Number	Photometric	Photometric	Radiometric	Radiometric	Dominant
10	0,2223	cd	0,001853	W/sr	631,9
11	200,4	cd	0,8329	W/sr	487,2
12	0,001666	lm	4,476E-6	W	601
13	0,01998	cd	0,0002623	W/sr	639,7

MAS 40
Mini-Array Spectrometer

Instrument Systems

KONICA MINOLTA Group

Features at a glance

↗ Cost-effective and robust CCD spectrometer technology

↗ Standard USB interface

↗ Compatible with all Instrument Systems measuring adapters

↗ Different models for UV / VIS / NIR spectral range

↗ Optimized for spectroradiometry and spectrophotometry

↗ Easy operation using SpecWin Light software

↗ DLL and LabVIEW driver available for writing custom software

MAS 40: A high-quality spectrometer worth the money

Have you been looking for a value-for-money spectrometer that delivers quality and precision? Then the MAS 40 Mini-Array Spectrometer is just what you need.

Instrument Systems has drawn on the experience gained in industrial quality control to develop an instrument that meets your demanding requirements, yet won't break your budget.

Like all spectrometers from Instrument Systems, optical fiber connectivity provides access to all the measurement-adapter accessories. This capability supports for a wide range of applications. Flexibility of this nature means that the MAS 40 is also ideal as a cost-effective instrument for research and development work.

USB Interface: plug and go

Install the software, connect up the USB cable and start taking measurements. That's how quick it is to get up and running – whether on a desktop or a notebook. The benefit: you can start working productively straight away.

MAS 40: compact, precise, complete

A number of manufacturers produce miniature spectrometers that boast compact design and low price. The snag is that they just aren't up to the complete application support required for the challenges of photometry, colorimetry and high-quality spectral analysis.

The MAS 40 is manufactured to the exacting quality standards of Instrument Systems. It is also calibrated with the measurement adapter of choice prior to shipment. The

calibration procedure uses standards directly traceable to PTB or NIST.

All Instrument Systems measurement adapters can be linked up to the spectrometer by optical fiber. This permits a broad field of applications:

↗ LED measurement

↗ Display measurement

↗ General spectroradiometry

↗ Spectrophotometry

↗ Colorimetry

MAS 40 Software: seamless integration in your application

Instrument Systems is a partner who understands what you need for optical metrology. In addition, DLLs and LabVIEW drivers permit efficient integration within existing customer applications. These drivers are also compatible with the entire Instrument Systems spectrometer family.

The Setup

The MAS 40 includes the complete spectrometer with data acquisition electronics and a USB port in a convenient package. The optical input is compatible with all PLG fiber adapters from Instrument Systems.

For the adjustment of the sensitivity range according to the desired application, alternative density filters of optical density 1 and 2 are available.

LED measurement

Instrument Systems has developed a complete entry level model for the measurement of LEDs which is based on the MAS 40.

LED Station - The complete solution for testing LEDs

A variety of measurement adapters that can be mounted to the stable input port of the MAS 40, transform the Mini-Array-Spectrometer into the LED Station.

The LED station is a cost-effective spectrometer system for fast and easy measurements of all optical parameters of an LED:

↗ Luminous intensity [cd] and Luminous flux [lm]
↗ Color coordinates, color temperature
↗ Color rendering index
↗ Spatial radiation pattern
↗ Dominant, centroid and Peak wavelength [nm]

Despite the attractive price, there are no compromises on measurement accuracy. All the components of the LED Station have been manufactured to the exacting quality standards of Instrument Systems and are calibrated with the spectrometer prior to shipment.

SpecWin Light Software - simple and user-friendly

SpecWin Light helps to make the LED Station easy to use by focusing on the basic functions of measurement, analysis and documentation. This means that SpecWin Light can also be operated by semi-skilled personnel, e.g. in quality assurance.
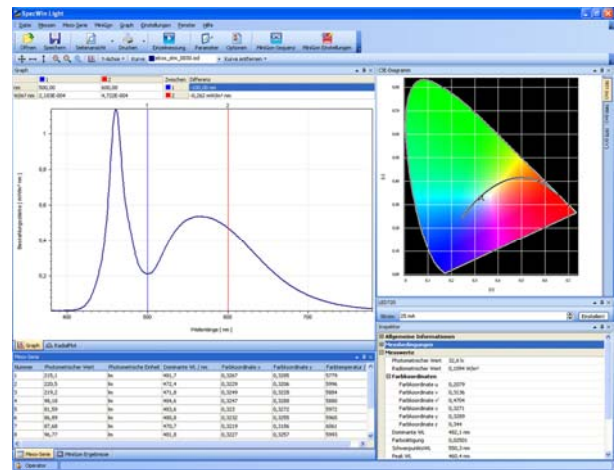
Measurement of luminous intensity - the I_{LED-B} adapter

The I_{LED-B} adapter provides CIE-compatible measurements of luminous intensity and all spectral parameters. Precision engineering maintains the specified measurement distance of precisely 10 cm from a detector with an area of 1 cm². The I_{LED-B} adapter can accommodate all LED test fixtures (supporting different package types including SMD) from Instrument Systems.
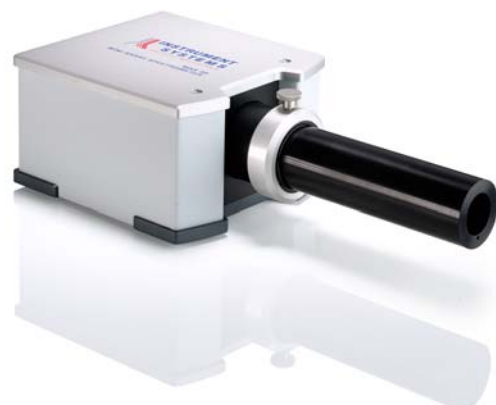
Mesurement of luminous flux - the integrating sphere adapter ISP 75

The ISP75 integrating sphere adapter is available for measuring luminous flux and radiant power.

The LED test fixture is used to push the LED into the opening of the sphere in such a way that the light radiation is captured by the integrating sphere. The interior of the integrating sphere has a highly reflective and diffusing white coating for this purpose.

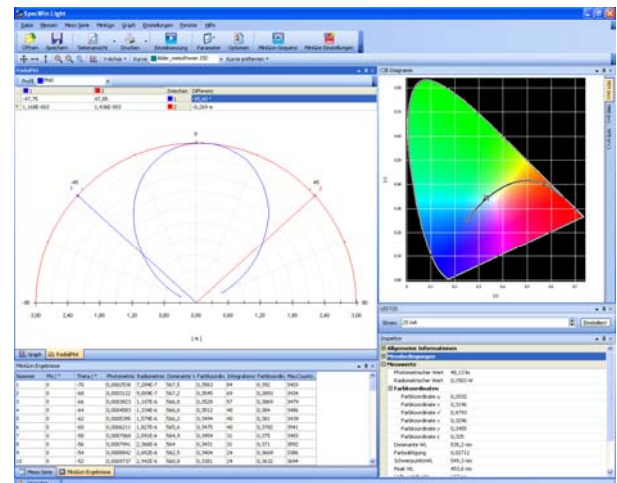All LED test fixtures from Instrument Systems can be used with the integrating sphere.

The Mini-Goniophotometer is controlled by the software via an USB interface.

A special measurement mode of the SpecWin Light software features the dialog for setting angular parameters.

The radiation pattern is displayed in either polar or Cartesian (xy) coordinates.

The test data obtained are stored in ASCII-text files and can be easily imported into MS Excel™.

The Mini-Goniophotometer

The Mini-Goniophotometer was developed to characterize the spatial radiation pattern of LEDs. The high angular resolution of 0.06° means that precise measurements can also be taken of narrow-angled LEDs. The integrated stepper motor control offers an angular range of 90° to the mechanical axis of the LED. The orientation of the LED in the phi axis can be manually adjusted for four orientations (0°, 45°, 90° and 135°).

The standard measurement geometry corresponds to the I_{LED-B} configuration, i.e. the distance between the LED and the detector is 10 cm with a detector area of 1 cm². The detector diameter can be limited to 0.6 mm when measuring narrow-angled LEDs.

Technical specifications for LED measurements:

Spectrometer Model	UV-VIS	VIS-NIR
Spectral range	250 – 830 nm	380 – 950 nm
Spectral resolution	2.7 nm	2.7 nm
Stray light (for LEDs) *1	5·10E-4	5·10E-4
Sensitivity range*2		
Luminous intensity (I_{LED-B})	20 µcd – 5 cd	
Luminous flux (ISP 75)	65 µlm – 15 lm	
Measurement accuracy*3		
Luminous intensity	+/- 7 %	
Luminous flux	+/- 7 %	
Dominant wavelength	+/- 1 nm	
Chromaticity (x,y)	+/- 0.005	
LED40-400 Mini-Goniophotometer		
Angular range in theta axis	+/- 90°	
Angular resolution	0.06°	
Angular accuracy	+/- 5 %	
Interface	USB	
LED-720 Current source		
Current range	0 – 48 mA	
Interface	USB	

*1   Measured at 100nm distance to the left of the peak wavelength, relative to the peak intensity of the unweighted spectral data

*2   Measured at 600 nm wavelength, a signal-to-noise ratio of 10:1, and without averaging

*3   Directly after calibration relative to the calibration standard

Technical specifications

Model	UV - VIS	VIS - NIR
Spectral range	250 – 830 nm	380 – 950 nm
Spectral resolution	2.7 nm	2.7 nm
Wavelength accuracy *1	± 0.5 nm	± 0.5 nm
Stray light (broadband with standard illuminant A) *2	2·10E-3 at 400 nm	2·10E-3 at 400 nm
General		
Detector	CCD line sensor	
Number of pixels	2048	
Integration time	4 msec – 20 sec	
Linearity	± 2.5 %	
Spectroradiometry		
Sensitivity range for irradiance *3	1 µW/m² nm – 0.15 W/m² nm	
Signal sensitivity at 1 s integration time *3	20 µW/m² nm	
Spectroradiometric accuracy *4	± 7 %	
Spectrophotometry		
Baseline noise *5	± 0.5 %	
Photometric transmission accuracy *6	± 1 %	
Baseline drift *6	0.5 %/h	
Miscellaneous		
Interface	USB	
AD converter	15 Bit	
Dimensions (H, W, D)	145 mm x 90 mm x 185 mm	
Power consumption	approx. 650 mW (via USB interface)	
Ambient conditions	10 – 35° C; relative humidity 70%	
Weight	approx. 2.1 kg	

*1 Applies to penray lamp or laser

*2 Measured with 455 nm cut filter

*3 Measured with EOP120 and OFG424 fiber bundle at 500 nm wavelength, a signal-to-noise ratio of 10:1 and without averaging

*4 Directly after calibration relative to the calibration standard

*5 For the shortest integration time, a sufficient signal level and averaging of 10; noise is reduced further at higher averaging

*6 Applies to LS100-130 light source after 1 hour of warming up and averaging of 10

Ordering information

Order No.	Descripition		
Spectrometer			
Model	**Spectral range**	**Spectral resolution**	**Data point interval**
MAS40-111	250 – 830 nm	2.7 nm	0.33 nm
MAS40-121	380 – 950 nm	2.7 nm	0.33 nm
Options			
MAS40-221	Density 1 filter (reduces signal level nominally by a factor of 10)		
MAS40-222	Density 2 filter (reduces signal level nominally by a factor of 100)		
MAS40-231	UV density 1 filter (reduces signal level nominally by a factor of 10)		
Software			
SW-120	SpecWin Light spectral software for Windows XP/Vista		
SW-130	SpecWin Pro high-end spectral software for Windows XP/Vista		
SW-251	Windows DLL for custom software development		
SW-253	LabVIEW driver (requires SW-251 DLL)		

Options for LED-Station

Order No.	Description
Measurement adapters	
LED40-310	I_{LED-B} Luminous intensity adapter; spectral range 320 nm – 950 nm
LED40-311	I_{LED-B} Luminous intensity adapter; spectral range 200 nm – 950 nm
LED40-320	Integrating sphere ISP 75
LED40-400	Mini-Goniophotometer
LED40-410	Fiber-bundle connector for Mini-Goniophotometer; spectral range 320 nm – 1650 nm
LED40-411	Fiber-bundle connector for Mini-Goniophotometer; spectral range 190 nm – 1700 nm
LED40-415	Extension tube for optional I_{LED-A} configuration of the Mini-Goniophotometer
Current source	
LED-720	Constant current source; current range 0 to 48 mA; compliance voltage 0 to 5.6 V; USB interface

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