platform	Concave Grating
Spectral Range	350 to 1050 nm
Spectral Resolution	1 nm
Slit Options	Micrometer Controlled Variable Slit
Input Fiber Connector	SMA 905 [FC (Optional)]
Input Fiber NA	0.22
Stray Light	< 0.06 % @ 532nm (< 0.1% overall)
Detector	Toshiba TCD1304AP Linear CCD Array
Pixel Number	3648
Pixel Size	8 x 200 μ m
Pixel Well Depth	100,000 electron
Signal-to-noise Ratio	1,000:1 (at full scale)
A / D Resolution	16 bit
Integration Time	0.1 to 6,500 ms
Frame Rate	up to 138 fps
Trigger Input	Yes, Optional
PC interface	USB 2.0
Software	Spectra ANALYTE Includes DLL libraries and SDKs for easy custom application development

Source Specifications

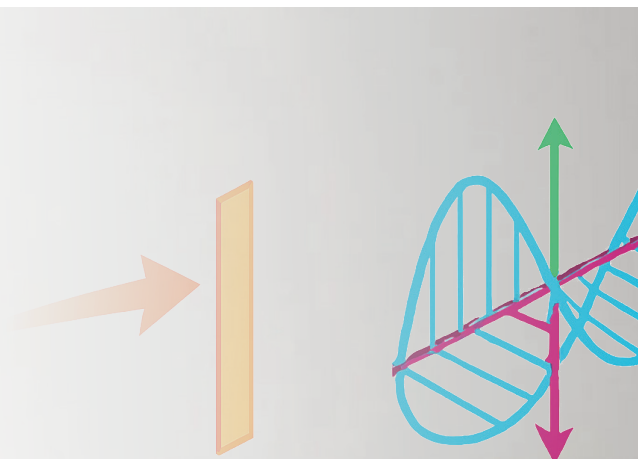
Lamp	Quartz Halogen
Wattage	50 W
Wavelength range	340 - 2700 nm
Powersupply	Constant Current SMPS
Supply	Fixed
Lamp Housing	Forced Air Cooled Type
Optics	Concave metallic mirror
Construction	Aluminium black Anodized

Fiber Specifications

Wavelength Range	190 - 1600 nm
Connector	SMA
Numerical Aperture NA	0.22
Acceptance Angle	25.4°
Operating Temperature	- 40 to +100°C
Length	1.5 m

Ellipsometer

- Thin film thickness measurement
- Refractive index determination
- Educational optical metrology tool



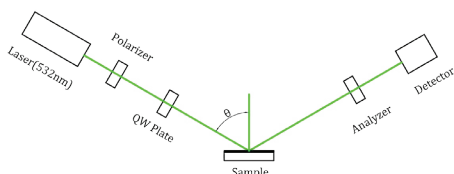
Variable Angle Laser Ellipsometer

Model No: HO-VALE-01

Ellipsometry is a very sensitive optical technique which provides unequalled capabilities for thin film metrology. Ellipsometry exploits phase information and polarization state of light and so can achieve angstrom level resolution. The main advantages of ellipsometry are its non-destructive character, high sensitivity and wide measurement range. HO-VALE-01 model is suitable for educational purpose and the optical parameters like thickness and refractive indices of a single layer thin film can be determined precisely. In the ellipsometer model HO-VALE-01, a circularly polarized light is made incident on the test substrate and the reflected light which is linearly polarized is analyzed for polarization changes. The instrument consists of two concentrically rotating arms around a precisely graduated disc that is fixed to a heavy base. The Laser, Polarizer, and Quarter wave plate are mounted on the laser arm, whereas the analyzer and the detector are mounted on the detector arm. The two arms can be positioned to set the incident angle between 30 and 90 degrees with a resolution of 0.1 degree. The Polarizer, Analyzer, and the Quarter-Wave plate are mounted in precision rotary stages that are 360° rotatable with a resolution of 0.1°. Linear glass polarizers are used for both polarizer and analyser. Sample is placed on a precision micrometer driven vertical stage with height adjustment range of 10 mm and resolution 0.01 mm. For null method, detector can be replaced with a miniature screen for visual determination of null point, if required.

Ellipsometer operation

As shown in the Fig., a randomly polarized laser light (532nm) passes through a polarizer which changes the polarization of light from random polarization to linear polarization. The linearly polarized light then passes through a quarter-wave plate (set the fast axis at 45 degree) which changes the polarization state from linear to circular. After reflection from the sample thin film, the circularly polarized light becomes linearly polarized and an analyzer measures the degree of polarization. A software will be used to find out the thickness and refractive index from the measured data.



Principle of Ellipsometry

Ellipsometry is a highly sensitive optical measurement technique for optical thin films. The principle relies on the analysis of the change in the polarization state of light reflected from a surface. The change in the polarization of light reflected from the thin film surface is measured by taking the amplitude ratio of two perpendicularly polarized beams.

$$\rho = r_p / r_s = \tan \Psi e^{i\Delta}$$

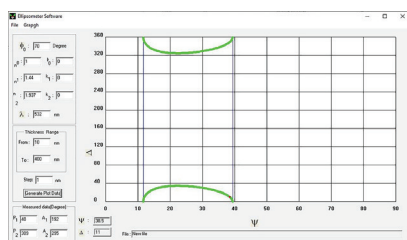
Where Ψ and Δ are the amplitude ratio and phase shift of the p and s components respectively. Since ellipsometry is measuring the ratio of two values, it is very accurate and reproducible.

Ellipsometric Solutions

Need Customization for measurements. HOLMARC's experienced support engineers will be glad to help you. Call us at +91 938-863-2098 or send us a mail to sales@holmarc.com

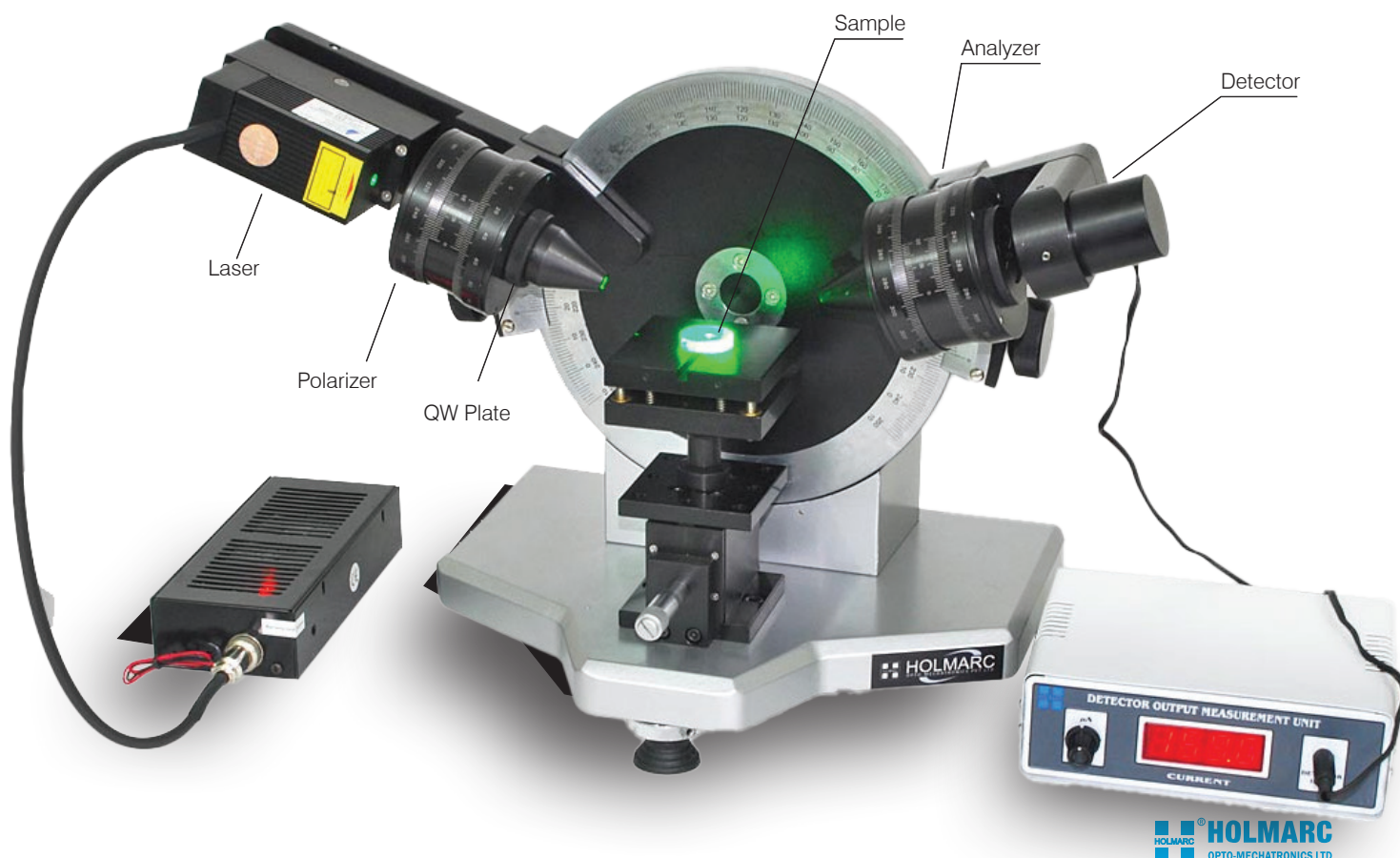
Holmarc can provide custom spectroscopic ellipsometers to fit a wide variety of applications.

Software



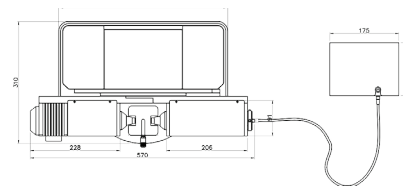
Specifications

Measurement Range	50 nm - 300 nm
Incident Angle	30° ~ 90°, Error ≤ 0.1°
Laser	DPSS (532 nm, 5 mW)
Detector	Si Photodiode (5.8 mm x 5.8 mm)
Rotation Range	
Polarizer	0° - 360°
Quarter-Wave	0° - 360°
Resolution	0.1 degree
Source Arm	
Rotation Range	70 degrees (from horizontal plane)
Main Scale Division	1 degree
Resolution	0.1 degree
Detector Arm	
Rotation Range	70 degrees (from horizontal plane)
Main Scale Division	1 degree
Resolution	0.1 degree
Sample Holder	
Height Adjustment Range	10 mm
Resolution	10 microns
Tilting Range	+/- 2 degree



Variable Angle Spectroscopic Ellipsometer

Model No: HO-SE-01XY / HO-SE-01



Spectroscopic Ellipsometer is a non-contact instrument widely used for thin film analysis and measurements. Holmarc's Spectroscopic Ellipsometer model HO-SE-01 incorporates Rotating Analyzer Ellipsometry(RAE) technology to characterize thin film samples. It uses a high speed CCD array detector to collect the entire spectrum. It measures films from nanometer thickness up to tens of microns and the optical properties from transparent to absorbing materials. It accurately measures optical constants like refractive index, film thickness and extinction coefficient.

HO-SE-01 model is equipped with a 50W Halogen lamp as the light source. A set of motorized rotatable Glan-Thompson polarizers are used as the Polarizer and the Analyser. A motorized Z stage is provided for the automatic focusing of sample and a manual tilting platform is provided for the sample alignment. A motorized XY stage with 30 mm x 30 mm travel is also provided for positioning the sample for measurement at different locations. An optical fiber with SMA connector is used to couple the reflected light from the sample to the spectrometer.

A user-friendly measurement software is provided for the initial calibration and automatic measurements. An analysis software with advanced mathematical fitting algorithm is provided for the deduction of thickness and optical properties from the measured data..

Features

- Advanced mathematical fitting algorithm
- Selection of different optical models
- User extendable optical models
- Data can be save as Excel or text files
- Dedicated software for analysis
- Automated operation
- Automatic sample focusing

Specifications

Model No.	HO-SE-01	HO-SE-01XY
Spectral Range	450 - 800 nm	450 - 800 nm
Ellipsometer configuration	RAE	RAE
Detector	3648 pixel CCD linear sensor	3648 pixel CCD linear sensor
Spectral resolution	1 nm	1 nm
Light Source	Halogen	Halogen
Incident angle	55 - 75 degree (Resolution 0.1 degree, Automated operation)	55 - 75 degree (Resolution 0.1 degree, Automated operation)
Thickness measurement range	20 nm - 10 microns	20 nm - 10 microns
Accuracy	+/- 3 %	+/- 3 %
Resolution of measured R.I	0.001	0.001
Sample thickness	0.3 mm - 8 mm	0.3 mm - 8 mm
Sample XY Stage travel		30 mm x 30 mm (motorized)
Sample focusing	Automated	Automated
Sample alignment	Manual tilt	Manual tilt
Sample measurement	Automatic	automatic
Thickness analysis	Advanced mathematical fitting algorithms	Advanced mathematical fitting algorithms

Motorized Sample XY Stage

30 mm x 30 mm



Incident angle

50 - 75 degree (Resolution
0.1 degree, Automated
operation)



HO-SE-01XY



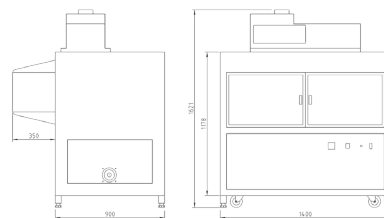
HO-SE-01



Magneto Optic Ellipsometry

Model No: HO-A216MOE-PH

Holmarc has introduced a new innovative high sensitivity and high magnetic field Spectroscopic ellipsometric measuring equipment utilizing the VIS-NIR wavelengths. HOLMARC A216 test station provides standardized testing solution to fit wide ranging optical rotation measurement applications. The modular hardware design allows user to take automatic liquid, solid and thin film sample measurements under magnetic and no magnetic field. Designed for magneto optic material research and testing including magnetic characterizations of ferromagnetic and ferrimagnetic films and materials. Measurement include magnetic hysteresis loops of ultrathin magnetic films and multilayers, Ellipticity measurements, Thin film thickness measurement of dielectric materials, Refractive index, Delta and psi measurements etc. System can be operated in Polar, Longitudinal and Transverse configurations. Instrument is designed for measurement in the wavelength range of 380nm to 845nm using a high sensitive photo multiplier tube made by hamamatsu. It is an extremely flexible test station based on HARS. Any magnetic thin film, crystal or solutions having magnetic field dependancy can be measured. It can be used to measure magnetic properties of magnetic thin films and nano-magnet arrays. Thin film thickness measurements under uniform magnetic field applied to the sample provides user to characterize each class of materials.



Specifications

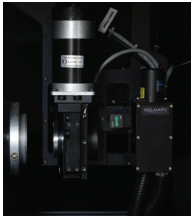
Light source	Spectra Halogen, Deuterium / Halogen or Xenon Arc Lamp
Monochromator	Quasar 300F Czerny-Turner Type
Wavelength Range	350 - 900 nm
Collimating & Focusing mirror	50 mm dia, 300 F
Optical Grating	1200 l / mm
Spectral dispersion	2.6 nm / mm
Absolute Diffraction Efficiency	45 - 65 %
Slit Width	0 ~ 3 mm Continuously Adjustable
Resolution	0.1 nm
Wavelength Accuracy	0.2 nm
Wavelength Repeatability	0.1 nm
Stray Light	10-3
Reciprocal of Linear Dispersion	2.7 mm
Half-Width of Spectral line	0.2 nm @ 586 nm
Polarization analysis method	Rotation analyzing method
ARMS	Stepper Motor Controlled Auto Positioning
Spot Diameter	1 - 5 mm
Thin film Holder Sample size	1 - 12 mm
	Custom Holders can be provided on request)
Cuvette	10 mm Path length Quartz Cuvette
Sample chamber option	High / low temperature sample holder
Sample Feeding Unit	Stepper Motor Controlled Auto Positioning System
Electro Magnet Unit	PC Controlled Constant current operation
Cooling	Water cooled
Max. magnetic field	1.75 Tesla @ 12mm pole gap
Min. Field Detection	1 Gauss

Features

- 350 - 900 nm Measurement Range
- 0.005 Degree Optical Rotation Resolution
- Fully automatic control
- Magnetic field detecting & feedback facility
- MOKE Measurements
- Ellipsometric Measurements

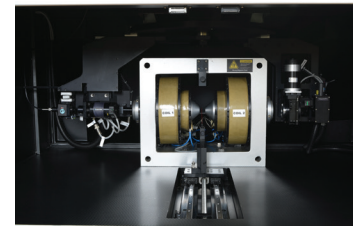
Polarization analysis

Rotation method



Magnetic Field

Magnetic field preciseness	$\pm 0.05 \%$
Field detection	Hall probe based (PC based field measurement)
Feed back of magnetic field	Hall element
Chiller	5 ~ 25°C Chilled water (for cooling electr
Volume	2 L / min.
Power supply for Electro Magnet	Bi-Polar type (Max. ± 90 V/5A
Power supply for Electro Magnet	2.5 kVA AC 220V 50Hz
Control unit	1 kVA AC 220V 50Hz
Software	Spectra ORMS software



MOKE

- **Magnetic characterization of thin films and multilayers**
- **Hysteresis loop measurements**
- **Magnetic anisotropy studies**
- **Surface and interface magnetism analysis**

High Sensitivity Laser-Based Magneto-Optical Kerr Effect (MOKE) Station

Model No: HO-MOKE LB215

HOLMARC MOKE LB215 is a high-sensitivity, laser-based Magneto-Optical Kerr Effect (MOKE) system designed for accurate magnetic characterization of thin films and materials. The system provides a convenient and reliable method to measure changes in magnetic moment under varying magnetic fields and temperatures.

The instrument uses 405 nm, 532 nm, and 650 nm diode lasers and employs a lock-in amplifier technique with optical modulation to achieve excellent sensitivity. The sample is mounted at the center of a high-field, variable-gap dipole electromagnet, with its surface oriented either parallel or perpendicular to the applied magnetic field.

Magnetic fields up to 18,000 Gauss at a 10 mm pole gap can be applied, enabling detailed studies of soft and hard magnetic materials in longitudinal and perpendicular geometries. The system is supplied with Spectra ORMS software for automated data acquisition, fast processing, and accurate analysis.

Key Features

- High-sensitivity laser-based MOKE measurements
- Magnetic field up to 18,000 Gauss
- Polar, Longitudinal & Transverse MOKE configurations
- Lock-in detection for improved signal-to-noise ratio
- PC-controlled electromagnet with Hall probe feedback
- Optional high- and low-temperature sample holders
- User-friendly Spectra ORMS software
- Custom configurations available on request

Applications

- Magnetic characterization of thin films and multilayers
- Hysteresis loop measurements
- Magnetic anisotropy studies
- Surface and interface magnetism analysis

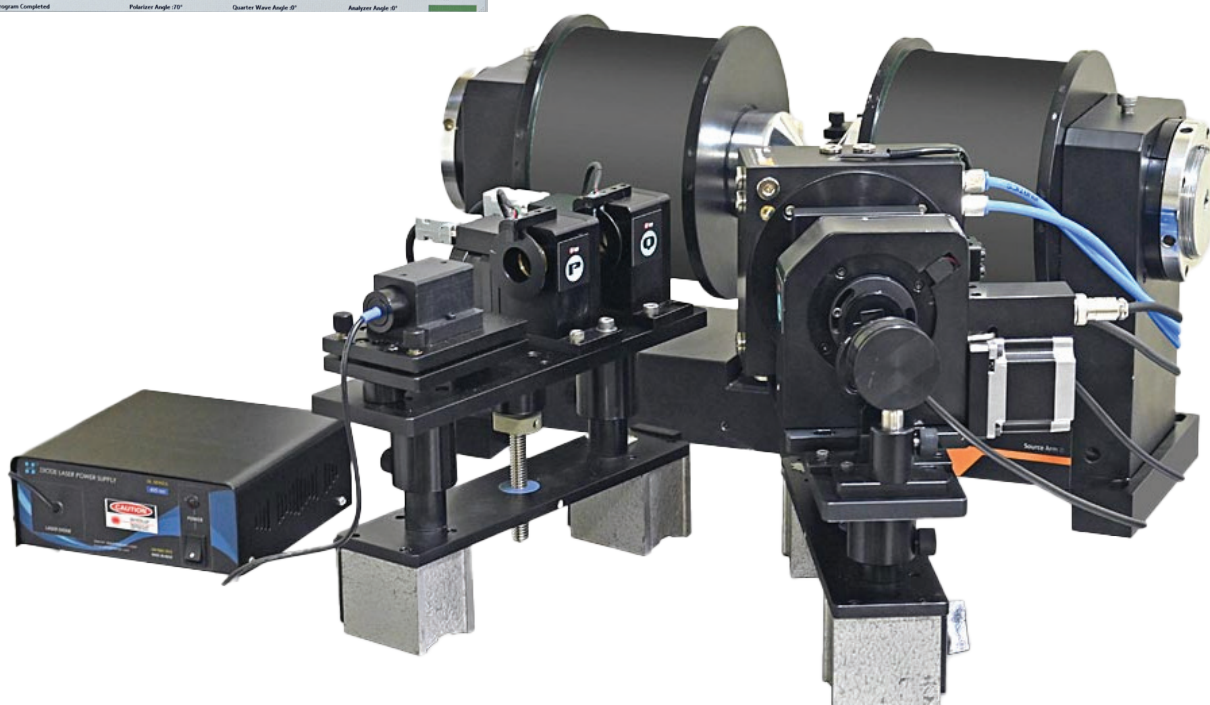
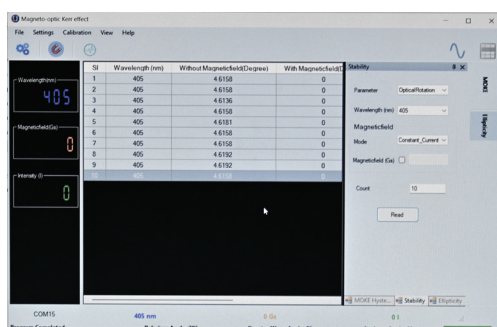


Specifications	Laser Wavelengths	405 nm, 532 nm, 650 nm diode lasers
	Optical Rotation Accuracy	0.003375°
	Optical Rotation Resolution	0.001125°
	Optical Rotation Measuring Range	± 90°
	Spot Size	0.1 mm (variable)
	Electromagnet Unit	PC-controlled constant current operation
	Maximum Magnetic Field	18,000 Gauss @ 10 mm pole gap
	Minimum Field Detection	1 Gauss
	Magnetic Field Preciseness	± 0.05 %
	Chiller	5 – 25 °C chilling water (for electromagnet cooling)
	Field Detection Method	Hall probe-based (PC-based field measurement)
	Magnetic Field Feedback	Hall element
	Sample Chamber Options	High-temperature / Low-temperature sample holder
	Sample Moving Stage	X, Y & Z axis positioner with angular tilting
	Travel Range	X, Y & Z (± 5 mm)

MOKE Measurement Configurations

- Polar MOKE: Magnetic field normal to the sample surface
- Longitudinal MOKE: Magnetic field parallel to the sample surface and plane of incidence
- Transverse MOKE: Magnetic field normal to the plane of incidence

Temperature Options (Optional)	HC-85	Heating chamber up to 200°C (PID controlled)
	NC-70	Liquid nitrogen cryostat down to -70°C
	TE-05	Thermoelectric heating/cooling (-5°C to 40°C)



High Sensitivity Laser-Based Magneto-Optical Kerr Effect (MOKE) Station 4T

Model No: HO-MOKE LB2154T

Holmarc HO-MOKE LB2154T is a highly sensitive Magneto-Optic Kerr Effect (MOKE) analysis system for precision study of magnetic materials under extreme field and temperature conditions. The system integrates a powerful electromagnet, cryogenic sample environment, laser optics and lock-in detection into a single platform for advanced R&D applications.

Designed for magnetic thin films, nanostructures, spintronic devices and coercivity studies, HO-MOKE LB2154T supports Polar, Longitudinal and Transverse measurement geometries with fast acquisition of accurate hysteresis loops

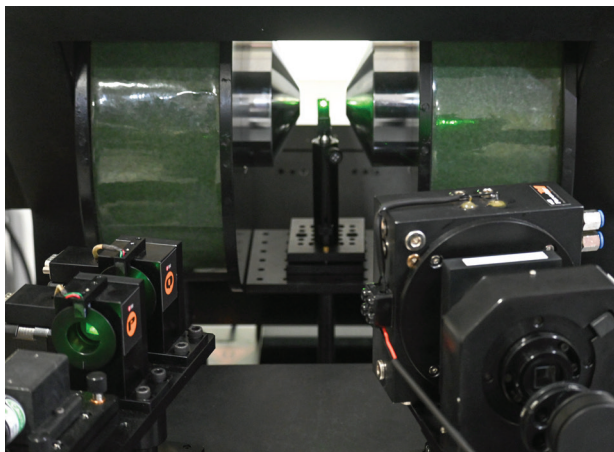
Key Features

- High-field HO-MOKE LB2154T electromagnet
- Up to 3.3 Tesla @ 5 mm pole gap
- PC-controlled lock-in amplifier detection
- Optical modulation for ultra-low-noise Kerr rotation measurement
- Outstanding sensitivity to micro-rad optical rotation changes
- Cryogenic temperature operation from -70°C to $+40^{\circ}\text{C}$
- Water-cooled coils $\rightarrow$ excellent field stability in continuous mode
- High-speed field sweeping & real-time loops
- Laser wavelengths for differential studies: 405 / 532 / 650 nm
- XYZ + tilt sample positioning
- Fully automated measurement sequences
- Robust ORMS software for analysis & reporting

Optical & Detection Sub-System

- Polarization-based Kerr rotation measurement
- Lock-in amplifier technique to suppress intensity noise
- Optical chopper/modulator + balanced photodiode detector
- Ultra-high sensitivity for very small magnetization changes
- Optimized beam stability, 0.1 mm spot size (adjustable)
- Excellent repeatability for thin-film hysteresis studies





HO-EM7000S High-Field Electromagnet Highlights

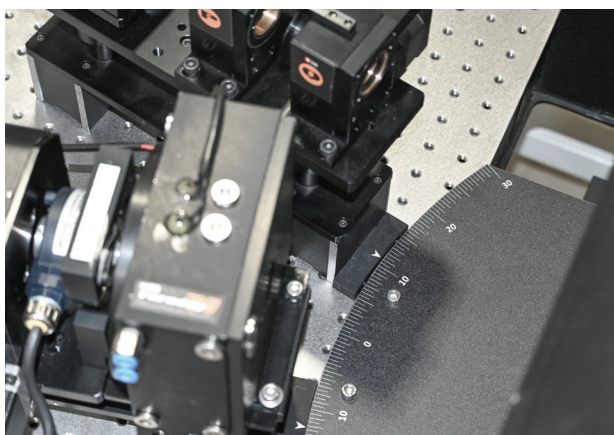
- Magnetic Field: 3.3 T (33,000 Gauss) @ 5 mm pole gap
- Continuously adjustable pole gap 0 – 100 mm
- Single-yoke, high-permeability soft iron frame
- Water-cooled coils for 4+ hours continuous operation
- Stable & uniform field region over 5 cm³
- Field stability < 0.005 %
- Mounted on strong wheel-based frame for easy positioning

Temperature-Controlled Sample Stage

- –70 °C to +40 °C through cryostat + integrated heater
- PID control for fast stabilization
- Magnetic field applied in-plane or out-of-plane
- Compatible with thin film substrates and custom sample holders

Software – ORMS MOKE Suite

- Real-time Kerr rotation vs field plotting
- Automated field sweeps & loop averaging
- Drift compensation and lock-in phase optimization
- Detailed data export & report generation



Specifications

Laser Wavelengths	405 nm, 532 nm, 650 nm Diode Lasers
Optical Rotation Accuracy	0.003375°
Optical Rotation Resolution	0.001125°
Optical Rotation Measuring Range	±90°
Spot Size	0.1 mm (variable)
Electromagnet Unit	HO-EM7000S, PC-controlled constant current
Maximum Magnetic Field	3.3 T @ 5 mm pole gap
Minimum Field Detection	1 Gauss
Magnetic Field Precision	±0.05% with Hall-probe feedback
Chiller / Cooling	Water-cooled coils for continuous operation
Field Detection	Hall probe based, PC-controlled
Sample Chamber Options	High / low temperature sample holder
Temperature Range	–70 °C to +40 °C (cryostat with heater)
Sample Moving Stage	X, Y & Z axis positioner with angular tilting
Travel Range	X, Y, Z ±5 mm, positioning resolution 10 μm
Detection Method	Lock-in amplifier (optical modulation based)
MOKE Geometries	Polar / Longitudinal / Transverse
Software	ORMS MOKE Suite: automated sweep, hysteresis plotting, data export

HO-EM7000S

Electromagnet Details

Maximum Magnetic Field	3.3 T @ 5 mm pole gap; 5000 Gauss @ 55 mm flat pole
Pole Piece Diameter	125 mm
Pole Gap Range	0 – 100 mm (continuously adjustable)
Coil Separation (Coil Gap)	160 mm
Field Uniformity	Uniform over 5 cm ³ volume
Field Stability	< 0.005 %
Yoke Type / Material	Single-yoke, high-permeability soft iron alloy
Cooling Method	Water-cooled for continuous operation > 4 hours
Electromagnet Dimensions (H × W × D)	650 × 420 × 610 mm
Frame Material / Mounting	Cast iron profile, wheel-mounted stand
Pole Pieces	2 Nos., removable / replaceable (Flat & 120 mm tapered)
Rotation Compatibility	Frame attachable/detachable to rotation base
Total Weight	~325 kg
Optical Height	325 mm

Spectroscopic Magneto - Optic Rotation Measurement System

Faraday Rotation Measurement System

Model No: HO-VIS214ORMS

The Holmarc HO-VIS214ORMS is a precision Spectroscopic Magneto-Optic Rotation Measurement System designed for accurate Faraday rotation measurements over a wide wavelength range from 385 nm to 900 nm. The system enables precise evaluation of the magnetic field dependence of optical rotation, making it ideal for advanced research in magneto-optics, materials science, solid-state physics, and optical characterization.

The measurement principle is based on the rotation analyzer method, providing high sensitivity and excellent accuracy in optical rotation measurements. A maximum magnetic field of 18,000 Gauss (1.8 Tesla) can be generated at a 10 mm pole gap, while the optical rotation resolution reaches $\pm 0.01^\circ$, ensuring reliable detection of very small Faraday rotation angles.

With optional temperature control accessories, the system supports thermal dependence studies of Faraday rotation over a wide temperature range from -70°C to $+300^\circ\text{C}$. The software enables complete control of magnetic field str

Key Features

- Spectroscopic Faraday rotation measurements (385–900 nm)
- High magnetic field up to 18,000 Gauss
- Rotation analyzer-based polarization measurement
- High optical rotation accuracy and resolution
- Optional high- and low-temperature measurement
- PC-controlled electromagnet with Hall probe feedback
- User-friendly Spectra ORMS software
- Custom sample holders and configurations available

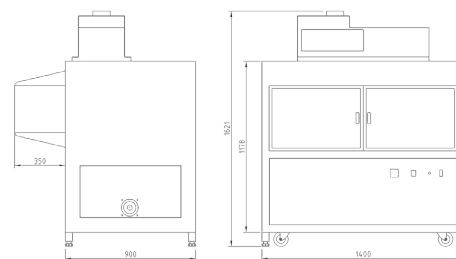


Specifications

Optical & Mechanical Parameters	Light Source	Spectra monochromator with halogen lamp
	Polarization Analysis Method	Rotation analyzing method
	Measuring Wavelength Range	385 nm – 900 nm
	Spectral Bandwidth	1 nm (variable up to 10 nm)
	Optical Rotation Measuring Range	$\pm 90^\circ$
	Angular Resolution	0.1°
	Optical Rotation Accuracy	0.003375°
	Optical Rotation Resolution	0.001125°
Sample Handling & Positioning	Cuvette	10 mm path length glass cuvette (Custom holders available on request)
	Sample Chamber Options	High / Low temperature sample holders
	Sample Moving Stage	X, Y & Z axis positioner
	Travel Range	X, Y & Z (± 5 mm)
	Positioning Resolution	10 microns
Electromagnet & Magnetic Field Control	Electromagnet Operation	PC-controlled constant current
	Cooling	Water cooled
	Maximum Magnetic Field	1.8 Tesla (18,000 Gauss) @ 10 mm pole gap
	Minimum Field Detection	1 Gauss
	Magnetic Field Detection	Hall probe based
	Magnetic Field Feedback	Hall element sensor feedback
	Magnetic Field Precision	$\pm 0.05\%$
Power Requirements	Electromagnet Power Supply	Bipolar, max ± 90 V / 5 A
	Electromagnet Supply Rating	2 kVA, AC 220 V, 50 Hz
	Control Unit Power	1 kVA, AC 220 V, 50 Hz
Cooling System	Chiller Requirement	5 – 25°C chilled water
	Application	Electromagnet cooling
Measurement Capabilities	Optical rotation (OR) measurement of thin films, crystals, liquids, and fluids exhibiting Faraday effect	
	Determination of Verdet constant of transparent solids and liquids	
	Magnetic field vs. Faraday rotation angle at selected wavelengths	
	Wavelength dispersion of Faraday rotation	
	Thermal dependence of Faraday rotation (optional)	
Temperature Control Options (Optional)	A. Model: HC 85 – High Temperature Chamber	
	Heating from room temperature up to 200°C	
	Operating range: RT to 85°C (PID controlled)	
	Temperature setting resolution: 0.1°C	
	Temperature sensor: Pt-100 Ohms	
Model: NC 70 – Low Temperature Cryostat	Nitrogen cryostat for low-temperature measurements	
	Cooling down to approximately -70°C using liquid nitrogen	
	Temperature setting resolution: 1°C	
	Temperature sensor: Pt-100 Ohms	
Model: TE 05 – Thermoelectric Temperature Controller	Heating and cooling using TE (Peltier) cooler	
	Temperature range: -5°C to 40°C	
	Control method: PID	
	Temperature stability: $\pm 0.5^\circ\text{C}$	
Software	Spectra ORMS Software	
	PC-based control of:	
	o Wavelength selection	
	o Magnetic field strength	
	o Temperature (optional modules)	
	• Automated data acquisition and analysis	
	• Graphical plotting of rotation angle vs wavelength, magnetic field, and temperature	

Magneto Optic Spectrometer Spectroscopic Kerr / Faraday / Ellipsometry

Fully Automated Optical Rotation / Thinfilm Test Station
Model: HO-A216FR/KRORMS

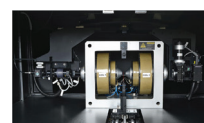


Specifications

Light source	Spectra Deuterium / Halogen or Xenon Arc Lamp
Monochromator	Quasar 300F Czerny-Turner Type
Wavelength Range	380 - 850 nm
Collimating & Focusing mirror	50 mm dia, 300 F
Optical Grating	1200 l / mm
Spectral dispersion	2.6 nm / mm
Grating Size	50 x 50 mm
Absolute Diffraction Efficiency	45 - 65 %
Slit Width	0 ~ 3 mm Continuously Adjustable
Resolution	0.1 nm
Wavelength Accuracy	0.2 nm
Wavelength Repeatability	0.1 nm
Stray Light	10-3
Reciprocal of Linear Dispersion	2.7 mm
Half-Width of Spectral line	0.2 nm @ 586 nm
Polarization analysis method	Rotation analyzing method
ARMS	Stepper Motor Controlled Auto Positioning
Spot Diameter	1 - 5 mm
Thin film Holder Sample size	1 - 12 mm
	(Custom Holders can be provided on request)
Cuvette	10 mm Path length Quartz Cuvette
Sample chamber option	High / low temperature sample holder
Sample Feeding Unit	Stepper Motor Controlled Auto Positioning System
Electro Magnet Unit	PC Controlled Constant current operation
Cooling	Water cooled
Max. magnetic field	1.75 Tesla @ 12mm pole gap
Min. Field Detection	1 Gauss
Magnetic field preciseness	± 0.05 %
Field detection	Hall probe based (PC based field measurement)
Feed back of magnetic field	Hall element
Chiller	5 ~ 25°C Chilled water (for cooling electromagnet)
Volume	2 L / min.
Power supply for Electro Magnet	Bi-Polar type (Max. ± 90 V/5A)
Control unit	1 kVA AC 220V 50Hz
Software	Spectra ORMS software

Features

- 380 - 850 nm Measurement Range
- 0.009 Degree Optical Rotation Resolution
- Fully automatic control
- Magnetic field detecting & feedback facility
- MOKE Measurements
- Ellipsometric Measurements



Measuring items

- OR Measurement of Thin film, crystal, fluids etc, having Faraday effect
- Measurement Verdet Constant of Transparent Solids and Liquids
- Faraday rotation / ellipticity angles
- Polar Kerr rotation / ellipticity angles
- Magnetic field vs. Faraday rotation angle property at a desired wavelength
- Faraday rotation angle vs. Wavelength dispersion property
- Faraday rotation angle vs. Thermal dependence property (Optional)

Holmarc has introduced a new innovative high sensitivity and high magnetic field Spectroscopic Faraday/Kerr effect measuring equipment utilizing the VIS-NIR wavelengths. HOLMARC A216 FR/KR test station provides standardized testing solution to fit wide ranging optical rotation measurement applications. The modular hardware design allows user to take automatic measurements of Faraday effect, MOKE & Ellipsometry in a single instrument.

Designed for magneto optic material research and testing including magnetic characterizations of ferromagnetic and ferrimagnetic films and materials. Measurement include magnetic hysteresis loops of ultra thin magnetic films and multilayers, Ellipticity measurements, Thin film thickness measurement of dielectric materials, Refractive index, Delta and psi measurements etc. System can be operated in Polar, Longitudinal and Transverse configurations.

Performance

- Optical Rotation Resolution : ± 0.009 Degree
- Detecting sensitivity : 0.009 deg (at transporence more than 20%)
- Stability : 0.03 deg (at transporence more than 20%)
- Ellipticity Measurement : ± 0.01 deg.
- Optical Rotation Measuring range : ± 90 deg.
- Measuring Wavelength Range : 380 - 850 nm
- Spectral Bandwidth : 1 nm (Variable band pass up to 10nm)
- Max. magnetic field : 11,000 Gauss @ 20 mm Pole Gap
- Min. Field Detection : 1 Gauss
- Magnetic field preciseness : $\pm 0.05\%$

Temperature Options

A. Model : HC 85

Sample chamber can be heated from room temperature to 85°C to measure temperature dependence property.

B. Model : NC 70

Sample holder for low temperature (Nitrogen CRYOSTAT) chamber to cool sample down to -70°C using liquid nitrogen.

C. Model : TE 05

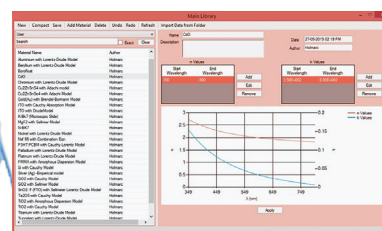
Heating / cooling method by TE cooler Temperature range, -5°C to 40°C

Models used in the software

- Constant Value Model
- Entered Value Model
- Cauchy's Coefficients Model
- Sellmeier's Coefficients Model
- Combination of Cauchy & Sellmeier Model
- Drude Coefficients
- Lorentz-Drude Coefficients
- Brendel-Bormann Coefficients
- Adachi Coefficients
- Cauchy Lorentz Coefficients
- Amorphous Dispersion Coefficients
- Cauchy Absorption Coefficients
- Sellmeier Lorentz Drude Model Coefficients
- Cauchy Urbach Coefficients

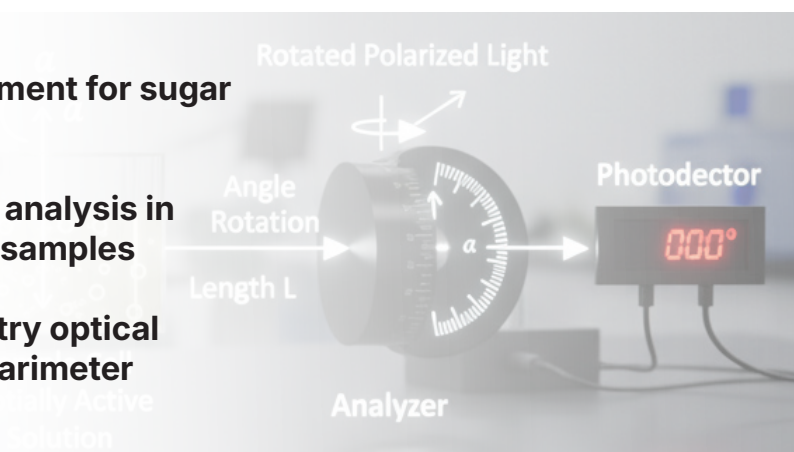


HO-A216FR
/KRORMS



Polarimeter

- Optical rotation measurement for sugar industry research labs
- Purity and concentration analysis in pharmaceutical industry samples
- Chemical and food industry optical characterization with polarimeter



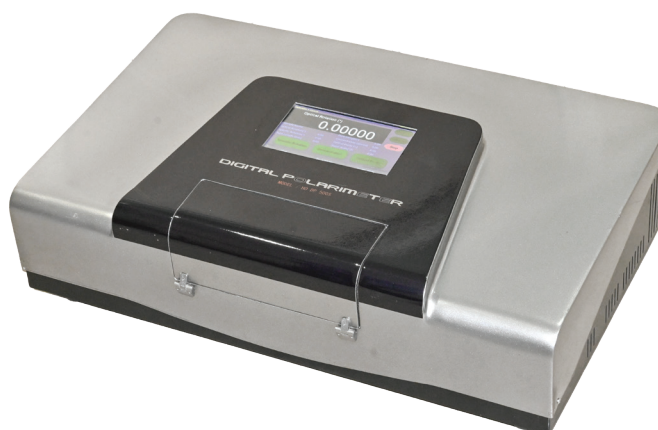
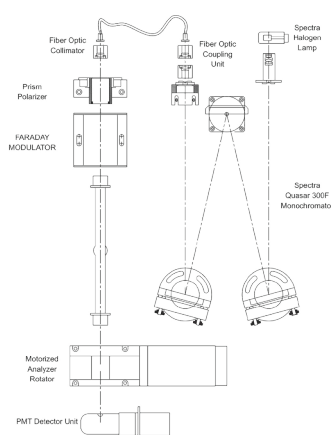
Digital Polarimeter

MODEL : HO-DP-500

Holmarc manufactures automatic digital polarimeters for industry and research with robust performance and efficiency. Symmetric angular oscillation optical null technique by Faraday Modulation is implemented in our polarimeters to achieve high resolution and repeatability. Operation is simple: place the sample filled tube in the automatic Polarimeter and press READ button. Measurement is displayed on the soft colour LCD display of the instrument. The Polarimeter is used for determining the optical rotation of substances. By measuring optical rotation, the concentration, content, purity etc of the sample solution can be found out. Polarimeter has become one of the most useful instruments in research laboratories of sugar industry, pharmaceutical industry, oil refining, food industry, chemical industry as well as basic research in universities and R&D organizations. Major modules in our Polarimeter include light source, Interference filter, polarizer, faraday modulator, sample chamber, analyzer and Detector. Unpolarized light from light source (LED) passes through an interference filter and polarizer so that a fixed wavelength polarized light comes out. This polarized light enters the Faraday Modulator and then passes through the sample cell. The modulated light which passed through the sample cell enters a second polarizer, known as the "Analyzer," which detects the angle of rotation. Finally, the light falls on a Silicon photo diode which converts the light intensity to an electric signal.

Optical rotation

Optical rotation is directly proportional to path length; the longer the tube, the greater the overall accuracy. Holmarc's Polarimeter accepts tubes up to 200mm long. A 200mm sample tube offers twice the sensitivity compared to measuring the same solution in a 100mm sample tube. Different types of sample tubes are available up to 200mm length.



Model No: HO-DP-500

Light source	LED
Optical wavelength	589 nm
Measuring range	$\pm 180^\circ$ (Switchable)
Resolution	0.009 Deg.
Repeatability	0.018 Deg.
Accuracy	± 0.03 Deg.
Measuring modes	Optical Rotation, Specific rotation, Concentration, Optical Purity & Sugar Scale.
Sample chamber	Accepts sample cells upto 200mm Length
Principle	Symmetric angular oscillation optical null principle
User interface	5.7 inch Graphical LCD & Keyboard and PC Software
Software	Suitable software included
Detector	Silicon photo diode
Power requirement	AC100 - 230 V 50 Hz



Spectroscopic Polarimeter

Model No: HO-ASP-500

Holmarc manufactures high quality automatic polarimeters for industry and research with robust performance and efficiency. Symmetric angular oscillation optical null technique by Faraday Modulation is implemented in our polarimeters to achieve high resolution and repeatability. In HO-ASP-500 a quartz halogen lamp with high spectral resolution monochromator is incorporated as light source. The measurements can be performed over wide range of analytical wavelengths from 380 - 850nm by using quartz halogen lamp. Also the wavelength accuracy is better compared to the normal interference filters. Our high quality optical system improves the light collection and flexibility of the system. All adjustments on the device are made via an easy to use touch screen. The sample parameters can be customized for different applications. Holmarc offers full line of accessories for Polarimeter. Temperature control and temperature compensation can be incorporated to eliminate the variation of results with temperature. Wide range of polarimeter sample cells are available. Center cup tubes and continuous flow through cells can also be supplied for custom applications.



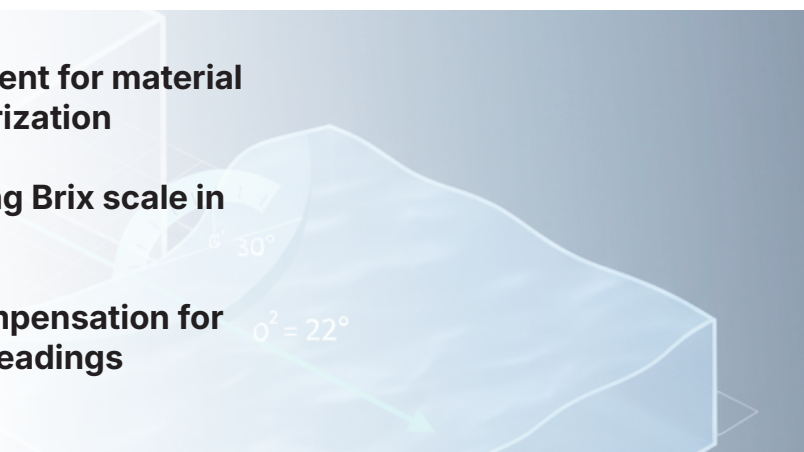
Light source	Quartz Halogen Lamp
Detector	PMT
Monochromator	Czerny-Turner
Grating	Blazed Holographic
Wavelength Range	380 - 850 nm
Bandwidth	1 nm
Positioning Accuracy	± 0.25 nm
Optical Rotation	
Measuring range	$\pm 90^\circ$
Resolution	0.009 Deg.
Repeatability	± 0.018 Deg.
Accuracy	± 0.027 Deg.
Sugar Scale Range	Sugar Scale Range
Resolution	$\pm 0.01^\circ$ Z
Repeatability	$\pm 0.1^\circ$ Z
Accuracy	$\pm 0.1^\circ$ Z
Principle of operation	Symmetric angular oscillation optical null principle.
Measuring modes	Optical Rotation, Specific rotation, Concentration, Optical Purity & Sugar Scale.
Sample chamber	Accepts sample cells up to 200mm Length

Refractometer

Refractive index measurement for material identification and characterization

Sugar content analysis using Brix scale in solutions

Automatic temperature compensation for accurate sucrose solution readings



Automatic Refractometer

Model : HO-NNSR-01

AR-1700 Automatic Refractometer from Holmarc is a compact instrument used for measuring refractive index and brix at the digital, automatic level. The AR-1700 Automatic Refractometer features exceptional accuracy, automatic temperature compensation, a wide reading range and simple and fast operation. It offers outstanding flexibility to provide accurate readings for a variety of applications.

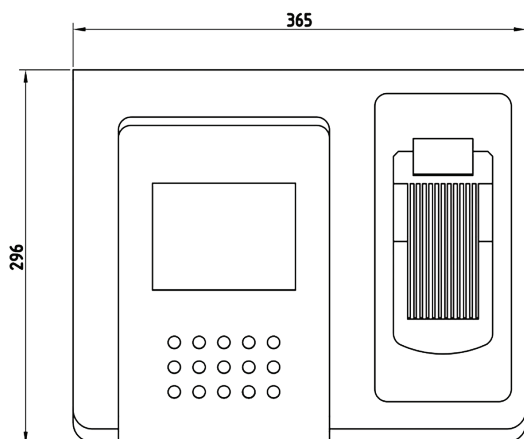
The refractive index measurement is easy, fast and non-destructive and can be used to identify and characterize materials. The sample is placed on the measuring prism and is irradiated by a 589nm (Na D-line) LED. The shadow line is detected with a high-resolution linear array CCD and hence the refractive index is obtained using internal software and is displayed. Degrees Brix (symbol °Bx) is the sugar content of an aqueous solution. It is the most commonly used refractometer scale for measuring solids dissolved in water; it corresponds directly to the refractive index scale. Temperature correction or control is necessary in refractometers because refractive index varies with temperature. In Holmarc's refractometer automatic temperature compensation (ATC) corrects readings over a range of temperatures for sucrose solutions. A temperature sensor is also integrated for the precise measurement of sample temperature.

The AR-1700 refractometer features an expanded refractive index reading range of 1.3200 to 1.6500 which enables the user to analyze a broad range of samples. The alphanumeric key pad and graphic display provide a means of entering and displaying prompts and data. Regardless of an instrument's specified accuracy, a refractometer's real world performance depends on how well the instrument is cleaned between samples. The AR-1700 addresses this issue by providing a very flat, easy to clean measurement surface with no corners or crevices that tend to trap samples causing contamination.



Automatic Refractometer

Principle of operation	: Optical-Refraction Critical-Angle detection system
Refractive index	: 1.3200 - 1.6500
Resolution	: 0.0001
Accuracy	: +- 0.001
Brix	: +- 0.001
Brix	: 0 - 95 %
Resolution	: 0.01 %
Accuracy	: +- 0.5 %
Optical Wavelength	: 589 nm (Na D-line)
Light Source	: High performance LED
Filter	: 589 nm Interference Filter
Detector	: Toshiba Linear Array CCD
Display	: 5" LCD Touch Display
Temperature Control	: Peltier Based 25°C Constant Temperature Control
Power Supply	: AC 230V / 50Hz



Spectroscopic Digital Refractometer

Model : HO-SR1700

Specifications

Principle of operation	: Optical-Refraction Critical-Angle detection system
Refractive index	: 1.3200 - 1.6500
Resolution	: 0.0001
Accuracy	: +- 0.001
Brix	: 0 - 95 %
Resolution	: 0.01 %
Accuracy	: +- 0.5 %
Optical Wavelength	: 589 nm (Na D-line)
Light Source	: Broadband 50 W Quartz Halogen Lamp
Monochromator Unit	: SQR120F Monochromator
Optical Layout	: Czerny Turner
Focal length	: 120 mm
Grating mount	: Single
Spectral Range	: 400 - 1000 nm
Wavelength	: 0.1 nm
Resolution	: Programmable
Wavelength Scanning	: Programmable
Illumination Design	: Fiber Optic
Connector Type	: SMA905
Detector	: Toshiba Linear Array CCD
Measurement	: Refractive index measurements, RI
Software features	: Vs. Time, RI Vs Wavelength, etc.
Computer interface	: USB 2.0
Software control	: Holmarc Spectra RI

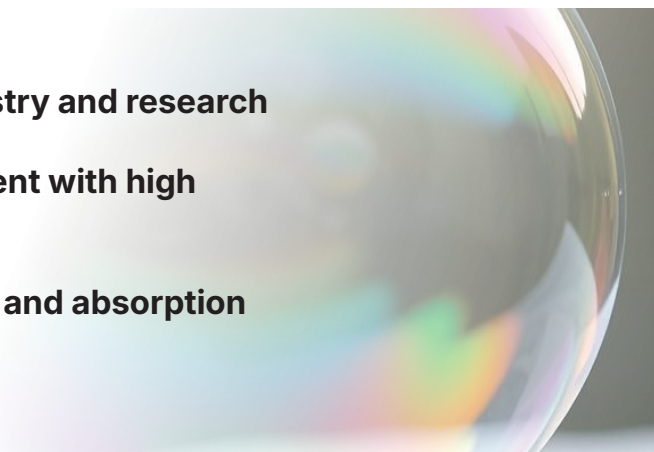


Reflectometer

Thin film thickness analysis for industry and research

Complex refractive index measurement with high repeatability

Absolute reflectance, transmittance, and absorption spectroscopy



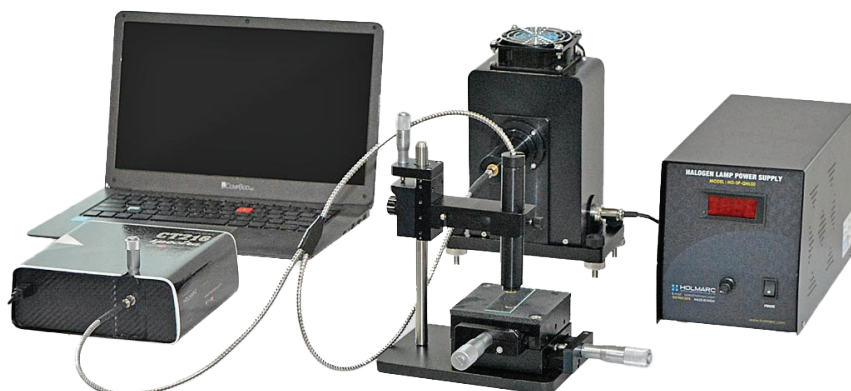
Near Normal Spectroscopic Reflectometer

Model : HO-NNSR-01

Near Normal Spectroscopic Reflectometer is a fundamental instrument used for thin film thickness analysis for industry & research. Holmarc's NNSR Model No: HO-NNSR-01 is able to analyze thin film's thickness & complex refractive index with high speed & repeatability. NNSR theory works with complex matrix form of Fresnel equations for reflectance & transmittance. Absolute reflectance spectroscopy is the principle behind Reflectometer; which is the ratio of the intensity of the reflected light beam (usually monochromatic) to the intensity of the incident beam. Light beam which normally incidents on the sample surface in turn reflect from top & bottom of the thin film surfaces which get interfere & is directed through Optical fiber to CCD attached spectrometer via computer. On the monitor we get spectrogram with interference oscillations directly proportional to thin film thickness. Holmarc's Reflectometer can be used to analyze single, free standing & rough layer thickness of various stacks such as di-electric, crystalline, amorphous, metallic & absorbing samples. It also finds absolute transmittance & absorption directly (Customized). Roughness treatment is done with EMA modeling.

Features

- Analyze single layer films
- Curve Fit / FFT based thickness measurement
- Fiber optic probe for reflectance measurement at normal incident angle
- CCD linear array image sensor for simultaneous measurement of reflectance at each wavelength
- User extendable materials library
- Data can be saved as an Excel or text file
- Advanced mathematical fitting algorithm
- FFT based thickness measurement
- Extraction of thickness and optical constants
- Parameterized models



Specifications

Film Thickness range	20 nm - 40 μ m
Reflectance Wavelength range	380 nm - 850 nm
Transmittance / Absorbance range	0 - 100% (Customized)
Light source	Tungsten Halogen Quartz Lamp, 50W
Detector	CCD linear array, 3648 pixels
Spectrometer	Grating spectrometer
Precision typically for SiO ₂ on NSF - 66	$\pm$ 1 nm
Optical Power	50 W
Light spot size	2 mm
Optical fiber	Multimode Bi-furcated fiber with SMA fiber coupler
Reference Sample	Polished NSF - 66 / Float Glass (Microscopic slide 1 mm)
Standard Sample	ITO thin film on float glass, SiO ₂ thin film on NSF - 66 Substrate
Measuring modes	Curve fitting / Regression Algorithms, FFT, FFT + Curve Fit
Dispersion formulas	Cauchy's, Sellmeiers & Empirical Models
EMA models	Linear EMA, Bruggemann, Maxwell Garnett, Lorentz - Lorenz models
Material Library	Extendable Material user library
PC Interface	USB

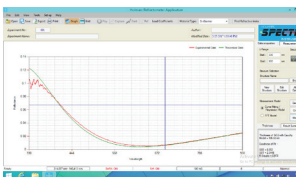
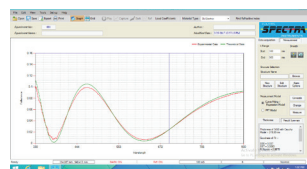
Near Normal Spectroscopic Reflectometer 2

Model : HO-NNSR-02

Near Normal Spectroscopic Reflectometer is a advanced instrument used for thin film thickness analysis for industry & research. Holmarc's NNSR Model No: HO-NNSR-02 is able to analyze thin film's thickness & complex refractive index with high speed & repeatability. NNSR theory works with complex matrix form of Fresnel equations for reflectance & transmittance. Absolute reflectance spectroscopy is the principle behind Reflectometer; which is the ratio of the intensity of the reflected light beam (usually monochromatic) to the intensity of the incident beam. Light beam which normally incidents on the sample surface in turn reflect from top & bottom of the thin film surfaces which get interfere & is directed through Optical fiber to CCD attached spectrometer via computer. On the monitor we get spectrogram with interference oscillations directly proportional to thin film thickness. Holmarc's Reflectometer can be used to analyze single, free standing & rough layer thickness of various stacks such as di-electric, crystalline, amorphous, metallic & absorbing samples. It also finds absolute transmittance & absorption directly (Customized). Roughness treatment is done with EMA modeling.



Specifications



Film Thickness range	20 nm - 40 μ m
Reflectance Wavelength range	400 nm - 850 nm
Transmittance / Absorbance range	0 - 100% (Customized)
Light source	Tungsten Halogen Quartz Lamp, 50W
Detector	CCD linear array, 3648 pixels
Spectrometer	Grating spectrometer
Precision typically for SiO ₂ on NSF - 66	$\pm$ 1 nm
Optical Power	50 W
Light spot size	2 mm
Optical fiber	Multimode Bi-furcated fiber with SMA fiber coupler
Reference Sample	Polished NSF - 66 / Float Glass (Microscopic slide 1 mm)
Standard Sample	ITO thin film on float glass, SiO ₂ thin film on NSF - 66 Substrate
Measuring modes	Curve fitting / Regression Algorithms, FFT, FFT + Curve Fit
Dispersion formulas	Cauchy's, Sellmeiers & Empirical Models
EMA models	Linear EMA, Bruggemann, Maxwell Garnett, Lorentz - Lorenz models
Material Library	Extendable Material user library
PC Interface	USB

Quantum Efficiency

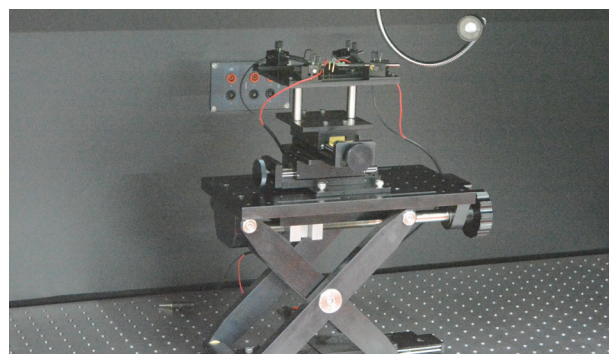
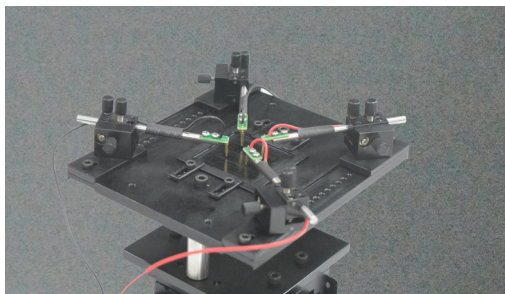
- Solar cell characterization (Si, DSSC, Perovskite, thin-film)
- QE-based spectral correction and calibration
- Photodetector and imaging sensor evaluation
- Research & quality control in photovoltaic laboratories

Quantum Efficiency & IV Measurement System

Model : HO-SC-QEIV

The Quantum Efficiency (QE) and Current–Voltage (I–V) characteristics of photovoltaic devices are critical for understanding charge carrier generation, recombination, transport, and diffusion mechanisms. QE data is also widely used for PV cell and module calibration, where spectral correction factors are derived from the measured quantum efficiency.

The Holmarc HO-SC-QEIV is a fully integrated Quantum Efficiency and IV Measurement System, combining a solar simulator, spectral response measurement setup, and I–V characterization platform in a single instrument. The system enables accurate measurement of dark and illuminated I–V characteristics along with QE measurements over the wavelength range of 380 nm to 1100 nm. The system is equipped with a 300 W Xenon arc lamp for IV measurements and a 50 W Tungsten Halogen lamp for QE measurements, complete with housing, optics, power supplies, and easy-to-use, PC-controlled software.



Xenon Lamp



System Overview

- Integrated QE and IV measurement platform
- 300 W Xenon lamp for illuminated IV measurements
- 50 W Tungsten Halogen lamp for QE and spectral response measurements
- Monochromator-based wavelength selection
- Fixed-frequency optical chopper and lock-in amplifier for high signal-to-noise QE measurements
- Normally incident illumination geometry
- Adjustable illumination area using lens assembly
- Precision sample stage for samples up to 50 mm diameter

The system can also be used for detector and imaging system characterization, including:

- Linearity range
- Spatial non-uniformity of response
- Responsivity variation across the active area

This allows identification of detectors with optimum performance for specific applications

Parameters Measured

- Spectral response curve
- External quantum efficiency (EQE / PCE)
- I-V curve (dark and illuminated)
- Open circuit voltage (Voc)
- Short circuit current (Isc)
- Voltage at maximum power (Vmpp)
- Current at maximum power (Impp)
- Current density at maximum power (Jmpp)
- Fill factor (FF)

Key Features

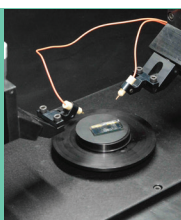
- QE and spectral response measurement from 380–1100 nm
- Dark and light IV characterization
- High-resolution monochromator (0.1 nm)
- Built-in optical chopper and lock-in amplifier
- Sample size up to 50 mm (2 inch)
- LED bias light option
- Fully automated PC-controlled operation
- Optional inverted configuration (HO-SC-QEIV500i)

Applications

- Solar cell characterization (Si, DSSC, Perovskite, thin-film)
- QE-based spectral correction and calibration
- Photodetector and imaging sensor evaluation
- Research & quality control in photovoltaic laboratories

Also available in Inverted Configuration: HO-SC-QEIV500i

An inverted configuration of the QE and IV measurement system is also available for specialized experimental requirements and sample geometries.



Specifications

General

Type of Solar Cells	DSSC, Mono / Multi-crystalline Si, Perovskite semiconductor heterostructures, etc
Spectral Wavelength Range	380 nm – 1100 nm
Mode of Operation	AC and DC
Measurement / System Quality	Repeatability: 99 %

Light Sources

IV Measurement Source	300 W Xenon arc lamp
QE Measurement Source	50 W Tungsten Halogen lamp

Monochromator & Optics

Monochromator Wavelength Range	380 nm – 1100 nm
Focal Length	250 mm
Wavelength Resolution	0.1 nm
Order Sorting Filters	Provided

Detection & Modulation

Optical Chopper	86 Hz modulation
Detector	Silicon photodiode
Bias Light	3 W (optional)

Lock-In Amplifier

Input Range	0 – 5 V
Reference Input	0 – 5 V
Gain Accuracy	± 1 %
Sensitivity	10 nA
Output Stability	500 ppm / °C (depending on sensitivity)
Time Constant	10 ms to 10 s
ADC Resolution	12 bit
Maximum Acquisition Speed	< 25 μ s (signal)
Control	Front panel / USB

Sample Handling

Sample Holder	Mounts with pogo pin probes
Sample Size	Up to 2 inch
Platform Diameter	50 mm

Software Features

Fully automatic, PC-controlled operation	
Controls monochromator and 86 Hz lock-in amplifier	
Performs scans over user-defined wavelength ranges	
Plots spectral response and QE curves	
Supports IV curve measurement and analysis	
Data export to spreadsheet-compatible formats	
Operating System	Windows XP / 7 / 8 / 8.1 / 10
PC Interface	RS232 or USB (via USB-to-serial converter)

Quantum Efficiency & Spectral Response Measurement System

Model : HO-SC-QE

The HOLMARC HO-SC-QE is a compact and precise system designed for spectral response and quantum efficiency (QE) measurements of photovoltaic devices and photodetectors. Quantum efficiency is a critical parameter for understanding charge generation, recombination, and carrier diffusion in solar cells, and is widely used for cell and module calibration through spectral correction factors.

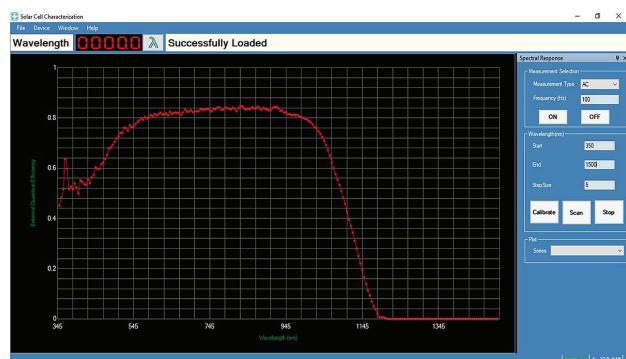
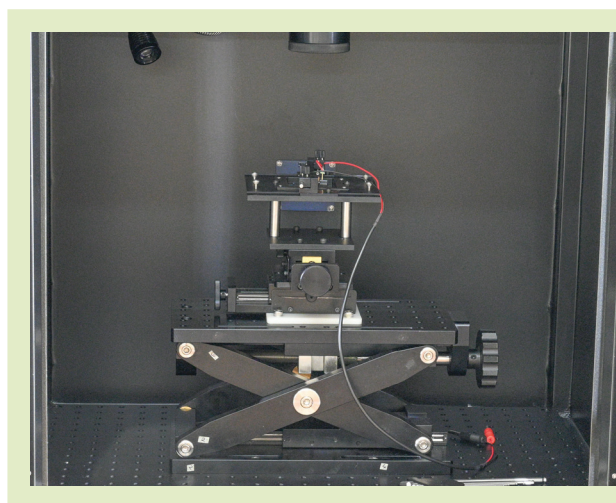
The system is integrated with a 50 W tungsten halogen lamp, high-resolution monochromator, optics, and an easy-to-use software platform for automated QE and spectral response measurements over the wavelength range of 380 nm to 1100 nm.

A fixed-frequency optical chopper (86 Hz) and lock-in amplifier are used to modulate the incident light and achieve high measurement sensitivity. The sample stage accommodates devices up to 50 mm diameter, with normal incidence illumination and adjustable illumination area using a precision lens assembly.

In addition to solar cell characterization, the HO-SC-QE can be used for detector and imaging system evaluation, including measurements of linearity and spatial non-uniformity of responsivity across the active area.

Key Features

- Spectral response & quantum efficiency measurement
- Wavelength range: 380 – 1100 nm
- Integrated 50 W halogen light source
- High-resolution monochromator (0.1 nm)
- Built-in optical chopper and lock-in amplifier
- Sample size up to 50 mm
- Manual X-Y sample positioning for beam alignment
- Optional LED bias light
- Fully automated, PC-controlled operation





Light Source & Optics	Light Source	Single Quartz Halogen Lamp
	Power Supply	Constant current
	Wavelength Range	380 nm – 1600 nm
	Spot Shape	Rectangular (as per system design)
	Illumination Control	Adjustable using lens assembly
Monochromator Specifications	Optical Geometry	Normally incident
	Configuration	Czerny–Turner
	Gratings	single grating 1200 lines/mm (Blaze wavelength: 500 nm)
	Slit Width	Variable (0.15 mm to 2.5 mm minimum)
	Slit Height / slit Height	As per optical requirement
	Bandwidth	5 nm or better
	Wavelength Accuracy	≤ 0.5 nm
Filters & Optical Control	Scan Step Size	1 nm to 10 nm (software selectable)
	Filter Type	Suitable combination of long-pass and band-pass filters
	Filter Wheel	Multi-position motorized filter wheel
	Second-Order Rejection	Automatic rejection of second-order diffraction peaks
Optical Chopper & Lock-In Detection	Automation	Automatic selection and switching of filters and gratings via software to cover full wavelength range
	Chopper Type	Optical chopper with control module
	Chopper Frequency	Software adjustable from 20 Hz to 200 Hz
	Fixed Modulation Frequency	86 Hz for spectral response (SR) measurement
Reference & Calibration	Reference Detector	calibrated photodiodes covering full spectral range
	Calibration Method	Calibration based on manufacturer-provided spectral response curves
	Reference Cell (Optional)	Reference solar cell traceable to NREL calibration, supplied with EQE data
Electrical Biasing (Optional)	Bias Voltage Range	–5 V to +5 V
	Voltage Resolution	0.1 V
Sample Handling	Sample Size	1 cm × 1 cm to 5 cm × 5 cm
	Thickness Range	0.5 mm to 3 mm
Software Features	• Automated control of monochromator and lock-in amplifier • User-defined wavelength scanning • Real-time plotting of spectral response • Data export to spreadsheet formats • USB / RS-232 PC interface • Compatible with Windows 7 / 8 / 10	

Applications

- Quantum efficiency measurement of solar cells
- Spectral response analysis
- Calibration of photovoltaic devices
- Photodetector and imaging sensor characterization

Quantum Efficiency Measurement System - VIS IR

Model : HO-SC-QE-C1

The HOLMARC HO-SC-QE-C1 is a high-performance VIS-IR Quantum Efficiency (QE) and Spectral Response Measurement System designed for comprehensive characterization of photovoltaic devices and photodetectors over a wide wavelength range of 380 nm to 1600 nm.

Quantum efficiency is a critical parameter for understanding current generation, recombination, and carrier diffusion mechanisms in solar cells. The HO-SC-QE-C1 accurately computes QE from measured spectral response data and supports EQE, IQE, spectral reflectance, and SR measurements using advanced optical and electronic instrumentation.

The system is integrated with a single quartz halogen light source, high-resolution monochromator, optical chopper, and lock-in amplifier for high signal-to-noise measurements. A light-tight enclosure eliminates the need for a dark room and ensures reliable, repeatable measurements.

The sample stage supports rigid and flexible samples up to 5 cm × 5 cm, with precision spring-loaded gold-coated micro-positioner probes for secure electrical contact without damaging the sample.

•



Optical & Reflectance Accessories

- Adjustable optical chopper (20–200 Hz & DC mode)
- Integrating sphere (≥ 4 inch diameter) for reflectance
- Calibrated VIS-IR reference detectors
- Reference solar cell traceable to NREL calibration

Key Features

- VIS-IR QE measurement from 380 nm to 1600 nm
- Measurement of EQE / IQE / Spectral Response / Reflectance
- Single quartz halogen light source with constant current supply
- Dual-grating monochromator for wide spectral coverage
- Built-in optical chopper and lock-in amplifier
- Precision micro-positioner probes with X-Y-Z movement
- Light-tight enclosure – no dark room required
- Fully automated, software-controlled operation

Measurement Capabilities

- Spectral Response (SR)
- External Quantum Efficiency (EQE / IPCE) – AC & DC
- Internal Quantum Efficiency (IQE)
- Spectral Reflectance
- QE under electrical bias (optional)

Applications

- Silicon, perovskite, thin-film & tandem solar cells
- VIS-IR photodetectors and sensors
- Spectral correction and calibration
- Research, quality control, and device optimization

Light Source & Optics	Light Source	Single Quartz Halogen Lamp
	Power Supply	Constant current
	Wavelength Range	380 nm – 1600 nm
	Spot Shape	Rectangular (as per system design)
	Illumination Control	Adjustable using lens assembly
Monochromator Specifications	Optical Geometry	Normally incident
	Configuration	Czerny–Turner
	Gratings	Dual grating turret 1200 lines/mm (Blaze wavelength: 500 nm) 600 lines/mm (Blaze wavelength: 1250 nm)
	Slit Width	Variable (0.15 mm to 2.5 mm minimum)
	Slit Height	As per optical requirement
	Bandwidth	5 nm or better
	Wavelength Accuracy	≤ 0.5 nm
	Scan Step Size	1 nm to 10 nm (software selectable)
	Filter Type	Suitable combination of long-pass and band-pass filters
	Filter Wheel	Multi-position motorized filter wheel
Filters & Optical Control	Second-Order Rejection	Automatic rejection of second-order diffraction peaks
	Automation	Automatic selection and switching of filters and gratings via software to cover full wavelength range
Optical Chopper & Lock-In Detection	Chopper Type	Optical chopper with control module
	Chopper Frequency	Software adjustable from 20 Hz to 200 Hz
	Fixed Modulation Frequency	86 Hz for spectral response (SR) measurement
Reflectance Measurement Accessories	Measurement Method	Integrating sphere for reflectance measurements over full spectral range
	Integrating Sphere Diameter	≥ 4 inches
	Detector	Separate calibrated detector for VIS–IR range
	Spot Consistency	Facility to ensure identical spot location during EQE and reflectance measurements
	Sample Size	1 cm × 1 cm to 5 cm × 5 cm
	Port Reducers	Provided as required
	Focusing Optics	Adjustable focusing lens to maintain identical focal conditions for EQE and reflectance measurements
Reference & Calibration	Reference Detectors	Two calibrated photodiodes covering full spectral range
	Calibration Method	Calibration based on manufacturer-provided spectral response curves
	Reference Cell (Optional)	Reference solar cell traceable to NREL calibration, supplied with EQE data
Electrical Biasing (Optional)	Bias Voltage Range	–5 V to +5 V
	Voltage Resolution	0.1 V
Sample Handling	Sample Size	1 cm × 1 cm to 5 cm × 5 cm
	Thickness Range	0.5 mm to 3 mm
Micro Positioners	Type	Magnetic-based micro positioners (minimum two)
	Movement	Independent X, Y, Z movement with precision knobs
	Probe Tips	Spring-loaded, hemispherical gold-coated probe tips
Optical & Reflectance Accessories	Adjustable optical chopper (20–200 Hz & DC mode)	
	Integrating sphere (≥ 4 inch diameter) for reflectance	
	Calibrated VIS–IR reference detectors	
	Reference solar cell traceable to NREL calibration	
Software Features	Fully automated QE, IQE, SR, and reflectance measurements	
	Software-controlled monochromator, gratings, and filters	
	User-defined wavelength range and step size	
	Real-time plotting and multi-graph comparison	
	Data export to Excel, Origin, and text formats	
	Lifetime licensed software provided	

Solar Cell / Photo-detector Characterization System

Model : HO-SC-QEIV225C

Precision EQE & Spectral Responsivity Characterization (360 – 1100 nm)

The Spectral Quantum Efficiency Measurement System is a high-performance, automated solution designed to rapidly and accurately measure the external quantum efficiency (EQE) of photovoltaic and photoelectric devices. The system is ideal for characterizing solar cells, photodetectors, photodiodes, and other photosensitive structures under a wide range of bias voltages and operating conditions.

In addition to EQE measurements, the system precisely determines the spectral sensitivity (responsivity) of photoelectric devices across the 360 – 1100 nm wavelength range. Integrated Windows-based software automates the complete measurement process and supports both continuous and pulsed illumination modes, ensuring high repeatability and ease of operation.

Measurement Concept

Spectral responsivity and quantum efficiency are key parameters for understanding current generation, recombination, and carrier diffusion mechanisms in photovoltaic devices.

For PV cell and module calibration, a spectral correction factor derived from the QE spectrum is often required.

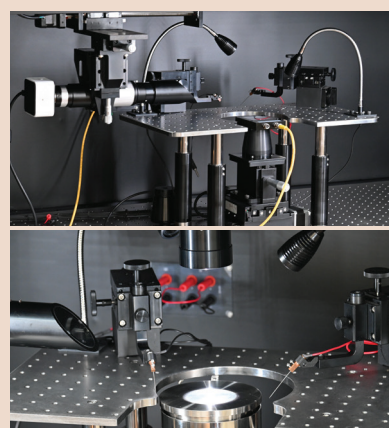
The system computes quantum efficiency—defined as the number of collected electron-hole pairs per incident photon—from the measured spectral response (A/W) as a function of wavelength.

Key Features

- Automated EQE and spectral responsivity measurement
- Wide wavelength range: 360 – 1100 nm
- Supports biased and unbiased device testing
- High sensitivity using optical chopper and lock-in detection
- Compatible with Keithley 2450 SMU
- Flexible illumination spot size control down to 50 μm
- Integrated digital inspection microscope
- User-friendly Windows software for system control and data analysis

A Complete Solution for Reliable QE Measurement

By combining stable broadband illumination, precision monochromation, sensitive lock-in detection, and automated software, the Spectral Quantum Efficiency Measurement System delivers accurate, repeatable, and research-grade QE data for advanced photovoltaic and optoelectronic characterization



Optical & Illumination System	300 W Xenon Lamp with integrated power supply
	Single-grating high-throughput automated monochromator Order-sorting filters for accurate wavelength selection Selectable flip-mirror assembly for - Quantum efficiency measurement - Lighted I-V measurement
Illumination Area	Standard collimated beam: 10×10 mm Adjustable down to $500 \mu\text{m}$ using free-space optics $50 \mu\text{m}$ using light guides
Sample Handling & Electrical Interface	Maximum sample size: 25 mm Manual X-Y sample positioning to maintain horizontal alignment Manual 3-axis precision sample stage Electrical contact via: - Pogo pins - Multimeter-style probe tips
Integrated Lock-In Detection	Built-in optical chopper
	Integrated lock-in amplifier Enables accurate low-signal and low-current QE measurements
Digital Inspection Microscope	Sensor Type: 20 MP CMOS (Sony) Quantum Efficiency: 84% @ 535 nm Resolution: 5472 (H) $\times$ 3648 (V) Pixel Size: $2.40 \mu\text{m} \times 2.40 \mu\text{m}$ Sensor Size: 1 inch (15.86 mm) Shutter Mode: Rolling Frame Rates: 14 fps @ 5472 $\times$ 3648 53 fps @ 2736 $\times$ 1824 67 fps @ 1824 $\times$ 1216 Binning: 2 $\times$ 2, 3 $\times$ 3, 4 $\times$ 4 Exposure: Auto / Manual Image Formats: JPG / PNG / TIFF / DICOM Data Interface: USB 3.0 Bit Depth: 16-bit / 8-bit Power Supply: 12 V PC Interface: RS232C / USB Power Input: 230 V, 50 Hz
Camera Specifications	
Micromanipulator & Probing	Model: MIM-4A-10 4-axis control: XYZ + Tilt Travel Range: XYZ: 10 mm Tilt: $\pm 3^\circ$
Probe Tips	Current Rating: 1 A Voltage Rating: Based on probe spacing Operating Temperature: -40°C to $+125^\circ\text{C}$ Contact Material: Brass Contact Plating: Gold over Nickel
	
Reference Detector	High-sensitivity Silicon photodiode Active Area: 5.8×5.8 mm Spectral Response: 360 – 1100 nm Peak Sensitivity Wavelength: 960 nm Dark Current: $\leq 5 \text{ pA}$ @ 10 mV reverse bias

Spectral Response Measurement Apparatus

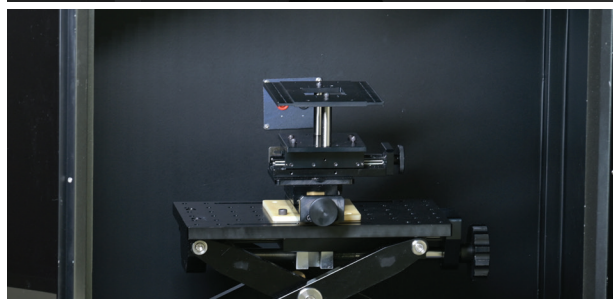
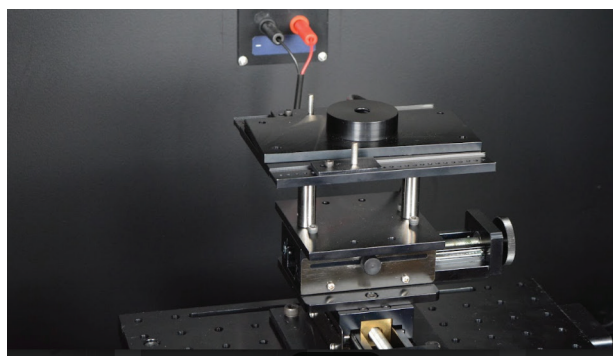
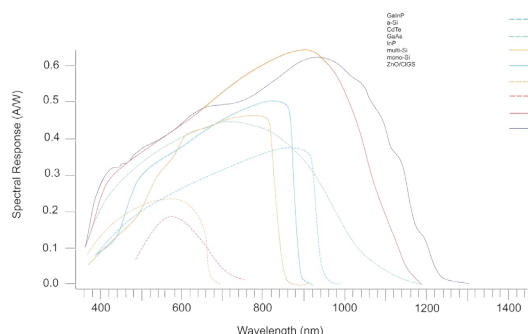
Model HO-AE-SR18

The Spectral Response Measurement Apparatus (Model HO-AE-SR18) is designed for precise measurement of the spectral response of photovoltaic devices and photosensors. Spectral response is defined as the ratio of the current generated by a solar cell or detector to the incident optical power at a given wavelength.



The system measures the short-circuit current of a solar cell across selected wavelengths over a broad spectral range. By normalizing the measured current with respect to incident light power, the spectral response as a function of wavelength is obtained. Spectral response is directly related to the External Quantum Efficiency (EQE) of the device. HOLMARC's HO-AE-SR18 system is capable of characterizing single-junction and multi-junction solar cells, photodiodes, and optical sensors with active areas up to 30 mm × 30 mm. Measurements can be performed over a wavelength range of 360 nm to 1100 nm with a resolution of 1 nm. The system supports computer-controlled operation for automated data acquisition and analysis.

A third-party Source Measure Unit (SMU) may be interfaced for current measurement and bias voltage application. HOLMARC also offers a fully integrated solar cell characterization system (Model HO-SC-QEIV) with an internal source-measure circuit for combined I-V and spectral response measurements.



Light Source Specifications	Light Source	50 W Tungsten Halogen Lamp
	Standard Wavelength Range	360 nm – 1100 nm
	Optional Wavelength Range	200 nm – 2000 nm
Monochromator Specifications	Optical Design	Czerny–Turner
	Main Mirrors	Parabolic mirrors with enhanced aluminum coating
	Focal Length	200 mm
	Dispersion Element	Holographic Grating
	Grating Density	1200 lines/mm
Wavelength Scanning & Resolution	Filter Unit	Higher-order cut-off filter wheel
	Wavelength Range	360 nm – 1100 nm
	Wavelength Resolution	1 nm
	Scanning Mechanism	Stepping motor–driven monochromator for precise wavelength positioning
Sample Handling & Probing	Maximum Sample Size	Up to 30 mm × 30 mm
	Electrical Contact:	- Two precision probes, one movable along the X-axis and the other along the Y-axis - Alternative contact option via alligator clips
Photocurrent Measurement	Built-in Electronics: Transimpedance amplifier for accurate photocurrent measurement	
	External SMU Support: Compatible with third-party SMUs for current measurement and bias voltage application	
User Interface & Communication	User Interface: PC-based software	
	PC Interface: RS-232 or USB (via USB-to-Serial converter)	
System Features	- Can be operated in standalone mode - Intuitive PC software interface - Plot browser for reading spectral response at each wavelength - Broad wavelength coverage from 360 nm to 1100 nm - High-precision stepping motor–based wavelength scanning	
	- Full control of the monochromator - Performs scans over user-defined wavelength ranges - Plots spectral response versus wavelength - Data export to spreadsheet files - Operating System Compatibility: Windows XP / 7 / 8 / 8.1 / 10	
Reference Sample Specifications	Active Area	5.8 mm × 5.8 mm
	Wavelength Range	360 nm – 1100 nm
	Wavelength of Peak Sensitivity	960 nm
	Photosensitivity	0.58 A/W at 960 nm
	Typical Short-Circuit Current (at 100 lx)	31 μ A
	Dark Current	50 pA
	Rise Time	10 μ s
Sample Size & Probes (Summary)	Maximum Sample Size	Up to 30 mm × 30 mm
Probes:	Two probes with independent X and Y axis movement for precise sample contact	

Photodetector Characterization Setup

Model HO-PDC-01

The HO-PDC-01 Photodetector Characterization Setup is a precision optical–electrical measurement system designed for complete evaluation of photodetectors and photodiodes under controlled spectral, electrical, and environmental conditions. In practical applications, no photodetector exhibits constant spectral responsivity under all operating conditions. Effects such as saturation at high incident power, spatial non-uniformity across the active area, and temperature-dependent responsivity must be thoroughly evaluated to identify the most suitable detector for a given application. For calibration-grade detectors, full characterization is essential to accurately estimate measurement uncertainty.

In this system, the detector under test (DUT) is measured relative to a reference detector of known spectral responsivity or quantum efficiency, ensuring traceable and reliable results.

A high-precision monochromator selects a narrow wavelength band from a broadband quartz tungsten halogen source, allowing continuous tuning across the operating wavelength range for accurate spectral responsivity measurements.

Key Measurement Capabilities

- Spectral responsivity measurement
- Detector linearity and saturation analysis
- Spatial uniformity mapping of detector response
- Temperature-dependent responsivity characterization
- Comparison with calibrated reference detectors

Applications

- Photodiode and detector characterization
- Calibration laboratory measurements
- Optical sensor development
- Research in photovoltaics and optoelectronics
- Quality control and performance validation

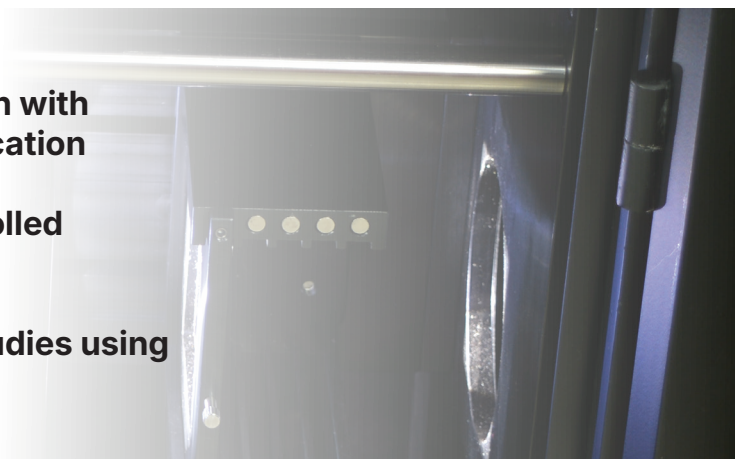


Optical System Specifications

Light Source	Type	Quartz Tungsten Halogen Lamp
	Lamp Power	50 W
	Spectral Output	Broad-band continuous spectrum
	Stability	Suitable for precision spectral responsivity measurements
Monochromator	Type	Czerny–Turner
	Gratings	Holographic grating
	Order Sorting	Second-order cut-off filters
	Standard Wavelength Range	380 nm – 1100 nm
	Optional Wavelength Ranges	Available on request
	Wavelength Selection	Continuously tunable
Electrical Measurement Specifications		
Photocurrent Measurement	Measurement Range	0.1 nA to 50 μA
	Measurement Method	Precision current measurement with low-noise electronics
Biasing	Bias Voltage Range	+10 V to –10 V
	Bias Voltage Step Size	100 mV
	Operation Mode	Forward and reverse bias characterization
		(External SMU or internal current measurement electronics can be used depending on configuration.)
Sample Handling & Mechanics	Maximum Sample Size	Up to 50 mm
	Sample Holder	Manual three-axis (X, Y, Z) positioning using precision knobs
	Electrical Contact Options	Pogo pins Multimeter-style probe tips
Temperature-Dependent Measurements (Enhanced Capability from QE Systems)	• Supports spectral response measurements at different temperatures • Enables determination of temperature coefficient of responsivity • Suitable for detector qualification under real operating conditions	
Advanced Characterization Parameters		
Linearity Range	• Determines the range of incident radiant power over which detector output remains linear • Laser-based methods used to identify detector saturation threshold	
Spatial Non-Uniformity of Response	• Responsivity variation across the detector active area • Measured by scanning a small optical spot at a selected wavelength	
Temperature Coefficient of Response	• Quantifies variation of detector responsivity with temperature	
Software & Control		
Software Features	• Monochromator control and wavelength scanning • Spectral responsivity plotting • Detector response analysis at different operating conditions • Data export to spreadsheet formats	
PC Interface	• Communication: RS-232 or USB (via USB-to-Serial converter) • Operating System Compatibility: Windows XP / 7 / 8 / 8.1 / 10 Note: PC is not included in the scope of supply.	
Typical Measurement Outputs	• Spectral response of photodiodes • Solar cell or detector response at different temperatures • Linearity and saturation curves • Spatial responsivity maps	

Solar Simulator

- **Photovoltaic characterization with precise solar spectrum replication**
- **Material testing under controlled solar-like illumination**
- **Environmental simulation studies using stable LED light**



LED Solar Simulator

Model : HO-SSLD-01

The Holmarc HO-SSLD-01 is a large-area, LED-based solar simulator designed for precise, stable, and customizable illumination in advanced research and testing applications. It is ideally suited for photovoltaic characterization, material testing, and environmental simulation studies where uniform and controllable solar-like illumination is essential.

This advanced system employs high-efficiency LEDs covering a wide wavelength range, enabling accurate replication of solar spectrum conditions over a large illumination area of 22×60 cm. The vertically adjustable LED source head allows precise control of irradiance from 0.1 Sun to 1 Sun, ensuring flexibility for diverse experimental requirements.

The simulator supports both manual operation and PC-controlled modes, offering seamless integration into automated measurement setups. With features such as exceptional temporal stability, spectral tunability, instant start-up, and zero maintenance, the HO-SSLD-01 delivers reliable performance with enhanced operational safety due to the absence of explosion risks commonly associated with conventional lamps.

Key Features

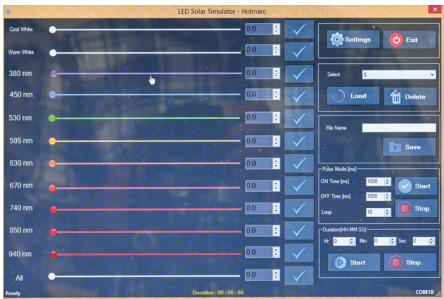
- Large-area uniform illumination (22×60 cm)
- LED-based solar simulation technology
- Adjustable irradiance from 0.1 Sun to 1 Sun
- Vertically adjustable illumination head
- High temporal stability
- Wide spectral coverage with tunable output
- Instant ON/OFF with no warm-up time
- Long LED lifetime and zero maintenance
- Safe operation with no explosion hazard
- Manual and PC-controlled operation modes



Specifications



Area of Illumination	22 × 60 cm
Light Source Type	LED-based
Spectral Deviation	< 70 %
Wavelength Range	380 – 800
Spectral Coverage	> 80 %
Irradiance (at working distance)	Up to 1000 W/m ² , variable
Lamp Lifetime	10,000 hours
Cooling Method	Forced air cooling
Color Temperature Adjustment	Available
Pulsed Mode Operation	Supported
Programmable Timer	Available
Working Distance	200 mm



Solar Simulator 1

Model HO-SC-SS Series

A solar simulator is an essential laboratory instrument used to reproduce natural sunlight under controlled conditions. Holmarc's HO-SC-SS Series Solar Simulator offers a simple, reliable, and cost-effective solution for experiments requiring a stable and uniform light source.

The system uses a high-intensity Xenon lamp combined with precision collimating optics, an AM1.5G air mass filter, and advanced control electronics to closely simulate the solar spectrum. The integrated manual shutter allows precise control of the illuminated area, while the 360° continuously rotatable illumination head ensures flexible sample positioning.

Designed for ease of use and dependable performance, this solar simulator is suitable for a wide range of photovoltaic and optoelectronic characterization experiments.

Key Features

- Stable and uniform light output
- Cost-effective solar simulation solution
- High-intensity Xenon light source
- AM1.5G air mass filter (300 – 1100 nm)
- Precision collimating optics
- Manual shutter (motorized shutter optional)
- 360° continuously rotatable illumination head
- User-friendly control electronics
- Digital voltage and current display

Stable light source

Cost effective solar simulator



**Model: HO-SC-SS150C (0.5 Sun Version)**

Light Output	1 Sun
Spectral Match (fraction of ideal)	0.60 – 1.40
Non-Uniformity of Irradiance	< $\pm 10\%$
Temporal Light Instability	$\pm 2\%$
Illumination Head	360° Continuous Rotatable
Illumination Diameter	50 mm
Shutter	Manual
Light Source	150 W Xenon Lamp
Maximum Beam Diameter	50 mm
Air Mass Filter	AM1.5G, 300 – 1100 nm
Regulation Mode	Constant current with power limit
Power Adjustment	Front panel knob
Display	Digital voltage and current

Model: HO-SC-SS300C (1 Sun Version)

Light Output	1 Sun
Spectral Match (fraction of ideal)	0.60 – 1.40
Non-Uniformity of Irradiance	< $\pm 10\%$
Temporal Light Instability	$\pm 2\%$
Illumination Head	360° Continuous Rotatable
Illumination Diameter	50 mm
Shutter	Manual (Optional Motorized Shutter)
Light Source	300 W Xenon Lamp
Maximum Beam Diameter	50 mm
Air Mass Filter	AM1.5G, 300 – 1100 nm
Regulation Mode	Constant current with power limit
Power Adjustment	Front panel knob
Display	Digital voltage and current
Dimensions (L × W × H)	700 × 400 × 450 mm
Weight	22 kg

Solar Filter Specifications

Filter Type	Air Mass Filter
Solar Filter	AM1.5G
Spectral Range	300 – 1100 nm
Transmission Band	300 – 1100 nm
Reflected / Absorbed Band	300 – 1100 nm
Spectral Region	Infrared & Visible
Filter Style	Interference
Filter Diameter	2" (50.8 mm)
Thickness	2.5 mm

Optional Accessories

- Additional cut-off filter attachment
- Optical fiber attachment unit
- Motorized shutter (optional)

Solar Simulator 2

HR222 / SS222 Series

Stable Xenon Lamp Based Solar Simulation System

The HR222 / SS222 Series Solar Simulators are designed to reproduce natural sunlight under controlled laboratory conditions. Using a high-performance xenon arc lamp, the system delivers one of the closest spectral matches to natural solar radiation available from an artificial source.

These cost-effective solar simulators provide excellent performance for both research laboratories and production environments. With high optical stability, programmable shutter control, and multiple air mass filter options, the system is ideally suited for photovoltaic testing and a wide range of photochemical and photobiological studies.

Applications

Photovoltaics, photobiology, photo-oxidation, photodegradation, photocatalysis, sunscreen and cosmetic testing, plastics and polymer aging, aerospace material testing, bioluminescence studies, photosynthesis research, water treatment, crude-oil degradation, and free-radical formation

Solar Simulator Test station

Model: HR-SS300WRM1-100ATS

Designed for Solar cell testing.

It includes 1SUN Class A Solar Simulation System with an illuminated area of 100mm x 100mm and Air Mass Filter of AM1.5, PC controlled source measurement unit and a constant temperature controlled sample platform. Other features include built in timer, monitoring the bulb operating time, automatic/programmable Shutter Control, Optical power monitoring/feedback photo detector, external solar power meter Etc

This instrument is also available with Keithley SMU interface & Labview compatibility. Optional bandwidth filters are available for spectral measurements. Contact us for more details...

Key Features

- Xenon arc lamp based stable solar light source
- Class-rated solar simulation with excellent spectral matching
- AM0, AM1 and AM1.5 air mass filter options
- Optical intensity stability better than 1%
- Built-in lamp hour timer and operating time monitor
- Automatic and programmable shutter control
- Optical power monitoring with feedback photodetector
- 360° rotatable lamp head for flexible alignment
- Optional bandwidth filters for spectral measurements
- PC-controlled operation with user-friendly SSTS Analyzer software

Electrical Measurement (Optional)

Current Measurement Range :
±1 A

Current Resolution : 0.1 μ A

Voltage Range : ± 5 V

Voltage Resolution : 5 mV

Operating Mode : Four Quadrant Operation

Temperature Control (Optional)

Temperature Control Unit :
Integrated

Temperature Control Range : 5 °C to 75 °C



General Specifications	Light Source	Xenon Arc Lamp (Ozone-free)
	Solar Simulation Type	Continuous, stable illumination
	Spectral Match	Class A (model dependent)
	Optical Intensity Stability	< 1 %
	Air Mass Filters	AM0 / AM1 / AM1.5
	Operation Mode	PC Controlled
	Software	SSTS Analyzer
Available Models – SS222 Series		
HR-SS150WRM1-50A	Solar Intensity	1 Sun
	Performance Class	Class A
	Illuminated Area	50 mm Diameter
	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	2 %
HR-SS150WRM2-50B	Solar Intensity	2 Sun
	Performance Class	Class B
	Illuminated Area	50 mm Diameter
	Air Mass Filter	AM 1.5
HR-SS150WRM2-50C	Spatial Non-uniformity	5 %
	Solar Intensity	2 Sun
	Performance Class	Class C
	Illuminated Area	50 mm × 50 mm
HR-SS300WRM1-50A+	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	10 %
	Solar Intensity	1 Sun
	Performance Class	Class A+
	Illuminated Area	50 mm Diameter
HR-SS300WRM1-50U	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	1 %
	Solar Intensity	Up to 5 Sun
	Performance Class	Class U
	Illuminated Area	50 mm Diameter
HR-SS300WRM1-100A	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	AM 1.5
	Solar Intensity	>10 %
	Performance Class	Class A
	Illuminated Area	100 mm × 100 mm
HR-SS300WRM2-100B	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	2 %
	Solar Intensity	2 Sun
	Performance Class	Class B
	Illuminated Area	100 mm Diameter
HR-SS300WRM2-100C	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	5 %
	Solar Intensity	2 Sun
	Performance Class	Class C
	Illuminated Area	Illuminated Area
HR-SS300WRM3-100U		100 mm × 100 mm
	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	10 %
	Solar Intensity	3 Sun
	Performance Class	Performance Class
	Illuminated Area	100 mm Diameter
	Air Mass Filter	AM 1.5
	Spatial Non-uniformity	>10 %

Solar Simulator with IV Measurement System

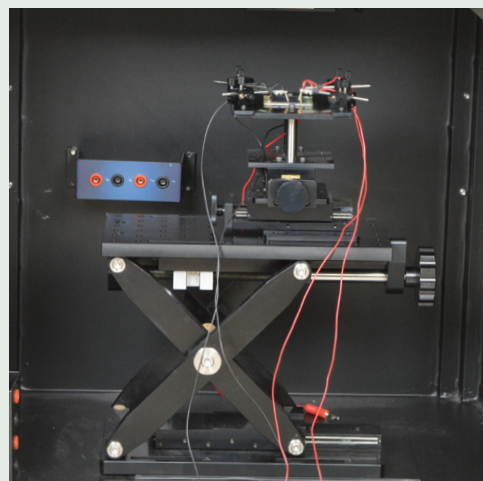
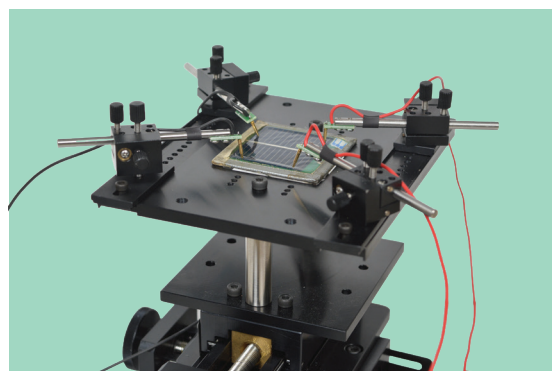
Model HO-SC-IV

The HO-SC-IV is a compact, fully integrated solar simulator and I-V characterization system designed for precise dark and illuminated I-V measurements of solar cells. The system combines a 300 W Xenon arc lamp, precision optics, stable power supply, and intuitive software into a single, user-friendly platform.

The system supports normally incident illumination and features an adjustable illumination area using a lens assembly, ensuring uniform exposure across the test sample. A precision sample stage with XY motion accommodates samples up to 50 mm diameter, making the system suitable for research, quality control, and device development.

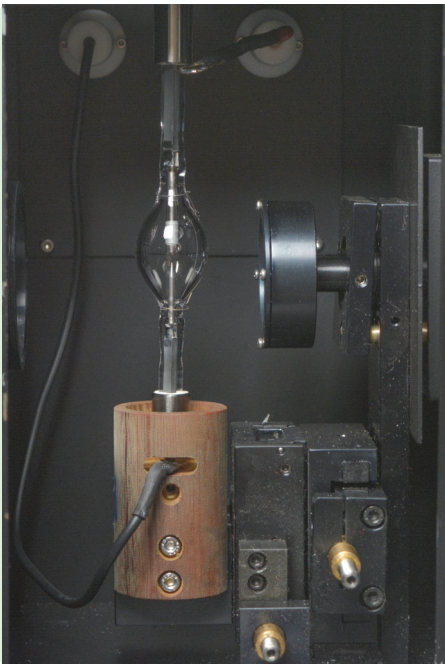
Key Features

- Integrated 300 W Xenon lamp-based solar simulator
- AM 1.5G air mass filter
- Supports dark and light I-V characterization
- Adjustable illumination area (up to 50 mm diameter)
- Stable irradiance with low temporal instability
- Precision XY sample stage with probe contacts
- User-friendly PC-controlled software





Optical & Illumination Specifications 	Light Source	300 W Xenon Lamp
	Solar Simulator Class	A / C / A
	Spectral Match	0.75 – 1.25
	Spatial Non-Uniformity of Irradiance	10 %
	Temporal Instability of Irradiance	2 %
	Maximum Beam Diameter	50 mm
	Intensity Range	0.7 Sun to 1 Sun
Electrical Measurement Specifications	Filter	Air Mass Filter (AM 1.5G)
	Bias Voltage Range	+1 V to –1 V
	Bias Voltage Resolution	5 mV
Sample & Mechanical Specifications	Current Measurement Range	0.1 μ A to 0.75 A
	Maximum Sample Size	50 mm
Lamp & Safety Features	Sample Holder	Precision holder with XY motion
	Quartz Type	Ozone-free
	Luminous Flux	7000 lm
	Luminous Intensity	700 cd
	Average Luminance	27,000 cd/cm ²
	Regulation Mode	Constant current with power limit
	Protection	Open/short circuit, over-temperature, and over-current
Software & Interface	• Performs user-defined I–V scans • Exports data to spreadsheet formats • Operating System: Windows XP / 7 / 8 / 8.1 / 10 • PC Interface: RS-232 or USB (USB-to-Serial supported)	



Solar Simulator & IV Measurement System with Keithley SMU

Model HO-SC-IVK

The HO-SC-IVK Solar Simulator & I-V Measurement System is a fully integrated solution designed for accurate characterization of solar cells under controlled illumination. The system is equipped with a Keithley 2450 SourceMeter® SMU and a 300 W Xenon lamp-based solar simulator, delivering reliable and repeatable dark and illuminated I-V measurements.

The system includes lamp housing, optical components, power supply, precision sample stage, probing arrangement, and user-friendly software for automated measurements. Light is incident normally on the sample, and the illumination area can be precisely adjusted using a lens assembly to suit different sample sizes.

The sample stage accommodates devices up to 50 mm diameter and features XY motion for accurate positioning, making the system suitable for research laboratories, academic institutions, and industrial testing environments.



Technical Specifications

Solar Simulator & Optical System



Light Source

300 W Xenon lamp

Filter	Air Mass Filter (AM 1.5G)
Solar Simulator Class	A C A
Spectral Match	0.75 – 1.25
Spatial Non-Uniformity of Irradiance	≤ 10 %
Temporal Instability of Irradiance	≤ 2 %
Maximum Beam Diameter	50 mm
Maximum Intensity	1 Sun
Minimum Intensity	0.7 Sun

Electrical Measurement (Keithley 2450 SMU)

Bias Voltage Range	+20 V to –20 V (Max current: ±1 A) +200 V to –200 V (Max current: ±100 mA)
Bias Voltage Resolution	0.5 μ V to 5 mV (depending on selected range)
Current Measurement Range	0.5 pA to 50 μ A (depending on selected range)

Sample Handling

Sample Size	Up to 50 mm
Sample Holder	Precision holder with XY motion

Lamp Specifications

Quartz Type	Ozone-free
Wattage	300 W
Luminous Flux	7000 lm
Luminous Intensity	700 cd
Average Luminance	27,000 cd/cm ²

Regulation & Protection

Regulation Mode	Constant current with power-limit control
Protection Features	Open / short-circuit protection Over-temperature protection Over-current protection

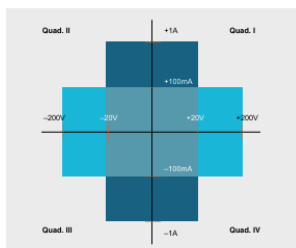
Software Features

- Performs I-V scanning over user-defined voltage ranges
- Supports dark and illuminated I-V measurements
- Automatic data acquisition and analysis
- Exports results to spreadsheet files
- Operating System Compatibility:
Windows XP / 7 / 8 / 8.1 / 10
- PC Interface: RS-232 or USB (USB-to-serial converter)

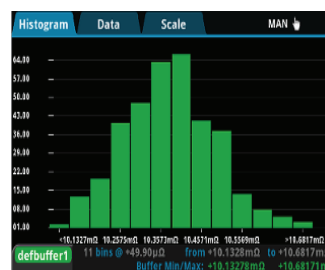
Keithley 2450 SourceMeter® SMU – Key Features



- Combines the capabilities of analyzers, curve tracers, and I-V systems
- Five-inch high-resolution capacitive touchscreen GUI
- 0.012 % basic measurement accuracy with 6½-digit resolution
- Enhanced sensitivity with 20 mV and 10 nA source/measure ranges
- Four-quadrant (source and sink) operation
- Four QuickSet™ modes for rapid setup and measurement
- Built-in context-sensitive help on the front panel
- Front-panel banana inputs and rear-panel triaxial connections
- Supports 2450 SCPI and TSP® scripting
- 2400-series SCPI-compatible programming mode
- Front-panel USB memory port for data storage, programming, and firmware upgrades



2450 power envelope.



Schlieren Imaging System

- **Wind tunnel research**
- **Fluid and air current flow**
- **Internal character of glass**
- **Flame analysis**



Standard Models with different Mirror sizes

Ideal for optical in-homogeneities studies in transparent material
Model: HO-SDIS Series

Holmarc schlieren system contains, Two aluminized parabolic mirrors overcoated with silicon monoxide and mounted in gimbal mounts, pointed LED light Source, Knife edge adjuster and a 5MP USB 2.0 digital camera. Camera is used for enabling a photographic record to serve as a permanent reference. For lower light intensities, a video camera and monitor combination may better enhance your total Schlieren system. Using video, your results are enlarged. Gimbal mounts for the parabolic mirrors eliminate unwanted linear beam translation during adjustment.

Schlieren imaging systems provide a powerful technique to visualize changes or non uniformities in refractive index of air or other transparent media. it is widely used in aeronautical engineering to photograph the flow of air around objects. Applications for the Schlieren system include: the determination of refractive index, wind tunnel research, fluid and air current flow, internal character of glass, flame analysis, sound velocity and the mass of microscopic particles.

Small scale unevenness that are commonly measured with interferometers or similar high sensitivity methods can also be tested with schlieren setups. Any inhomogeneities of the surface in a transparent material can be visualised with a schlieren setup. The small bumps or irregularities in the structure cause the same deviation of the light as in fluids.

Schlieren Imaging System is beneficial to use in fluid dynamics studies because they are sensitive to changes and do not interfere with flow. They are also used to study optical media and changes in refractive index within the material. Most commonly, schlieren systems have been applied to visualize diverse subjects such as striations in blown glass, inhalation in humans and animals, shock waves from a plane in flight, and heat emanating from a system.

Another important schlieren application is heat convection visualization. Mainly energetic questions as the thermic flux in buildings are answered with the schlieren method. An interesting example are the agricultural tests of thermal convection as seen in figure. Even small scale thermic convection on plants has been possible to visualize.

- Wind tunnel research
- Fluid and air current flow
- Internal character of glass
- Flame analysis
- Ultrasound visualization
- Heat convection visualization

Optional Features

- Custom Sizes & Lens Based Schlieren Imaging System
- To visualize instantaneous density profiles, a short duration flash rather than continuous illumination can be used
- # Flash lights can be provided on request

Model Options

Model No.	Mirror Size	Focal Length
HO-SDIS-150A	150 mm	1200 mm
HO-SDIS-150B	150 mm	1500 mm
HO-SDIS-200A	200 mm	1200 mm
HO-SDIS-200B	200 mm	1500 mm
HO-SDIS-300A	300 mm	1200 mm
HO-SDIS-300B	300 mm	1500 mm



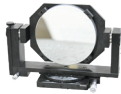
Airflow around the leaves of a corn plant is visualized using schlieren imager for agronomical research.

Viewing screen

200 mm dia diffused screen

Parabolic mirrors

Mounted in Gimbal Mirror Mount, allows user to steer a beam in any direction desired



Plain mirror

First-surface to reflect the image to a convenient viewing location

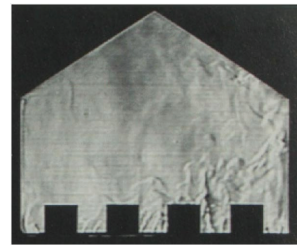
Knife edge

Adjustable in all three axis



Imaging Unit

USB 2.0 5MP 1/2.5" CCD camera with Optical Zoom



A model green house section with the heat convection produced by the sun light heat

Light source

Halogen or LED



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Flash Time: 1 ms
Trig Out : ms
Trig In : 3351 ms
Flash Inten: 100 %
```

Schlieren Imaging System

with Independent Mounting System Model: HO-SDIS-200B-IM

Holmarc schlieren system contains, Two aluminized parabolic mirrors overcoated with silicon monoxide and mounted in gimbal mounts, pointed LED light Source, Knife edge adjuster and a 5MP USB 2.0 digital camera. Camera is used for enabling a photographic record to serve as a permanent reference. For lower light intensities, a video camera and monitor combination may better enhance your total Schlieren system. Using video, your results are enlarged. Gimbal mounts for the parabolic mirrors eliminate unwanted linear beam translation during adjustment.

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Airflow around the leafs of a corn plant is visualized using schlieren imager for agronomical research.



A model green house section with the heat convection produced by the sun light heat.



Components

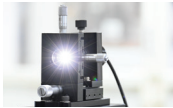
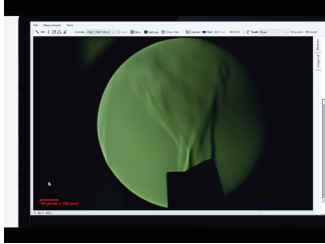
- Parabolic Mirrors
- Gimbal Mirror Mount for Parabolic Mirrors
- Imaging zoom Lens
- 5MP USB 2.0 CMOS camera
- Knife Edge with positioning mount
- LED point light source with variable power supply and condenser optics
- Platform for mounting Knife edge and zoom lens
- Image grabbing software
- Viewing screen

Optional Features

- Custom Sizes & Lens Based Schlieren Imaging System
- To visualize instantaneous density profiles, a short duration flash rather than continuous illumination can be used
Flash lights can be provided on request

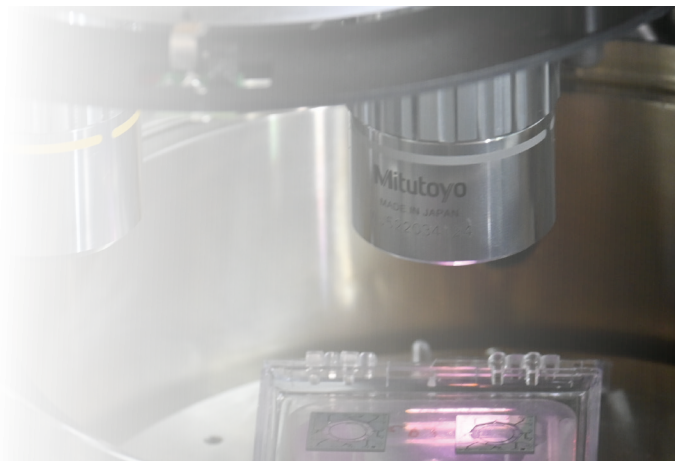


Technical Specifications

Parabolic Mirrors 	Diameter	200 mm, Focal length = 1500 mm
	Surface quality	40 - 20 (Scratch-dig)
	Material	Borofloat, Coating = Protected aluminium
	Reflectivity Ravg	2> 88% @ 450 - 2000 nm
Gimbal Mirror Mount for Parabolic Mirrors 	Coarse travel	360 degree
	Fine travel	+/- 6 degree
	Travel range	360 degree
	Linear resolution	0.01 mm (Least count for micrometer)
	Sensitivity	4 arc sec
	Mounting holes	M6 slots
	Construction material	Aluminium alloy
	Finish	Black anodized
	Optical axis height from the floor	1.41 meter
	Height adjustment	200 mm
	Height adjustment mechanism	Manual coarse height adjustment with lock knob
	Height adjustment mechanism Material	Mild Steel
	Foot leveling	with leveling screws
LED point light source with variable power supply and condenser optics 	LED	3W high bright White
	Intensity	Adjustable
	Condenser Optics	Multi-element design
	Optical axis height from the floor	1.41 meter
	Height adjustment	200 mm
	Height adjustment mechanism	Manual coarse height adjustment with lock knob
	Height adjustment mechanism Material	Mild Steel
	Foot leveling	with leveling screws
Platform for mounting Knife edge and Zoom lens	Optical axis height from the floor	1.41 meter
	Height adjustment	
	Height adjustment mechanism	Manual coarse height adjustment with lock knob
	Height adjustment mechanism Material	Mild Steel
	Foot leveling	with leveling screws
5MP USB 2.0 CMOS camera  	Sensor	CMOS, Color, 5 Mp
	Optical format	1 / 2.5"
	Active imager size	5.70 mm x 4.28mm (7.13mm diagonal)
	Pixel size	2.2 um x 2.2 um
	Frame rate	8 fps @ full resolution
	Sensitivity	1.76 V / Lux - sec
	Exposure time	109 us - 3000 ms
	Spectral range	380 - 650 nm
	SNR	38.5 dB
	Dynamic range	67.7 dB
	Shutter	Electronic rolling shutter
	Data interface	USB 2.0
	Software interface	TWAIN / DirectShow
	Operating mode	Continuous output
	Data format	8 Bit / 12 Bit RAW
	Picture format	JPEG / BMP / PNG / RAW
Viewing screen 	Optical axis height from the floor	1.41 meter
	Height adjustment	200 mm
	Height adjustment mechanism	Manual coarse height adjustment with lock knob
	Height adjustment mechanism Material	Mild Steel
	Foot leveling	with leveling screws

Others

- **Microlithography and MEMS fabrication with high precision**
- **Real-time imaging and advanced biological research applications**
- **High-speed scribing, cutting, and material removal tasks**



Confocal Micro Laser Ablation with integrated galvano scanning unit

The Confocal Micro Laser Ablation and Laser Scanning Microscope Workstation is a high-precision, fully automated system designed for real-time imaging, micro-scale laser ablation, and advanced material processing applications. Featuring a color-corrected infinity optical system, motorized sample scanning and rotation stages, and a high-power Nd:YAG laser (30W, 1064 nm), this workstation provides unparalleled precision in microlithography, MEMS fabrication, micro-machining, and biological research.

Equipped with a cooled 20MP CMOS imaging camera, advanced software-controlled microscope operations, and a vacuum-type sample chamber, this system enables high-resolution imaging, laser ablation, and automated post-processing inspection. The programmable turret, motorized focus control, and real-time image stitching allow precise laser pattern overlay, making it ideal for solar cell research, MEMS device tuning, and microfabrication tasks.

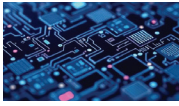
The system also integrates a Galvano-based laser scanning unit for high-speed scribing, cutting, and material removal over large areas. Laser power and frequency control via software ensures optimized ablation for various materials.



The Confocal Micro Laser Ablation and Laser Scanning Microscope Workstation is ideal for high-precision micro-scale applications,

Micro Lithography

Pattern generation for semiconductor and microfabrication industries.



Solar Cell Research

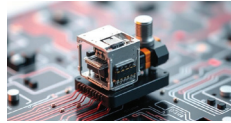
Selective material removal and microstructuring.



MEMS

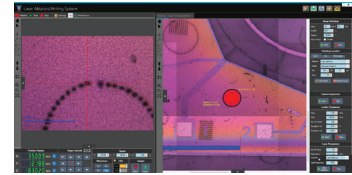
(Micro-electromechanical systems)

Device Fabrication & Resonant Frequency Control – High-accuracy ablation and tuning of MEMS structures.



Micro Machining

Precision cutting, marking, and material removal at the micron scale.



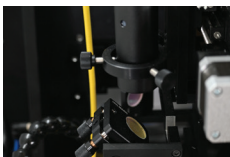
Biological Research & Cell Ablation

Controlled laser-based cell modification and analysis.



Laser Ablation System

Laser Type	Nd:YAG
Power	30W
Wavelength	1064 nm
Ablation Spot Diameter (Min)	2 Microns
Ablation Line Marking Width (Min)	2 Microns
Laser Power & Frequency Control	Adjustable via Software



Optical System

Equipment Type	Upright Microscope
Optical System	Color-Corrected Infinity Optical System
Observation	24" Touch Display with Dedicated PC

Galvano

Galvano Based Laser Unit for Large-Area Scribing & Material Removal



Objectives & Optical Components

5X LWD Plan	0.15 NA, 44 mm (WD)
10X LWD Plan	0.30NA, 34 mm (WD)
20X LWD Plan	0.35 NA, 29MM (WD)
50X LWD Plan	0.50 NA, 17 mm WD



Imaging Camera Specifications

Sensor Type	Cooled 20MP CMOS (Sony)
Quantum Efficiency	84% @ 535 nm
Resolution	5472 (H) × 3648 (V)
Pixel Size	2.40 μm × 2.40 μm
Sensor Size	15.86 mm (1-inch)
Shutter Mode	Rolling
Read Noise	<1e-
Cooling	Forced Air (-15°C at Ambient 25°C)
Frame Rate	• 14 fps @ 5472 × 3648 • 53 fps @ 2736 × 1824 • 67 fps @ 1824 × 1216
Binning Options	2×2, 3×3, 4×4
Exposure Settings	Auto/Manual
Exposure Time	18 μs - 1 hour
Picture Formats	

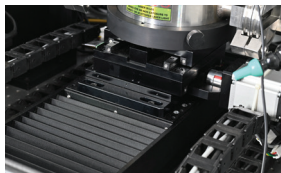
Illumination Systems

Illumination Types	Top, Bottom, and Co-Axial HB-LED Based
Illumination Control	Continuously Variable, PC Controlled



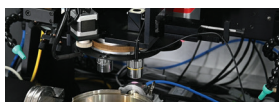
Sample Scanning & Rotation Stages

Sample Scanning Stage	Motorized, Programmable
Design	Linear Encoder-Based
Resolution	1 Micron
Sample Rotation Stage	Encoder-Based, Stepper Motor Controlled, Programmable



Sample Chamber

Type	Vacuum Chamber
Construction Material	Stainless Steel 304
Optical Window Material	Lambda/8 Polished B-K7 (High Optical Damage Threshold)



Control System & Software

Controller	HOLMARC XYZ Stepper Controller with Joystick
Software	Holmarc Micro/Analyser PRO
Features	• Programmable Microscope Controls • Depth Measurements • Track Saving Feature • Multiple Position Saving • Tracking • Live Image Addition, Subtraction, and Enhancement • Linear and Angle Measurements

Additional Features

Real-Time Sample Imaging & Ablation
Auto Inspection After Scribing, Cutting, or Hole Marking

Large-Area Sample Imaging (Stitched Images)

Overlay of Ablation Patterns on Stitched Images

Laser Power & Frequency Adjustments via Software

Galvano-Based Laser Unit for Large-Area Scribing & Material Removal

High-Precision Laser Ablation

2-micron ablation spot with programmable laser control.

Advanced Imaging & Inspection

Real-time imaging, post-ablation auto-inspection, and stitched image generation.

Fully Motorized & Programmable

Motorized stage, focus, turret, and illumination control.

Multi-Mode Illumination

Top, bottom, and co-axial HB-LED-based lighting.

High-Resolution Imaging

20MP cooled CMOS sensor with low noise & high quantum efficiency.

Galvano-Based Large-Area Processing

Efficient laser scribing and material removal over extended areas

Automated Multi-wavelength Laser Scribing/ablation/ Cutting station with Micro Inspection Camera



Model HO-LSWS300X i

The Holmarc Automated Multi-wavelength Laser Scribing/ablation/Cutting Station with Micro Inspection Camera Model HO-LSWS300X is a versatile laser system designed for precision scribing, ablation, and cutting. It is a useful tool for creating narrower scribe lines compared to traditional mechanical methods. It is a non-contact process that minimizes micro-cracking and substrate damage. With high peak power and excellent beam quality lasers are used for scribing, resulting in cleaner lines and higher throughput. Laser scribing offers benefits such as clean scribing of hard or brittle materials, lower cost, less chipping and micro-cracking, narrower cut widths for more parts per wafer, and greater process tolerances for reliable manufacturing at low cost.

It features Precision optical assembly creating a minimum line width of 0.002mm (Line width can be varied up to 0.5mm using optics), precise repeatability (± 0.002 mm), a red guidance laser, motorized focusing, and an integrated microscope. The closed-chamber design ensures safety, and it finds applications in microelectronics, photovoltaics, and MEMS fabrication.

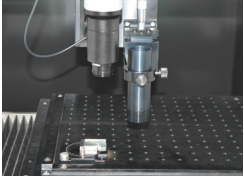
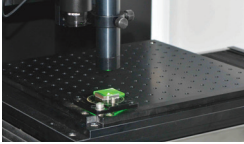


Laser 1 532 nm LD PUMPED ALL-SOLID-STATE AOM Q-SWITCHED LASER

Wavelength (nm)	: 532 $\pm$ 1
Operating mode	: Acousto-Optic Q-switched
Average power (W)	: 20W @ 50kHz
Average power (W)	: Single pulse energy (mJ) * Rep. rate (kHz)
Single pulse energy (μ J)	: >400 μ J @ 50kHz
Rep. rate (kHz)	: 50~100
Pulse width (ns)	: ~11 @ 50 kHz
Transverse mode TEM00	
Beam Circularity (%)	: >85
M2 factor	: <1.3
Warm-up time (minutes)	: <10
Beam divergence, full angle (mrad)	: <2
Beam diameter at the aperture (1/e2, mm)	: ~3
Beam height from base plate (mm)	: 91
Cooled method	: Water Cooled
Operating temperature	: 10 ~ 35 ($^{\circ}$ C)
Supply Voltage	: 100 - 240 VAC or 24 VDC
Dimension	: 640 * 260 * 124 mm

Laser 2 1064 nm LD PUMPED ALL-SOLID-STATE AOM Q-SWITCHED LASER

Wavelength (nm)	: 1064 $\pm$ 1
Operating mode	: Acousto-Optic Q-switched
Average power (W)	: 35W @ 50kHz
Average power (W)	: Single pulse energy (mJ) * Rep. rate (kHz)
Single pulse energy (μ J)	: >700 μ J @ 50kHz
Rep. rate (kHz)	: 50~100
Pulse width (ns)	: ~11 @ 50 kHz
Transverse mode	: TEM00
Beam Circularity (%)	: >85
M2 factor	: <1.3
Warm-up time (minutes)	: <10
Beam divergence, full angle (mrad)	: <2
Beam diameter at the aperture (1/e2, mm)	: ~3
Beam height from base plate (mm)	: 91
Cooled method	: Water Cooled
Operating temperature	: 10 ~ 35 ($^{\circ}$ C)
Supply Voltage	: 100 - 240 VAC or 24 VDC
Dimension	: 640 * 260 * 124 mm
Water Chiller	: Yes

Specifications Automated Multi-wavelength Laser Scribing / Ablation / Cutting Station	Scribing / Ablation / Cutting Area	200 x 200 mm, 150 x 150 mm & 100 x 100 mm (selectable)
	Scribing / Cutting Method	Galvano based
	Galvano speed limit	0 - 1500 mm / s
	The minimum line width	0.01 mm
	Repeatability	± 0.002 mm
	Guidance Laser	Red
	Focusing	Motorized stepper motor controlled Focusing
	Travel Range	300 mm
	Design	Closed Chamber
	Gas inlet	Active assist gas purging option
Memory Focus button	Imaging / Inspection / Alignment	Yes
Telecentric Microscope 	Equipment Type	Upright
	Effective Magnification	1 X
	Vision	Digital PC Based software measurements
	Working Distance	40 mm
	Working Throat	100 mm
	Objective Design	Telecentric
	Mount	C-Mount
	Typical Distortion @ 588 nm	0.0083 %
	Typical Telecentricity @ 588 nm	0.02°
	Working Distance Tolerance	± 1 mm
	Illumination for imaging	Top, Bottom & Co-Axial HB-LED Based
	Illumination Control	Continuously Variable PC controlled
Imaging Camera	Sensor Type	Cooled CMOS
	Array Diagonal	15.86 mm
	Resolution	20MP, 5472(H) x 3648(V)
	Pixel Size	2.4 μm x 2.4 μm
	Effective Area	13.1 mm x 8.8 mm
	Frame Rate	15fps @ 5472 x 3648
	Exposure Time	18 μs - 15 s
	Bit Depth	16 / 8 bit
	Camera Size	68 x 68 x 46 mm
	Data Interface	USB 3.0
Mapping Stage 	Stage	Automatic XYZ stage with Z-axis Automated Focus Function
	FOCUS and XY	Motorized servo motor controlled
	Resolution	1 Micron
	Positioning Accuracy	10 Micron with encoder
	Scanning Speed	40 mm / sec
	Controller	HOLMARC XYZ Stepper controller Unit
532 / 1064 nm Scribing / Ablation / Cutting Laser Specifications		
Laser 1	532 nm LD PUMPED ALL-SOLID-STATE AOM Q-SWITCHED LASER	
	Wavelength (nm)	532 ± 1
Laser 2	1064 nm LD PUMPED ALL-SOLID-STATE AOM Q-SWITCHED LASER	
	Wavelength (nm)	1064 ± 1

Laser Induced Current Measurement

- Identifying defects, coating errors, shunts, and photovoltaically inactive regions
- Predicting lifetime, mobility, and defect details
- Determining external quantum efficiency (EQE) based on laser power and wavelength

Confocal Real-time Laser Beam Induced Current and Photoluminescence Measurement Unit

The system uses a high-sensitivity APD with an onboard circuit optimized for APD evaluation. It can detect optical signals from fixed light (DC light). It also features a built-in temperature-compensated bias power supply.

Microscope

Equipment Type	Upright
Optical System	Colour Corrected Infinity Optical System
Sample Stage	Stepper motor controlled
Objectives	10x, 20x, 40 x, 60X confocal objective lens
Objective Turret	Motorized positioning
Filter Selection Unit	Motorized
Tube Length	200 mm
FOCUS	Motorized Stepper motor controlled Illumination for imaging: Co-Axial HB-LED Based Illumination Control: Continuously Variable PC-controlled

Scanning Stage

Scanning Area	250x250mm
Mapping resolution	1 μ m
Absolute positioning accuracy	5 μ m
Construction	Aluminium alloy on any rust-free Finish: Black anodized
Linear guide	Recirculation block and rail Drive: Rolled ball screw, pitch 4 mm
Actuator	Stepper motor
Maximum speed	16 mm/sec
Limit switch	Optical Limit switch on both ends Pay-Load: 8 Kg
Controller	HOLMARC XYZ Stepper Controller Unit with Joystick.

Probe Tip

Current Rating	1 Amp
Voltage Rating	Based on placement distance
Operating Temperature	-40°C to +125°C
Contact Material	Brass
Contact Plating	Gold over Nickel

Micromanipulator

4 Axis Micromanipulator (XYZ & Tilt)	
Model	MIM-4A-10
4Travel	XYZ 10 mm & +/- 3 degree



Camer Specifications

20MP CMOS for Imaging	
Sensor model	Sony
Quantum efficiency	84%@535nm
Resolution	5472(H)x3648(V)
Pixel size	2.40 μ m x 2.40 μ m
Sensor size	15.86mm; 1inch
Shutter mode	Rolling
Frame rate	14fps @5472x3648, 53fps @2736x1824, 67fps @1824x1216
Binning	2x2, 3x3, 4x4
Exposure settings	Auto/Manual
Picture format	JPG/PNG/TIFF/DICOM
Data interface	USB3.0
Bit depth	16bit/8bit
Power supply	12V



Keithley 2450SMU Instrument

Source Meter	Keithley 2450SMU Instrument
Voltage-Ranges	20 mV – 200 V depending on the selected voltage range
Current-Ranges	10 nA – 1 A depending on the selected current range 0.012% Basic Accuracy
Wideband Noise	2 mVrms Typ
Sweep Types	Linear, Log, Dual Linear, Dual Log, Custom,
Source-Memory (SCPI 2400 Mode)	
>250,000 Point Reading Buffer	
>250,000 Point Reading Buffer	
>3000 Readings/Second	
SCPI (2400 + 2450) + TSP Programming	
GPIO, USB, Ethernet (LXI)	
Front	Banana Jacks
Rear	Triax

Detector

Detector	High-sensitivity type, Active area: 3.0 mm
Type	High-sensitivity type
Effective photosensitive area	3.0 mm
Temperature stability of gain (typ.)	$\pm 2.5\%$
Photoelectric sensitivity (typ.)	-1.50×10^8 V/W
Low Band Cut-off Frequency (typ.)	Cooling Non-cooled
High Band Cut-off Frequency (typ.)	DC MHz
Response time	0.1 MHz
Supply voltage (typ.)	10 microseconds
Measurement condition	± 12 V
Photoelectric sensitivity	M=30 $\lambda=800$ nm, Temperature stability of gain: 25 ± 10 λ , M=30
Optical Coupling	Free space/Fiberoptic
Input Fiber	NA 0.22
Laser Wavelengths	405nm, 532nm and 655nm MLL-III-405-50mW, MLL-III-532-50mW & MLL-III-655-50mW
High output power stability	CW, line width < 0.2nm, beam diameter < 1.5mm, beam divergence < 1.5mrad, PSU-III-FDA Tunable output power via control knob & PC Controlled Operation
Laser Spot Size	2 μ m - 50 μ m selectable via objective lens



Light Beam Induced Current (LBIC) Measurement

Model : HO-SC-QE-C1

Light Beam Induced Current (LBIC) measurement Laser-based solar PV response mapping / Ideal for quality control & identification of Defects. This is a valuable tool for defect analysis in solar cells used to measure the spatial distribution of recombination active defects in solar cells. It works by illuminating a laser beam onto a solar cell and measuring the resulting current. The current is higher at locations where there are more recombination defects, so by scanning the laser beam across the solar cell, a map of the defect density can be created.

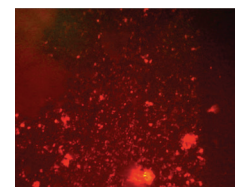
Our instrument uses three lasers with wavelengths of 405nm, 532nm, and 655nm to measure the spatial distribution of recombination active defects in solar cells. The different wavelengths allow us to probe different depths within the solar cell, which helps us to identify defects that are located at different layer. LBIC is a well-established method primarily used in the photovoltaic sector for spatially resolved measurements of recombination active defects in ready-processed solar cells. Holmarc Laser Beam Induced Current (LBIC) systems Model : HO-LBIC-3LC provide rapid, high-resolution mapping of the photovoltaic response in solar cells across large areas, from individual cells to entire modules. These systems are ideal for measuring photovoltaic active regions, identifying defects, shunts, inactive areas, and coating errors. The low-noise design ensures immunity to external light interference, and they are available in both single-wavelength and multiwavelength configurations for testing various photovoltaic responses.

Applications

- Identifying defects, coating errors, shunts, and photovoltaically inactive regions
- Predicting lifetime, mobility, and defect details
- Determining external quantum efficiency (EQE) based on laser power and wavelength

Real-Time Photoluminescence (PL) Measurement / Mapping System

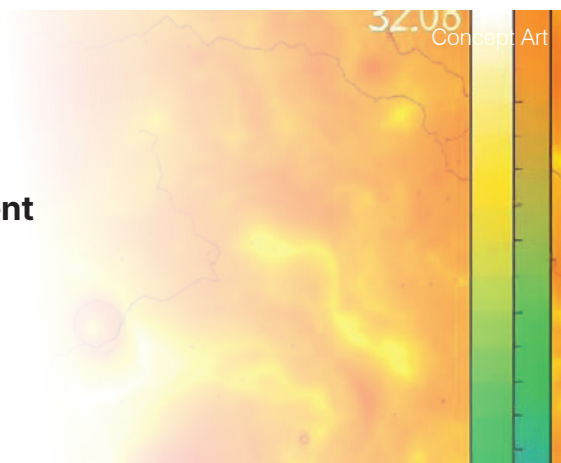
Photoluminescence spectroscopy offers valuable insights into the electronically excited states of molecules and substances following light absorption. Holmarc provides various accessories for photoluminescence (PL) detection and mapping. In parallel, Light Beam Induced Current (LBIC) helps identify defects in solar cells. By combining these techniques, we enhance our understanding of photovoltaic materials and their behavior.



Laser	Wavelengths	405nm, 532nm and 655nm
		MLL-III-405-50mW, MLL-III-532-50mW & MLL-III-655-50mW
		High output power stability, CW, line width < 0.2nm, beam diameter < 1.5mm, beam divergence < 1.5mrad, PSU-III-FDA
		Tunable output power via control knob & PC Controlled Operation
	Laser Spot Size:	2 μ m - 50 μ m selectable via objective lens
4 Axis Micromanipulator (XYZ & Tilt)	Model	MIM-4A-10
	4 Travel	XYZ 10 mm & +/- 3 degree
Mapping resolution		1 μ m
Absolute positioning accuracy		5 μ m
Construction		Aluminium alloy on any rust-free
Finish		Black anodized
Linear guide		Recirculation block and rail
Drive		Rolled ball screw, Pitch 4 mm
Actuator		Stepper motor
Maximum speed		16 mm / sec
Limit switch		Optical Limit switch on both ends
Pay-Load		8 Kg
Controller		HOLMARC XYZ Stepper controller Unit with Joystick
Probe Tip Specifications	Current Rating	1 Amp
	Voltage Rating	Based on placement distance
	Operating Temperature	-40°C to +125°C
	Contact Material	Brass
	Contact Plating	Gold over Nickel
320 - 1600 nm Wavelength Operation	Holmarc also provides an integrated monochromator system for continuous wavelength measurements spanning from 320 nm to 1600 nm	
Keithley 2450SMU Instrument	Source Meter	Keithley 2450SMU Instrument
	Voltage - Ranges	20 mV - 200 V depending on the selected voltage range
	Current - Ranges	10 nA - 1 A depending on the selected current range
		0.012 % Basic Accuracy
	Wideband Noise	2 mVrms Typ
	Sweep Types	Linear, Log, Dual Linear, Dual Log, Custom
	Source-Memory (SCPI 2400 Mode)	
		> 2,50,000 Point Reading Buffer
		> 3000 Readings / Second
		GPIO, USB, Ethernet (LXI)
Sample Inspection Camera		20MP CMOS for Imaging
	Sensor model	Sony
	Quantum efficiency	84% @ 535 nm
	Resolution	5472 (H) x 3648 (V)
	Pixel size	2.40 μ m x 2.40 μ m
	Sensor size	15.86 mm; 1 inch
	Shutter mode	Rolling
	Frame rate	14fps @ 5472 x 3648, 53fps @ 2736 x 1824, 67fps @ 1824 x 1216
	Binning	2 x 2, 3 x 3, 4 x 4
	Exposure settings	Auto / Manual
	Picture format	JPG / PNG / TIFF / DICOM
	Data interface	USB 3.0
	Bit depth	16 bit / 8 bit

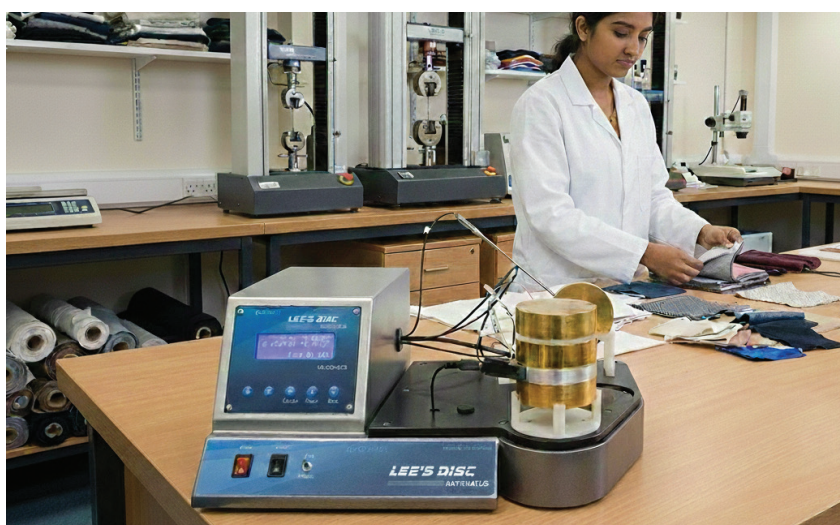
Lees Disc Apparatus

- New and integrated design
- Measure thermal conductivity of different materials
- LCD display readout for accurate measurement



Model: HO-AE-LD18

Holmarc Opto-Mechatronics Limited's Lee's Disc apparatus is an essential tool in the textile industry for assessing the thermal conductivity of fabric materials. This instrument is used to measure how well a textile conducts heat, which is crucial for evaluating the comfort and insulation properties of fabrics. The Lee's Disc apparatus consists of two brass discs with heating elements, between which the textile sample is placed. By monitoring the heat transfer through the fabric, this device provides precise thermal conductivity measurements, enabling manufacturers to select the best materials for various applications, such as clothing, upholstery, and technical textiles. The accuracy and reliability of Holmarc's Lee's Disc apparatus ensure that textile products meet the necessary quality standards and performance requirements.



**ASSESSING
THERMAL
CONDUCTIVITY**

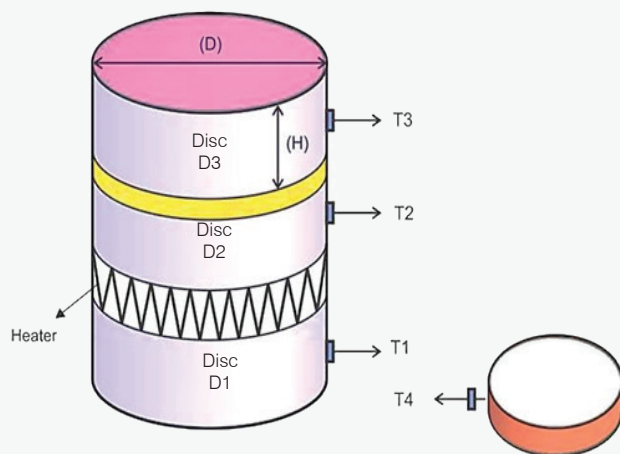
**FOR POLYMER
MATERIALS**

**PRECISE
MEASUREMENTS**

**QUALITY AND
PERFORMANCE**

FEATURES

- ▶ New and integrated design
- ▶ Measure thermal conductivity of different materials
- ▶ LCD display readout for accurate measurement
- ▶ Manual and auto measurements using a single system
- ▶ Easy to use equipment



Experimental setup for Lee's Disc steady-state thermal conductivity measurement

DETERMINE THERMAL CONDUCTIVITY OF BAD CONDUCTORS (GLASS, NYLON, PLYWOOD, ETC.) IN THE FORM OF A DISC USING LEE'S METHOD.

Four discs are used in this apparatus for much more accurate results. D1 and D2 are heating discs. D3 is the Lee's disc and D4 is for measuring the brass atmospheric temperature behaviour. In Auto mode, we use all these 4 disc temperature data for finding the result.



Z - Scan Characterization Kit

- Measure intensity-dependent nonlinear susceptibilities of materials
- Analyze real and imaginary parts of third-order susceptibility
- Characterize nonlinear optical properties using Z-Scan curve

Characterization of Transparent Optical Materials

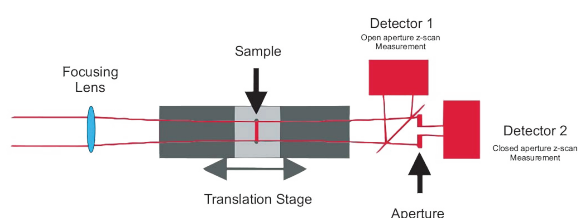
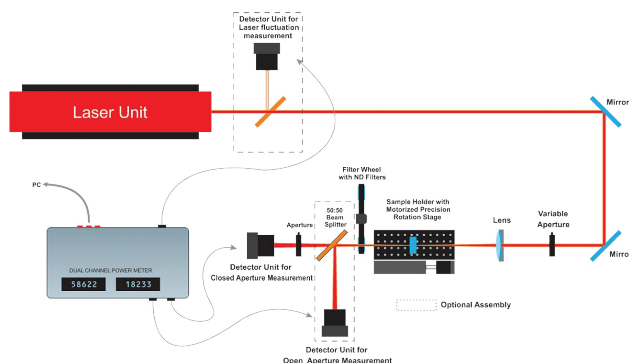
Model: HO-IAD-ZS-01A

The Z-Scan technique is a widely used and simple experimental method to measure intensity-dependent nonlinear susceptibilities of materials. Holmarc's Z-Scan System offers an efficient implementation of this technique for characterizing optical materials. In this method, the sample is translated along the axis of a focused Gaussian beam while the far-field intensity is measured as a function of the sample's position. The resulting intensity versus position curve, known as the Z-Scan curve, is used to analyze the nonlinear optical properties of the material, specifically the real and imaginary parts of the third-order susceptibility. This analysis assumes a local response of the material. In practice, the Z-Scan technique involves moving the sample in and out of the focal region of an incident laser beam to measure the optical effects.

Holmarc's Z-Scan System includes a precision motorized stage for linear scanning, a photodiode assembly with mechanical mounts, and control electronics for motion control and data acquisition. A high-power 532 nm CW DPSS laser serves as the light source. Key parameters, such as travel distance and data acquisition intervals, can be programmed through a computer interface.

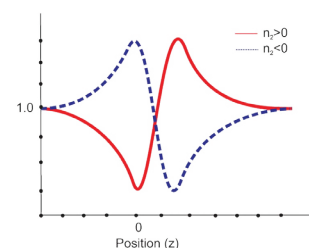
Experiment

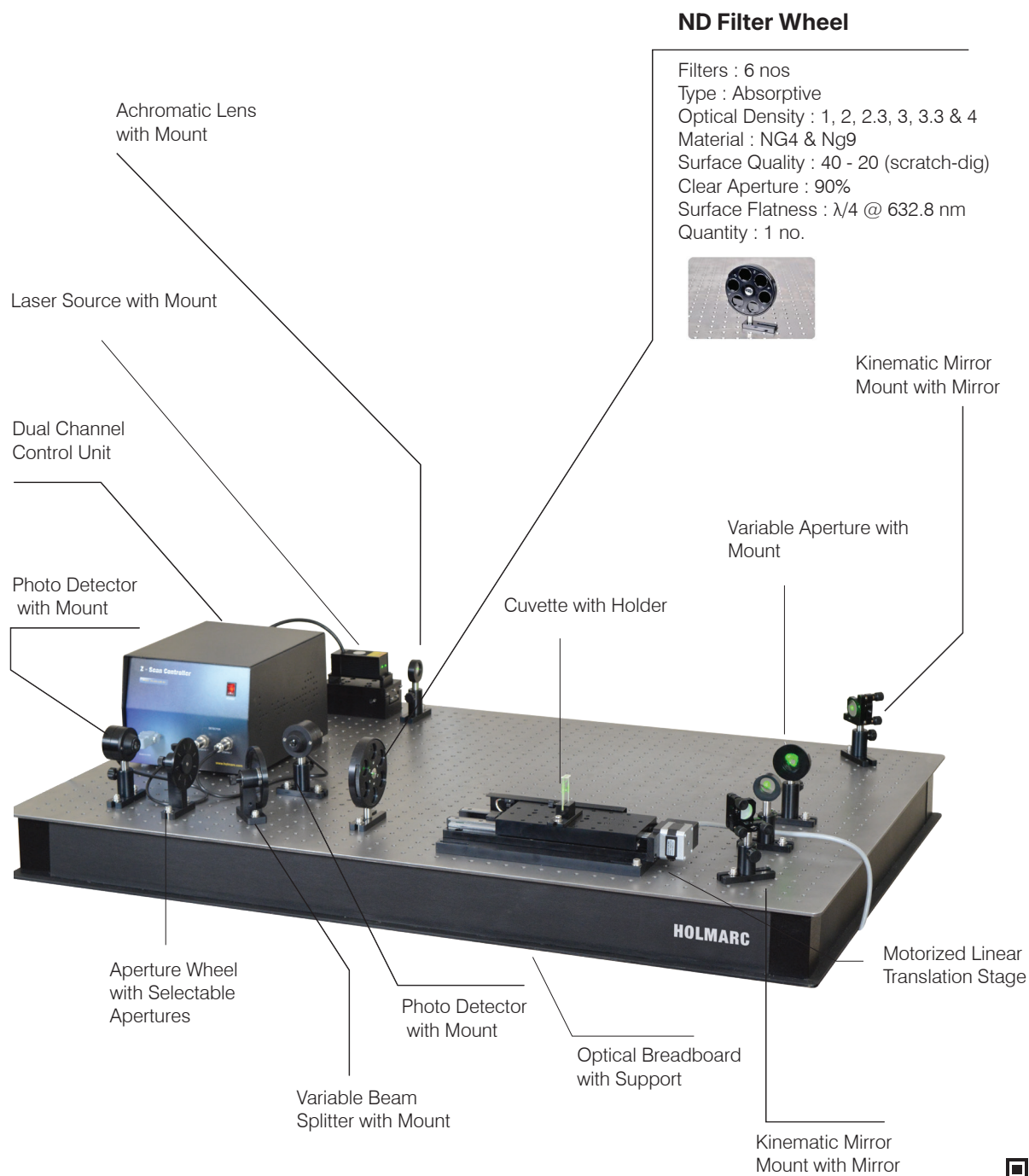
To measure intensity dependent nonlinear susceptibilities of materials



Features

- 532nm CW DPSS Laser
- Photo detector with spectral response range of 320 - 1100 nm
- Optical breadboard make the system flexible
- User - friendly software
- Live plot during scanning





Electronic Speckle Pattern Interferometer (ESPI)

- **Non-destructive optical method for studying surface deformations**
- **Measure sub-micron displacements in-plane or out-of-plane**
- **Analyze deformation variations using CCD image fringe patterns**

Model: HO-AE-ESP18

Electronic Speckle Pattern interferometry (ESPI) is a non-destructive optical method for studying surface deformations. It relies on the interference between diffusely reflected light from the test object and a reference beam. This is one of the most sensitive interferometric technique, so that we can measure sub-micron level displacements either in plane or out of plane. The images before and after deformation are recorded by a CCD camera and analysed using an image analysis software. Deformation causes variations in the fringe pattern. These variations can be analyzed with the help of the software provided to find the deformations.

As this interferometer is highly sensitive to vibrational noises, Holmarc's ESPI comes with a Vibration isolation optical breadboard. A linearly polarized 632.8nm He-Ne laser with 5mW output power is used as the light source. A beam splitter splits the laser beam into two. The transmitted beam illuminates the test object uniformly via a spatial filter assembly while the reflected beam falls on a CCD as reference beam. The image of the illuminated test object is captured by zoom lens and CCD.

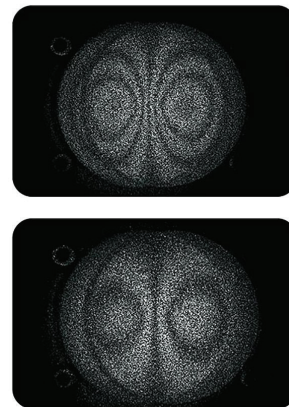
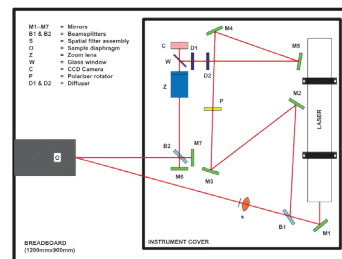
Our ESPI system allows the user to perform the Electronic Speckle Shearographic interferometry in the same system without disturbing the optical set ups and alignments. Holmarc's camera application software helps to capture and analyze the images.

Experiment

To observe and study the deformation of objects with respect to mechanical and thermal loads using electronic speckle pattern interferometer (ESPI)

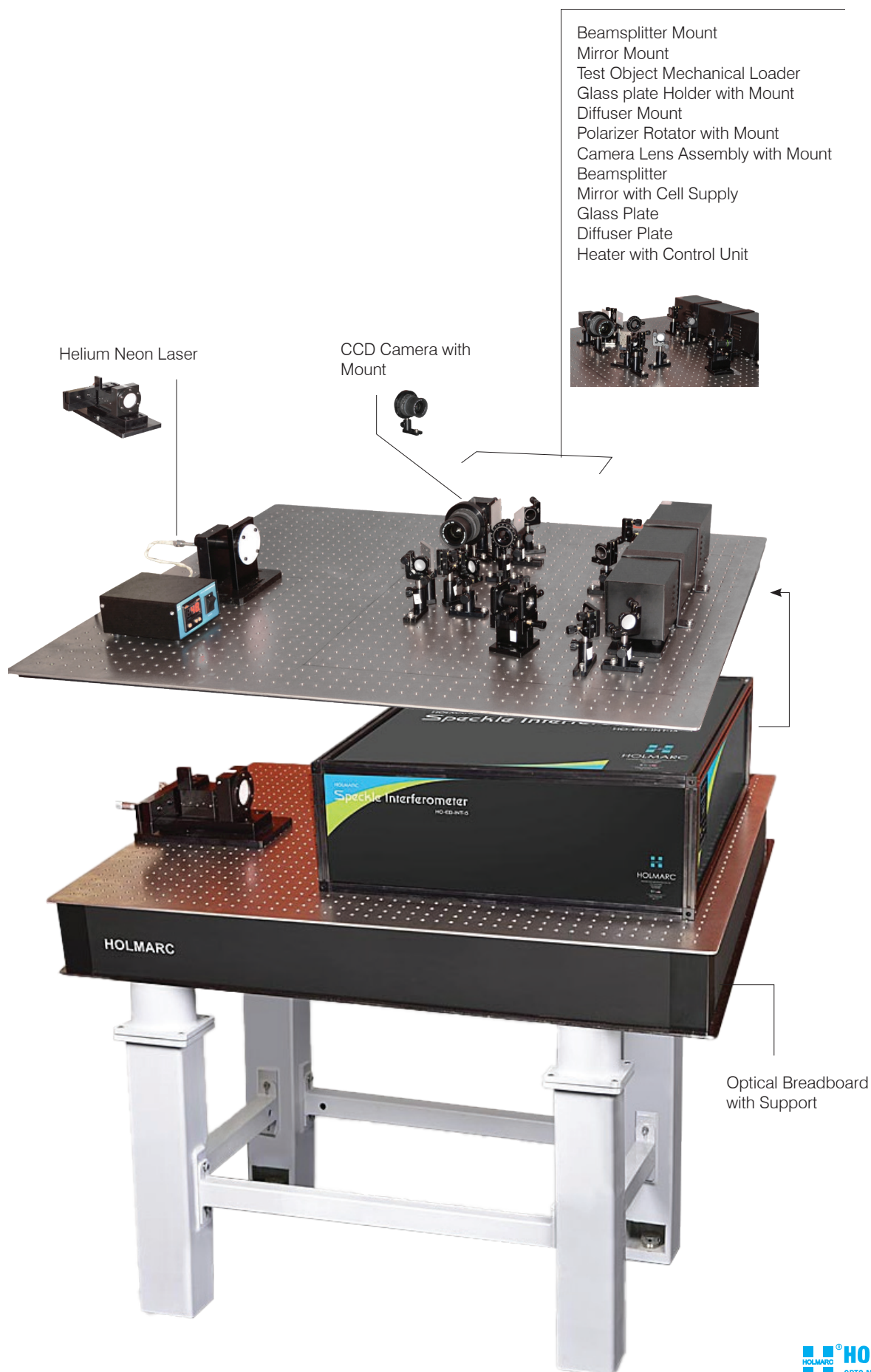
To observe and study the deformation of objects with respect to mechanical and thermal loads using electronic speckle shearographic interferometer (ESSI)

Laser	He-Ne 5mW @ 632.8 nm
Beam expander	20 X microscope objective with pinhole
Zoom lens	Nikon ®
Camera	1/2.5" 5 MPC MOS Color
Software	Holmarc camera application software & image analysis software
Optical Breadboard	1200 x 900 mm size with vibration isolation support



Measurement under visible light is possible
Non contact and full field measurements
Object contour and displacement measurements



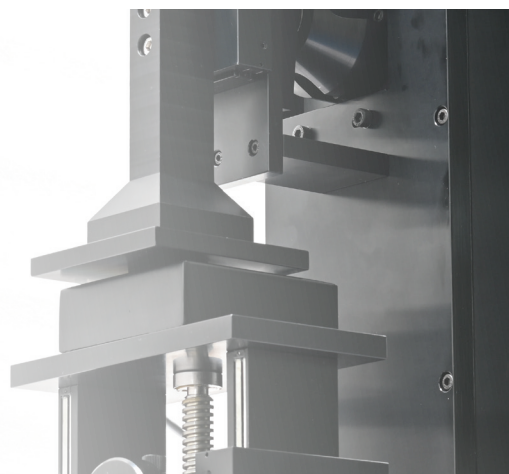


Cyclical Force Generator

Cyclical impact for piezoelectric sample characterization

Frequency and force adjustable for precise testing

Supports varied sample thickness requirements in experiments



Cyclical Force Generator is used to provide cyclical impact on a piezoelectric sample for its characterization. The frequency and the force can be set using the front panel LCD and buttons. The force inducer plate is made of electrically insulating material. The measurement electronics is not included. Holmarc can supply the measurement electronics separately according to the application requirements, or the user can use their own measurement setup for the characterization. Three models are available which has different frequency ranges (10Hz or 20Hz) and sample thickness requirements (3mm, 15mm or 30mm).



	TBM-01	TBM-02	TBM-03
Motor type	AC Servo	AC Servo	Stepper
Required range of the force	1N to 100N with 1N increment	1N to 100N with 1N increment	1N to 10N with 1N increment
Force repeatability	+/- 2N	+/- 2N	+/- 2N
Range of frequency	1Hz to 20Hz with 1Hz increment	1Hz to 10Hz with 1Hz increment	1Hz to 10Hz with 1Hz increment
Maximum sample thickness	30 mm	30 mm	30 mm
Maximum compression of sample	3 mm *	15 mm *	20 mm *
Maximum sample area	100 x 100 mm	100 x 100 mm	100 x 100 mm
Built material and finish	Anodized Aluminium	Anodized Aluminium	Anodized Aluminium
Built material of force inducer plate and sample stage	Acetal resin (Delrin)	Acetal resin (Delrin)	Anodized Aluminium
Height adjustable sample loading platform			Adjustable up to 5 cm
Area of force inducer plate			100 x 100 mm
Dimensions of sample stage	100 x 100 x 15 mm	100 x 100 x 15 mm	100 x 100 mm
Dimensions of force inducer plate	1) 100 x 100 x 15 mm; quantity: 1No.	1) 100 x 100 x 15 mm; quantity: 1No.	
	2) 80 x 80 x 15 mm; quantity: 1No.	2) 80 x 80 x 15 mm; quantity: 1No.	
	3) 60 x 60 x 15 mm; quantity: 1No.	3) 60 x 60 x 15 mm; quantity: 1No.	
	4) 40 x 40 x 15 mm; quantity: 1No.	4) 40 x 40 x 15 mm; quantity: 1No.	
	20 x 20 x 15 mm; quantity : 1No.	5) 20 x 20 x 15 mm; quantity : 1No.	Adjustable up to 5 cm
Force sensor type	Load cell	Load cell	Load cell
Interface	Controller with LCD display	Controller with LCD display	Controller with LCD display
Power input	230 ± 10 V 50 Hz	230 ± 10 V 50 Hz	230 ± 10 V 50 Hz

TBM-01

Frequency: 5 Hz
SetForce :
Duration: 30 Sec(-

Range of Force

1N to 10N with 1N increment

Compression

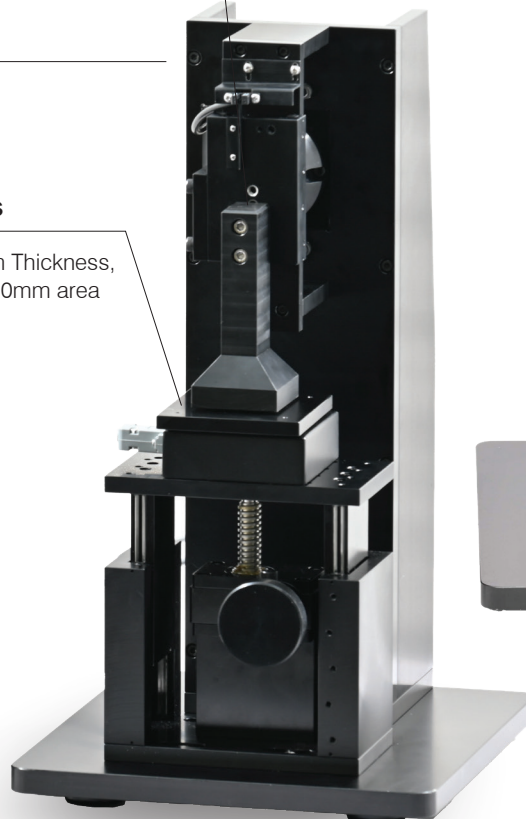
3 mm Maximum compression of sample

TBM-02**Compression**

15 mm Maximum compression of sample

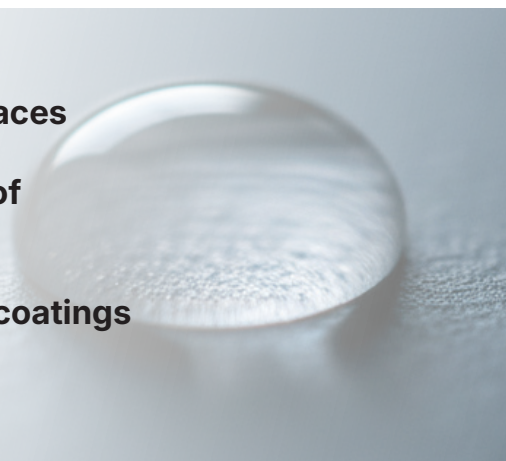
Samples

with 30 mm Thickness,
100mmx100mm area



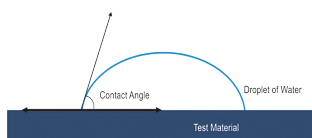
Contact Angle Meter

- **Measure contact angle of liquids on solid surfaces**
- **Determine wettability and surface properties of materials**
- **Develop superhydrophobic and self-cleaning coatings for industries**



Contact Angle Meter - Base Model

Contact angle is the angle formed by a liquid at the phase boundary where a liquid, gas and solid intersect. The shape of the drop is controlled by the three forces of interfacial tension. Static Angle and Advancing Angle are quantitative measures of the wetting of a solid by the liquid, but they can also be used as a quality control measure in surface treatments and surface cleanliness. Receding Angle is a quantitative measure of the adhesion of a solid to a liquid.



Base Model No: HO-IAD-CAM-01

Holmarc's Contact Angle Meter (Model No: HO-IAD-CAM-01) is a compact and cost effective CMOS based instrument for measuring contact angles of liquids over solid substrates. It has manual dispensing unit with camera interface for measuring contact angle of liquids on solid surfaces. The surface over which contact angle is to be measured is held in horizontal position to find out contact angle using sessile drop method.

State-of-the-art optics, precise opto-mechanics, high-resolution CMOS detector and associated electronics used in our instrument guarantee stable and accurate measurements. The illumination intensity of the back light LED can be controlled.. The surface over which contact angle is to be measured can be rotated through 180 degree from its horizontal position for advanced contact angle study and to find out contact angle hysteresis.

The wettability of a droplet is also dependent on the substrate in contact with the liquid. We provide 3 different substrates along with the equipment - made of aluminium, brass and stainless steel. However, the substrate according to customers' choice can also be loaded into the equipment.

Standard off the shelf syringes can be integrated from 0.4 to 20 ml, from any manufacturer. The equipment is compatible with glass, plastic and SS syringes. Three chromatographic syringes with 50 micro litre, 100 micro litre and 250 micro litre capacity are supplied along with the equipment



Technical Highlights

1. White light LED with variable intensity control ensures extreme low heat radiation.
2. Precise travel adjustment provided for CMOS with Optics assembly to fine focus the image.
3. Manual and motorized syringe pump for precise micro litre dispensing.
4. 50, 100 & 250 micro litre sample syringes provided with the system.
5. Precision height adjustment and angular displacement provided at the test base.
6. Vibration inhibiting solid construction for sharp drop images.
7. Powerful and user friendly windows software provided for image analysis.
8. Live images can be viewed on the PC monitor showing the droplet on the solid surface reassures the operator - regarding validity of the contact angle measurement.
9. Substrate can be rotated 180 degree from horizontal position.
10. Captured image and its Angle measurement table can be saved for future reference.

Contact Angle Meter with Rotatable Substrate Holder & Automated Dispenser

Model: HO-IAD-CAM-01A

Holmarc's Contact angle meter Model no: HO-IAD-CAM-01A is an instrument for research as well as industrial application with motorized syringe pump for precise dispensing and with camera interface for measuring contact angle of liquids on solid. Video capturing and video image processing features are included in Holmarc Contact angle analysis software.

State-of-the-art optics, precise opto-mechanics, high-resolution CMOS detector and associated electronics used in our instrument guarantee stable and accurate measurements. The illumination intensity of the back light LED can be controlled using the software. The flow rate and volume to be dispensed can be controlled from the software. Three chromatographic syringes with 50 micro litre, 100 micro litre and 250 micro litre capacity are supplied along with the equipment. Standard off the shelf syringes can be integrated from 0.4 to 20 ml, from any manufacturer. The equipment is compatible with glass, plastic and SS syringes.

HO-IAD-CAM-01A

Rotatable Substrate Holder

HO-IAD-CAM-01

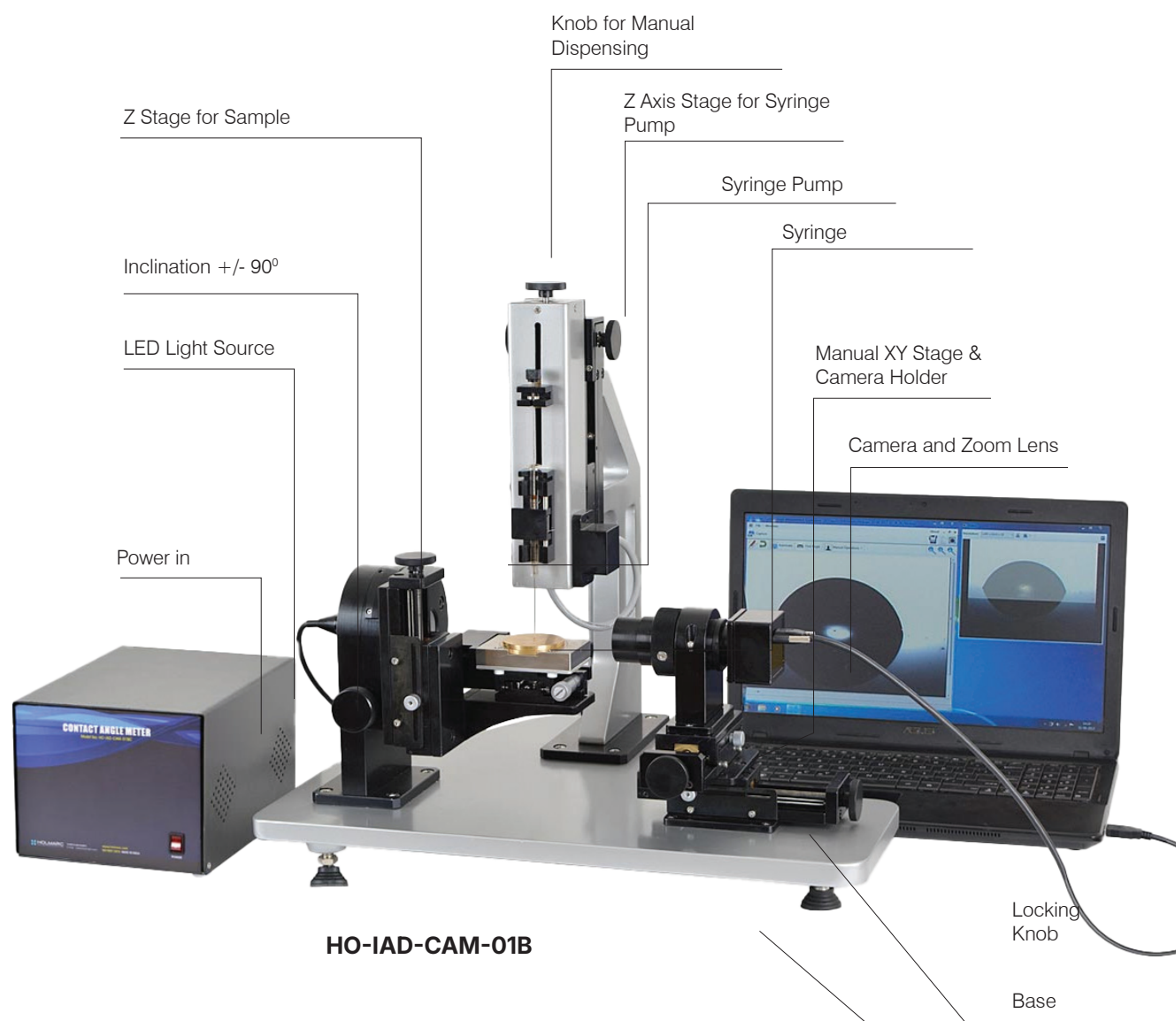


Contact Angle Meter with Rotatable Substrate Holder, Automated Dispenser & Temperature Control

Model: HO-IAD-CAM-01B

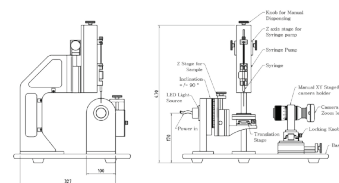
Holmarc's Contact angle meter Model no: HO-IAD-CAM-01B is an advanced model with automated dispenser, rotatable substrate holder and temperature control. Additional feature from the Model: HO-IAD-CAM-01A is that this model is equipped with temperature control for the substrate holder (up to 100 degree Celsius from ambient). This proves to be ideal for the study of contact angle variations with respect to temperature. Video capturing and video image processing features are included in Holmarc Contact angle analysis software. The surface over which contact angle is to be measured can be rotated through 180 degree from its horizontal position for advanced contact angle studies and to find out contact angle hysteresis.

State-of-the-art optics, precise opto-mechanics, high-resolution CMOS detector and associated electronics used in our instrument guarantee stable and accurate measurements. The illumination intensity of the back light LED can be controlled using the software. The flow rate and volume to be dispensed can be controlled from the software. Three chromatographic syringes with 50 micro litre, 100 micro litre and 250 micro litre capacity are supplied along with the equipment. Standard off the shelf syringes can be integrated from 0.4 to 20 ml, from any manufacturer. The equipment is compatible with glass, plastic and SS syringes.



MODEL	HO-IAD-CAM-01	HO-IAD-CAM-01A	HO-IAD-CAM-01B
	 	 	 
	Base Model	with Rotatable Substrate Holder & Automated Dispenser	with Rotatable Substrate Holder, Automated Dispenser & Temperature Control
Measuring method	Sessile drop method	Sessile drop method	Sessile drop method
Analysis method	Automatic curve fit analysis using drop snake method.	Automatic curve fit analysis using drop snake method.	Automatic curve fit analysis using drop snake method.
Optics	High performance aberration corrected imaging lens with precise manual focus adjustment.	High performance aberration corrected imaging lens with precise manual focus adjustment.	High performance aberration corrected imaging lens with precise manual focus adjustment.
Camera type and FPS	CMOS Sensor	CMOS Sensor	CMOS Sensor
Image Resolution in Pixels	2592 x 1944	2592 x 1944 (Max.)	2592 x 1944 (Max)
Video system	High performance CMOS Sensor. 3m shielded USB cable included.	High performance CMOS Sensor. 3m shielded USB cable included.	High performance CMOS Sensor. 3m shielded USB cable included.
Video Resolution in Pixels	640 x 480 at 17 fps , 1280 x 960 at 10 fps	640 x 480 at 17 fps , 1280 x 960 at 10 fps	640 x 480 at 17 fps , 1280 x 960 at 10 fps
	1920 x 1080 at 9 fps , 2048 x 1536 at 6 fps	1920 x 1080 at 9 fps , 2048 x 1536 at 6 fps	1920 x 1080 at 9 fps , 2048 x 1536 at 6 fps
	2592 x 1944 at 4 fps	2592 x 1944 at 4 fps	2592 x 1944 at 4 fps
Lighting	LED Based diffused lighting mechanism.	LED Based diffused lighting mechanism.	LED Based diffused lighting mechanism.
Dispenser	Mechanical dispenser with precise control.	Mechanical & Motorized dispenser.	Mechanical & Motorized dispenser.
Dimension	350 x 125 x 350 mm	500 x 400 x 498 mm	500 x 400 x 498 mm
Weight	30 kg (approx)	35 kg (approx)	35 kg (approx)
Power supply	230VAC, 50 Hz. / 110V AC, 60Hz (Optional)	230VAC, 50 Hz. / 110V AC, 60Hz (Optional)	230VAC, 50 Hz. / 110V AC, 60Hz (Optional)
Test base temperature			Ambient to 100°C
Other specifications	15mm height adjustment for Sample holder.	30mm height adjustment for Sample holder.	30 mm height adjustment for Sample holder.
	180 degree rotation for the sample holder.	180 degree rotation for the Sample Holder.	180 degree rotation for the Sample Holder.
	75mm XY travel provided for the CMOS - optics assembly.	75mm XY Travel provided for the CMOS - Optics assembly.	75mm XY Travel provided for the CMOS - Optics assembly.
	Rotatable screws provided beneath the base for levelling purpose.	Rotatable screws provided beneath the base for levelling.	Rotatable screws provided beneath the base for levelling purpose.
# Laptop is not in scope of supply			

Contact Angle Meter with Dispenser to camera positioning unit, Motorized Substrate Holder, Automated Dispenser & Temperature Control



Model: HO-IAD-CAM-01BC

Holmarc's Contact angle meter Model No: HO-IAD-CAM-01BC is an advanced model that features dynamic contact angle measurements with motorized precise tilting for the substrate holder, dispenser to camera positioning unit (camera can be positioned at different angle for drop imaging), automated dispenser and temperature control. Advancing and receding contact angle can be measured at different angle (Image acquisitions are also automated) and roll-off angle can also be measured.

We are using a sessile drop optical method to find out the contact angle meter but we can incorporate a pendant drop method to find out surface free energy. Additional feature from the Model: HO-IAD-CAM-01A is that this model is equipped with temperature control for the substrate holder (up to 100 degree Celsius from ambient). This proves to be ideal for the study of contact angle variations with respect to temperature. Motorized syringe pump is provided in the equipment for precise dispensing and camera interface for measuring contact angle of liquids on solid surfaces. Video capturing and video image processing features are included in Holmarc Contact angle analysis software.

The surface over which contact angle is to be measured can be rotated through 180 degree from its horizontal position for advancing and receding contact angle by tilt plate method and roll-off angle can also be measured. Three chromatographic syringes with 50 micro litre, 100 micro litre and 250 micro litre capacity are supplied along with the equipment. The wettability of a droplet is also dependent on the substrate in contact with the liquid. We provide three different substrates along with the equipment - made of aluminium, brass and stainless steel. However, the substrate according to customers' choice can also be loaded into the equipment.

Liquid Dispenser:

The system includes a motorized syringe pump with programmable flow rate of 1 - 100 $\mu\text{l}/\text{min}$ & 1 - 100 $\mu\text{l}/\text{hr}$ ensures precise and controlled dispensing of liquids for accurate measurements. Three syringes with capacities of 50, 100, and 250 microliters are included.

Temperature Control:

The temperature of the test base is adjustable from ambient to 100°C, allowing for experiments under various thermal conditions.

Measuring Method:

The sessile drop method is employed for accurate contact angle measurements. The system utilizes automatic curve fit analysis using the drop snake method, providing reliable and precise data.

Advanced Functionalities:

- Support for ROI acquisition window settings, resolution, and frame rate linkage adjustment.
- Auto exposure, EDR support.
- Internal and external synchronization capabilities.
- Various external signal triggering options (rising edge, falling edge, low level, high level).
- Automatic triggering of image changes in very small areas.
- Standard shutter release cable for shooting control.
- Real-time screen monitoring with a 1080P@50 frames format.
- Intelligent positioning trigger key-frames and image key-frames

Optics and Illumination

Equipped with a high-performance aberration-corrected imaging lens, the system ensures clear and detailed images with precise manual focus adjustment. The LED-based diffused lighting mechanism includes fixed backlit LED illuminators and angled illuminators for top view imaging, ensuring optimal illumination for various sample types.

Camera Focus Adjustment:

The linear stage offers a travel range of ≥ 75 mm, allowing for precise positioning and focusing of the CMOS/Optics assembly.



Motorized Substrate and Sample Holder:

The substrate holder is rotatable in the range of 180° from its horizontal position and is height adjustable, accommodating different sample sizes and shapes. The system includes substrates made of aluminum, brass, and stainless steel.

Measurement Range and Accuracy:

The contact angle meter offers a measurement angle range of 0 - 180 degrees with an accuracy of ≤ 1 degree, making it suitable for a wide range of materials and surfaces.
Integrated High-Speed Camera:

Software:

The system includes Windows OS compatible processing software for live image and video capturing, as well as contact angle measurements. The software supports static and dynamic contact angle measurement, contact angle hysteresis, and roll-off angle determination.

Measuring method	Sessile drop method
Analysis method	Automatic curve fit analysis using drop snake method.
Optics	High performance aberration corrected imaging lens with precise manual focus adjustment.
Measurement angle range	0 - 180 degree
Measurement accuracy	≤ 1 degree
Camera type	CMOS Sensor
Image Res. in Pixels	2592 x 1944 (typical, max.)
Video system	High performance CMOS sensor and suitable shielded cable of minimum 3 m length
Dispenser to camera positioning unit	Designed for top view
Illumination	LED based diffused lighting
Illumination Units	Fixed backlit LED illuminator and angled illuminator for top view imaging
Liquid dispenser	Through motorized syringe pump; suitable for both motorized and mechanical type Three syringes with 50, 100 and 250 micro litre capacity will be included
Temperature of test base	Adjustable from ambient to 100°C
Substrate / sample holder	It will be rotatable in the range 180° from its horizontal position; Height adjustable
Substrates	Aluminum, brass and stainless steel (1 each)
Focusing	≥ 75 mm travel of CMOS / Optics assembly to fine focus the image For live image / video capturing and contact angle measurements, windows operating system (OS) compatible processing software is included. The system has provision for :
Other accessories	i. Static and dynamic contact angle measurement ii. Contact angle hysteresis, iii. Roll-of Angle
Input power	230+10 VAC, 50Hz
The system has rigid & vibration resistant construction suitable to operate on a table top	
# Laptop is not in scope of supply	



Construction and Warranty:

The system is built with rigid and vibration-resistant construction, suitable for tabletop operation. It comes with a minimum one-year warranty from the date of installation, ensuring reliability and peace of mind.

Contact Angle Meter

Advanced Model with new Design

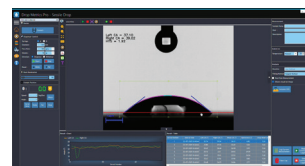
MODEL A: HO-IAD-CAM-02

MODEL B: HO-IAD-CAM-02A

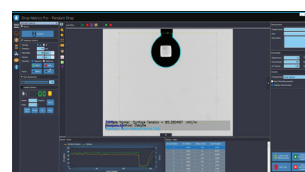
MODEL C: HO-IAD-CAM-02B

Holmarc's Contact Angle Meter is a compact and cost-effective instrument for measuring contact angles of liquids over solid substrates. It has automatic dispensing unit with camera interface for measuring contact angle of liquids on solid surfaces. The surface over which contact angle is to be measured is held in horizontal position to find out contact angle using sessile drop method. State-of-the-art optics, precise opto-mechanics, high-resolution CMOS detector and associated electronics used in our instrument guarantee stable and accurate measurements. The illumination intensity of the back light LED can be controlled by software. The surface over which contact angle is to be measured can be rotated through 180 degrees from its horizontal position for advanced contact angle study and to find out contact angle advanced/receding angles. The wettability of a droplet is also dependent on the substrate in contact with the liquid. The equipment is compatible with glass, plastic syringes. Chromatographic syringes with 100 micro litre capacity is supplied along with the equipment. Holmarc's Contact Angle Meter is a versatile instrument widely used in both research and industrial applications. It measures the contact angle of liquids on solid surfaces, which is crucial for understanding the wettability and surface properties of materials. These information's is essential in fields such as material science, coatings, and surface engineering, where the interaction between liquids and solids plays a significant role in product performance and quality. By measuring the contact angle, researchers can determine the hydrophobicity or hydrophilicity of drug coatings, which affects the release rate and absorption of the drug in the body. Contact Angle Meter is used in the development of advanced materials, such as superhydrophobic surfaces and self-cleaning coatings. These materials have applications in various industries, including automotive, aerospace, and construction, where reducing surface contamination and improving durability are critical. By accurately measuring contact angles, researchers can optimize the design and functionality of these innovative materials.

Sessile drop method



Pendant Drop method



Height adjustments for Sample holder

Specifications	HO-IAD-CAM-02	HO-IAD-CAM-02A	HO-IAD-CAM-02B
	1 Syringe (Motorized)	2 Syringe (Motorized)	3 Syringe (Motorized)
CA Measuring method	Sessile drop method for CA Studies		
CA Analysis method	Tangent method, Circle method & $\theta/2$ method		
Surface/Interfacial tension	Pendant drop method, Laplace method, Ds/De method		
Surface energy	Owrk model, Zisman model, Fowkes method etc		
Dispenser	Software based automatic dispenser with precise control		
Optics	High performance aberration corrected imaging lens with precise manual focus adjustment.		
Angular rotation	Mechanical/automatic (optional) rotation available for advanced /receding CA studies. (0-180 +/- 90 degrees)		
Camera type and FPS	high speed CMOS Sensor,200fps		
Image Resolution in Pixels	1024*1280 pixels		
Baseline	- Manual, Automatic -		
Lens Assembly	EF 50mm,f/1.8 STM		
Video system	High performance CMOS Sensor with 200fps or higher (customized)		
Video Resolution in Pixels	1024*1280 pixels with 200fps		
Lighting	software based LED controlled system		
Software	DropMetrics Pro		
Dimension & weight	600 x 250 x 700 mm,35kgs(Approx)		
Power supply	230VAC, 50 Hz. / 110V AC, 60Hz (Optional)		
Other specifications	25mm XY travel provided for the CMOS - optics assembly, Height adjustments for Sample holder etc.		
Rotatable screws provided beneath the sample stage for levelling purpose.			
# Laptop is not in scope of supply			

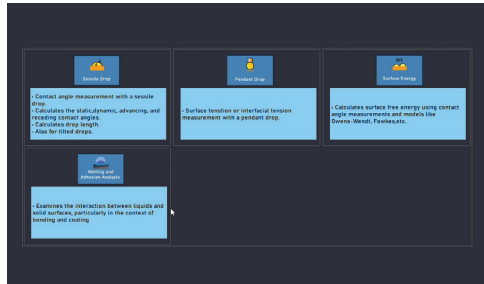


HO-IAD-CAM-02



Software

User friendly software available with the instrument (customized version also available)



Angular rotation

Mechanical/automatic (optional) rotation available for advanced /receding CA studies. (0-180 +/-90 degrees)

Lighting

software based
LED controlled
system

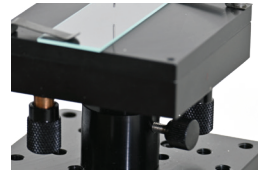
Contact Angle Analysis method

Sessile drop method used for measuring. Tangent method, Circle method & $\theta/2$ method for Analysis

Pendant drop method, Laplace method, Ds/De method for Surface Tension of Liquid.

Surface energy of solid using parameterized models OWRK, VCG Method, Zisman, Fowkes method etc.

Wettability Analysing



Camera

high speed CMOS Sensor, 200fps
1024*1280 pixels



25mm XY travel provided
for the CMOS - optics
assembly,

HO-IAD-CAM-02A

35kgs(Approx)

Call us now and talk with our Engineers for custom Designed Contact Angle Meter

Contact Angle Instrument for Under-Liquid Low Energy Surfaces

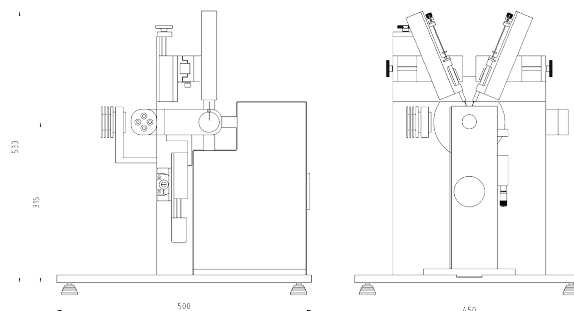
MODEL NO: HO-IAD-CAM-02

Unlike the standard setup in which we use syringe to create and drop the liquid onto the surface, this unique instrument can be used to create two independent droplets inside a liquid bath. The droplet surface can be visualized from bottom and side-ways using a unique camera setup.

In the pendant drop deposition technique, a needle containing the drop at its end is brought near the surface. On touching the surface the drop spreads and attains equilibrium and in the process the drop gets detached from the needle spontaneously. This mechanism inevitably requires the condition that the drop-substrate surface energy is larger than the drop needle surface energy. Hence for surfaces, for which the corresponding drop-substrate surface energy is much smaller than the drop-needle surface energy, such simple steps, as discussed above, do not occur. Using our instrument, one can generate a drop at the tip of a needle inserted inside the liquid bath, where the low energy substrate is present. Instead of bringing the drop closer to the substrate as we do our standard contact angle meter, we take it away from the substrate so that the drop needle entity hits the liquid-fluid interface. Here this fluid can be air, or some other liquid whose film has been deliberately created on the liquid surface. The moment the drop-needle combination hits the liquid-fluid interface, the drop and the needle are subjected to different surface tension forces, thereby allowing them to get detached from each other. Consequently, the needle goes out of the liquid bath, whereas the drop remains at the interface.

Specifications

- The motions are fully automated and can be controlled using dedicated software
- The system includes dual Syringe pump, two 13.5mm W.D 10 X objectives, zoom lens assembly, Image combining optics, 5mp USB camera, sample positioning stage, LED light source etc.
- The bottom & side profile views of the droplet are same in width and can be viewed in a single window
- There are two backlight LED's provided along with the equipment., the top light LED and side light LED. They are integrated on the same unit which is detachable whenever required.
- The automatic retraction of syringe head (two syringes will move together) is possible in the equipment. The automated retraction speed max is 4 mm / sec.
- The camera can be positioned at different angles to the needle assembly to get a view on entire drop / drops sitting inside the cuvette.
- X - Y translation for the substrate holder is provided in the equipment.
- Imaging area of our CMOS sensor is 1.2 x 0.85 mm for bottom and side imaging.
- Provision to integrate your camera in the present equipment.
- Standard contact angle measurements can also be conducted and studied using this equipment.



The system includes dual Syringe pump, two 13.5mm W.D 10 X objectives, zoom lens assembly, Image combining optics, 5mp USB camera, sample positioning stage, LED light source etc.

LED Backlight

There are two backlight LED's provided along with the equipment., the top light LED and side light LED. They are integrated on the same unit which is detachable whenever required.

X - Y translation

X - Y translation for the substrate holder is provided in the equipment.
Imaging area of our CMOS sensor is 1.2 x 0.85 mm for bottom and side imaging.

Syringle Head Retraction

The automatic retraction of syringe head (two syringes will move together) is possible in the equipment. The automated retraction speed max is 4 mm / sec.



Profile views

The bottom & side profile views of the droplet are same in width and can be viewed in a single window



Integrate your camera

Provision to integrate your camera in the present equipment. Standard contact angle measurements can also be conducted and studied using this equipment.



Custom Camera Position

The camera can be positioned at different angles to the needle assembly to get a view on entire drop / drops sitting inside the cuvette.



Software Controlled

The motions are fully automated and can be controlled using dedicated software



Acoustic Impedance Tube

- **Measure acoustic absorption, reflection, and transmission loss**
- **Analyze sound absorption coefficient of solid materials**
- **Support product development of sound absorptive materials**

Model : HO-AE-ITA219

HOLMARC's Impedance tube apparatus is designed to measure acoustic absorption, reflection and transmission loss of symmetric & non symmetric materials according to ASTM standards. The metallic design of the impedance tube with a piston support is dedicated to measure reflection, transmission & absorption coefficients of different solid materials. For measurement analysis, we have software controls, the instrumental design as well as operations are based on ASTM standards. Two microphone method for reflection coefficient analysis & four microphone method (For Transmission analysis) are used. 4-port USB Hub (USB3.0) is used for sound card function which is then connected to computer. The dedicated software is used to configure the speaker & microphones according to requirements. Impedance tubes have a lot of applications in different industries such as automobile, musical instruments etc... Since the whole system is calibrated and operated according to ASTM standards you can obtain the required result in a single click on your PC installed with HOLMARC's software. The scanned result can be exported as an excel file. The flange is available in centre of tube to fix the different materials according to ASTM dimensions. We have a designed control box to control the amplitude of sound signal transmitted through the tube. Holmarc offers the complete set of Impedance Tube system, which includes: hollow tubes, microphones, sample holders, DAQ unit and measurement software as per international standards. The tube is designed using anodized aluminum to measure sound absorption coefficient and transmission loss as per test standards described in ISO 10534-2, ASTM E1050 & ASTM E2611 at normal incident, that is, 0°. The measurement is based on transfer function method which separates the incident and reflected energy from the measured transfer function, and then estimates the acoustic properties of the test sample. The properties measured with this test method are useful in basic research and product development of sound absorptive materials

TUBE	LARGE	SMALL
Frequency Range	100Hz – 1600 HZ	500Hz – 6300HZ
Inner Diameter	100 mm	29mm
Sample Holder Inner diameter	100 mm	29 mm
Sample Holder Max length	200 mm	200 mm
Scanning Frequencies	1/3 Octaves	
Standard	ISO10534-2, ASTM E1050, ASTM E2611	
Value to be Measured	Sound Absorption Coefficient (α) and Transmission Loss (TL)	
Loud Speaker	3½ "in diameter, 30 Watts, 4 Ohm	
Microphone	1/4" in diameter, -3dB at 1.5V sensitivity, 20 -16,000 Hz frequency response	
Measurement software	Holmarc Wave Analyzer 4C	

PRODUCT FEATURES

- Measurement is based on transfer-function method according to ISO10534-2 and ASTM E1050 international standards for absorption coefficient and ASTM E2611 for transmission loss.
- Built-in Sine Wave generator & power amplifier.
- Quick and simple to use.
- Two kind of tube to measure full range frequencies.
- Measure in 1/3 octave frequencies.
- Measure other normal incident material properties like reflection coefficient,
- impedance ratio, resistance ratio, reactance ratio, admittance ratio, conductance
- ratio, susceptance ratio, transmission coefficient, propagation wave number in
- material, characteristic impedance in material as per ASTM standards.
- Data measured on different tubes can be combined into full-frequency.
- Direct data export to excel sheet and print report

Transmission loss measurement - Full tube

SAMPLE FOAM

Impedance tube is fitted with a 200mm sample holder to accommodate a variety of samples.



Tube with Built in Loud Speaker

100 mm transmission loss System

extension tube.

anechoic tube.

100 mm anechoic tube.

100 mm transmission loss measurement sample holder.

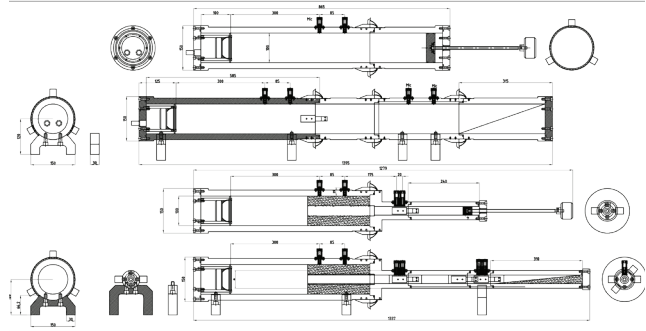
29 mm absorption measurement sample holder.

100 mm absorption measurement sample holder.

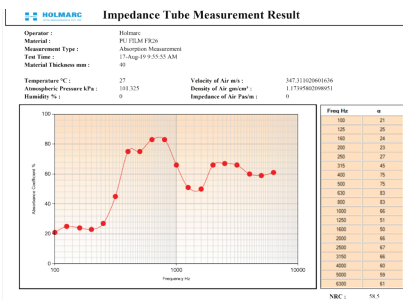
29 mm connecting tube.

Microphone

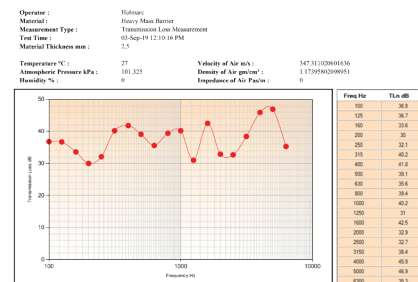
Speaker Connector



PU FILM



HEAVY MASS BARRIER



100Hz -1600 Hz
Frequency Range

100mm
Inner Diameter

100mm
Sample Holder



Custom Impedance Tube

We can provide our ITA-219 Impedance tube setup with 1/4" LEMO Pressure Standard Microphone Set, GRAS 42AG Multifunction Sound Calibrator. It can be used to measure specific impedances, sound absorption coefficients (SACs), sound transmission losses (STLs) and acoustic properties (characteristic impedances, propagation wave numbers, effective densities, bulk moduli) of acoustic materials in normal incidence conditions.

GRAS 42AG Multifunction Sound Calibrator is a portable, battery operated sound source for calibration and check of microphones and sound level meters. It is designed for field use and comes with a protective casing. It conforms to the requirements in IEC 60942 for a class 1 sound calibrator. It can produce a sinusoidal signal of 250 Hz or 1 kHz at 94 dB or 114 dB. For documentation purposes, 42AG provides display of the environmental conditions: ambient air pressure, temperature. The sound is generated by a small loudspeaker integrated in the acoustic coupler. An internal reference microphone measures the level in the coupler and a feed back circuit automatically adjusts the level. Therefore, the calibration level is virtually independent of ambient conditions like temperature, atmospheric pressure and humidity within the specified range of operation.

GRAS 46BP-1 is typically used for sound pressure, high frequency, and high level pressure measurements. It is suitable for general purpose acoustic measurements in couplers and at boundaries. The microphone in the 46BP-1 is very versatile when connected to the RA0086 Transmitter Adapter for 1/4" Microphones. The 46BP-1 becomes a high impedance sound source when the RA0086 takes a calibration signal directly from the signal generator and makes the microphone behave like an electrostatic loudspeaker. When used for calibrating an acoustic coupler, this gives a frequency response that is as good as when the 46BP behaves like a microphone. A front-vented version is available, 46BP-1-FV 1/4" LEMO Pressure Microphone Set, Front Vented. Regarding temperature range, see the Specifications. Should higher temperature limits be required, we recommend considering the GRAS probe microphones where the microphone and preamplifier can be isolated from the hot source.



PRODUCT FEATURES

- Measurement is based on transfer-function method according to ISO10534-2 and ASTM E1050 international standards for absorption coefficient and ASTM E2611 for transmission loss.
- Built-in Sine wave generator & power amplifier.
- Quick and simple to use.
- Two kind of tube to measure full range frequencies.
- Measure in 1/3 octave frequencies.
- Measure other normal incident material properties like reflection coefficient, impedance ratio, resistance ratio, reactance ratio, admittance ratio, conductance ratio, susceptance ratio, transmission coefficient, propagation wave number in material, characteristic impedance in material as per ASTM standards.
- Data measured on different tubes can be combined into full-frequency.
- Direct data export to excel sheet and print report



Transmission loss TL_n
using 29mm tube which
includes 4 mics & 2 dummy
Mikes



Absorption measurement

with two microphones & backup piston unit for 29mm tube.
(Mic A & Mic B only)

SPECIFICATIONS - HO-SO-ITA219C3

TUBE	LARGE	SMALL
Frequency Range	100Hz – 1600 HZ	500Hz – 6300HZ
Inner Diameter	100 mm	29mm
Sample Holder Inner diameter	100 mm	29 mm
Sample Holder Max length	200 mm	200 mm
Scanning Frequencies Standard	1/3 Octaves ISO10534-2, ASTM E1050, ASTM E2611	
Value to be Measured	Sound Absorption Coefficient (α) and Transmission Loss (TL)	
Loud Speaker	3½ "in diameter, 30 Watts, 4 Ohm	
Microphone	GRAS 46BP-1 1/4" LEMO Pressure Standard Microphone Set Freq range: 4 Hz to 70 kHz Dyn range: 39 dB(A) to 172 dB Sensitivity: 1.5 mV/Pa	
Measurement software	Holmarc Wave Analyzer 4C	

GRAS 46BP-1 Compatibility

To perform as specified, the GRAS 46BP-1 microphone set requires a power module or an analyzer input which can supply the preamplifier with power as well as 200 V polarization voltage for the microphone.

The microphone set is terminated with a 5-pin mini LEMO connector. Ready to use cable assemblies with LEMO connectors of various types and lengths

are available in standard as well as customized lengths.

The 46BP-1 is IEEE 1451.4 TEDS 27v. 1.0 compliant. If your measurement platform supports Transducer Electronic Data Sheets you will be able to read and write data like properties and calibration data.

MODEL NO: HO-SO-ITA219C3

Multifunction
Sound Calibrator



GRAS 46BP-1 1/4

100Hz -1600 Hz
Frequency Range

100mm
Inner Diameter

200mm
Length Sample
Holder



Designed @ HOLMARC Design LAB
Cochin, May 2025



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We have well-developed optic, mechanical & electronics fabrication facilities and thin film coating unit.
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