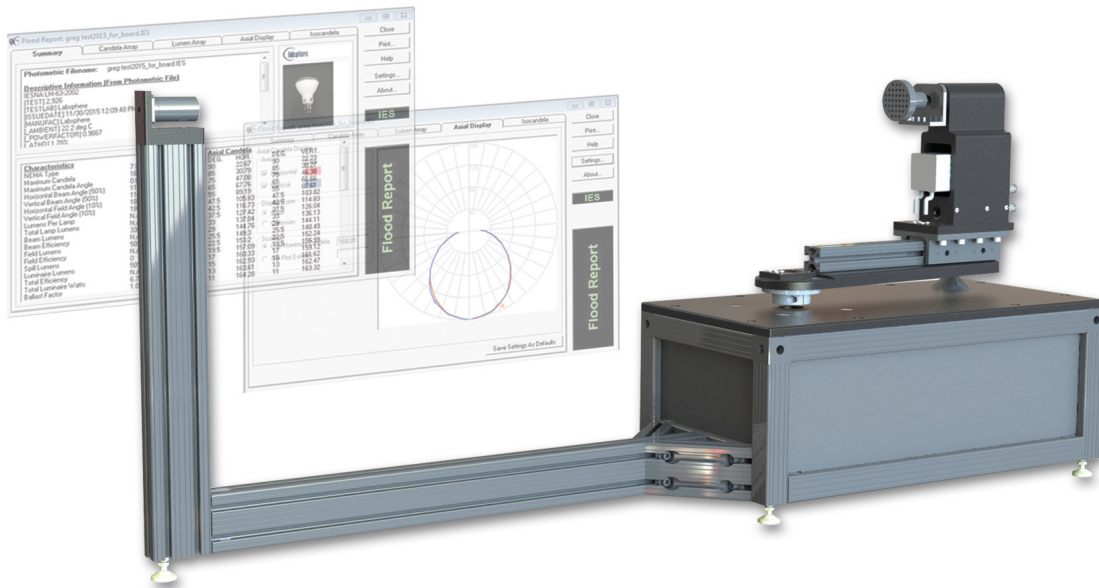


Type D Benchtop Goniospectrometer



Benchtop Goniospectrometer used to measure lamp and luminaire output, efficiency/efficacy, intensity distribution, and zonal lumen density

Complete Turnkey Solution

Everything your business needs in one system: hardware, software, computer, and NIST-traceable spectral intensity lamp standard.

Save Money, Save Space

The Labsphere Type D Goniospectrometer fits on a benchtop. No need for costly lab expansions or large capital investment projects.

Get Your Products to Market Faster

Testing in-house protects your IP and saves the time and hassle associated with third-party lab testing.

IES Files Made Easy

Create IES and ELUMDAT data files compatible with your existing design and data analysis tools for producing reports in industry standard formats.

Over 35 years of leadership in light metrology enables Labsphere to offer the Type D Benchtop Goniospectrometer as the standard of the lighting industry.



The Type D Benchtop Goniospectrometer delivers easy operation with accurate results in the space of a benchtop. State-of-the-art hardware and control, coupled with sophisticated data collection provides an easy and practical fully-automated test system for generating IES files for lamps and luminaires.

The high value, high performance of the Type D Benchtop Goniospectrometer can cut your development time by a third while saving time and cost by not having to send your light products out for third party testing. All the while protecting your IP throughout development by managing test and characterization in house. Save time and money creating IES files in the space of a benchtop with this accurate and easy to operate instrument.

LABSPHERE GONIOSPECTROMETER BENEFITS SUMMARY

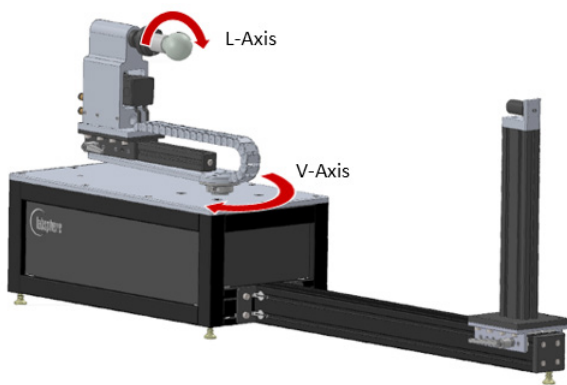
- No need for a large dedicated room saving on valuable space or need for costly expansions. The Goniospectrometer fits on a benchtop.
- Create the IES and ELUMDAT data formatted files compatible with leading design and data analysis software tools for creating detailed reports in industry standard, and flood formats.
- Complete turnkey solution including goniometer, CCD spectrometer, control rack and electronics, temperature sensors, lamp standard, computer and preprogrammed control software, display, and wireless keyboard and mouse.
- The detector remains at a fixed height in reference to the lateral axis of the lamp. During the test; the lamp or luminaire rotates about the lateral and vertical axis on a C Ordinate system for replication of Type C Data Formats.
- The sensor can slide along a lateral axis to optimize sensitivity for a variety of light sources.
- Limited field of view spectral sensor optimizing reduction of stray light.
- Includes interchangeable optical density filters that allow tests over a high dynamic range of lamp intensities.
- Fixed and auto ranging CCD spectrometer for high speed spectral intensity and color uniformity.
- Automatic dark current compensation reduces errors, boosts accuracy.
- Includes NIST traceable Spectral Intensity standard for user calibration at any time.
- Four pole power connector box plus easy wire feedthroughs for simple lamp interchange and with no light interference from cabling.
- Edison Base plus multiple interchangeable versatile lamp and lamp holding adaptors.
- Precision drives providing unrivaled accuracy.
- High-speed data collection and point-to-point choices for accurate data collection.
- Temporal stability data for measured thermal, photometric and electrical data.
- High-quality construction delivers years of trouble-free performance.

GONIOSPECTROMETER COMPONENTS

The Type D Benchtop Goniospectrometer consists of four basic components:

Lamp Swing-Arm and Support Structure

The height of the test luminaire or lamp is fixed on a 360 degree rotating lateral axis at the same height as the sensor. The arm rotates in circles around the vertical axis, eliminating constant repositioning of the test item to different heights.



This component holds the test luminaire or lamp during testing and includes the sensor support on a rail, swing-arm, the rotating luminaire mounting fixtures, and the temperature sensors. The structure may be manufactured in several sizes, depending on the maximum size of item to be tested. Optional rails extensions are available to increase the measurement path length for larger devices.

Spectrometer Sensor

A shielded unit houses the optical fiber that feeds back to a high-dynamic range spectrometer that is used to obtain the spectral intensity data. The shielding houses also serves as an adaptor for the series of optical density filters. The shielded housing is mounted at the same height as the lamp's lateral axis on vertical arm. The vertical arm is mounting on a sliding rail to slide and fix the measurement distance. The spectrometer is calibrated over the visible spectrum. The data are relayed to the computer interface via USB.

Goniospectrometer Integrated Console

This unit contains all of the system's electric and electronic equipment including main power switches, power supplies, power analyzer, motor controllers and computer and computer interfaces.

Computer Station

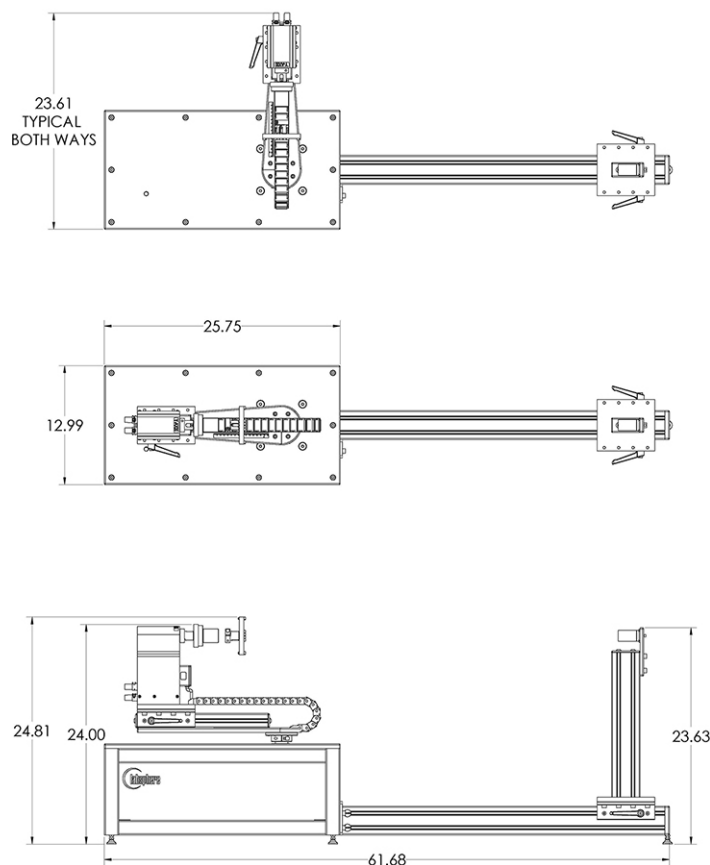
This includes a mini computer with Goniospectrometer control software to control the operation and data collection functions of the Type D Benchtop Goniospectrometer during testing. All information controlled and collected are displayed on the computer monitor. Additional automated software produces IES, ELUMDAT and Excel Files for full data analysis.

COMPONENT FEATURES

Lamp Swing-Arm and Support Structure

The main vertical swing-arm and lateral access mounting assembly are all engineered and manufactured to produce the most stable test platform available. Precision assembly ensures that the lamp swing-arm is balanced to provide for continuously accurate alignment throughout all rotational positions.

The test luminaire or lamp is at a fixed height in the center of the lamps lateral axis* and reference to the detector optical axis throughout the test. The lamp rotates about the vertical axis in reference to the fixed sensor.



The lamp or luminaire is positioned at the goniospectrometer's vertical axis which allows the goniospectrometer to accommodate a variety tall fixtures up to 0.4 meter. Because the width of the height of the luminaire support and lateral axis 0.2m (8 ins.), light loss due to shadowing is kept to an absolute minimum.

Precision digital motors are coupled to the vertical axis shaft and the luminaire rotation shaft, and are constantly monitored by the system's homing sensor, ensuring that swinging arm position and the luminaire angles are precise throughout the test sequence. Resolution of each motor of the Type D Benchtop Goniospectrometer is an extremely fine 0.01 degrees.

*Options for increasing the height for larger lamps

Spectrometer Sensor

The sensor is Labsphere's CDS-600 CCD array spectrometer. The highly sensitive CDS 600 CCD Array Spectrometer offers low noise and a broad spectral response with sensitivity range from 200 to 850 nm. For use with Type D Benchtop Goniospectrometer it is used for the visible range of 380nm to 780nm. When coupled with a Type D Benchtop Goniospectrometer the spectrometer avoids the inherent photometric errors associated with filter-based photometers; The CDS-600 multi-channel spectral analyzer is designed for real-time spectral analysis. The instantaneous spectral acquisition provides the radiometric, photometric, and color characteristics of the lamp or luminaire. The fast results help to maintain high scan rates, excellent linearity and low drift, and is housed in a shielded chamber. The optical fiber field of view helps to exclude stray light not emitted directly from the luminaire itself. This serves to block stray light from room surfaces, by allowing the optical fiber to collect light only from the intended source.



The housing has a thread end compatible with the 2.54 cm optical density filters included with system. The optical filters can be thread onto the housing in the beam path. Filter correction are applied in software. The optical filters allow for attenuation of high intensity lamps from saturating the sensors, increasing the sensitivity and dynamic range of the system.

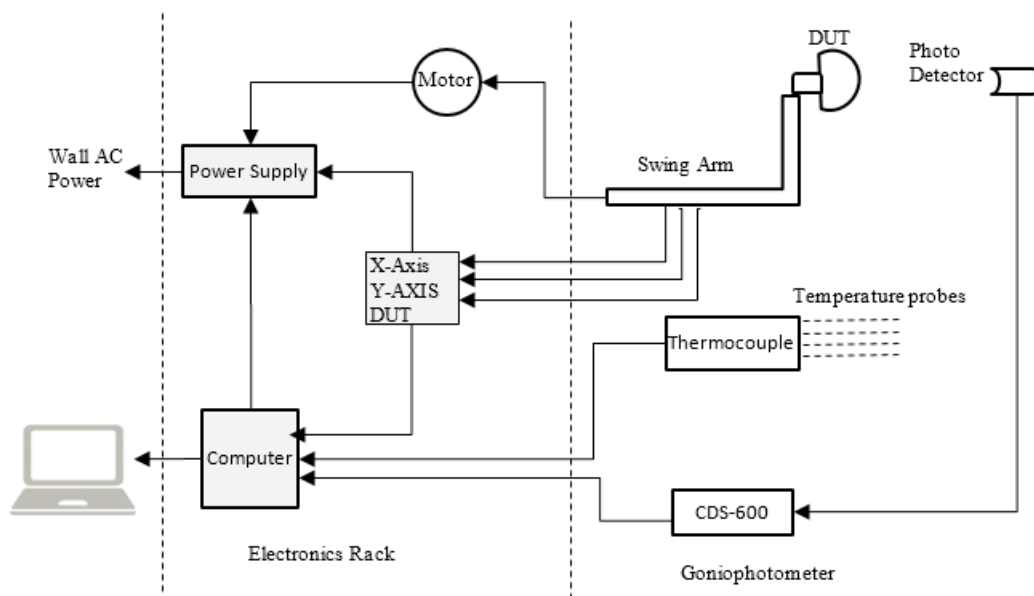
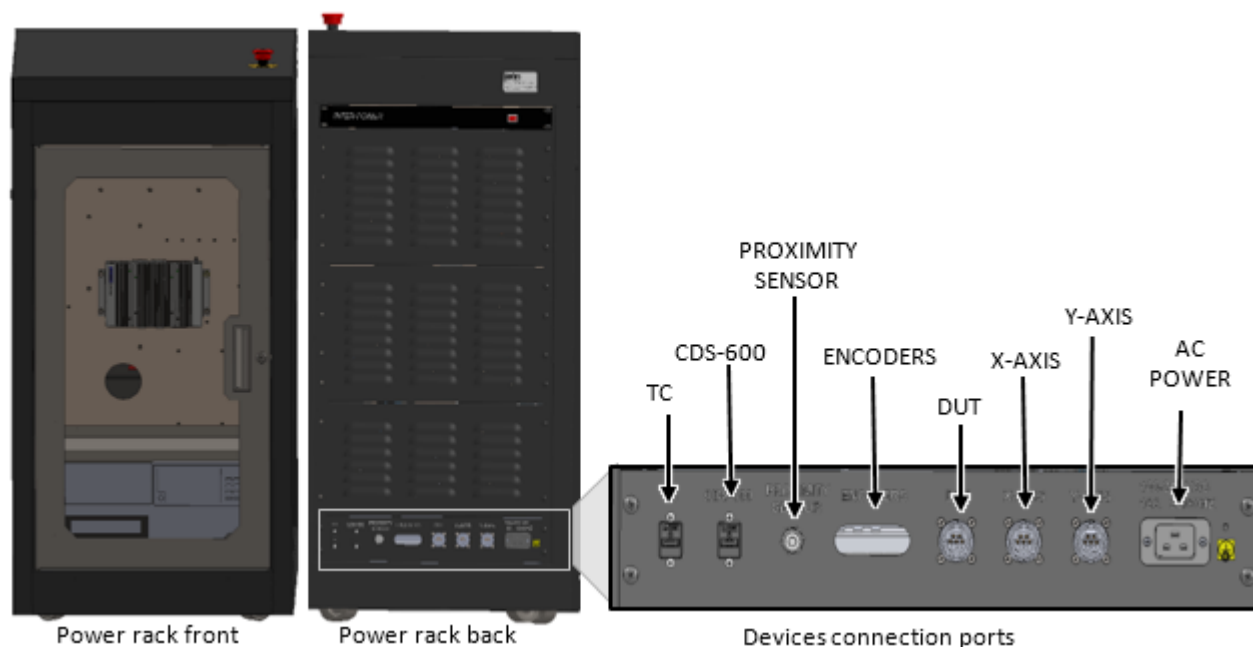
The optical fiber sensor can be moved along the optical rail to change the distance between the sensor and the vertical rotation axis of the system. Industry recommendations for keeping in the far field for goniophotometer is 5x the area of illumination. In most cases it is not necessary to move the sensor distance from it fixed position.

The CDS-600 is calibrated for spectral intensity. The spectral intensity is used to determine radiant and luminous intensity distribution and color distribution as well as total lumens. The spectrometer can be calibrated at any time by the user using spectral intensity lamp standard provided with the system. Dark correction is measured during calibration with the standard lamps and applied with very measurement thereafter.

The CDS-600 spectrometer is housed in the Goniospectrometer support structure. It is interfaced to the Goniospectrometer console computer via USB.

Goniospectrometer Console

This component contains all of the system's electrical and electronic controls. Main power switches and a test primary lamp voltage input, power analyzer and computer are included in the Goniospectrometer console. A single bundled cable is routed between the goniospectrometer and console.



Four options are available:

No AC Power supply or power analyzer: This option the lamp power can come from the main line or an independent external power supply.

Power Analyzer, no AC power Supply: This option the Yokogawa WT 310E power analyzer is included and mounted in the console. The lamp power can come from the main line or an independent external power supply. The current can be routed into the console through the power analyzer.

AC power Supply, no Power Analyzer: This option the Chroma 61602 AC Power supply is included and mounted in the console. The lamp power can come from the Chroma 61602 AC Power supply, main line or an independent external power supply. If from the Chroma 61602, the power to the lamp is control via the system control software. The voltage to the lamp is routed can be routed the console directly to the lamp, independent of the console.

AC power Supply and Power Analyzer: This option the Chroma 61602 AC Power supply and the Yokogawa WT 310E power analyzer is included and mounted in the console. The lamp power can come from the Chroma 61602 AC Power supply, main line or an independent external power supply. If from the Chroma 61602, the power to the lamp is control via the system control software. The current from the power supply is routed through the power analyzer.

A Yokogawa power analyzer meter is installed which incorporates a large digital display of volts, amps and watts. The meter measures the exact lamp characteristics by use of remote sensing leads to the test luminaire. Measurement of Power Factor and Total Harmonic Distortion is available.

Computer and Software

The functional heart of the Type D Benchtop Goniospectrometer is the computer hardware and software which control the system's entire operation. Virtually all functions of the system are computer automated including the vertical arm rotation, lamp/ luminaire rotation, selection of data points and the recording of data.

The computer system provided with the Benchtop Goniospectrometer consists of MS Windows- based equipment totally configured and integrated to provide full system operation, data collection, processing, and data file outputs.

Control Software

Comprehensive software controls the operation of the Benchtop Goniospectrometer and gathers the appropriate test data for the particular type of lamp or luminaire being tested. Standard test formats for indoor luminaires, floodlights, spotlights and bare lamps, and may be created and saved by the test operator from easy-to-use menus.

The software is MS Windows 7-based. It allows automatic or manual operation of the system, with pre-stored horizontal (lateral) and vertical angle formats for commonly-used test procedures. Test data are automatically collected and stored in IES data formats.

Data Processing Software

Upon completion spectral intensity spatial scans of the lamp or luminaire the data is processed to compute luminous intensity, x, y, CRI and CCT and save it in IES data format for data analysis.

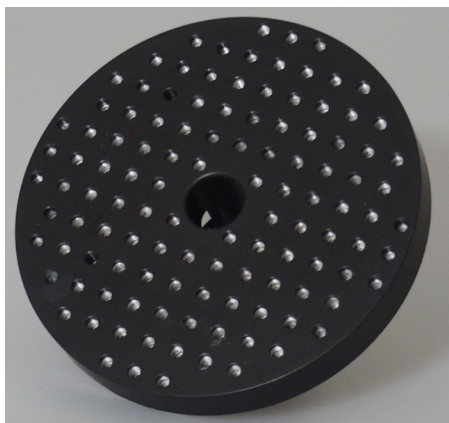
Data can be exported to external spreadsheet software where the spectral intensity at every angle as well as intensity and color are reported.

Data Presented During Scans

- Intensity (candlepower)
- CCT
- Chromaticity x and y
- Set and actual angles
- Sensor saturations levels
- Axial plot

IES Formats

Labsphere's software supports IES testing formats for analysis and reporting.



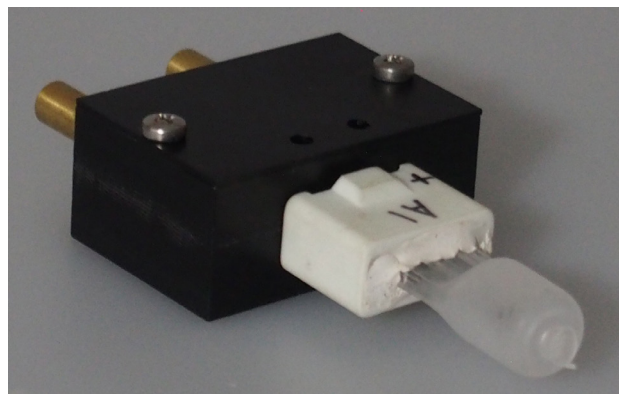
Lamp and Luminaire Mounts

Standard Edison plus versatile lamp mounts to handle or mount different luminaire sizes and to fit customer's specific lamps and luminaires. Application-specific designs available upon request.

Standard Lamps

A standard lamp is included and are calibrated in Labsphere's industry leading light metrology labs reference to a NIST reference standard. Optional additional lamps are available in sets of three.

The standard lamps are calibrated for directional spectral intensity. Software routines are provided for user-selectable Goniospectrometer calibration. One lamp is included with an option for an additional set of three.



INCLUDED ITEMS

Hardware:

- A goniometer supporting the main vertical swing arm and horizontal shaft.
- The vertical swing arm motor, temperature monitor, and spectrometer are enclosed in the base of the black framed goniometer chassis.
- A precision rotating vertical axis incorporating 360 degrees' rotation of the arm around the test luminaire emitting surface.
- A precision rotating horizontal (lateral) axis incorporating 360 degrees' rotation fitted with a low profile lateral (horizontal) axis enclosed with black metal sheathing.
- A horizontal framework holding a lateral shaft, onto which are attached plates for mounting of the lamp or luminaire from above or below.
- Means for adjusting the depth of the horizontal arm which holds the vertical shaft and luminaire, using locking rail system.
- Vertical rotation drive motor, which is a high-precision digital stepping motor operating under computer control, manually or automatically.
- Lamp/luminaire rotation drive motor, which is a high precision digital stepping motor operating under computer control, either manually or automatically.
- A high dynamic range CDS-600 spectrometer calibrated for spectral intensity over the visible spectral range.
- A housing for the CDS-600 optical fiber and optical density filters.
- Ambient and DUT optical thermal sensors
- Optical Density filter set
- Spectral Intensity lamp standard and mounting fixture
- Edison Lamp Base
- Two (2) versatile lamp adaptors
- A console housing incorporating:
 - A Windows-based computer system and display with wireless keyboard and mouse
 - Goniospectrometer electronic interface
 - Optional AC power supply
 - Optional Digital Analyzer
 - Emergency off "panic" button

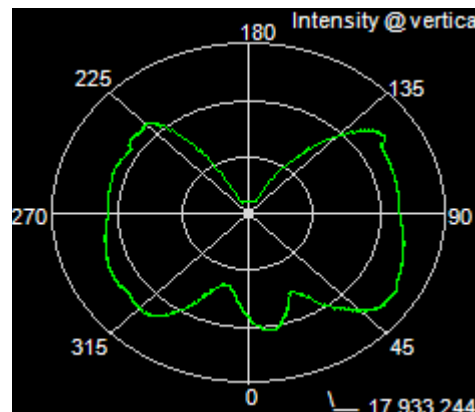


Set of 6 OD filters from ND 0.1 to ND 3 included with every purchase.

Software:

All software is Windows based. Standard data collection software package offering:

- Automatic or manual operation
- Automated and manual control of vertical rotation
- Automated and manual control of lamp/luminaire rotation
- Selectable vertical angle intensity steps
- Selectable lamp/luminaire rotation increments and angles
- Output in industry standard format (IES)
- Single readings mode with the capability to input the desired vertical and lamp/ luminaire angular location, with automatic rotation to selected angles
- Calibration software routines using standard lamps calibrated for directional spectral intensity.
- LM-79 stabilization routine
- Temporal graphing data
- Operator selectable data collection vertical angles. Specify starting and ending angles, and step increment. Step increment as small as 0.01 degrees.
- Operator selectable luminaire horizontal angles. Specify starting and ending angles, and step increment. Step increment as low as 0.01 degrees.



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Luminaire Cat # <input type="text"/>		Lamp(LED) Desc <input type="text" value="MSI-PAR 30"/>	
Lamp(LED) Cat # <input type="text" value="Directional"/>	Width <input type="text" value="0.076"/>	Length <input type="text" value="0.076"/>	Height <input type="text" value="0.010"/>
Tilt <input type="text" value="NONE"/>	Num of Lamps(LEDs) <input type="text" value="1"/>	Lumens / Lamp(LED) <input type="text" value="-1"/>	Multiplier <input type="text" value="1.0"/>
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External AC Power Mode		ITHD <input checked="" type="checkbox"/> 0.17%	VDC <input type="text" value="0"/> Amps <input type="text" value="0.11"/>
Warm up Min <input type="text" value="0"/> Sec <input type="text" value="0"/>	<input checked="" type="checkbox"/> Auto	Offsets: L/R <input type="text" value="0.00"/> U/D <input type="text" value="0.00"/>	
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Comment <input type="text" value="Test lamp"/>		Ambient Temp <input type="text" value="23.4 deg C"/>	
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SUMMARY OF TECHNICAL SPECIFICATIONS

Measurement Method	Far field
Type	Benchtop Type D.
Axis	V-plane axis automated, H-axis rotation automated
Operation	Fully Automated save loading lamp samples and align process
Area occupied by goniometer	1.7m x 0.6m x 0.8m
Sensor Distance	0.5m to 1m (with option to extend to 2.4M and 3.6m, (costed separately)
Device Limit Size	0.3m x 0.4m (ask about options to increase)
Spectrometer	Labsphere CDS-600
Max Lamp weight	~5 kg
Wire routing	Axial feedthrough for system cabling and to allow customer to route their own source cables when needed
Electric connections	90-240VAC, 15A, 50- 60-Hz
Power Analyzer Voltage Range	12VAC - 240 VAC <+/- 0.2V
Power Analyzer Current Range	0A - 3A (Avg: +/- 0.1mA)
Power Analyzer Power Range	0W - 200W (Avg: +/- 0.001W)
Electrical measurements	Lamp Power factor, voltage, and current
Lumen	1 - >10000 (need to validate with CDS-600 spectrometer)
Intensity Range (cd)	1 to >5000 (need to validate with CDS-600 spectrometer)
Color Temperature	1000K to 10,000K +/-35K (with spectrometer option)
CRI	0-100 +/- 0.7 (with spectrometer option)
UI	Interface(s) to entering control and test parameters and display measurement results
Operating System	Windows 7
Angular Rotation	
Angular Resolution	0.01 degree /step

Report Inputs

Descriptive Information's

- a) Date and testing agency
- b) Manufacturer's name and designation of product under test
- c) Lamp category
- d) Lamp or Luminaire
- e) Ambient Temperature
- f) Power factor
- g) THD
- h) Current
- i) Voltage
- j) Warm up
- k) Lumen
- l) Lamp Characteristics based on lamp type
- m) Measurement quantities measured (angles, luminous intensity, total luminous flux, luminous efficacy, etc.)
- n) Rated electrical values (AC (frequency) or DC) of product tested
- o) Number of hours operated prior to measurement (0 h for rating new products)
- p) Total operating time of the product for measurements including stabilization
- q) LM-79 stability procedure using intensity measurement at a fixed point. Ability to save warmup intensity data.
- r) Ambient temperature
- s) Device Temperature
- t) Orientation (burning position) of product during test
- u) Designation and type of reference standard used
- v) Photometric measurement conditions: photometric distance.
- w) Measured total luminous flux (lm) and input voltage (V), current (A), and power (W) of each SSL product
- x) Luminous intensity distribution (IES.net)
 - i. Peak intensity
 - ii. Cone Illuminance
 - iii. Beam angle
- y) Color quantities (chromaticity coordinates, CCT, and CRI)
- z) Spectral power distribution
- aa) Color Uniformity

Data Format

*.IES IESNA, ELUMDAT file format

Traceability (where applicable)

NIST

ORDER INFORMATION

Available optional equipment consists of individual accessories or complete systems providing enhanced capabilities.

MODEL	DESCRIPTION	PART NUMBER
Benchtop Goniospectrometer w/o AC Power Supply or Power Analyzer	Goniometer Stage with E26 and Universal Adaptor, Spectrometer, ND Filter Kit, Temperature Monitor Control Rack and CPU, Monitor, keyboard and mouse, Lamp standard, Control Software	AA-01351-100
Benchtop Goniospectrometer with AC Power Supply and Power Analyzer	Goniometer Stage with E26 and Universal Adaptor, Spectrometer, ND Filter Kit, Temperature Monitor, Control Rack with Chroma 61602 and Yokogawa WT310E, and CPU, Monitor, keyboard and mouse, Lamp standard, Control Software	AA-01351-000
Benchtop Goniospectrometer with AC Power Supply	Goniometer Stage with E26 and Universal Adaptor, Spectrometer, ND Filter Kit, Temperature Monitor, Control Rack with Chroma 61602, and CPU, Monitor, keyboard and mouse, Lamp standard, Control Software	AA-01351-200
Benchtop Goniospectrometer with Power Analyzer	Goniometer Stage with E26 and Universal Adaptor, Spectrometer, ND Filter Kit, Temperature Monitor, Control Rack with Yokogawa WT310E, and CPU, Monitor, keyboard and mouse, Lamp standard, Control Software	AA-01351-300
Benchtop Goniophotometer Options		
Intensity Standard Kit	Intensity Lamp Standard: Set of 3	AA-01309-000
Chroma 61602 AC Power Supply	0 -300V, 1000 VA Single Phase AC Power Supply, mounts in rack	AS-03062-006
Chroma 62000 DC Power Supply	Programmable DC Power Supply Model 620121P-80-60	EX-05140-000
Yokogawa WT310E	Power Analyzer, mount in rack	PP-04625-011
E26 Kelvin Socket	4 pole Kelvin Socket	AS-03062-005
2m Rail	Positions sensor to lamp distance to 2 m	PP-04626-002
Lamp Mount Accessories	Application specific mounts	Custom

Extended Warranties		
Extended Warranties	Software (12 Months)	AA-01375-000
Extended Warranties	Parts Only (12 Months) (not including lamps)	AA-01375-001
Extended Warranties	Parts and Labor (12 Months) (not including lamps)	AA-01375-002