# Manual
# Software SPECTRO3-MSM-CALIB-Scope V1.0

(PC software for Microsoft® Windows® 7, 8, 10)

## for color sensors of SPECTRO-3-MSM Series

This manual describes the installation of the PC software SPECTRO3-MSM-CALIB-Scope.

The software was developed for calibrating color sensors of the Spectro3 MSM DIG, Spectro3 MSM ANA, Spectro3 MSM SLE and Spectro3 MSM SLA series. Here, calibration takes place with a calibration wizard, which guides the user step by step through the calibration process via the corresponding instruction windows.

There are 3 preconditions

1. You need **one** reference card. This is one of the RAL 9003-P, RAL 9010-P or RAL 9016-P cards.
2. You need different RAL colors from the RAL CLASSIC or RAL DESIGN SYSTEM plus series. They are available from the supplier of the sensor.
3. You need a file in which the L*a*b* values for the various RAL cards are stored. This file is also available from the supplier.

The respective sensor parameters as well as the Teach table are only displayed in this software; they cannot be changed.

So also, the sensor data is visualised on the PC interface.

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**Shortcuts:**

| | |
|---|---|
| SEND | F9 |
| GET | F10 |
| GO | F11 |
| STOP | F12 |

# 1. Installation of the SPECTRO3-MSM-CALIB-Scope software

The following requirements must be fulfilled for successful installation of the software:

- Microsoft® Windows® 7, 8, 10
- IBM PC AT or compatible
- VGA graphics
- Microsoft-compatible mouse
- Serial RS232 interface at the PC or USB slot or RJ45 connector
- Cable ***cab-las4/PC*** for the RS232 interface or ***cab-4/USB*** USB converter or ***cab-4/ETH*** Ethernet converter

Please install the software as described below:

1. You can download the software via a provided download link or, if applicable, install it via the provided software DVD. To install the software, start the 'SETUP' program in the 'SOFTWARE' folder.

2. The installation program displays a dialog 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. Installation is then performed automatically.

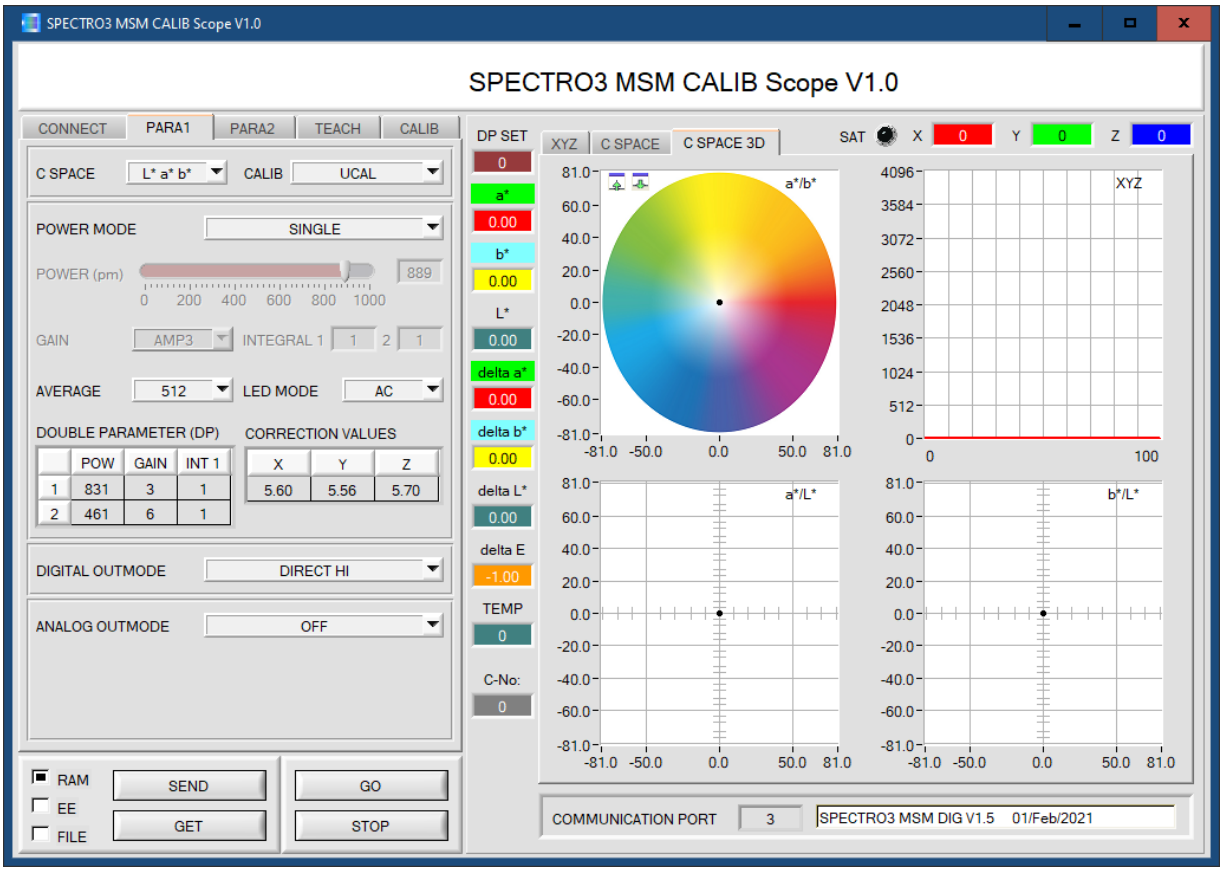
3. During the installation process a new program group for the software is created in the Windows Program Manager. In the program group an icon for starting the software is created automatically. When installation is successfully completed the installation program displays "Setup OK".

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

# 2. Operation of the SPECTRO3-MSM-CALIB-Scope software

**Please read this chapter first before you start to adjust and parameterise the SPECTRO-3-MSM-DIG color sensor.**

When the SPECTRO3-MSM-CALIB-Scope software is started, the following window appears on the Windows interface:




The window size and position will be the same as when the software was last closed. A double-click with the right mouse button e.g. under the minimise symbol places the window centrally in its original size.

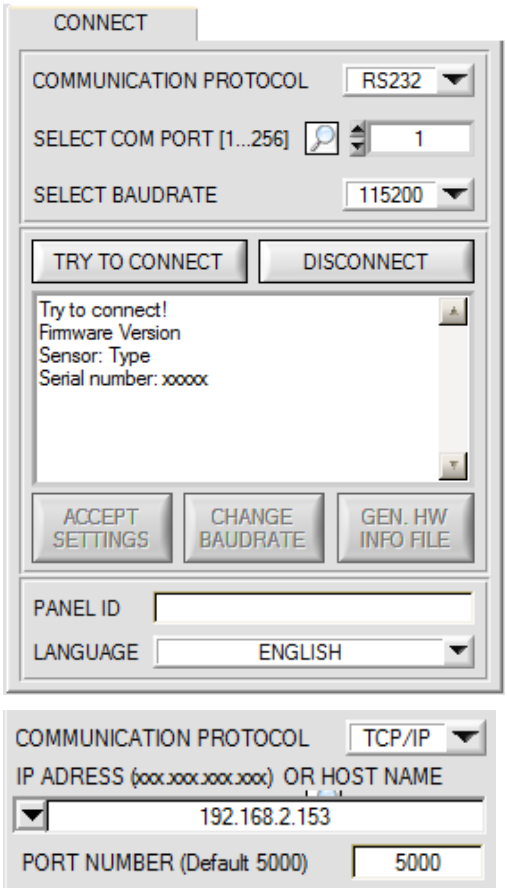
If a connection is not established automatically, e.g. if no sensor is connected, the software can be run in OFFLINE mode. In offline mode it only is possible to exchange parameters with a file on a storage medium, which often is helpful for the purpose of analysing parameter files.

If a sensor is connected and a connection still cannot be established, either the SCOPE version (program at the PC) and the firmware version (program in the sensor) do not match, or the interface to the sensor must be correctly configured.
If different Scope and firmware versions should be the problem, please get the Scope version that matches the firmware from your supplier.
The interface configuration is described in the CONNECT tab chapter.

**Pressing the right mouse button on an individual element will call up a short help text.**

**Due to a better overview, parameters that are not required, displays, graphs, etc., are greyed out or invisible depending on the parameterization.**

## 2.1 Tab CONNECT




**CONNECT:**
Pressing the **CONNECT** tab opens a window for selecting and configuring the interface.

The **COMMUNICATION PROTOCOL** function field is used for selecting either an **RS232** or a **TCP/IP** protocol.
If **RS232** is selected, a port from 1 to 256 can be selected with **SELECT COM PORT**, depending on which port the sensor is connected to. The sensor operates with a set baudrate that can be modified with **CHANGE BAUDRATE** (see below). The sensor and the user interface both must operate with the same baudrate. At the user interface the baudrate is set with **SELECT BAUDRATE**. If after starting the software should not automatically establish a connection, the correct baudrate can be found with **SELECT BAUDRATE**.
If an converter is used, the **COM PORT** number can be determined by way of the hardware manager in the system control panel.
A click on the magnifier symbol opens a list with all the possible COM ports in the display.

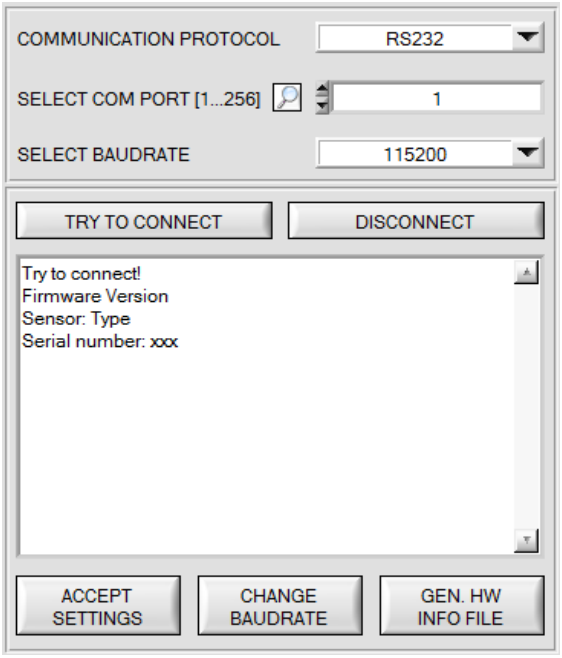
An RS232 to Ethernet converter **(cab-4/ETH)** is needed if the sensor should communicate through a local network. With this converter a connection to the sensor can be established using the **TCP/IP** protocol.
Parameterisation of the **cab-4/ETH** converter (assigning of IP address, baudrate setting, ...) can be done with the **SensorFinder software** that is available free of charge on the internet.

In order to establish a connection to the converter, its IP address or HOST name must be entered in the field **IP ADDRESS (xxx.xxx.xxx.xxx) OR HOST NAME**. The DROP DOWN menu (down arrow) shows the last 10 IP addresses that were used. An address from this list can be directly selected by clicking on the respective item. The DROP DOWN list is saved and is thus always available when the software is closed.
The **PORT NUMBER** for the **cab-4/ETH** is 5000. This port number must not be changed.
When you press the **TRY TO CONNECT** button, the software tries to establish a connection with the set parameters. The communication status is shown in the display field. If the sensor answers with its FIRMWARE ID, the set connection type can be accepted by pressing **ACCEPT SETTINGS**. You will then be returned to the **PARA** tab. If you get a **TIMEOUT** message, the software could not establish a connection to the sensor. In this case please check if the interface cable is correctly connected, if the sensor is supplied with power, and if the set parameters are correct.
If a connection has been accepted by pressing **ACCEPT SETTINGS**, the software starts automatically with these settings when called the next time.

**DISCONNECT** disconnects the connection between sensor and PC. The software then switches to OFFLINE mode, where it is only possible to exchange parameters with a file on a storage medium.

Under **PANEL ID** a name can be entered that will be displayed at different points in the program window, and that will be recorded in different files (e.g. Record File) as well. With the input field **LANGUAGE** a language can be set with which the individual controls are displayed on the surface. This also applies to the help function that is actuated with the right mouse button.

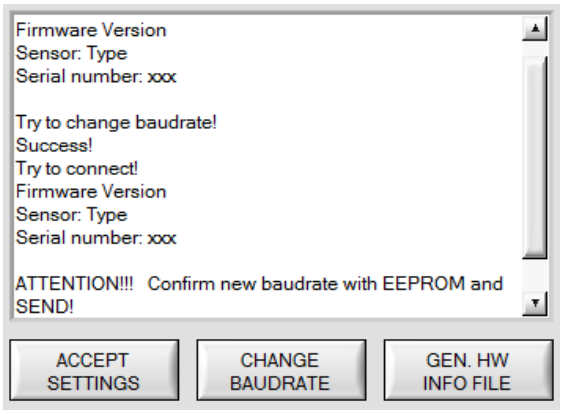
| | |
|---|---|
| **Please note:**<br>  <br>**ATTENTION !** | **The stable function of the interface is a basic prerequisite for measured value transfer from the PC to the sensor.**<br>**Due to the limited data transfer rate through the serial RS232 interface only slow changes of the raw signals at the sensor front end can be observed in the graphic output window of the PC.**<br>**For maintaining maximum switching frequency at the sensor data communication with the PC must be stopped (press the STOP button).** |




The baudrate for data transfer through the RS232 interface can be set by means of the **SELECT BAUDRATE** drop down menu and **CHANGE BAUDRATE** function field.

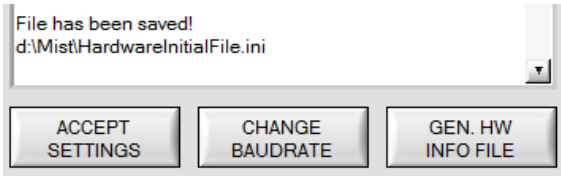
If the baudrate should be changed, a connection must first be established by clicking on **TRY TO CONNECT**.
The **CHANGE BAUDRATE** button will then be active.


Now a new baudrate can be selected under **SELECT BAUDRATE**.
A click on **CHANGE BAUDRATE** sends the new baudrate information to the sensor.



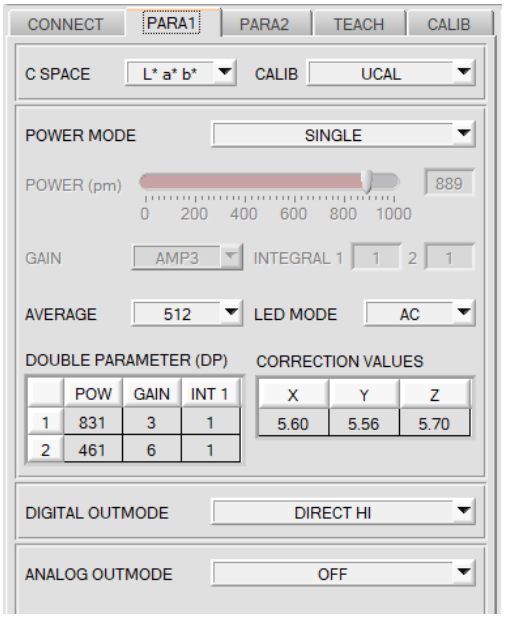

When the new baudrate information has been successfully sent, the sensor operates with the new baudrate. A window will pop up, prompting you to select **EEPROM** and then to press **SEND**. After a hardware reset the new baudrate only will be used when **EEPROM** and **SEND** have been pressed.

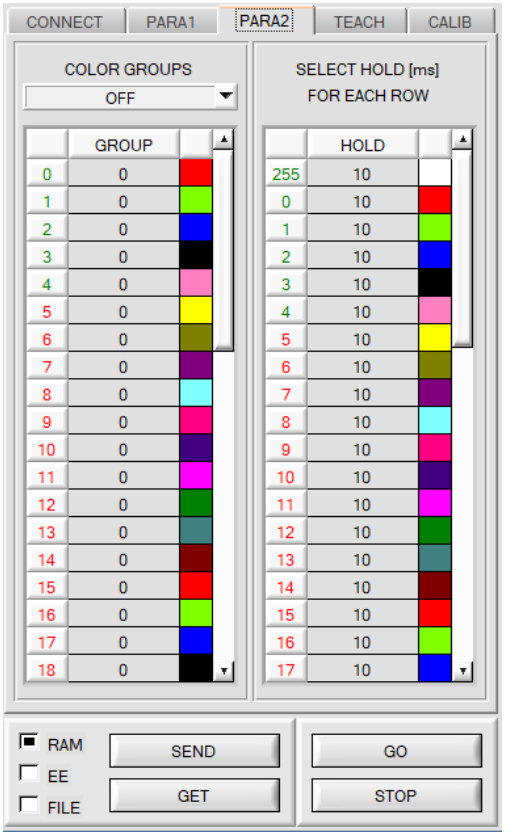
A click on **ACCEPT SETTINGS** saves the current interface settings, which will then be automatically set when the software is restarted.




A click on the **GEN. HW INFO FILE** generates a file in which all the important sensor data are stored in encrypted form. This file can be sent to the manufacturer for diagnostic purposes.

## 2.2 Tab PARA1, PARA2, button SEND, GET, GO, STOP




**PARA1 and PARA2:**
Upon clicking **PARA1** or **PARA2**, there opens a view in which the sensor parameters are displayed.
They are only displayed and cannot be edited.
The meanings of the parameters are explained in the manual of the respective connected sensor.
A right-click on a parameter opens a window with brief information.

**SEND [F9]:**
Clicking the **SEND** button (or the shortcut key F9) saves all the currently displayed parameters in a file.

**GET [F10]:**
The currently set values can be interrogated from the sensor by clicking on the **GET** button (or with shortcut key button F10). The source of data exchange is determined by the selected button (**RAM**, **EEPROM**, or **FILE**).

**RAM:**
The current parameters are read from the **RAM** of the sensor on pressing **GET**.

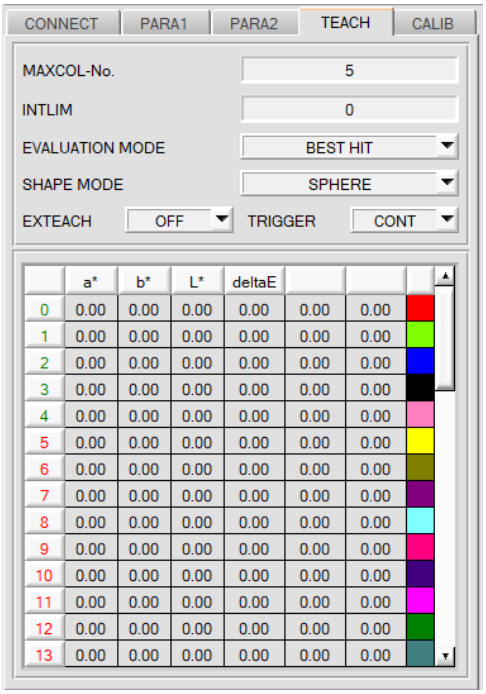
**EEPROM:**
The current parameters are read from its **EEPROM** upon pressing **GET**.

**FILE:**
After pressing **SEND**, the current parameters can be written to a selectable file on the hard disk. With **GET** parameters can be read from such a file. When the **SEND** or **GET** button is pressed, a dialog box opens for selecting the desired file.

**GO [F11]:**
Upon clicking this button, the data transfer from the sensor to the PC is started. The data are displayed in the display elements on the PC interface.

**STOP [F12]:**
Clicking this button ends the data transfer from the sensor to the PC.

## 2.3 Tab TEACH

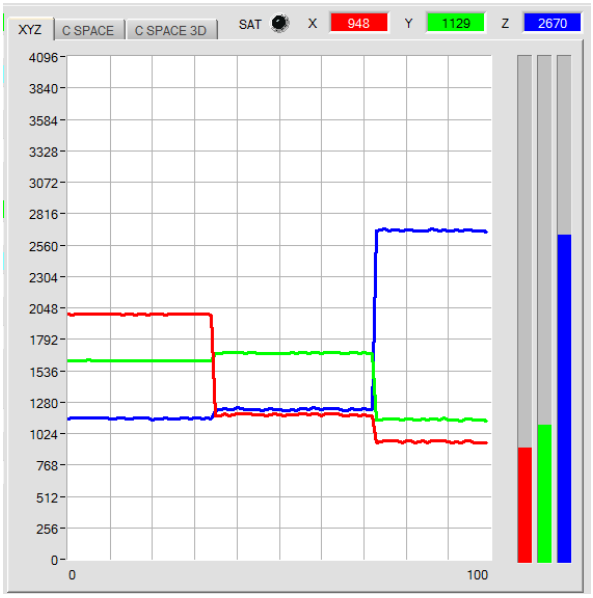



**TEACH:**
Clicking **TEACH** opens a view in which the **TEACH TABLE** and some parameters required for operation of the digital outputs are displayed.
The table and the parameters are only displayed and cannot be edited.
The meanings of the parameters are explained in the manual of the respective connected sensor.
A right-click on a parameter opens a window with brief information.

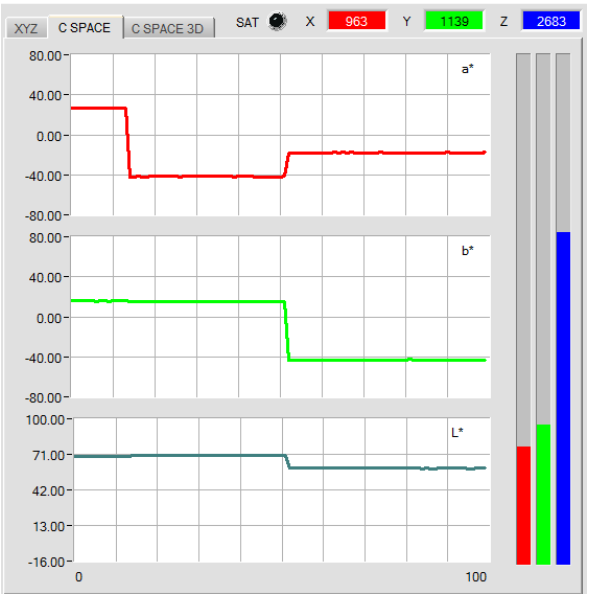
The **TEACH TABLE** is organised in rows, i.e. the individual parameters for the teach colors are listed side by side in the respective row.
The sensor can work with up to 48 teach colors. The number of the respective teach color is shown in the left column of the table.
Only rows with a green number are used for evaluation by the sensor. The number of rows to be used is defined with **MAXCOL-No.**

## 2.4 Graphical display elements

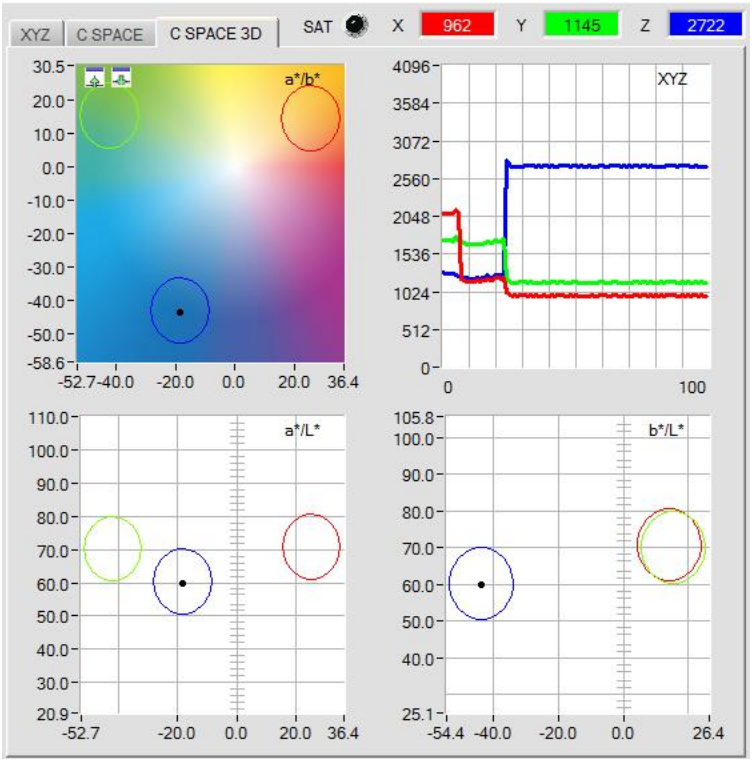
Tab **XYZ:**
Display of the current raw signals (tristimulus values) **X, Y, Z** of the 3-fold receiver.
The LED **SAT** indicates if one of the channels is in saturation. In this case, it lights up red.




Tab **C SPACE:**
Line graph display of the color coordinates of the color space selected under **C SPACE**.



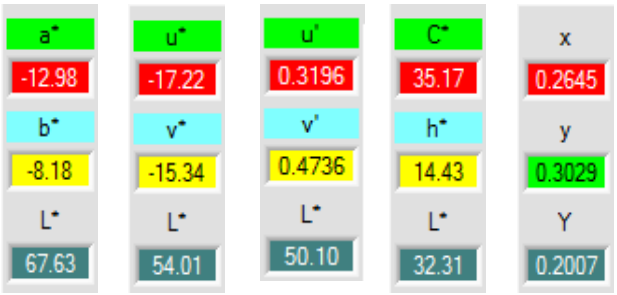

Tab **C SPACE 3D:**
Three-side view of the taught color in space.
The taught color space coordinates with their tolerances and the current color position are displayed. A three-side view in space was chosen to provide a clearer representation.



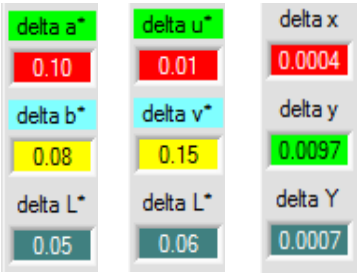

A left double-click in one of the graphs causes all the circles to be displayed in grey, only the circle with the recognised color is displayed in color.
A single left click returns to the standard view.

A left double-click in the XYZ graph starts an automatic zoom function.
A single left click closes this zoom function again

The graph with the color chart in the background can be zoomed in and out.




These numerical value displays show the color coordinates and brightness values that are calculated from the tristimulus values **X, Y, Z**.
Calculation is performed as described in **C SPACE.**



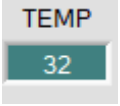

These numeric value displays show the deviations of the individual color coordinates and of the brightness value of the current surface from the "color hit" (C-No:) in the **TEACH TABLE**.
The values are calculated on the PC user interface and not in the sensor, and are only shown in these displays.


**delta E:**
The color deviation from the color hit is shown in this display.


**C-No:**
The currently detected color number according to the entry in the **TEACH TABLE** is displayed in this numeric output field. The current detected color number is applied to the digital outputs as the corresponding bit pattern.
A value of 255 means that none of the colors that have been learned has been detected.


**GRP:**
If there is a sensor connected, with which it is possible to form color groups, the detected color group is shown in this display.
The currently detected group **GRP** and not **C-No:** is applied at the digital outputs as the corresponding bit pattern.
A value of 255 means that none of the groups or colors that have been learned has been detected.


**IN0:**
This LED display visualises the status of input IN0.
If 0 V is applied at the input, the LED is black.
If 24 V is applied at the input, the LED is green.
This display only is visible if the input is used.




**TEMP:**
This display shows the temperature in the sensor housing.
The display does **NOT** show degrees Celsius or Fahrenheit.


**DP SET:**
With which **DOUBLE PARAMETER SET** the sensor is working currently is shown in this display.

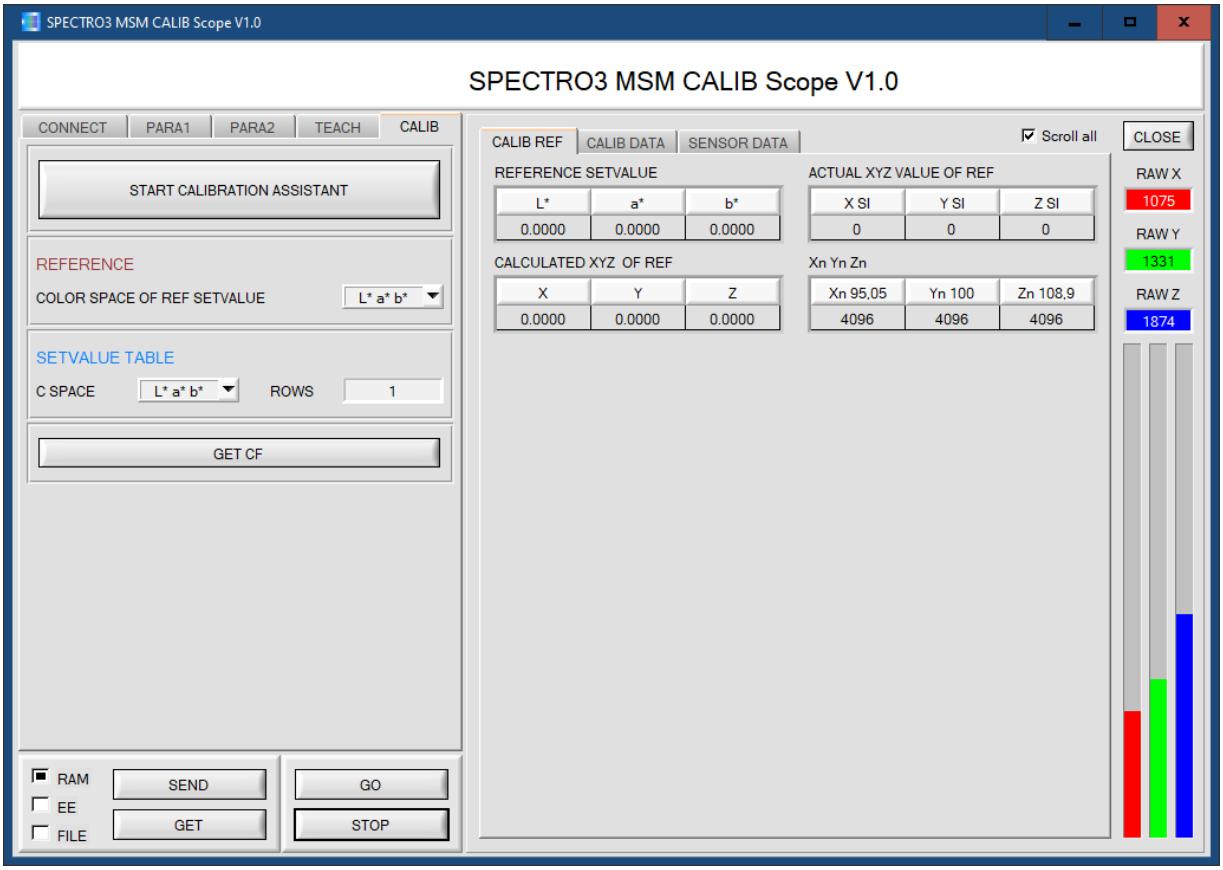
| | |
|---|---|
| **Please note:** | **The above-mentioned output fields are only updated when data transfer between PC and sensor is active (GO button pressed).** |

## 2.5 Tab CALIB

The sensors are factory calibrated. If the **CALIB** parameter is set to **FCAL (F**actory **CAL**ibration), the sensor operates with this factory calibration.

As an alternative the user can himself calibrate the sensor to different surfaces (**U**ser **CAL**ibration).
If **CALIB=UCAL** is selected, the sensor operates with the calibration made by the user.

A click on **CALIB** will open the following window:




With **START CALIBRATION ASSISTANT** you can start an assistant that guides you through the calibration. The following three conditions must be met:

1. You need **one** reference card. This is either the card RAL 9003-P, RAL 9010-P, or RAL 9016-P.
2. You need different RAL colors RAL from the *RAL CLASSIC* or *RAL DESIGN SYSTEM plus* series. These are available from the sensor supplier.
3. You need a file in which the L*a*b* values for the different RAL cards are stored. This file is also available from the supplier.

Upon pressing **GET CF,** the calibration factors that have been determined are displayed in the tab **SENSOR DATA**.

The individual tables, displays and display boxes for calculating the calibration factors are updated automatically during the calibration process. They cannot be changed and need not be paid any further attention.