

## Technical Specification Colorimeter PCE-CSM 4

### **Spectrophotometer for quality control / digital software included / Li-ion battery / black-and-white contrast calibratable / measuring modes for various parameters / colour analysis of black, white, red, green, yellow and blue**

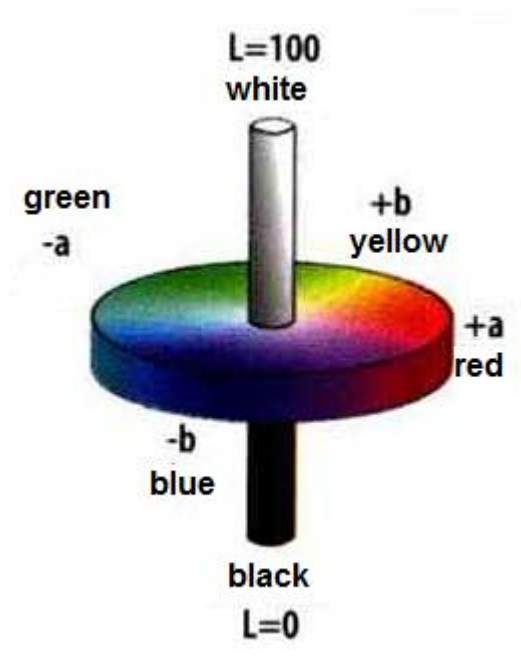
The Colorimeter proves to be a multitasking device. It is designed to measure the colour spectrum of various objects. Light consists of a broad spectrum of colours which are not always purely white, black or blue. A light-source illuminates an object, which then absorbs part of that light and reflects another one. That reflected light can be then detected by a sensor in order to determine the reflected wavelengths and thus calculate its colour. Colorimeters are often applied in areas of quality control in industrial sectors. Colorimeter of the PCE-CSM series are applied especially in industries where the characteristics of colours play a big role. Whether it is dental technology, painting industries or for the production of plastic bags, the colorimeter PCE-CSM 2 and PCE-CSM 4 are ideal products for quality management and thus assure highest reliability, whenever it is important to assure a certain standard in optic quality. The colorimeter supports an ergonomic design and features a user-friendly menu navigation. The difference between the colorimeter PCE-CSM 2 and PCE-CSM 4 is the size of the measuring surface. The colorimeter PCE-CSM 2 has a size of 8 mm, while the colorimeter PCE-CSM 4 has a larger measuring aperture of 20 mm. Due to this alternation the devices are ideal for individualised applications in various divisions. The supported colour spaces of the colorimeter PCE-CSM 2 and PCE-CSM 4 are CIEL\*a\*b\*C\*h, CIEL a\*b\* and CIEXYZ. Thus the colorimeter is designed for application in professional industries. Another advantage of the colorimeter of the PCE-CSM series is that it supports a vertical justification. This means that the whole device does not need to be placed on the object to analyse, but only the part with the sensor in it. The industrial perspective of it is that this method allows the measuring of damp objects, textiles and even food. The colorimeter PCE-CSM 2 and PCE-CSM 4 are therefore ideally applied for measurements of e.g. meat, bananas or tomatoes. Due to the software "CQCS3" that is included in the delivery, the measured data can be read out on a computer or laptop for a digital overview.

- Rechargeable Lithium-Ion battery
- Autom. calibration of black-and-white contrast
- Continuous performance
- Designed for food industry
- Measures various colours
- Application on different surfaces
- Simplified user-interface
- Software included in delivery

### Technical Specifications of the Colorimeter

Measuring apertures	Ø8 mm (PCE-CSM 2), Ø20 mm (PCE-CSM 4)
Sensor	Silicium-photodiode
Colour spaces	CIE L*a*b*C*h CIE L a* b* CIE XYZ
Formula for indifference in colour	$\Delta E^*_{ab}$ $\Delta L^*_{ab}$ $\Delta E^*_{C^*H}$
Light source	D65
Type of light source	LED
Data memory	100 standards, 20000 samples
Aberrance in-between the utilities	$\leq 0,50 \Delta E^*_{ab}$
Repeatability	30 measurements on average, with standard-white plate
Standard deviation	within $\Delta E^*_{ab}$ 0.08
Weight	500 g
Dimensions	205 x 67 x 80 mm
Power Supply	rechargeable lithium-ion-batteries 3.7 V at 3200 mAh
Charging time	8 hours
Battery operation time	approx. 5000 measurements
Lifetime of lamp	5 years, more than 1.6 million measurements
Temperature range	0 ... +40 °C
Relative humidity	0 ... 85 %, non-condensing

### The L\*a\*b color space



Here you can see the colour space L\*a\*b. This colour space covers all colors that are visible with the naked eye. L=100 stands for white and L=0 for black. "a+" and "a-" or "b+" and "b-" stands for the colour contrasts red, green, yellow and blue.

### Connections and measurement apertures of the Colourimeter PCE-CSM 2 and PCE-CSM 4



Here you can see the inputs at the colourimeter PCE-CSM 2 and PCE-CSM 4. One of these is compatible with the adapter for recharging the device's battery (in image left input). The other one is a RS232 interface for USB connections to a computer or printer, in order to evaluate the data by means of the software included in delivery.



Here you can see the main difference between the PCE-CSM 2 and the PCE-CSM 4. It is the size of the aperture. The PCE-CSM 4 features a size of 20 mm of the aperture (right). The PCE-CSM 2 features an aperture of 8 mm (left). The Colorimeter PCE-CSM 2 enables measuring of smaller objects, for example smaller straight surfaces of food.

#### Examples of application of the Colorimeter PCE-CSM 2 and PCE-CSM 4



Here you can see the Colorimeter PCE-CSM 2 in progress. Due to the 8 mm measurement aperture the device is also designed for smaller surfaces. Especially for food the device is very handy, since only the measuring aperture covers the surface of the measured object instead of the whole measurement device like with other measuring devices.

The Colorimeter PCE-CSM 2 and PCE-CSM 4 can be applied in various industrial fields and thus allows a precise and simple application to assure a consistent quality of the products.

#### Main Functions of the Colorimeter PCE-CSM 2 and PCE-CSM 4

The menu of the Colorimeter PCE-CSM 2 and PCE-CSM 4 contains all characteristics and settings that can be performed at the Colorimeter PCE-CSM 2 and PCE-CSM 4. Such are the basic settings like time, language, date, but also settings about the recording and the colour spaces that shall be displayed by the Colorimeter PCE-CSM 2 and PCE-CSM 4.



Here you can see the user interface of the Colorimeter PCE-CSM 2 and PCE-CSM 4 during standard measurements. That interface starts as soon as the device initiates the measuring process. The Colorimeter does not only display the various values of the parameter, but it also illustrates the measuring results in a graphic as you can see here.



After performing the measurement you can also enter the sampling mode. Here the relevant parameters are displayed in detail. They are also visualized by two graphics for all the colours and for black and white. Furthermore the Colorimeter PCE-CSM 2 and PCE-CSM 4 thus offers a precise overview for all kinds of measurements.

**Delivery Content:**

- 1 x Colorimeter PCE-CSM 4
- 1 x USB cable
- 1 x aluminium transportation case
- 1 x battery
- 1 x adapter
- 1 x wrist band
- 1 x standard calibration plate white
- 1 x computer software
- 1 x instruction manual