Colour Meter
PCE-RGB 2

MANUAL

Version 1.0
10.09.2014

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1. Safety Precautions

Please read the following instruction manual before operating with the device. Damages caused by disregard of the instructions written in this manual, are excluded from any warranty or liability.

- This device is only designed for the applications mentioned in this manual. In case the device is used for any other application than these, it might lead to hazardous situations.

- The device is can only be used within the permitted temperature range.
- The sensor must be stored in the carrying case included in delivery, if not used.
- Let the device prior to application acclimate to the surrounding temperature
- The device may be opened only by specialized personnel of PCE instruments
- Never set down the device on its control panel (e.g. onto a table, with the console faced down).
- The device should be only cleaned with a damp cloth. Do only use pH-neutral solvents.

2. Technical Specifications

Measurement geometry:	45° / 0° circular lighting at 45°, measurement at 0° according to DIN 5033
Measurement range:	RGB: 0 … 1023 each for, R, G and B / HSL 0 … 1,000 for H, S, L
Resolution:	1 for RGB measurement / at 0.001 HSL-measurement
Repeatability:	< 3 RGB, at min. 10 measurements
Colour models:	RGB and HSL
Spectral range:	400 nm up to 700 nm
Light source:	2 white light diodes
	Caution: The device can be only operated with non-fluorescent sensors
Applications:	- not for illuminated surfaces (absolute values)
	- for self-luminous surfaces (relatively compared)
Display:	Relative and absolute values
Interface:	RS-232 at display
Software:	Optional software kit
Power Supply:	1 x 9 V bloc battery
Dimensions (sensor):	45 x 92 x 160 mm
Weight:	approx.. 600 g
Surrounding conditions:	0 … +50 °C / max. 80 % RH
Standards:	DIN 5033

3. Detailed description of device

Fig.1
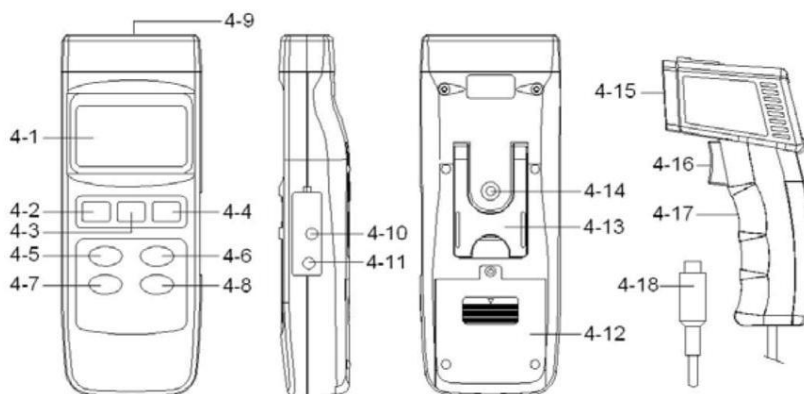
|			
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4. Measuring Procedure

4.1 Measurement of samples that are not self-luminous

Materials that do not luminaire on their own, are e.g. paper, leather, synthetics …
- Insert the Connector (4-17, Fig. 1) into the relevant input (4-9, Fig.1).
- Start colour meter by pressing "Power" (4-2, Fig. 1). The display will then indicate "0" for RGB.
- Take the handle of the pistol (4-17, Fig. 1), and place the sensor head (4-15, Fig. 1) near to the material's surface and press it slightly onto the surface.

Fig. 2
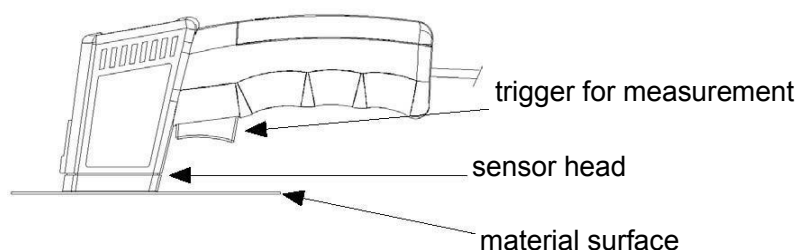
trigger for measurement

sensor head

material surface

RGB:

Press the "OP"-button (4-16 or 4-3, Fig. 1) once, so that the display indicates "Mesu" (for measurement), and after several seconds R, G, B – values. Now you can lift the sensor head from the sample surface. If you wish to perform a new measurement, proceed the same way.

HSL:

If you wish to determine the H, S, L values (hue, saturation, lightness), press the "RGB / HSL"-button (4-7. Fig. 1) once, so that the display indicates the H-, S-, L- values. Press the "RGB / HSL"-button again to return to the R, G, B – values again.

Compared to the RGB- values, the HSL values can emphathise the perception of the human eye much better.

Note:

If you measure materials, that are not self-luminous, press the "OP"- button (4-16 or 4-3, Fig.1) once. If the sensor head (4-15, Fig. 1) does not emanate a white light, proceed as following:
   a. Start colour meter, and <u>do not</u> press the "OP" button.
   b. Press the "LIGHT ON / OFF" button (4-8, Fig. 1) once. Now press the "OP" button. The sensor head will then emanate white light.

If you press the "OP" button and the device does emanate white light, the device is ready for application on surfaces that are not self-luminous.

If you press the "OP"- button and the sensor head does not emanate white light, the device is ready for application on self-luminous surfaces.

4.2   Measurement on self-luminous samples

Self-luminous materials are e.g. LCD monitors, LED's, …

Consider for this measurement mode, that there might appear larger statistical spreads for the absolute measurement values. Thus this type of measurement should be mainly applied for relative comparisons (before and after / new to old). First make sure that the sensor head does not emanate any light.

Note:

If you measure materials that are self-luminous, press the "OP"-button (4-16 or 4-3, Fig 1) once, and the sensor head (4-15, Fig. 1) emanates white light, proceed as following:
   a. Turn on colour meter, <u>do not</u> press the "OP"-button.
   b. Press the "LIGHT ON / OFF" button (4-8, Fig. 1) once. Now press the "OP" button. The sensor head will then stop emanating white light.

If you press the "OP"- button and the sensor head does not emanate white light, the colour meter is ready for application on self-luminous surfaces.

RGB:

Press the "OP"- button (4-16 or 4-3, Fig. 1) once, so that the display indicates "Mesu" (for measurement). After several seconds it will indicate the R, G, B values. Now you can remove the sensor head from the material surface. If you want to perform a new measurement, proceed the same.

HSL:

If you want to determine the H, S, L – values (hue, saturation, lightness), press the "RGB / HSL"-button once, so that the display indicates the H-, S-, L- values. Press the "RGB / HSL"- button again to return to the R, G, B – values again.

4.3 Relative measurement

You can press during measurement, when the display indicates the R, G, B – values, the "REL"-button (4-6, Fig. 1) once (Relative-mode), to switch to the Relative-mode. The display will then indicate a blinking "0".
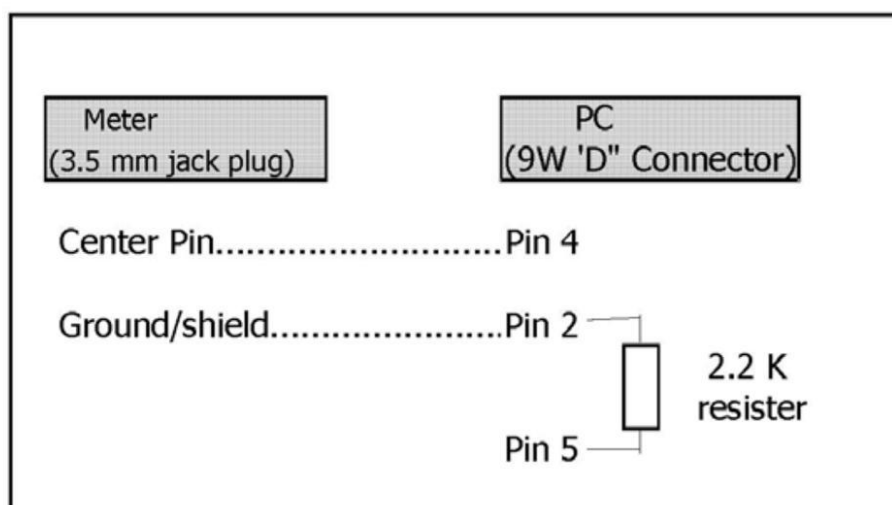
If you now want to perform a new measurement, press the "OP"-button once (4-16 or 4-3, Fig. 1), and the device will automatically calculate the difference between the new measurement value and the one before. That value will then be blinking on the display. Press the "REL"-button again to return to the standard measurement mode.

5. Calibration

The calibration does not refer to self-luminous samples. The delivery also contains a standard white, which represents the 100 %- white value (not optically lightened). That standard is a white paper. But you can also use other commercial standards (e.g. barium-sulphate- pellets) for the calibration. Set the measurement device to the measurement mode for surfaces that are not self-luminous (chapter 4.1).

   a. Lay down the calibration standard on its flat side.
   b. Take the handle of the pistol (4-17, Fig. 1), and place the sensor head (4-15, Fig. 1) near to the material's surface and press it slightly onto the surface.
   c. Press "Function"- button (4-4, Fig. 1) and "CAL"-button (4-5, Fig. 1) for a while. The display will then indicate the following points:
   R CAL (Wait 30 sec.)
   R 10 23
   GCAL (Wait 10 sec.)
   G 10 23
   B CAL (Wait 10 sec.)
   B 10 23

6. Interface

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

D0	End - word = 0D		
D1 & D8	Display read-out, D1 = LSD, D8 = MSD, Example: If the value reads 1234, D8 to D1 will be: 00001234		
D9	Decimal place (DP), places from right to left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D10	Polarity 0 = positive, 1 = negative		
D11 & D12	Indicator		
	R = 70	G = 71	B = 72
	H = 42	S = 73	L = 99
D13	If the R-value is transmitted = 1 / If the G- value is transmitted = 2 / If the B-value is transmitted = 3 / If the H value is transmitted = 4 / If the S- value is transmitted = 5 / If the L-value is transmitted = 6 / R, G, B, H, S, L are transmitted in sequences.		
D14	4		
D14	Start – word = 02		

RS-232 setting

Baud rate	9600
Parity	No parity
Data-bit number	8 data - bits
Stop Bit	1 stop-bit

7. Change batteries

If the following symbol ⌒ is indicated on the display, the battery capacity appears to be low. So the battery needs to be changed. Loosen the screws of the battery compartment at the backside of the device. Remove the old batteries and put in a new 9 V bloc battery. Consider the poling of the batteries, if you do so. Reattach the cover of the battery compartment and secure with the screws.

8. Software

The software of the colour meter PCE-RGB 2 can be purchased optionally. The delivery of the software will contain a separate instruction manual.

9. Disposal

Batteries may not be put in the household waste. They have to be given in the set up collection points.

NOTE: "This instrument doesn't have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."

Please contact PCE Instruments if you have any questions concerning our products, service etc.