# Short instructions for the operation of color sensors of the SI-COLO3 series through software SI-COLO3-Scope V6.4

These instructions describe how to perform quick teaching of the color sensors of SI-COLO3 series with the **SI-COLO3-Scope V6.4** software interface.

Basically there are 2 methods of teaching a color. These methods can be set with **CALCULATION MODE**.
The **CALCULATION MODE = X/Y/INT (or s/i/M)** uses a color sphere in space with radius TOL.
Contrary to this, the **CALCULATION MODE = X/Y INT (or s/i M)** uses a color cylinder in space with radius CTO or siTO and with height ITO or M.

The teach process is the same for both methods.
Color evaluation according to **s/i M** uses the **Lab calculation method**.
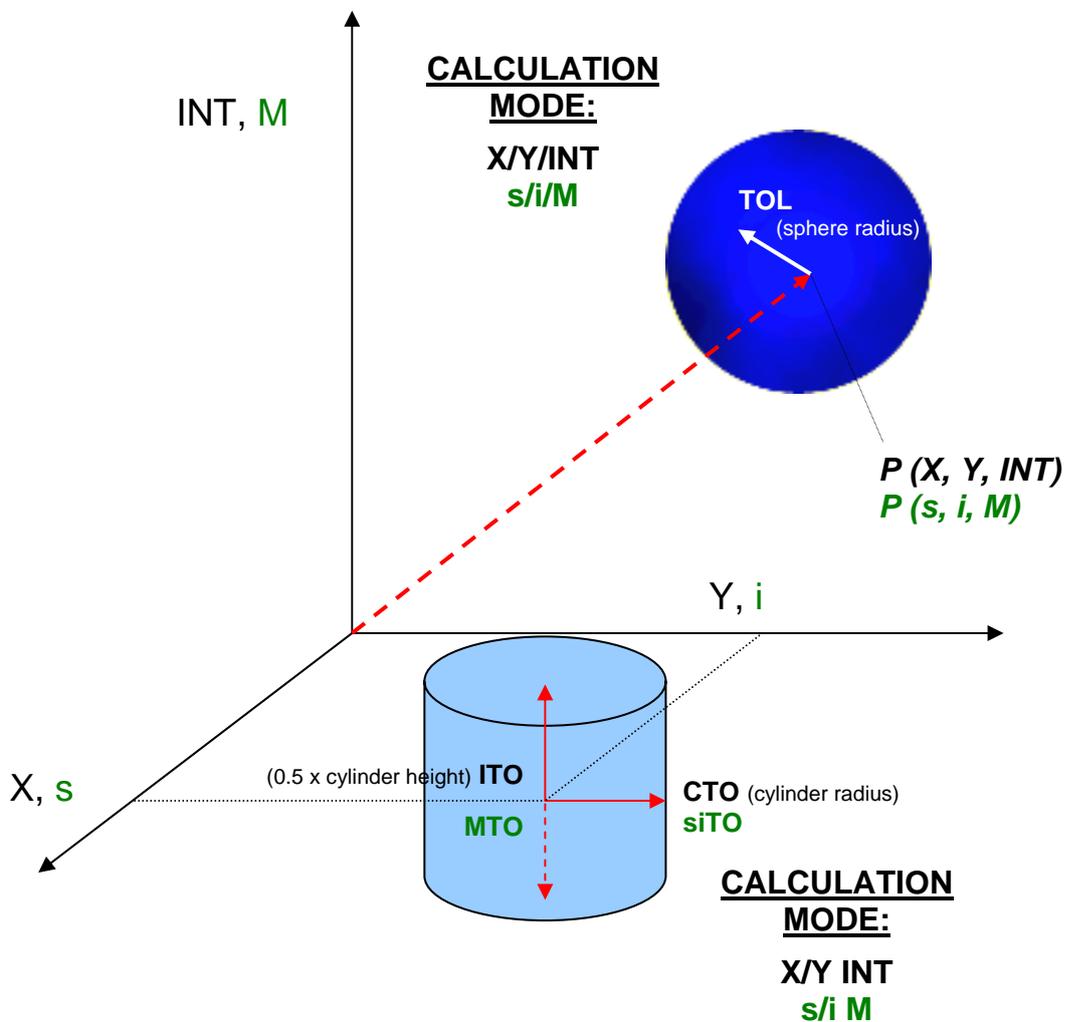
The text below describes a teach process with **EVALUATION MODE = BEST HIT** and **CALCULATION MODE = X/Y/INT**.

Step 1:
Prior to the use of the software aids (graphic display of sensor signals) the sensor must be manually adjusted to the respective target or background as accurately as possible. The reference distance of the sensor to the target is defined in the data sheet of the respective sensor.
Please make sure that the sensor is properly connected and supplied with power. Furthermore the sensor head must be directed onto the brightest surface (paper, leather, glass, etc.) of the color to be taught. This is absolutely necessary for being able to set a suitable **POWER** value for the sensor.

Step 2:
Start the SI-COLO3-Scope V6.4 software. Please check whether the status line at the right bottom displays the „SI-COLO3 V6.4   RT:KW*xx/xx* " message.
Info: Moving the mouse cursor to a control element and clicking with the right mouse button displays a short info on the respective individual control element.
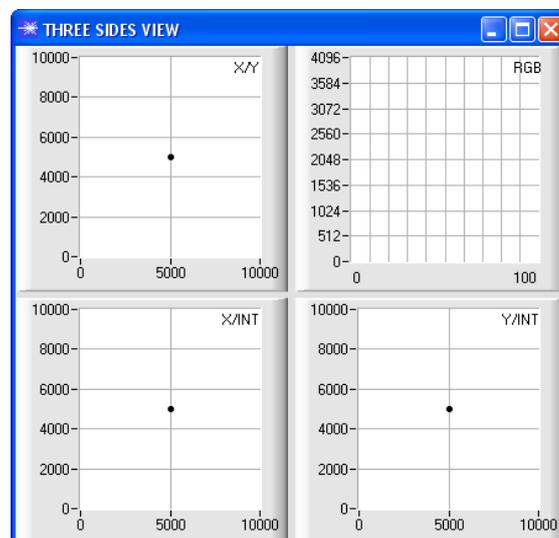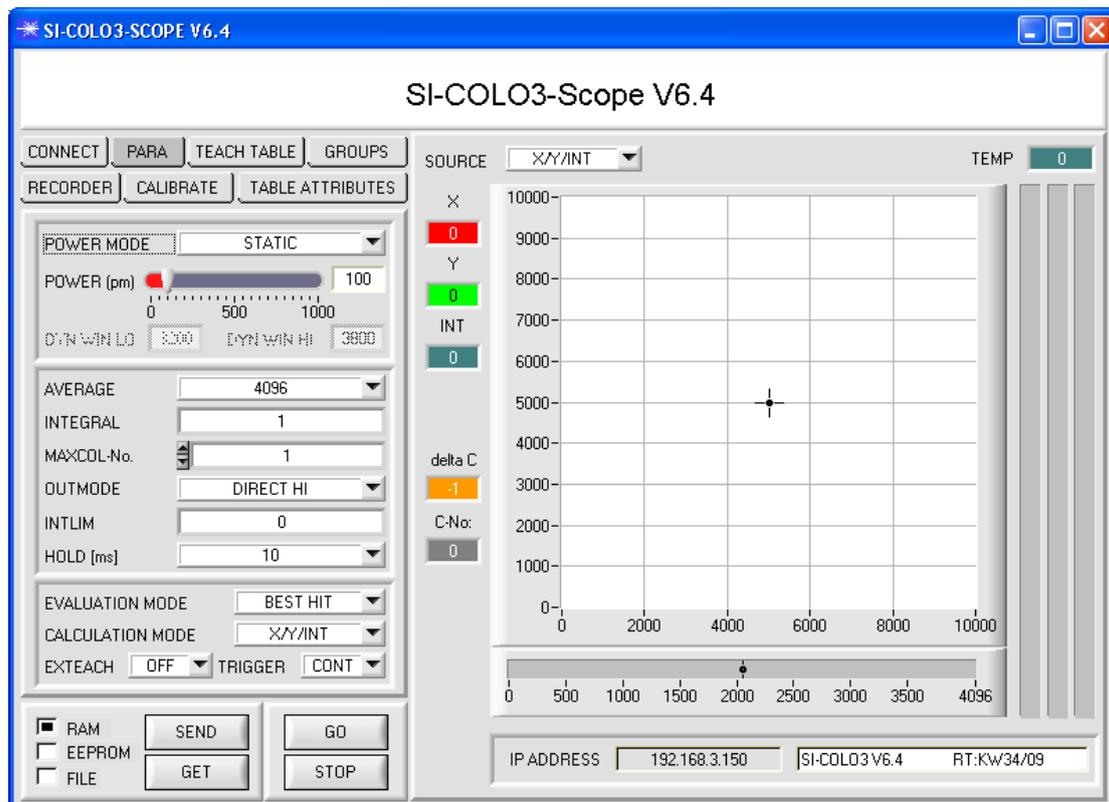
Step 3:
Please make sure that for the time being **RAM** and not **EEPROM** is selected for the data exchange with the sensor (RAM is a volatile memory in the sensor, i.e. the data will be lost when power is turned off. EEPROM is a non-volatile memory in the sensor, i.e. the data will not be lost when power is turned off.)
All the other parameters should be set as shown in the picture below. Press the tab **PARA** to show the parameters. (See the FILE function in the operating instructions.)
Now press the **GO** button. Data exchange between sensor and PC will then start. The contents for **RED, GREEN,** and **BLUE** that are diffusely reflected from the surface are represented as bars on the software interface. Set the POWER value in such a way that at least one of the three bars is in the upper third of its dynamic range, but none of them is in saturation.

ATTENTION: The sensor must be informed when you have changed the **POWER** value. Press the **SEND** button to send this information to the sensor. Check the bars by pressing **GO** again. Repeat this process until you have a suitable **POWER** value.
Optimally the three bars **RED**, **GREEN**, and **BLUE** should be at approximately the same level on white paper.
If the bars vary too much, you need to perform white light balancing.
(For white light balancing see the "SI-COLO3-Scope" operating instructions on the supplied CD.)

Tip! There is a trick for finding a suitable **POWER** value in no time at all. Set **POWER MODE = DYNAMIC**. The sensor then tries to find a suitable power value. Check this by pressing **GO**. Press **STOP** when the bars have "levelled out". Then press **GET**. The power value that was found now is shown in the **POWER** function field. Now set **POWER MODE = STATIC**, and press **SEND**.
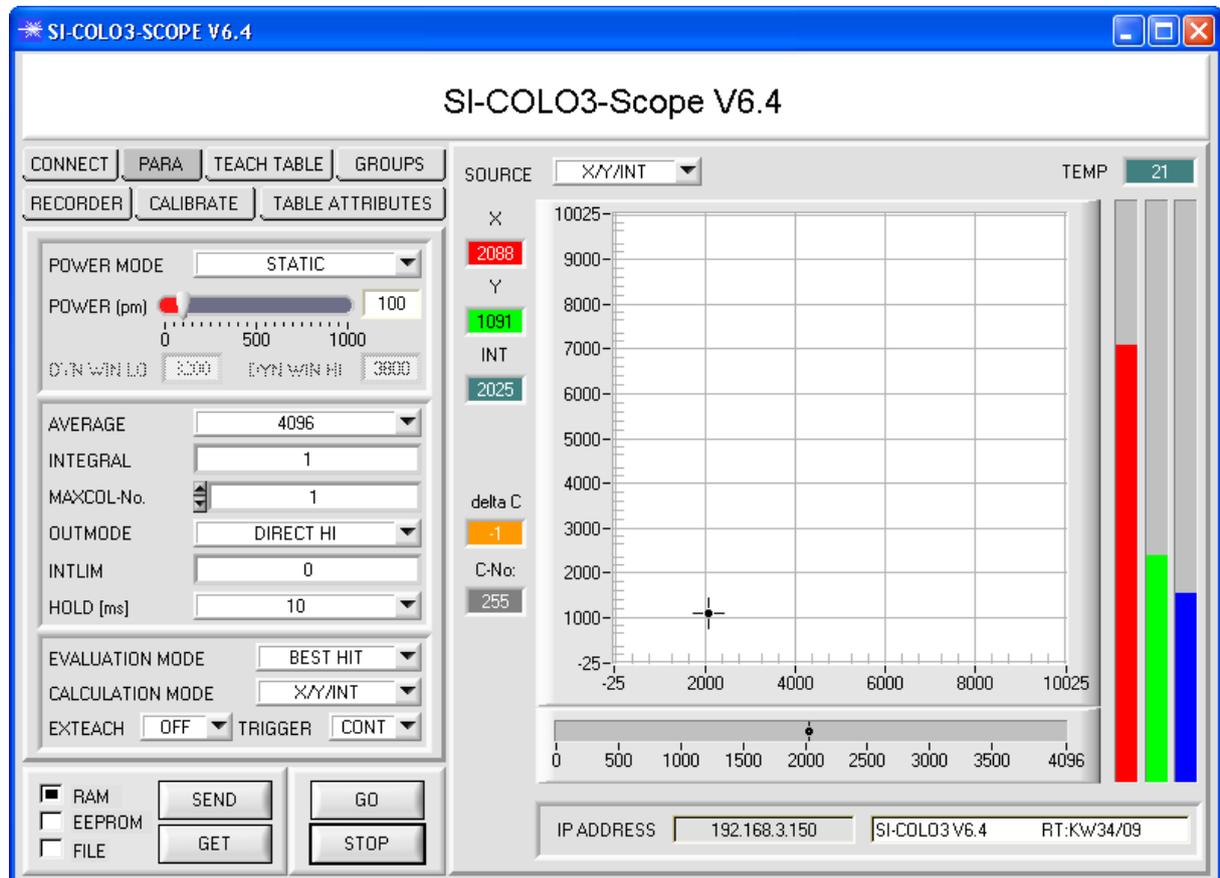
Step 4:
An **X** and a **Y** coordinate as well as an intensity **INT** are calculated from the **RED, GREEN,** and **BLUE** data.
$X = (R*4095) / (R+G+B)$
$Y = (G*4095) / (R+G+B)$
$INT = (R+G+B) / 3$

Press the **GO** button once again to read out the current data.
Press **STOP** to stop the data exchange.
Now use the tab **TEACH TABLE** to switch to the TEACH TABLE.
Select a row under **No.:** to which the currently present color should be taught.
(ATTENTION: Only the rows marked with green numbers are evaluated by the sensor. If you want to teach more colors, use the **MAXCOL-No.** parameter to select how many colors you want to teach.)
Now press the **TEACH DATA TO** button. The calculated values for X, Y, and INT are transferred to the TEACH TABLE in the row that was selected under **No.:**.
The graphic display then shows a circle. This is the tolerance circle for the color. The radius of this circle can be set under **TOL** (tolerance). To change the TOL value, please double-click on the corresponding cell in the TEACH TABLE with the left mouse button. In the small graph the current intensity INT with the tolerance window set under No.: is displayed in turquoise.
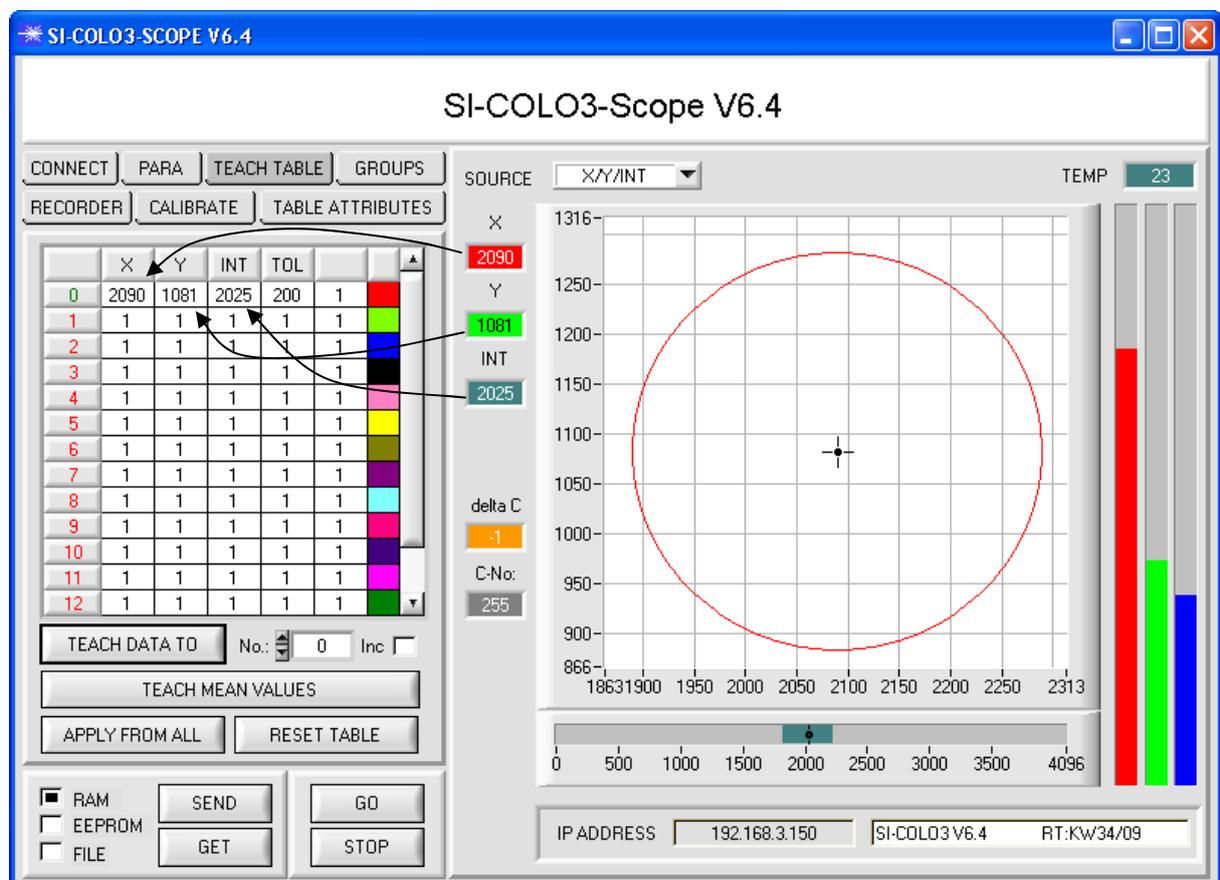
Now press the **SEND** button again to inform the sensor about the taught color. Then activate the **GO** mode again. When the sensor recognises a row vector (color), the corresponding row number is visualised on the software interface under **C-No:**. A value of 255 means that none of the taught colors were recognised.

As you know the **X/Y/INT** mode uses a color sphere in space. To provide a better visual representation of this sphere, an additional panel is displayed here that shows the color sphere in a three-side view with the axes X/Y, X/INT, and Y/INT (see below).
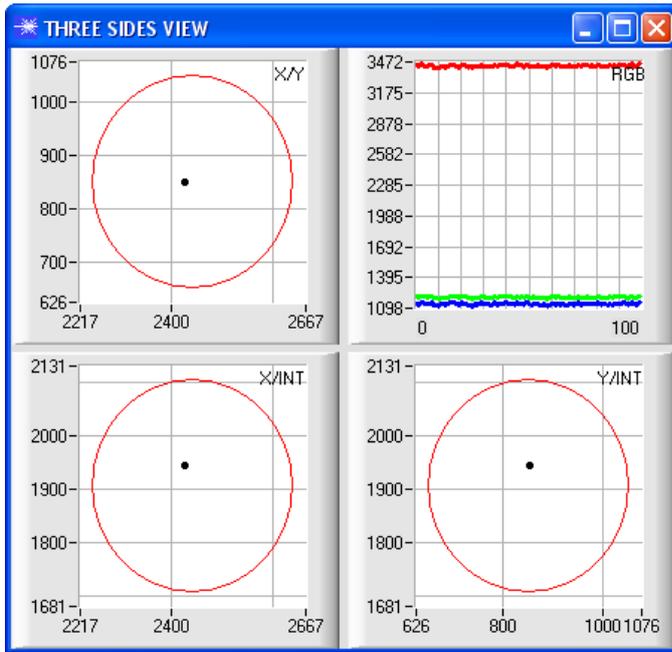
A color is only recognised if its current coordinates lie in the tolerance circle.

C-No:
0

Step 5:
For teaching additional colors please make sure that the sensor head is directed onto the respective color.
Then repeat the procedure starting from step 4.

Step 6:
When you have taught all the channels, please select **EEPROM** and press **SEND** to save the data to the non-volatile memory of the sensor.

For the meaning and handling of the remaining parameters please refer to the manual.