USER MANUAL

COLOR METER

PCE-RAL 40

ENGLISH

DEUTSCH



User manuals in various languages (français, italiano, español, português, nederlands, türk, polski) can be found via our product search on:
www.pce-instruments.com

DESCRIPTION

The PCE-RAL 40 is used to measure colors. It allows you to measure the difference between the sample being tested and the reference sample. The measurement results in three colors that most closely match the sample being tested in relation to a selected color palette or the LAB color space values. The vertical design of the meter allows measurements to be taken on small surfaces.

MEASUREMENT METHOD

A color sensor and two light-emitting diodes form a system based on 45º/0º geometry. The sample surface is illuminated at a 45-degree angle. The detector is positioned at a 0-degree angle, perpendicular to the sample surface. The analog color is determined based on the measured sample and the reference pattern. It displays the numerical difference between the measured color and the reference pattern.

TECHNICAL SPECIFICATIONS

Lighting system	45°/0°
Light source	White LED
Minimum sample area	32 mm x 20 mm
Power supply	2 x AA batteries 1.5 V LR6/AA
Dimensions	128 mm x 79 mm x 25 mm
Weight with batteries	162 g
Weight without batteries	116 g
Operating temperature range	10°C ... 40°C
Storage temperature range	-30°C ... 55°C

Temperature Range
Low and high ambient temperatures can affect the speed of data display and the accuracy of color matching. Do not expose the device to high temperatures or leave it in direct sunlight.

Measurement Accuracy
The average color recognition rate, based on two results, is 99.5%. When considering only the first optimal match, the accuracy is approximately 95%. The device may not clearly recognize about 0.5% of colors.

FACTORY SETTINGS

If the device is not used for more than 3 minutes, it will automatically turn off. This setting can be changed in the settings menu. The next time you turn it on, all recently selected settings for the color palette and active language will be retained.

DESCRIPTION OF THE DEVICE

1 - POWER/OK button
2 - DOWN button
3 - Battery compartment
4 - UP button
5 - Display
6 - Color sensor



Menu Control Buttons
At the bottom of the screen, you will find information about the function of a specific button in the current situation. If there is a + next to the name, this means that the button has a hidden function when held down. When the button is pressed, the name of the new function appears above the button. After holding the button down for 3 seconds, the function is activated.

LCD display
1 - Battery level indicator,
2 - Color name from the palette
3 - Information about the button's function on the current screen
4 - Measured color number
5 - Palette name and year of release (for selected palettes).
6 - Each screen displays the name of the currently displayed



MENU DESCRIPTION

On the main screen, press MENU or hold NEXT + for 3 seconds to select the currently highlighted option, then press the OK button.

Available menu options:
- Measure,
- Contrast LRV
- Multiple Measurement,
- Options: Language, Auto-Off Time, Back

Back
This option allows you to return to the MENU.

Measurement
This function allows you to perform multiple measurements. The RGB values in percent are displayed on the screen. It is possible to arrange up to 32 consecutive measurements side by side. You can scroll through the measurements by pressing the buttons.

Info Mode
Press and hold the UP button on the results screen to enter Info Mode.

Color Palette
Use the UP and DOWN buttons to change the color palette against which the measurement is to be compared. Press the OK button to confirm.

Disclaimer:
This device and the associated software do not create, own, or claim any rights to the color palettes identified by it. All color palettes, brand names, and color formulations referenced by this device or compared with this device are the property of their respective owners. The use of third-party color names or codes is for identification and informational purposes only and does not imply any connection to or endorsement by the original paint manufacturers.

Languages
Use the UP and DOWN buttons to select the language: French, English, Dutch, and German.

Update
Allows the device to connect, update the software, and search for available pallets.

Instructions for updating the pallet and software firmware

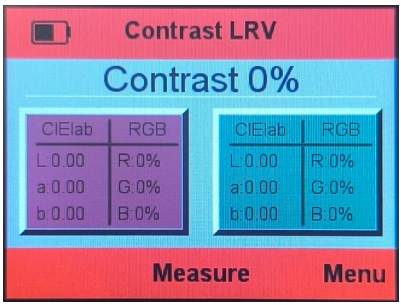
- Open the Update menu: Navigate to Menu > Settings > Update.
- Connect a USB-C charger (do not disconnect it until the update is complete) .
- If Wi-Fi was not previously configured: The device will prompt you to connect to the FMG40-WIFI-MANAGER access point on your computer.
- Connect to this network, enter the IP address displayed on the device into your web browser, e.g., 192.168.4.1. The Wi-Fi configuration page will appear.
- Enter the SSID and password for your local Wi-Fi network. Click OK.
- The device will restart immediately.
- The Wi-Fi credentials are now saved to memory.
- Now select Settings > Update > Firmware or Palette Update. The device will check for available updates.
- **Firmware Update:** This update installs the latest software version to improve the device's stability and security.
- **Palette Update:** This update checks for new color palettes and updates the current palette.
- **Important Precautions:** Do not turn off the device or disconnect the USB connection while the update is in progress.

MENU FOR QUICK SELECTION OF THE COLOR PALETTE

On the main screen or the measurement results screen, you can quickly change the current color palette. To do this, press the UP or DOWN button to display the list of available color palettes. To view the list of available palettes, press the UP button, select the desired option from the color palette, and confirm with OK.

LRV (CONTRAST) MEASUREMENT

Enable LRV from the menu.
The contrast between colors is based on the LRV value.



PERFORMING A MEASUREMENT

The test sample should be dry and non-transparent. Samples can be placed horizontally (on a table), vertically (on a wall), or at an angle.

The colors shown on the display are for approximate identification only. **The most accurate color reproduction occurs when viewing the display straight on or from below.** You should visually confirm that the color indicated by the device is similar to the tested sample. Depending on environmental conditions, color identification may be inaccurate. Final confirmation of the color should be based on the physical sample.

The device contains a sensitive optical system that must be kept dry and free of dust. The device should be stored at room temperature. Remove from the case before use and put it away immediately after use. Clean with a microfiber cloth. Dust should be removed with compressed air. Contaminants can affect the measurement results.

- Turn on the device using the POWER button.
- Place the device on the surface to be measured. **Caution!** The part with the sensor must be in full contact with the surface to be measured.
- Press the OK button to perform the measurement. **Caution!** Do not move the device while the measurement is in progress.
- Once the measurement is complete, the window displaying the measurement result will appear.
- The next measurement can be performed by pressing the OK button.

After the measurement, the screen displays two color numbers that best match the sample being tested. The first color is the best match; the second color is the next best match.

Factors that may affect the measurement result:

- Obstruction of the optical system;
- Low and high temperatures;
- Improper use of the device;
- Poorly performed measurement;
- Contaminated sample;
- Uneven sample surface;
- content of metallic or iridescent dyes;
- samples with extremely high brightness (may contain fluorescent dyes).

Note: The background color displayed on the screen is only an approximation and may vary depending on lighting conditions and screen settings. For accurate results, please refer exclusively to the color code in the center of the screen.

TURNING OFF THE DEVICE

- The device can be turned off at any time by pressing and holding the POWER button for about 3 seconds and then releasing it.
- The colorimeter automatically turns off after 3 minutes if it is not in use (this can be changed in the menu for the automatic shut-off time).
- If the battery level is too low, the low battery indicator appears and the device turns off. The batteries must then be replaced with new ones.

POWER SUPPLY

The colorimeter is powered by two AA batteries. You can use either rechargeable or disposable batteries. The battery indicator on the screen shows the battery status. If an empty battery icon appears, replace the batteries. Be sure to use batteries of the same type. Do not mix rechargeable and disposable batteries, or use a partially used battery with a new one.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

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