Manual

COLOR3-CALIB-Scope V6.1 Software

(PC software for Microsoft® Windows® Vista, XP, 2000, NT® 4.0, Me, 98, 95)

for calibrating the color sensors of the SI-COLO3 series

The sensors of SI-COLO3 Series can be calibrated by means of separate software COLOR3-CALIB-Scope. The color balance can be done on any white target. In alternative, a ColorChecker™ is available which has 24 different color areas according to CIE norm. The calibration can be done on any of the white areas.

(Standard software for SI-COLO3 color sensors → please cf. manual COLOR3-Scope V6.1)

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1 Installation of the COLOR3-CALIB-Scope Software

Hardware requirements for successful installation of the COLOR3-CALIB-Scope software:

- IBM PC AT or compatible
- VGA graphics
- Microsoft® Windows® Vista, XP, 2000, NT® 4.0, Me, 98, or 95
- Serial RS232 interface at the PC
- Microsoft-compatible mouse
- Cable for the RS232 interface
- CD-ROM drive
- Approx. 5 MByte of free hard disk space

The COLOR3-CALIB-Scope software can only be installed under Windows. Windows must therefore be started first, if it is not yet running.

Please install the software as described below:

1. The software can be installed directly from the installation CD-ROM. The CD-ROM contains a folder named INSTALL. This INSTALL folder contains a SETUP program. Please start this SETUP program to install the software.

2. The installation program displays a dialog box and suggests to install the software in the C:\"FILENAME" directory on the hard disk.
   You may accept this suggestion with **OK** or [**ENTER**], or you may change the path as desired.

3. During the installation process a new program group for the software will be created in the Windows Program Manager. In the corresponding program group an icon for starting the software will also be created automatically. When installation is successfully completed the installation program displays a "Setup OK" dialog box .

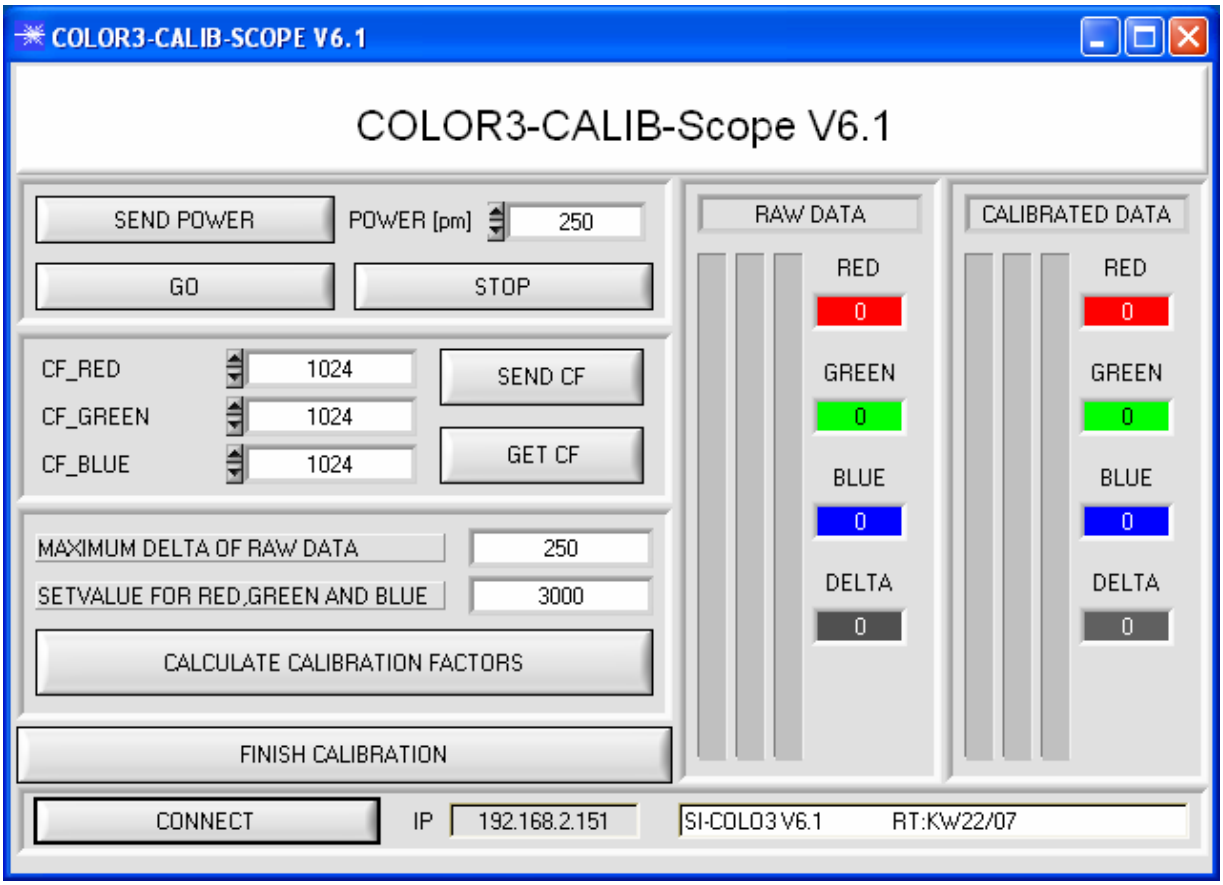
4. After successful installation the software can be started by double-clicking on the icon with the left mouse button.

2 Operation of the COLOR3-CALIB-Scope Software

Please read this chapter first before you start to calibrate the SI-COLO3 color sensor.

Info: Clicking on an individual element with the right mouse button displays a short help on the respective element.

When the COLOR3-CALIB-Scope software is started the following window appears on the Windows user interface:



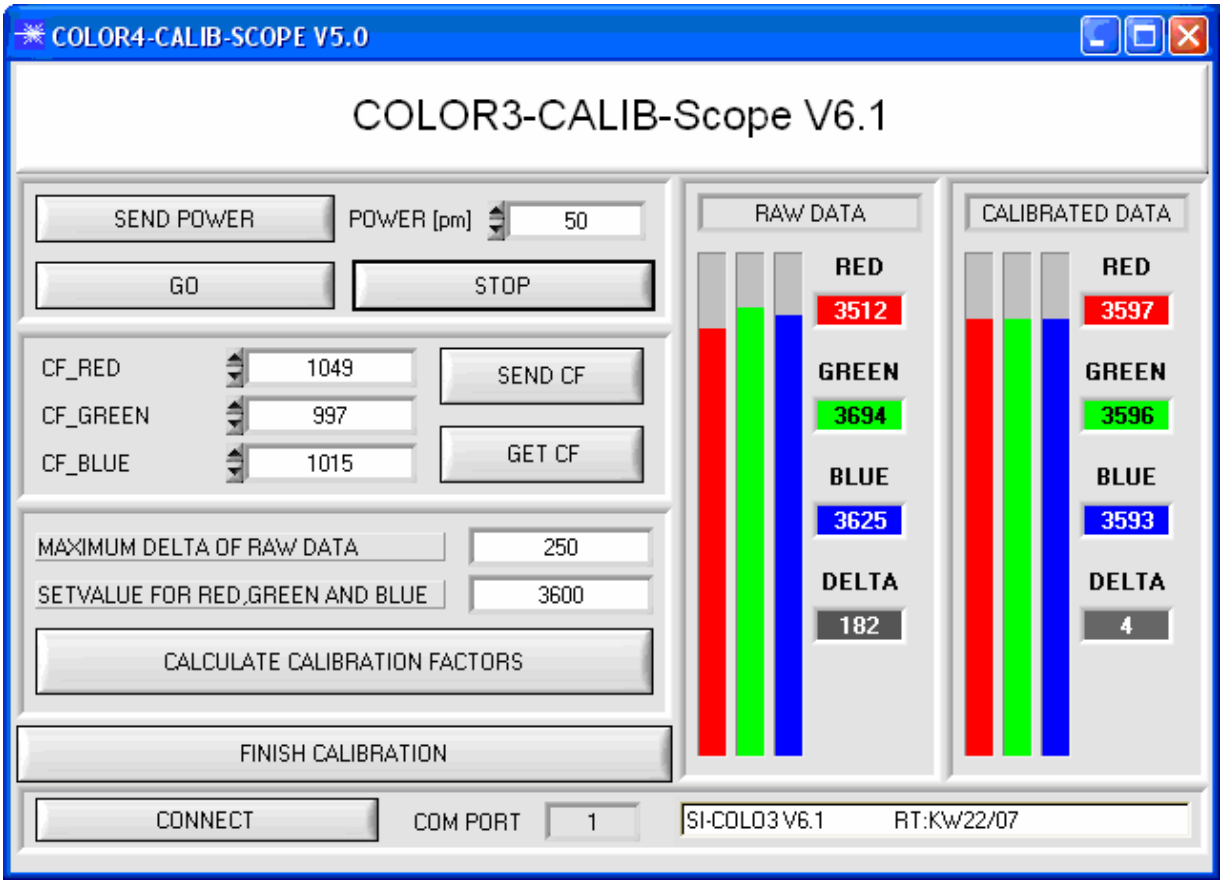
Will you please make sure that the status line "SI-COLO3 …" appears. This guarantees that the sensor is connected to the PC interface.
(Standard software for SI-COLO3 color sensors → please cf. manual COLOR3-Scope V6.1)

2.1 Calculation example for determining the calibration factors

In the example in the picture below, PMOD = STAT has been selected, i.e. a suitable POWER value at which the three bars of the raw signals are in the dynamic range has been set. Each of the three bars is at approx. 3000 digits. It is thus appropriate to set a setpoint value of 3000 (see SETVALUE) for the three bars. When calibration is now started by pressing CALCULATE CALIBRATION FACTORS, the software automatically calculates the calibration factors for channel RED, channel GREEN, and channel BLUE. The calibration factors are normalized as integers to the value 1024.

Formula:

CF_RED = (SETVALUE / RAW DATA RED) * 1024 = (3600 / 3512) * 1024 = 1049
CF_GREEN = (SETVALUE / RAW DATA GREEN) * 1024 = (3600 / 3694) * 1024 = 997
CF_BLUE = (SETVALUE / RAW DATA BLUE) * 1024 = (3600 / 3625) * 1024 = 1015



When the calibration factors have been calculated by the software on the user interface, they are automatically saved to the non-volatile EEPROM memory of the sensor. Calibration is then finished, and work with the COLOR3-Scope software can be continued.

When the sensor detects a raw signal, it applies the calibration factor saved in the EEPROM to this raw signal according to the following formula:

CALIBRATED RED = (RAW DATA RED * CF_RED) / 1024 = (3512 * 1049) / 1024 = 3597
CALIBRATED GREEN = (RAW DATA GREEN * CF_GREEN) / 1024 = (3694 * 997) / 1024 = 3596
CALIBRATED BLUE = (RAW DATA BLUE * CF_BLUE) / 1024 = (3625 * 1015) / 1024 = 3593

This means that only the calibrated data for the channels RED, GREEN, and BLUE are displayed in the COLOR3-Scope software. Evaluation by the micro-controller also is exclusively done with the calibrated data.

2.2 Calibration

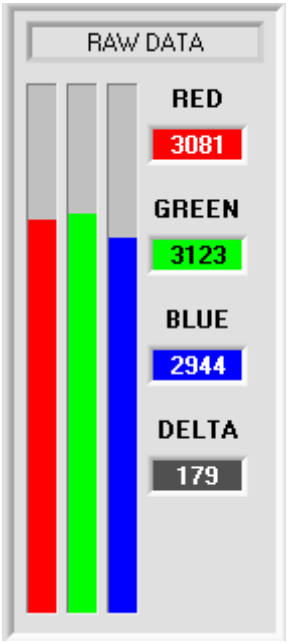
This chapter describes the individual steps for calibrating the SI-COLO3 color sensor:

INFO: The individual pop-up windows are intended as a help to guide you through the calibration process.

ATTENTION: It is a prerequisite for successful calibration that the sensor front-end is calibrated to a white surface.

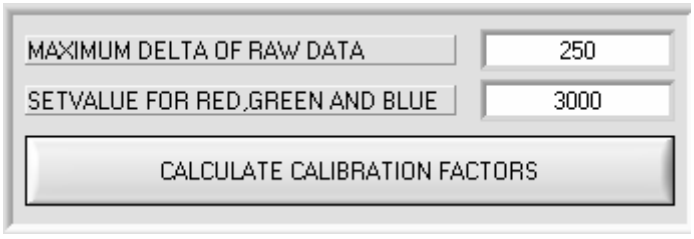
Step 1:

Click on START CALIBRATION.
The software automatically establishes a connection to the sensor and starts to record raw data from the sensor front-end. These raw data are visualized under RAW DATA.
Set the value for POWER [pm] such that all three bars are in the dynamic range, i.e. each of the three bars should lie between 3000 and 4000 digits.
Attention: A change of the POWER value only becomes effective when SEND POWER is pressed again.
Data exchange can be started and stopped with the GO und STOP buttons.



Step 2:

When you have set a suitable POWER value, determine a SETVALUE FOR RED, GREEN, AND BLUE. The software now calculates the calibration factors in such a way that this SETVALUE is reached for the raw data (see calculation example on page 4).

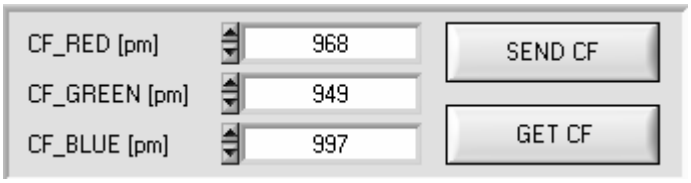


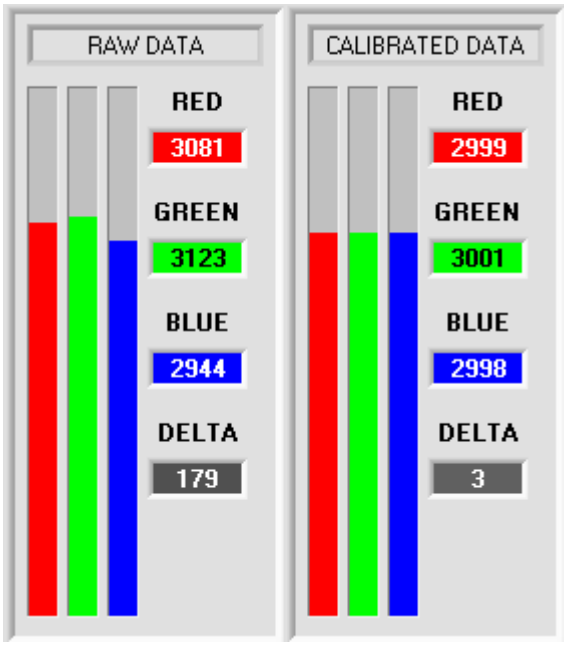
Step 3:

Determine a MAXIMUM DELTA OF RAW DATA (the software suggests 250).
Calibration is only permitted, if the current DELTA of the RAW DATA is smaller than the MAXIMUM DELTA OF RAW DATA.
DELTA is the maximum of RED, GREEN, and BLUE, minus the minimum of RED, GREEN, and BLUE. This is necessary in order to ensure that the sensor functions properly and calibration is performed on a white surface.

Step 4:

Start calibration by pressing CALCULATE CALIBRATION FACTORS.
The button starts to flash in RED, and at the same time 100 raw data are recorded through the interface, of which the respective mean value of RED, GREEN, and BLUE is formed.
The individual calibration factors are formed from these mean values and from the SETVALUES FOR RED, GREEN, and BLUE, and they are then entered in the corresponding edit-boxes.
The calibration software automatically saves the calculated calibration factors to the EEPROM of the sensor.
Then the software changes to the GO mode and displays the RAW DATA and the CALIBRATED DATA.
Please note that the DELTA of the CALIBRATED DATA is considerably lower than the DELTA of the RAW DATA, and that the values for RED, GREEN, and BLUE in the CALIBRATED DATA approximately are equal to the value of SETVALUE.

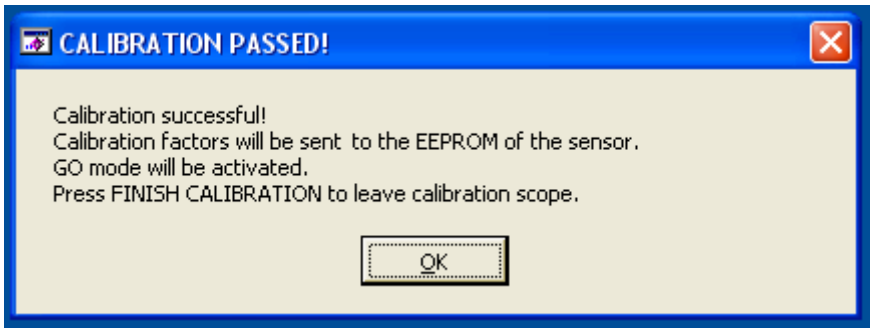




You may also change the calibration factors CF_RED, CF_GREEN, CF_BLUE manually by entering new values in the corresponding input fields. Please note that these factors are saved to the EEPROM by pressing SEND CF. GET CF reads the calibration factors that are currently saved in the EEPROM.

If pressing CALCULATE CALIBRATION FACTORS should not be successful, please follow the information provided in the pop-up windows.

Calibration only is completed successfully, if the following pop-up window is displayed:



Step 5:

Finish the calibration process by pressing FINISH CALIBRATION.
The calibration factors set under CF_RED, CF_GREEN, and CF_BLUE, and a standard parameter set, will be sent to the sensor.