# SPECTRO2-Scope:
# Changes after Software Update
# from SPECTRO2-Scope V1.6 to V1.7

This manual summarises the changes that were made with the software update from **SPECTRO2 V1.6** to **V1.7**.

A software update from V1.x to V1.7 can be performed quite easily.
All you need is the FirmwareLoader V1.1 and the firmware files for version V1.7.
The FirmwareLoader V1.1 can be found on the software CD that is provided with the sensor or can be downloaded from our homepage.
The firmware files are available from your sensor supplier.
The respective procedure is exactly described in the **"Manual FirmwareLoader V1_1"** file.

## Change 1:
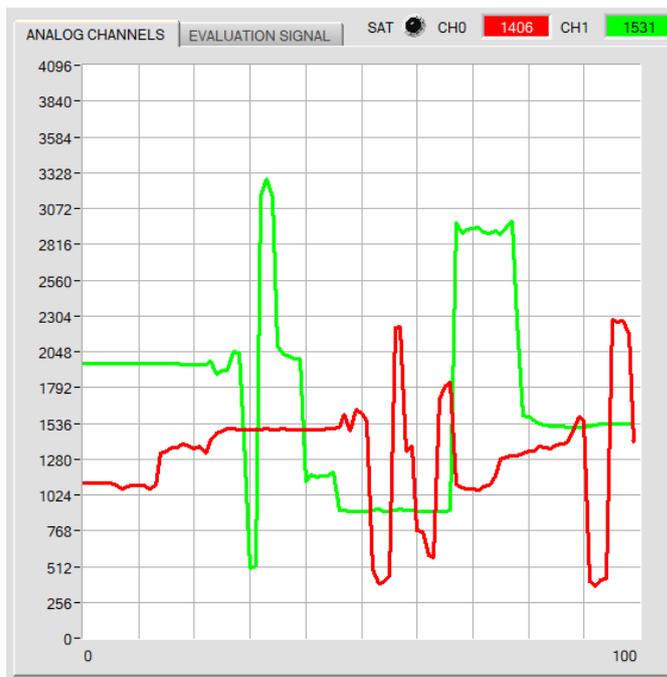


The newly added LED **SAT** indicates if one of the channels CH0 or CH1 is in saturation.
If this is the case, it lights up red.
This is very helpful when e.g. working with LED MODE = AC.
In AC mode, the light source is switched on and off to compensate for the ambient light (extraneous light). The signal SIG is the difference (Delta) between the activated light source and the deactivated light source.
For example, with an offset of 500 digits with a deactivated light source and a value of 4095 with an activated light source, this produces a delta of 4095-500 = 3595. One could think that SIG 3595 is a digit. In reality, the channel is overmodulated with an activated light source. If the ambient light were now to increase, we would see that SIG is even smaller.
The same applies with ALTERNATING modes which can be selected under POWER SOURCE.
It is necessary to ensure that the sensor is parametrized in such a way that the saturation LED SAT is off.
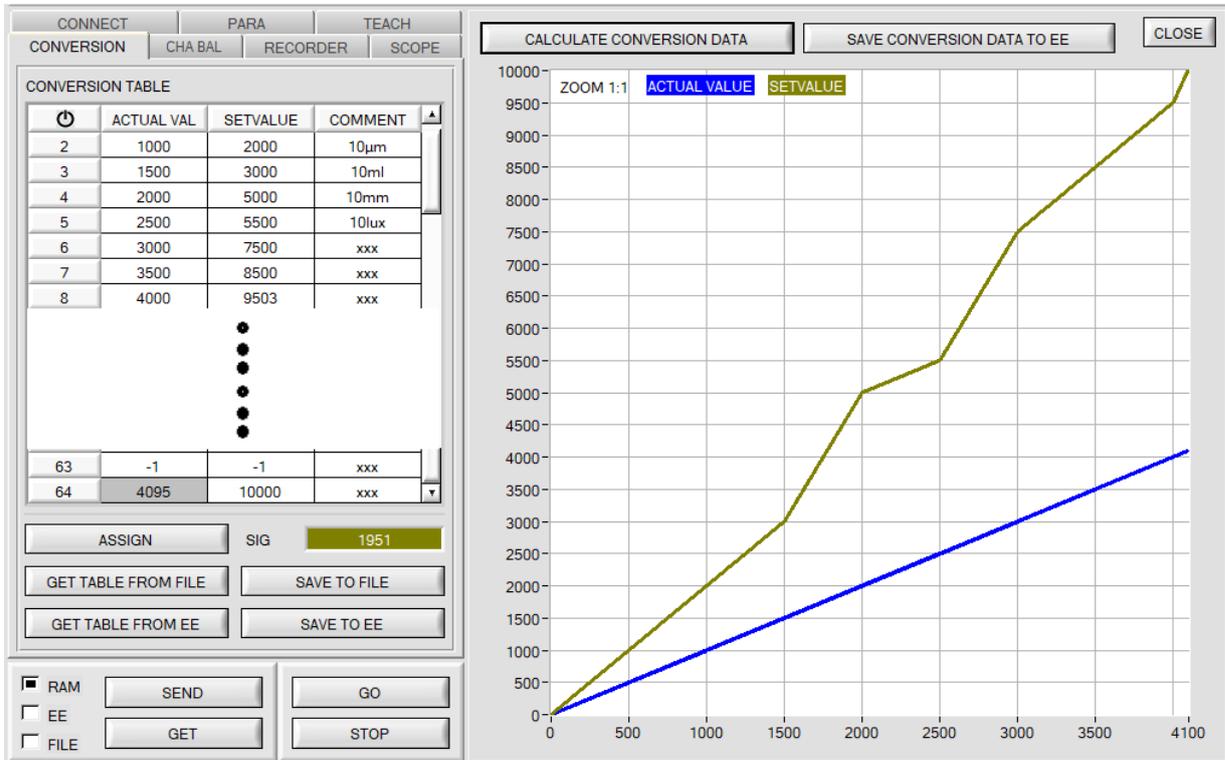
## Change 2:

In the **CONVERSION TABLE** on the tab **CONVERSION**, the **COMMENT** column has been added.
An individual comment for every line can be entered in the COMMENT column.
A physical dimension or a description can be assigned to a certain output value.
The comment is stored in a file on the PC via **SAVE TO FILE** and the sensor EEPROM with **SAVE TO EE**. Memory space issues mean that only the first 8 characters are entered in EEPROM from the respective comment line.

## Change 3:

With the sensors of the SPECTRO-2 series a channel balancing can be performed. The balancing can be performed on any surface.

Channel balancing makes sense given multiple sensors which are to be taught.

If so, the same switching threshold, tolerance and hysteresis can be set for all sensors. This creates an identical starting point for multiple sensors and various applications.

After pressing **CHA BAL** the following window is displayed:
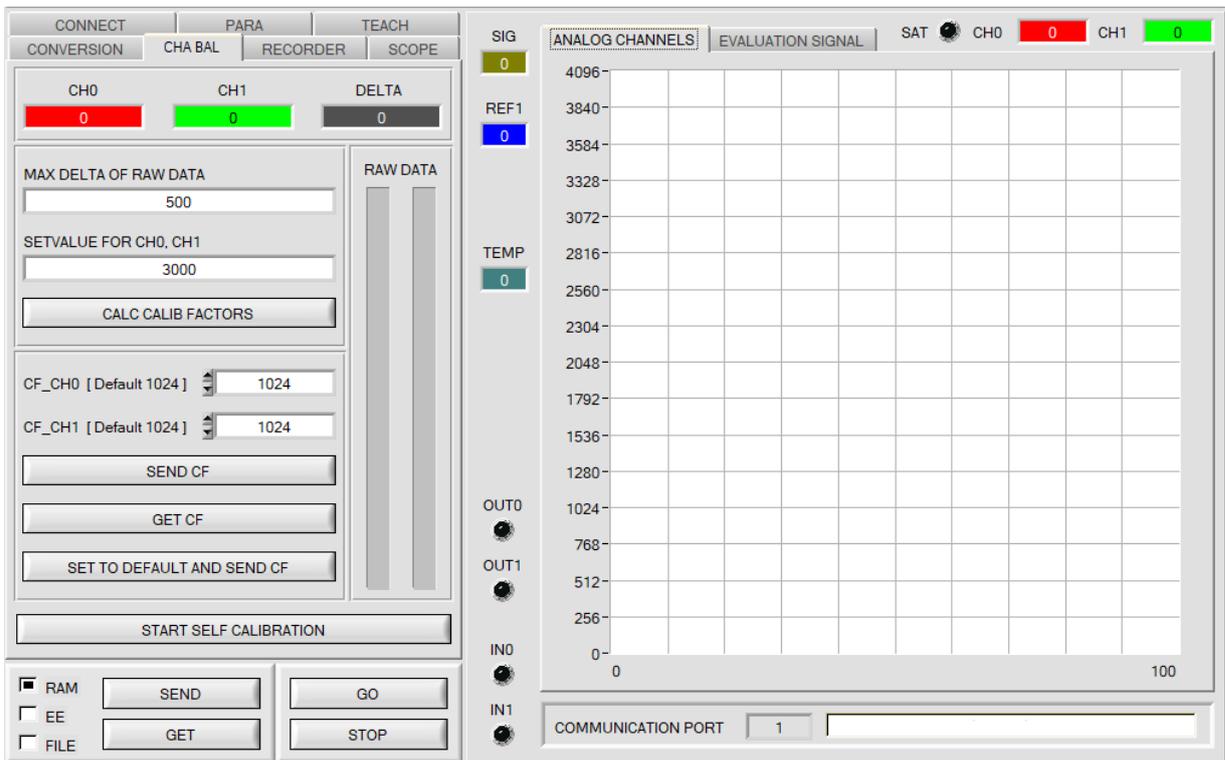
Calculation example for determining the calibration factors

In the example in the picture below, a POWER value at which the two bars of the raw signals **RAW DATA** are in the dynamic range has been set. Each of the two bars is at approx. 2300 digits. It is thus appropriate to set a setpoint value of 2300 (see **SETVALUE FOR CH0, CH1**). When calibration is now started by pressing **CALC CALIB FACTORS** the software automatically calculates the calibration factors for **CH0** and channel **CH1**. The calibration factors are normalized as integers to the value 1024.

Formula:

CF_CH0 = (SETVALUE / RAW DATA CH0) * 1024 = (3300 / 3150) * 1024 = 1073
CF_CH1 = (SETVALUE / RAW DATA CH1) * 1024 = (3300 / 3490) * 1024 = 968
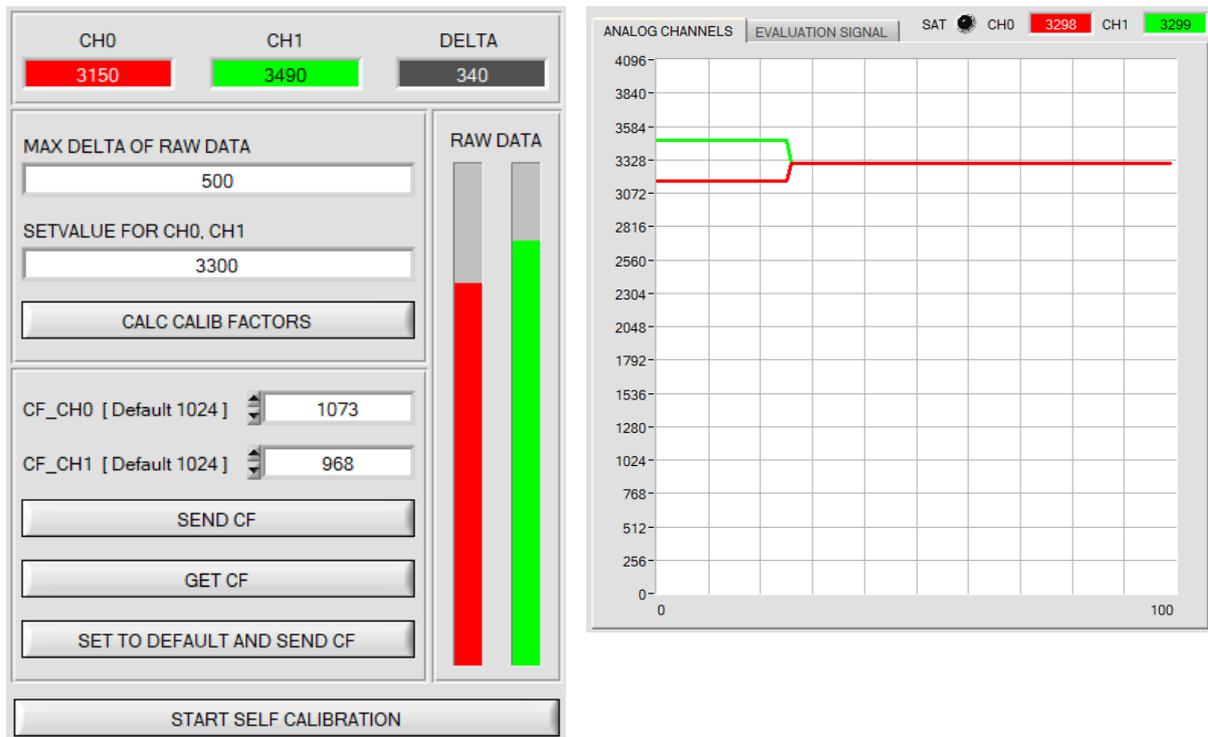


When the calibration factors have been calculated by the software on the user interface, they are automatically saved to the non-volatile **EEPROM** memory of the sensor. Calibration is then finished, work can then be continued in the main panel.

When the sensor detects a raw signal, it applies the calibration factor saved in the **EEPROM** to this raw signal, i.e. in the main panel only the calibrated data for channel **CH0** and channel **CH1** are displayed. Evaluation by the micro-controller also is exclusively done with the calibrated data.

**In the following the individual steps for calibrating the sensors are described:**
**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.**
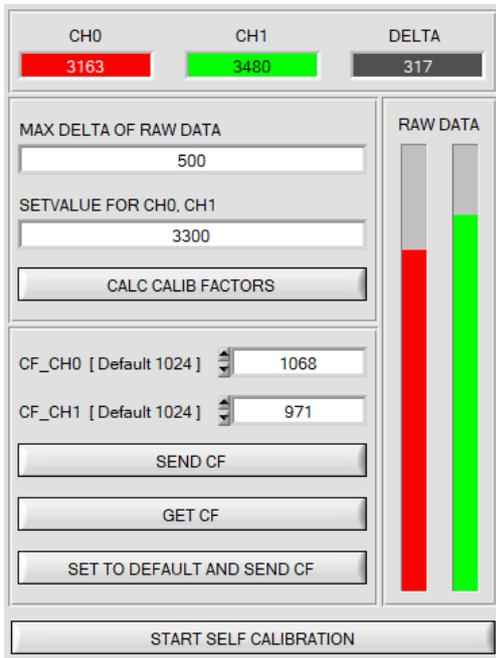


**Step 1:**
First of all a suitable **POWER** value must be found such that the **RAW DATA** for **CH0** and **CH1** lie in the dynamic range (upper third of the bar display).

**Step 2:**
When you have set a suitable POWER value, determine a **SETVALUE FOR CH0, CH1**. The software now calculates the calibration factors in such a way that this SETVALUE is reached for the raw data (see calculation example above).

**Step 3:**
Determine a **MAX DELTA OF RAW DATA** (the software suggests 500).
Calibration is only permitted, if the current **DELTA** of the **RAW DATA** is smaller than the **MAX DELTA OF RAW DATA**. **DELTA** is the maximum of **CH0** and **CH1** minus the minimum of **CH0** and **CH1**. This is necessary in order to ensure that the sensor functions properly and calibration is performed on a suitable surface.

**Step 4:**
Start calibration by pressing **CALC CALIB 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 **CH0** and **CH1**. The individual calibration factors are formed from these mean values and from the **SETVALUES FOR CH0 and CH1** 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 in the main panel. Please note that the values for **CH0** and **CH1** in the main panel approximately are equal to the value of SETVALUE

You may also change the calibration factors **CF_CH0** and **CF_CH1** 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 **CALC CALIB 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:
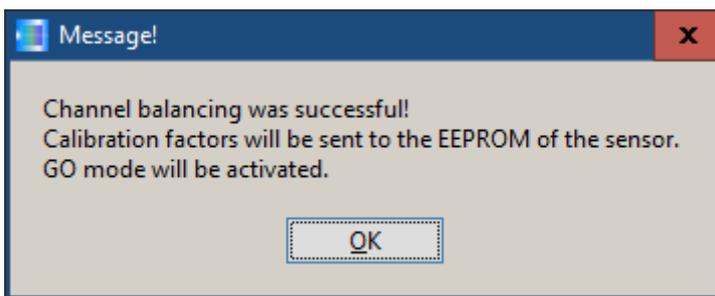


A click on **START SELF CALIBRATION** causes the sensor to calculate the calibration factors itself. It is not possible to specify a **SETVALUE FOR CH0, CH1** and a **MAX DELTA OF RAW DATA** here.
When the sensor has calculated the calibration factors, it displays these on the software user interface. In the corresponding input fields it also displays the **SETVALUE FOR CH0, CH1** that it used for calculation and the **MAX DELTA OF RAW DATA** value that resulted from calculation.

With the **SET TO DEFAULT AND SEND CF** button, **CF_CH0** and **CF_CH1** are reset and written into the EEPROM. **MAX DELTA OF RAW DATA** and **SETVALUE FOR CH0, CH1** are also reset to their default values on the software user interface.