Gooch & Housego

CR-110 Flicker Detector / Photometer

Designed for Temporal Analysis and Photometry

The CR-110 Flicker Detector/ Photometer uses dual photodiode technology to measure photometric parameters (luminance, illuminance, etc.), and for fast capture and digitization of the light source.

Quantifying Flicker

The CR-110 provides fast data captures at user-selectable sampling rates ideal for flicker and temporal analysis of modulated light sources, such as in the Solid-State Lighting (SSL) devices/luminaries and displays with LED backlight dimming based on pulse-width modulation. An adaptive electronic smart noise-filtering algorithm reduces high frequency noise.

Flicker characterization is compliant with the IDMS (Information Display Measurements Standard) published by the SID's (Society for Information Display) ICDM (International Committee for Display Metrology) working group. This includes the FFT (Fast Fourier Transform) method of calculating dominant flicker frequency and weighted flicker level to match the approximate temporal flicker sensitivity of the human eye.

Response Time Analysis

Fast temporal captures at the user-selectable sampling rate of the CR-110 are ideal for response time analysis of light sources and displays. A smart peak valley noise suppression and moving window average filter enables accurate detection of response times.

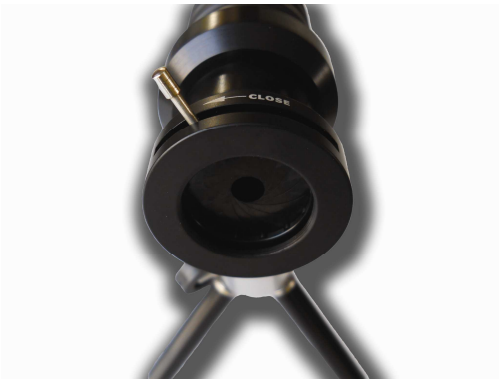
Response time analysis is also compliant with the ICDM.

Match Calibration

Using the match calibration method allows the CR-100 to be correctly matched to a reference instrument.

Photometry

The CR-110 provides the user with a highly accurate photometer that can be used to measure luminance and illuminance, photometric transmittance, photometric reflectance, contrast ratio, and more.



Ruggedly constructed, the housing is machined aluminum and stainless steel, and can withstand high acceleration rates for the most demanding motion positioning systems and environments. All optical components are fixed to ensure that no optical misalignments occur due to vibration, shock or high acceleration/ deceleration rates. The CR-110 is completely solid-state with no mechanical shutter or moving parts to ensure high reliability and long mean time between failures (MTBF).

Weighing only 12 ounces (340 grams), it is the perfect tool for display inspection or mounting on fast moving XYZ tables. Its small size and shape allows for several instruments to be mounted in the same motion control system and the simultaneous measurement of several spots in the same display.

Versatile Interface Options

The CR-110 is powered directly from any USB port and consumes only 120mA at 5V (600 mW), making it a portable instrument without the need for batteries or external power. It is a USB 2.0 compatible device, remotely controlled by the host software from any personal computer, laptop, or net book. As an option, the CR-100 can also be controlled by an Ethernet 10BASE-T/100BASE-TX IEEE-802.3 compliant connection.

Accessories

- USB cable
- Wrist strap and bracket
- Universal mounting bar
- Cosine receptor (optional)
- ND filters (optional)

Photopic Filter F1' Errors

	Guaranteed	Typical
Y (Photopic)	≤ 2.0%	1.4 – 1.8%

Each CR-110 goes through a strict quality control process. Every photopic filter is measured using a double monochromator, and the results are provided in a graph format with the relative errors at 1 nm wavelength increments. Photopic performance is included with the unit so the user can verify that the instrument is within the maximum f1' errors guaranteed.

Application Software

The PC-based software application is a streamlined, cross-platform, user-centric assistant used to perform photometric and temporal analysis. It provides a familiar workspace regardless of the platform used. All CR-110s come standard with a built-in, easy-to-learn, English language command interpreter to control all aspects of operation via a computer, tablet or smart device, making it easy for users to create their own software dedicated to perform specific measurement tasks or for inclusion in an Automated Test Environment.

In addition, a fully documented communication language with numerous real-world, sample templates are included as starting points for customers to build their own software tools using any of the modern computer development environments. LabVIEW driver is available upon request.

Feature Highlights

- Cross Platform:
  The working environment is the same in every platform while taking advantage of features specific to the host operating system.
- Intuitive:
  The interface is designed with a user-friendly approach allowing controls at your fingertips, not hidden away in menus or complex preferences.
- Connectivity:
  The software is engineered to support simultaneous data capture from multiple connected instruments based on the contextual task at hand. Select an instrument to take a reading or simultaneously use all open instruments.
- Data Visualization:
  Measurements are presented in a customizable tabular grid or easy to read charts. The software supports multiple types of measurements and co-exists gracefully within the same streamlined interface. All data can be exported easily into your own spreadsheet application for further analysis.
- Display Flicker Measurements:
  The CR-110 uses proprietary hardware and software for fast sampling of display luminance to compute flicker levels (or modulation amplitude) and dominant flicker frequency components.

The Colorimeter Utility is an accompanying tool that aids in updating, preserving and recovering the state of the instrument.

Measurement Spot Size

Spot size at end of hood ..... 23.0 mm
Spot size at 100 mm from end of hood ..... 31.7 mm

The spot size can be calculated at any distance from the end of the rubber hood with the following equation:
*Spot size (mm) = 23.0 mm + 0.08732 * distance to object (mm)*

Optional External Trigger Port

The CR-110 can be equipped with an External Trigger Port. The External Trigger Port/Sync Input enables remote measurement activation from either a push button or a peripheral device, while the External Trigger Port/Sync Output allows synchronization signals to measure strobes/pulsed lights, and start/stop signals. This option is ideal for fast temporal events that need to be precisely synchronized with the measurement or data capture.

CR-110 Photometer Specifications

Wavelength Range	380 – 780 nm
Luminance Range	0.0002 fL to 15000 fL
	0.0002 fL @ Signal to Noise Ratio > 10, 20 seconds exposure
	0.001 fL @ Signal to Noise Ratio > 10, 0.5 second exposure
	0.001 fL @ Signal to Noise Ratio > 100, 20 seconds exposure
	1500 fL @ Signal to Noise Ratio> 8000, 1 second exposure
Luminance Accuracy	± 2% @ 0.1 fL, 0.4 sec exposure
Luminance Repeatability	0.2 % @ 0.1 fL, 0.4 second exposure
	1.5 % @ 0.01 fL, 0.5 second exposure
	1.5 % @ 0.001 fL, 20 seconds exposure
Polarization Error	≤0.1 %
ADC resolution	16 bits
Synchronization Frequencies	10 - 500 Hz
	(Custom Synchronization from 10 Hz to 10 KHz available)
Exposure Time Range	1 ms to 20 seconds
Power Requirements	5V, 120 mA (600 mW) via USB 2.0
Interface	USB 2.0, Ethernet
Weight	12oz. (0.34 Kg.)

NOTE: *When Custom Synchronization is selected, the user is required to enter the refresh rate or the on/off frequency of the device he is measuring. All the above measured with a NIST-traceable 2856 K light source*

CR-110 Temporal Specifications

Electro-optical bandwidth	1 MHz
Maximum sampling rate	333 K samples per second
Minimum sampling period	3µ seconds
ADC resolution	12 bits
Number of ranges	(4) Manual (Auto-range available)
Noise filtering technology	proprietary smart noise filter