

# External Quantum Efficiency Measurement System C9920-12



## Luminous efficiency for light emitting devices is measured precisely by utilizing an integrating sphere

Light emitting materials are characterized by their fluorescence quantum yield. For light emitting devices like organic and inorganic LEDs the respective physical value is the external quantum efficiency, measured usually by electroluminescence (EL) method. For this application the External Quantum Efficiency Measurement System C9920-12 system is designed.

The luminous efficiency of LED devices depends on various factors such as absorption of the individual layers and of the glass substrate, reflectance of the surface, radiation angle and waveguiding capacity of the glass substrate. These effects are countered by using an integration sphere as sample chamber. The sample is placed inside the sphere and excited by constant current or voltage.

Employing a highly sensitive Hamamatsu CCD spectrometer as detector, the whole spectrum is measured instantaneously. The spectral data as well as the external quantum yield, I-V-L characteristics and further calculations are displayed by the dedicated software.

C9920-12 shares common configuration for C9920-02, -03 which measures an absolute quantum yields of photo-luminescent materials, and for C9920-11 which measures brightness, emission spectrum and chromaticity of LEDs. C9920-02, -03 and/or C9920-11 can be configured by adding the optical parts, excitation light source, and dedicated measurement software.

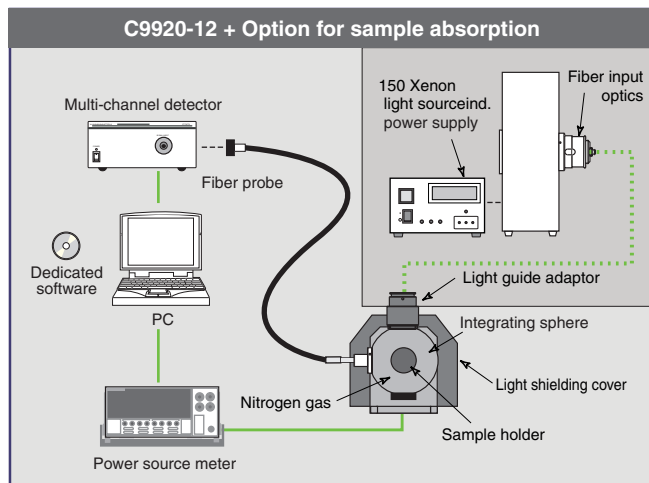
### Applications

- Development of LED devices
  - Organic LEDs
  - Inorganic LEDs
- Characterization of laser diodes



## External quantum efficiency measurement system utilizing an integrating sphere.

For measuring the external quantum yield of a light emitting device, it is placed inside an integration sphere and excited by constant current. Current or voltage is changed stepwise and each time a complete emission spectrum is taken and displayed by the software. The system is fully computer controlled.



### Features

- Use of an integration sphere renders the measurement independent from the emission angle.
- The power source meter (KEITHLEY 2400) is fully controlled by our measurement software.
- Instantaneous measurement of the whole spectrum by employing a high sensitivity CCD Sensor.
- The power source meter (KEITHLEY 2400) is fully software controlled.
- Easy to handle intuitive software for measuring, calculating and controlling the system.
- Spectral range from 380 nm to 780 nm.  
Display of combination of several variables (current, voltage, luminous efficiency, chromaticity, etc).
- The system can be easily extended to absolute PL quantum yield measurement and external quantum efficiency measurement systems.

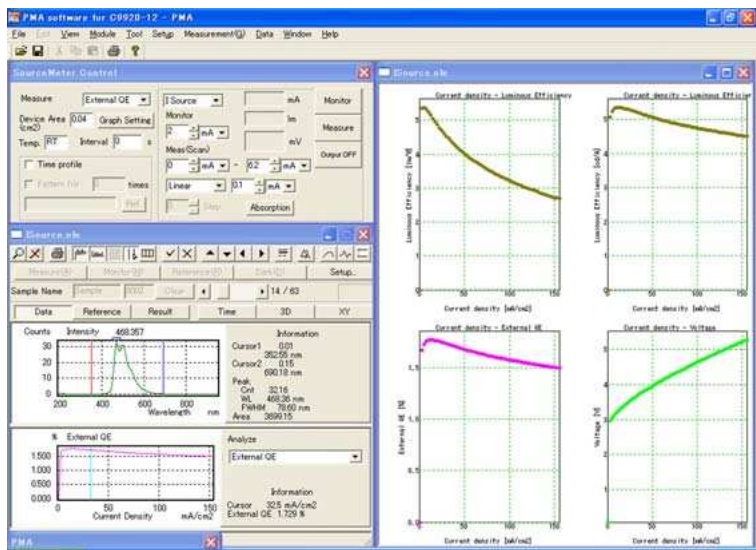
### Specifications

Integrating sphere	3.3 inch inside diameter, reflective material: Spectralon
Detector	BT(buck thinned) cooled CCD
Cooling temperature (CCD)	-15 °C
No. of photosensitive device channels	1024 ch
Wavelength measurement range	380 nm to 780 nm (detector: 200 nm to 950 nm)
Fiber probe	1.5 m
Range of measurement for luminous flux	0.00013 lm to 0.12 lm (with an emission area 2 mm square and white light)

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

The software allows the user to define a current/voltage range to be measured automatically. Measurement conditions like minimum and maximum current/voltage, step width etc. are defined in one section of the screen. The raw data (emission spectrum etc.) 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



## Specifications

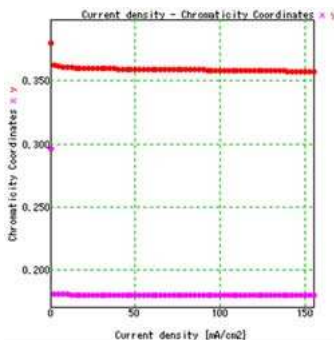
- Windows XP
- Standard PC with 4 USB ports and 1 RS232C(9 pins)
- Dongle protected.
- Respective calibration files

## Graph Display

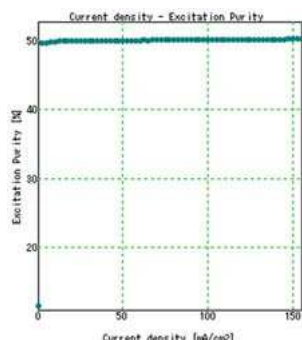
Results can be depicted in various graph formats. Current density can be replaced by voltage.

- Time/Chromaticity coordinates(x, y)
- Time/Current (voltage)
- Time/Emission spectrum
- Current density/External quantum efficiency
- Current density/Luminous efficiency (cd/A)
- Current/External differential quantum efficiency
- Current density/Voltage
- Current density/Dominant wavelength

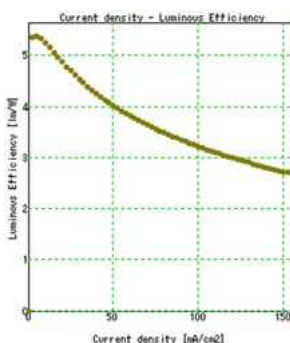
Current density/Chromaticity coordinates



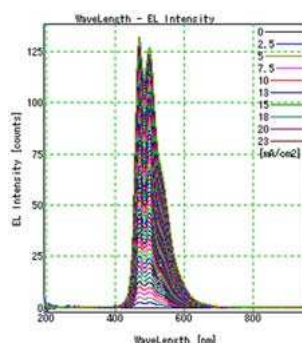
Current density/Excitation purity



Current density/Power efficiency



Wavelength/Intensity



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

## Options



### Monochromator A10080-01

Monochromator is for selecting the wavelength of the Xenon lamp.



### Integrating Sphere Adaptor A10093

An adaptor for connecting an absorption supplementing light source to the integrating sphere.



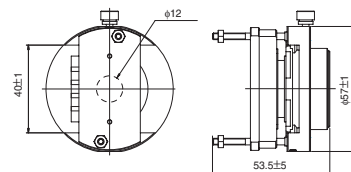
### EL Measurement Sample Holder A9924-04

Standard sample holder for C9920-12 with pin connectors.



### EL Measurement Sample Holder A9924-06

Standard sample holder with alligator clips. Used in combination with the light shielding cover.



### 1.5 m Light Guide A10079-01

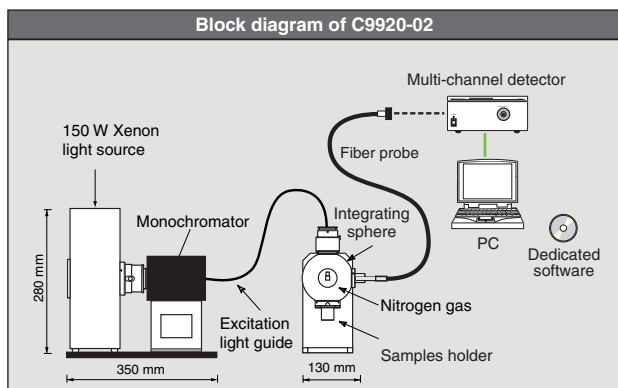
Light guide for excitation light

## Related Products

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

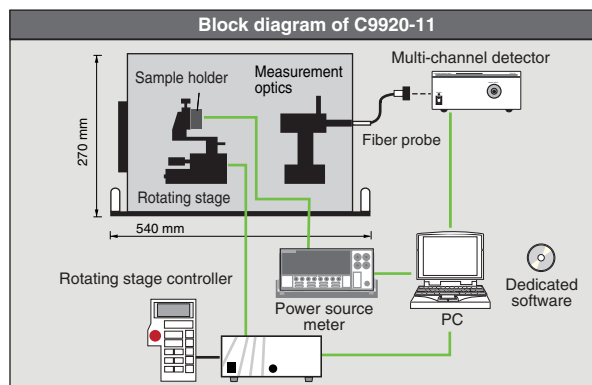
### Absolute PL Quantum Yield Measurement System C9920-02,-03

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 150W Xenon lamp.



### Brightness Light Distribution Characteristics Measurement System C9920-11

This system integrates a rotating stage for measuring the brightness of emitting devices for different emission angles, their emission spectra, color coordinates and IVL measurements. Angles and voltage/current are defined in the software.



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