

# Light distribution measurement system C9920-11



Brightness

Emission spectrum

Color coordinates

Light distribution characteristics

Quantum efficiency

## Brightness, emission spectrum and chromaticity of light emitting devices are measured in relation to the detection angle.

The emission of devices like organic LEDs or other light sources varies strongly with the viewing angle. For proper characterization of such samples it is therefore necessary to measure brightness, chromaticity and the emission spectrum for different detection angles. Hamamatsu C9920-11 Brightness Light Distribution Characteristics Measurement meets these needs by using a rotating stage as sample mount and a highly sensitive detector.

The device is mounted on the rotating stage and placed inside a dark sample chamber. It is excited by constant current or voltage.

The electroluminescence is collected by a condensing lens into the light guide. This is connected to the highly sensitive CCD spectrometer which measures instantaneously the whole emission spectrum.

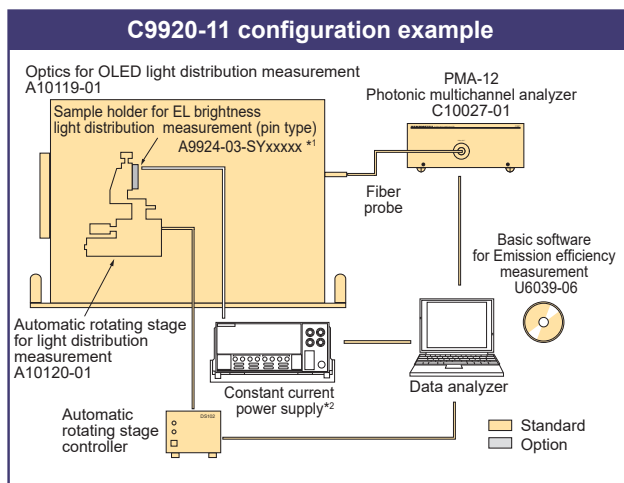
The software measures the emission spectrum for each angle and displays besides each spectrum brightness, angle dependency, I-V-L characteristics and chromaticity.

Furthermore the external quantum efficiency under a Lambertian assumption can be calculated, but it can be corrected using the emission angle distribution characteristics.



## Brightness, emission spectrum, and chromaticity are measured for each emission angle

While controlling the rotating stage, it is possible to measure brightness, emission spectrum and chromaticity for each angle. With the rotating stage and power source meter control, it is possible to measure the spectrum instantaneously at each current (voltage) step and display the measurement results in various graphs, including polar plots.



\*1 This is a customized product for each customer.

\*2 Please prepare Keythley Model 2400 Series or Model 2450 SourceMeter separately.

### Features

- Brightness, emission spectrum and chromaticity are measured in relation to the emission angle.
- For each step the whole emission spectrum is measured instantaneously by our multi-channel detector.
- Using a high-performance BT (back thinned) cooled CCD, the system has ultra-high sensitivity.
- Software controls the constant current power supply.
- Easy to handle intuitive software for measuring, calculating and controlling the system.
- Possibility of plotting different variables in several graphs (current, current density, voltage, luminous efficiency, chromaticity, etc.).
- The system can be easily extended to absolute PL quantum yield measurement and external quantum efficiency measurement systems.

### Specifications

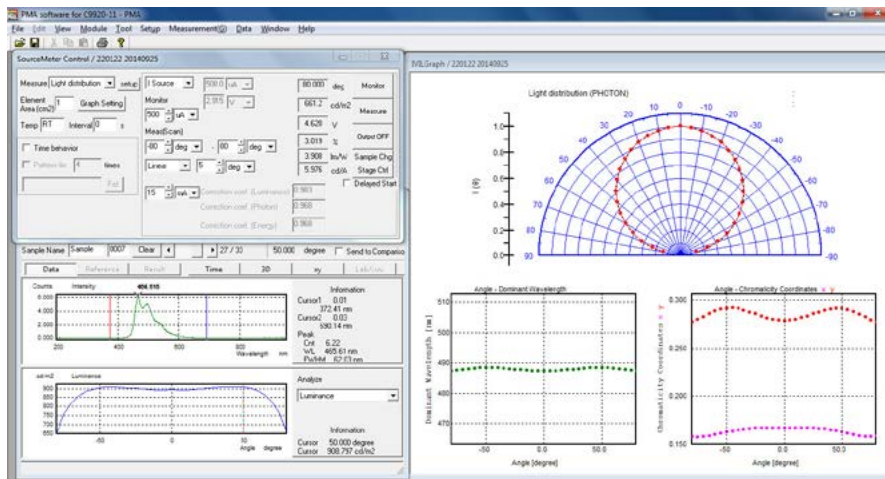
Rotating stage	Minimum angle setting 1°
Light distribution measurement range	0° to +80°, -80° to +80°
Minimum step setting	1°
Angle resolution	0.1° or less
Detector	BT-CCD
Device cooling temperature	-15 °C
Number of photosensitive device channels	1024 ch
Wavelength measurement range	200 nm to 950 nm (for spectrum display range) 380 nm to 780 nm (for color measurement and luminous flux calculation range)
Fiber length	1.5 m
Measurement spot size	< 200 μm (at 0° on front)
Brightness measurement range	10 cd/m <sup>2</sup> to 10 000 cd/m <sup>2</sup> (in white light)

# Simple and intuitive handling is realized through the dedicated analysis software.

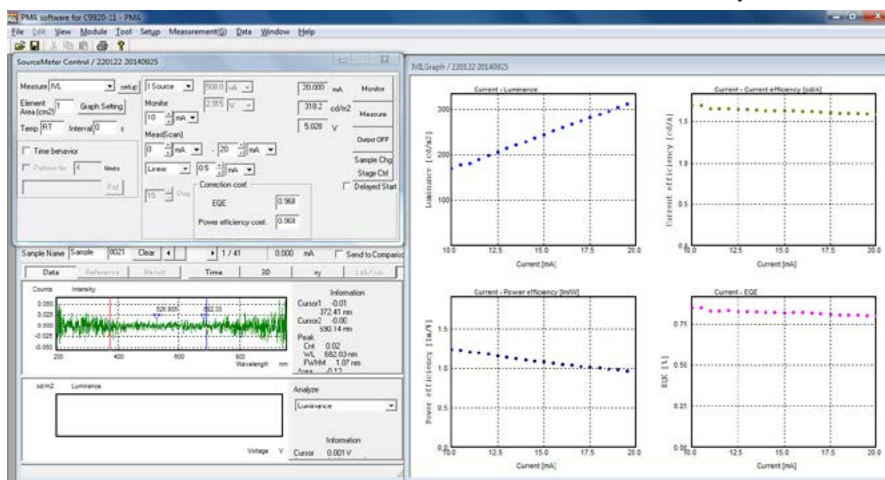
The software provides two measurement modes for brightness and light distribution and luminous efficiency. Measurement conditions like minimum and maximum current/voltage, step width etc. are defined in one section of the screen. The raw data, e.g. the emission spectrum are shown below. The main screen monitors the measurement and displays the graphs defined before by the user. It is possible to display several graphs with different axis.

## Two Measurement Modes

Light distribution measurement



Luminous efficiency measurement



The luminous efficiency is calculated using the Lambertian assumption. It can be corrected by the emission angle distribution characteristics.

Luminous efficiency of an OLED device.  
Courtesy of Prof. Kido laboratory, Yamagata University.

## Graph Display

Results can be depicted in various graph formats.  
Current density can be replaced by voltage.

- Current density / Luminance (cd/m<sup>2</sup>)
- Current density / Luminous efficiency (lm/W)
- Current density / Luminous efficiency (cd/A)
- Current density / Chromaticity coordinates (x, y)
- Current density / Voltage
- Current density / External quantum efficiency
- Current density / Emission spectrum
- Time / Chromaticity coordinates (x, y)
- Time / Emission spectrum
- Time / Current (voltage)

## Specifications

- Standard PC with 4 USB ports and 1 RS232C (9 pins)
- Dongle protected.
- Respective calibration files



# A wide variety of applications can be met by adding optional parts and components.

## Options



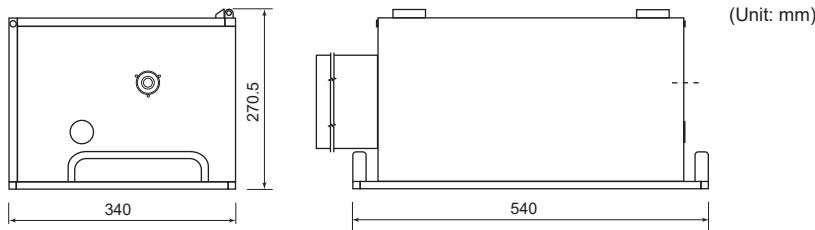
### Sample holder for EL brightness light distribution measurement (pin type) A9924-03-SYxxxxx\*

Alternate sample holder to the standard crocodile clamp type.  
This is a customized product for your sample.

\* xxxxx would be unique numbers for each product.

## Dimensional Outlines

### Optics for OLED light distribution measurement A10119-01



## Related Products

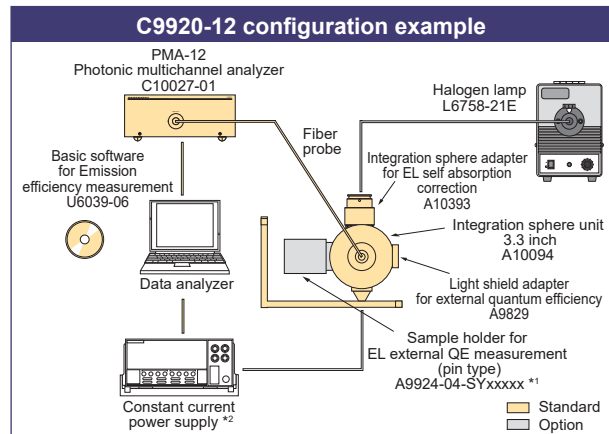
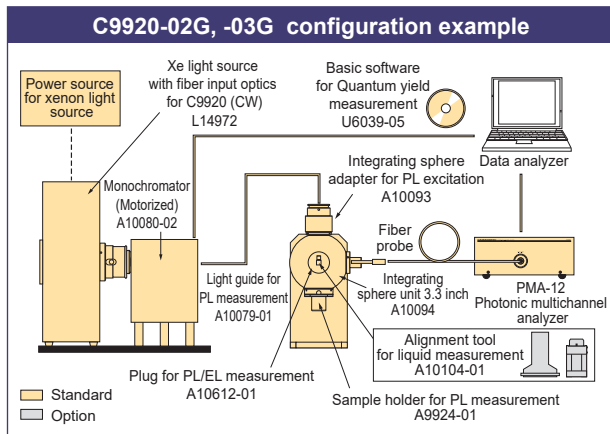
The C9920 series offers various possibilities for combined configurations and easy upgrades to following products.

### ● Absolute PL quantum yield spectrometer C9920-02, -02G, -03, -03G

These systems employ the PL method for measuring absolute fluorescence or photo-luminescence quantum yields for liquid samples, powders and thin films. As this is not a relative method no reference samples are necessary. The excitation wavelength is selected from the output of a 150 W Xenon lamp.

### ● External quantum efficiency measurement system C9920-12

Highly precise measurements of emission efficiency do not depend on the emission angle distribution characteristics when using an integrating sphere. The C9920-12 allows for measurements of emission versus applied current as well as detecting effects like absorption of the light emitting part and glass substrate, reflective mirror efficiency, etc.



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\*2 Please prepare Keythley Model 2400 Series or Model 2450 SourceMeter separately.

- The product and software package names noted in this brochure are trademarks or registered trademarks of their respective manufactures.
  - The university, institute, or company name of the researchers, whose measurement data is published in this brochure, is subject to change.
  - Subject to local technical requirements and regulations, availability of products included in this brochure may vary. Please consult your local sales representative.
  - The products described in this brochure are designed to meet the written specifications, when used strictly in accordance with all instructions.
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