

LIGHT SENSOR¹

0..150 000 LUX

Description D0143i



Figure 1. The Light Sensor 0..150 000 lux

Short description

The Light Sensor (0143i) measures light intensities in the range of 0 to 150 000 lux (150 klx). A photodiode (BPW21), which is located at the side of a plastic box, converts light intensity in an output voltage adjusted to a range of 0 to 5V, which can be measured by an interface. The output of the light sensor is linear with respect to light intensity. Because of its range the sensor is suitable for measurements in daylight. Full sun illumination is within the range of the sensor.

The spectral response of the sensor approximates the response of the human eye.

¹ To use the new intelligent sensors in the Coach 5 program you need to update the Coach library. This update can be found at <http://www.cma.science.uva.nl/english> section Support > Coach 5.

The light sensor is equipped with a BT-plug and can be connected to the following CMA interfaces:

- ULAB
- CoachLab
- CoachLab II
- UIA/UIB through Measuring console (via 0520 adapter²).

Furthermore the sensor can be used in combination with other interfaces, like Texas Instruments CBL™, CBL2™ and Vernier LabPro without the need of an adapter.

Intelligent sensor³

The light sensor is an intelligent sensor. The sensor has a memory chip with information about the sensor. Through a simple protocol (I²C) the sensor communicates with ULAB and transfers its data (name, quantity, unit and calibration) to the datalogger. ULAB automatically displays the calibrated values on its screen. Also ULAB communicates the information to the Coach software.

The sensor is delivered with a standard calibration.

Suggested experiments

The light sensor is specially designed for measurements outdoors and can be used in various experiments in biology, chemistry and environmental science such as:

- weather study to monitor sunrise and sunset times
- measurements of light intensity during plant growth
- solar energy studies.

Calibration

The output of the light sensor is linear with respect to light intensity.

To collect data you can:

1. Use the calibration supplied in the standard library of the Coach program.
2. Use the calibration supplied by the sensor EEPROM memory (only for the ULAB datalogger).
3. Calibrate the light sensor. The calibration can be performed in the Coach software (for details see 'Guide to Coach 5').

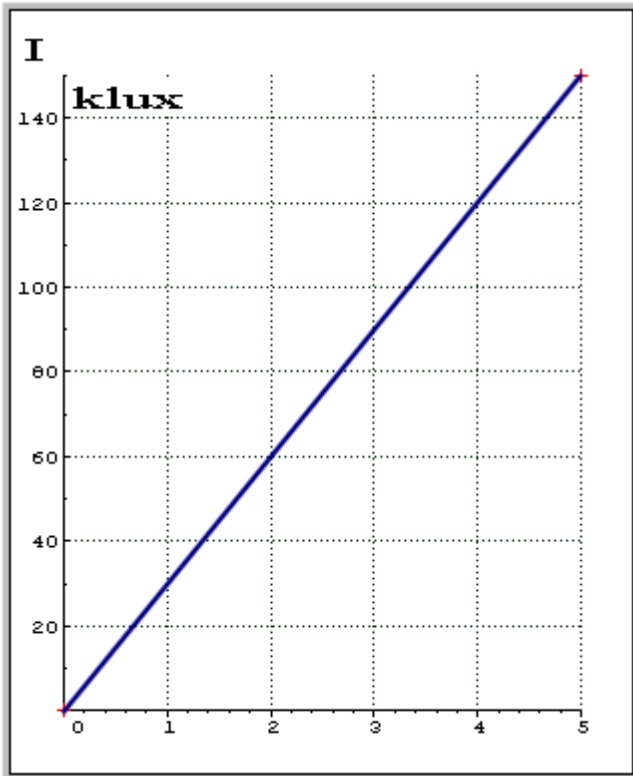
The calibration is easy if you have a calibrated light meter. You simply perform a standard two-point calibration using two different light levels both measured with a calibrated, hand-held light meter.

² The CMA adapter art. nr 0520 allows connecting sensors with BT-plugs to 4-mm inputs.

³ At this moment only for CMA ULAB datalogger, in the future also for LabPro and the CBL2.

Changing of the default calibration in EEPROM of the sensor

In the near future a special program will be available to enable replacing of the default calibration in EEPROM of the sensor by a calibration done by the user. This will be done while the sensor is connected to the ULAB datalogger. In this way the sensor can have its own, precise calibration.



The name of the light sensor in the sensor library of the Coach 5 program is **Light sensor (0143i) (CMA) (0..150 klx)**.

Figure 2.

Default calibration graph of the light sensor (used in the standard Coach library and sensor memory)

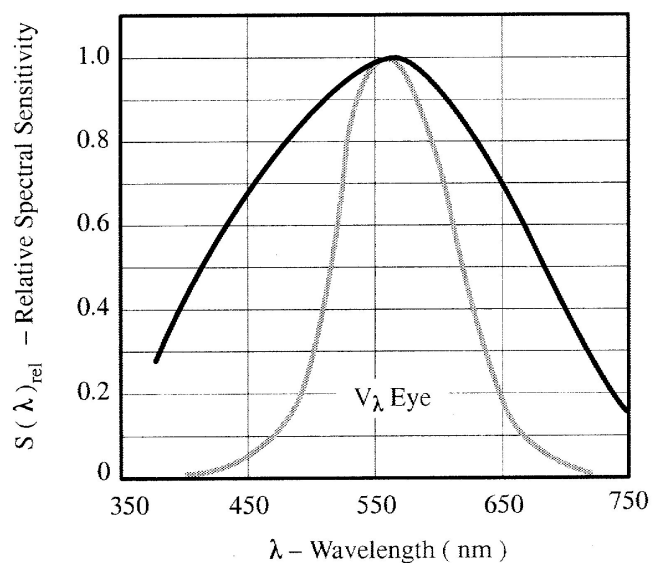
$$I (\text{klx}) = 30 * V_{\text{out}} (\text{V})$$

Coefficients of the calibration function:
a= 30; b= 0.


Spectral sensitivity of the light sensor

The spectral sensitivity of the light sensor approximates the spectral sensitivity of the human eye. The maximum sensitivity is at 565 nm.

Figure 3. Spectral sensitivity of the Photodiode (BPW21).



Technical data

Light intensity (illuminance) range	0 - 150000 lx
Voltage output range	0 - 5 V
Calibration function	$I \text{ (klx)} = 30 * V_{\text{out}} \text{ (V)}$
Resolution using 12 bit A/D converter	37 lx
Angle of incidence at half sensitivity	$\pm 55^\circ$
Spectral range	350 nm - 820 nm (10% of Spectral max) 420 nm - 675 nm (50% of Spectral max)
Wavelength of the highest sensitivity	565 nm
Rise time	3 μs (bandwidth approx. 50 kHz)
Current requirement	< 5 mA
Sensor information for Auto-ID and calibration	256 byte serial EEPROM
Connections	 BT (British Telecom) plug

This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.

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