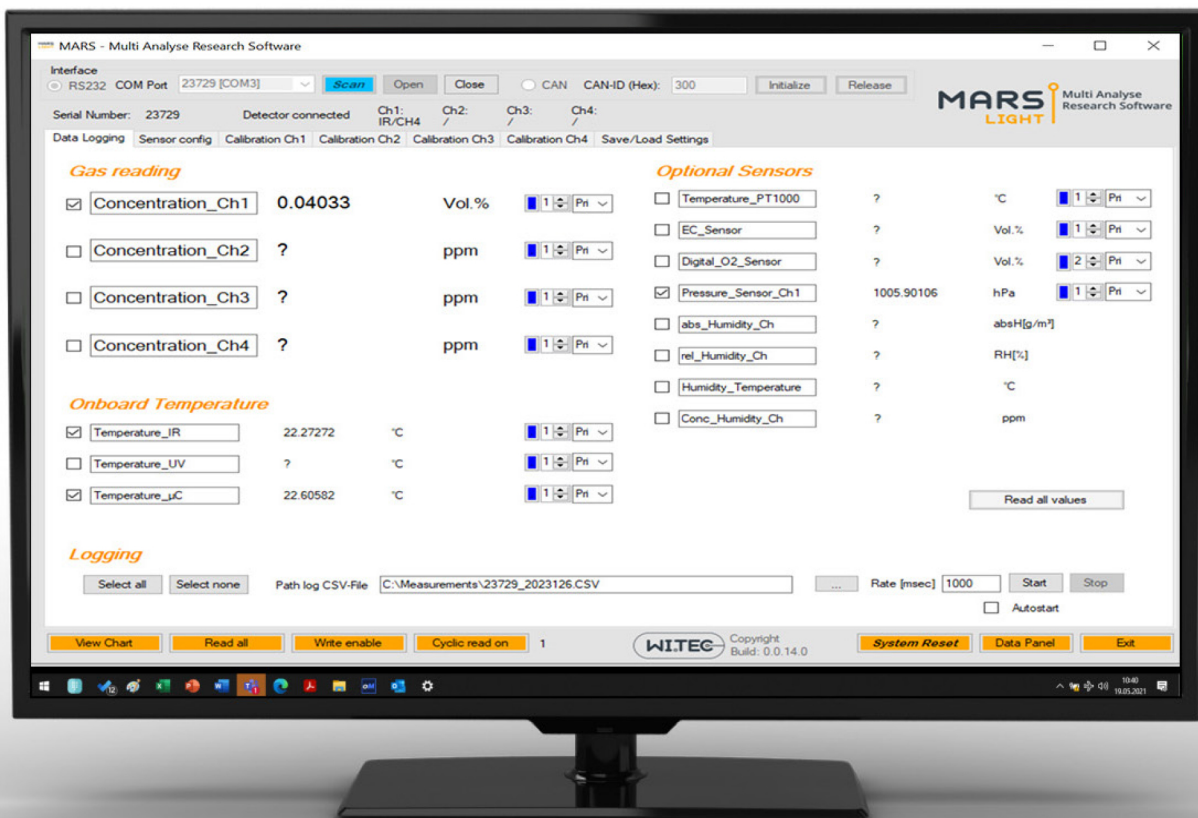


# MARS light

## Multi analyzer & research software user manual



MicroFlow  
Gas sensors

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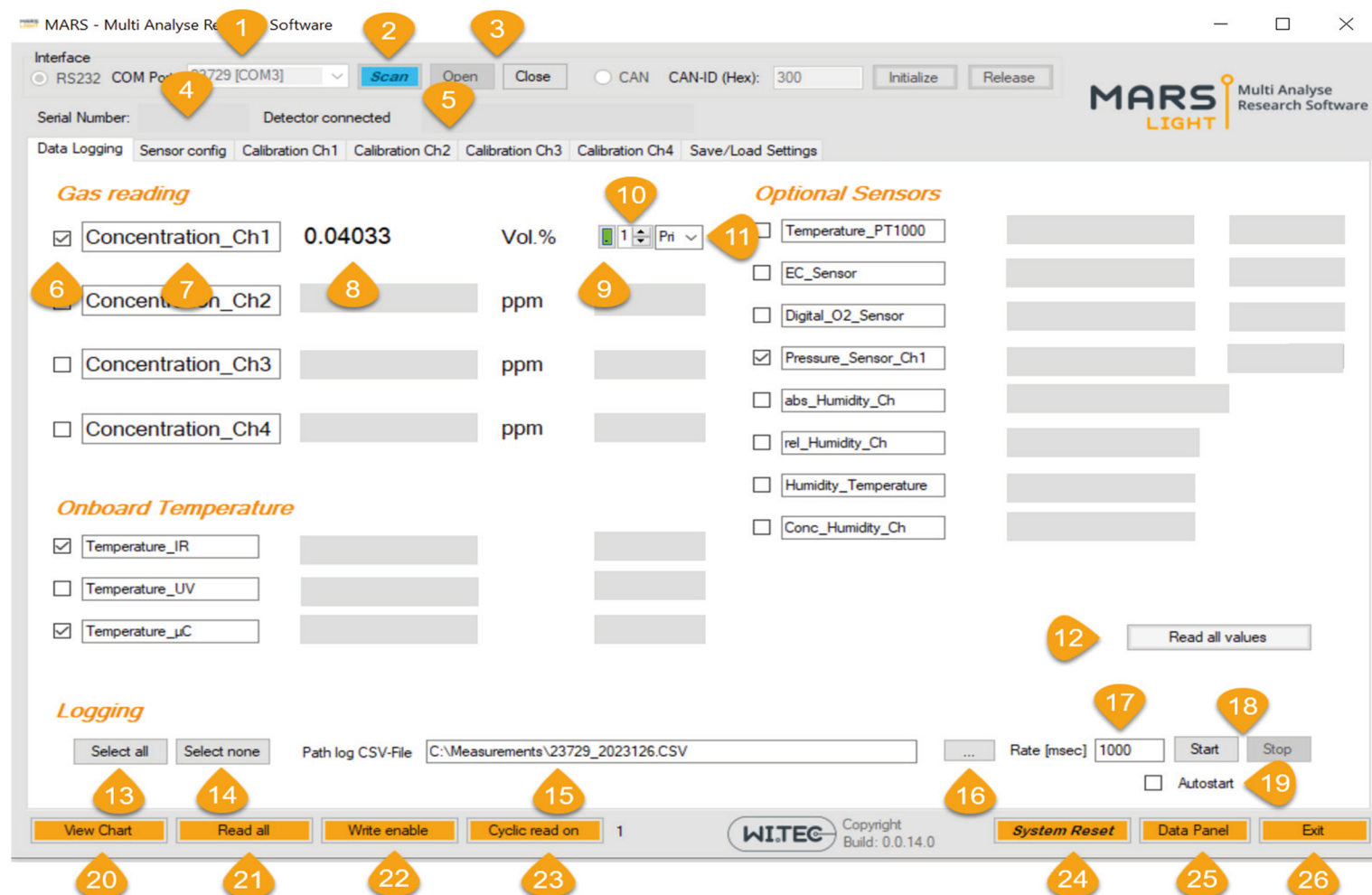
## 1. General

The MARS<sub>light</sub> enables data logging of all relevant parameters from the sensor (chart and data).

The main user level of this software can read important parameters and set zero- and endpoint of the gas channels.

**Note:** To load the calibration data and some other sensible parameters the user can type a password to entry into an advanced user mode. The password is given after request and only in special cases.

## 1.1 Surface description data logging



Surface description data logging tab

- |  |  |
|--|--|
| <p>1 Selects the serial COM port</p> <p>2 Scans available sensor(s) and port(s)</p> <p>3 Opens/ closes selected COM port; reads configuration of sensor</p> <p>4 Display of connected serial number</p> <p>5 Display of sensor configuration</p> <p>6 Selects/ de-selects channel for logging and chart view</p> <p>7 Channel and function designators, free editable (stored in configuration)</p> <p>8 Measurement values ppm, ppb, or Vol.-%</p> <p>9 Colour for the plotted line (chart view)</p> <p>10 Thickness of the plotted line (chart view)</p> <p>11 Selects primary or secondary axis (chart view)</p> <p>12 Reads all measurement values</p> <p>13 Selects all channels for logging and chart</p> <p>14 De-selects all channels for logging and chart view</p> | <p>15 Storage path and file name for data logging file</p> <p>16 Select storage path with MS Explorer</p> <p>17 Time interval for logging the data in milliseconds, minimum 100 msec</p> <p>18 Starts/ stops data logging into *.csv file</p> <p>19 N/A</p> <p>20 Opens chart view in separate window</p> <p>21 Reads all measurement values</p> <p>22 Open the password manager</p> <p>23 Starts measurement cycle independently from data logging. Useful for chart view and direct feedback values</p> <p>24 Restarts the complete sensor (software reset)</p> <p>25 Shows a front panel view with the main important readings</p> <p>26 Close the software and store all relevant settings</p> |
|--|--|



## 1.2 Surface description sensor config

The screenshot shows the 'Sensor config' tab in the MARS LIGHT software. The interface includes a top bar with connection settings (RS232, COM Port, CAN, CAN-ID) and a main area with several configuration sections. Numbered callouts identify key elements:

- 1**: Sensor configuration tab active
- 2**: Serial Number field
- 3**: HW Revision field
- 4**: SW Revision field
- 5**: Operating Hours field
- 6**: Manufacturing Date field
- 7**: Status Byte field
- 8**: Ch1 and Ch2 damping mode dropdown
- 9**: Ch3 and Ch4 damping mode dropdown
- 10**: CAN Protocol Type dropdown
- 11**: CAN termination checkbox
- 12**: CAN\_ID\_REC field
- 13**: CAN\_ID\_TRA field
- 14**: CAN Baudrate field
- 15**: NodeID field
- 16**: Alarmlevel\_UVLED1 field
- 17**: Alarmlevel\_UVLED2 field
- 18**: Alarmlevel\_IRLAMP field
- 19**: Source\_Power\_UVLED1 field
- 20**: Source\_Power\_UVLED2 field
- 21**: Source\_Power\_IRLAMP field
- 22**: Freeze reading checkbox
- 23**: T\_INTERVAL field
- 24**: T\_RINSE field
- 25**: Hex Code field
- 26**: Dez Code field
- 27**: Set button
- 28**: Read Sensor Config button

Surface description of sensor configuration tab

1	Sensor configuration tab active	16	Set alarm UVLED1 level in percent to change status byte if the value is below the threshold
2	Serial number from connected sensor	17	Set alarm UVLED2 level in percent to change status byte if the value is below the threshold
3	Hardware revision mainboard	18	Set alarm IRLAMP level in percent to change status byte if the value is below the threshold
4	Firmware revision controller	19	Shows the actual intensity level in percent
5	Operating hours since assembly	20	Shows the actual intensity level in percent
6	Manufacturing date of assembly	21	Shows the actual intensity level in percent
7	Status Byte shows the actual system status (see details 1.2.1)	22	Autozero function control, in combination AZF board the sensor can freeze the readings during calibration
8	Gas-channel 1 and 2 damping configuration (see details 1.2.2)	23	Interval time for the automatic zero calibration [min, h, d]
9	Gas-channel 3 and 4 damping configuration (see details 1.2.2)	24	Rinse / purge time with zero gas [sec]
10	CAN protocol selection to CANbus or CANopen	25	Hex code
11	Sensor configuration tab active high	26	Dez code
12	CAN receive address (slave address)	27	Set
13	CAN transmit address (Master address)	28	Read sensor config
14	CAN baudrate can be set to [125k, 250k, 500k, 1000k]		
15	NodeID only for CANopen communication		

## 1.2.1 Status byte

IR detected	NA	NA	NA	IR level error	NA	NA	NA	Satus code	Status LED	
Bit 0	Bit 1	Bit2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	hex	dez	
0	1	1	1	1	1	1	1	7F	127	red
1	1	1	1	1	1	1	1	FF	255	red
1	1	1	1	0	1	1	1	F7	247	green

## 1.2.2 Damping mode

Setting	Response	Signal performance
Slow	30 sec	High
Medium	6 sec	Normal
Fast	3 sec	Normal
Peak	1 sec	Low
Custom*	TBD	TBD

## 1.3 Surface description calibration for each channel

The Calibration tabs for the different gases are very similar to each other, but the marked fields are in the same place in each tab.

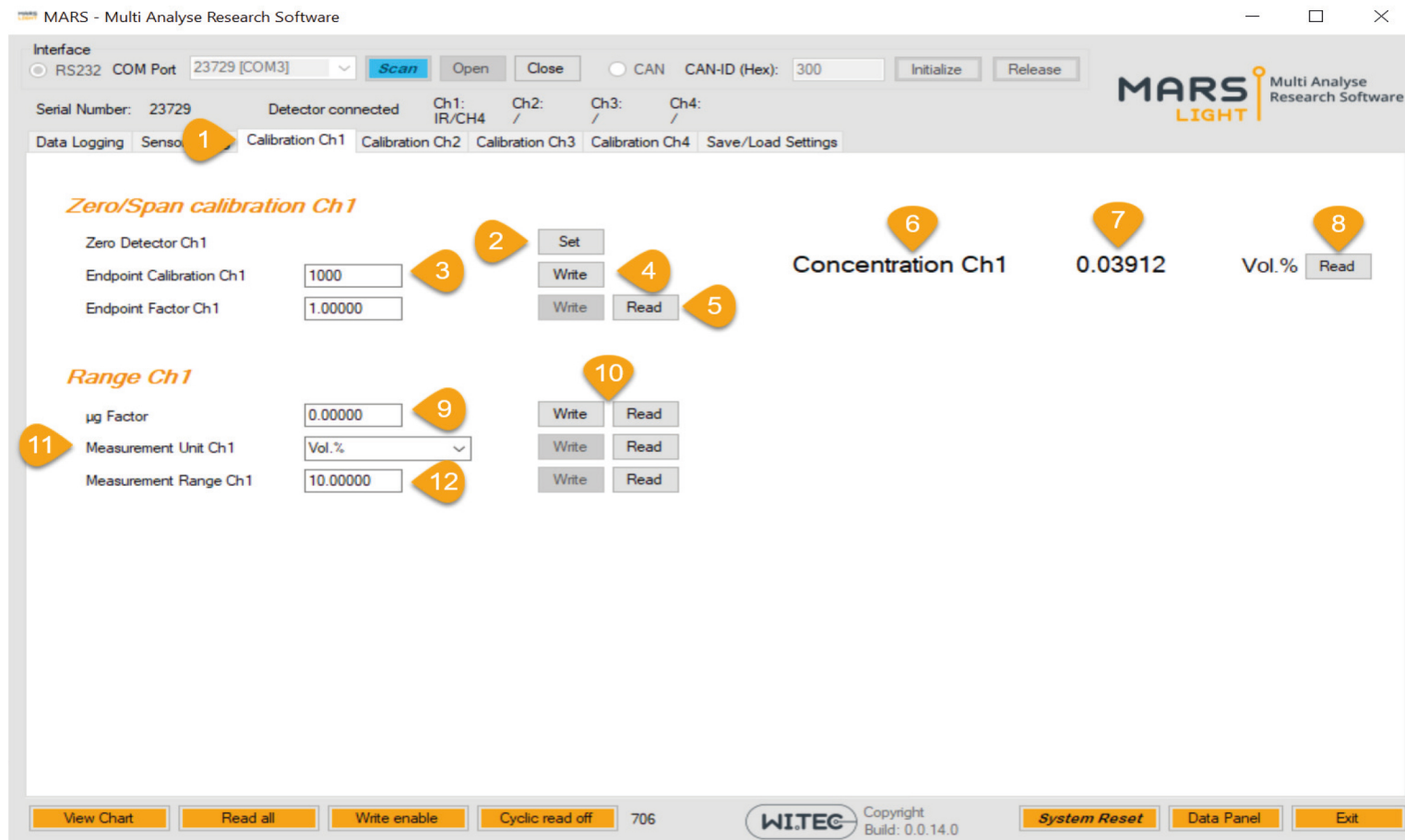


Figure 3: Surface description of calibration CH1 tab

- 1 Calibration CH1 tab
- 2 Set zero calibration – purge (1min) gas without content of target gas and press set
- 3 Endpoint calibration – type in the value of the expected gas concentration
- 4 Press write the sensor calculate the calibration factor and store it permanently
- 5 Read / Write the endpoint calibration factor, factory default: 1.00
- 6 Label actual reading
- 7 Actual reading to have an feedback during the calibration
- 8 After press the button the value is updated
- 9 Custom factor to recalculate the concentration out with another factor
- 10 Read / Write the custom defined factor (default: 0.00)
- 11 Read the measurement unit for the selected channel
- 12 Read the measurement range for the selected channel

## 1.4 Surface password manager

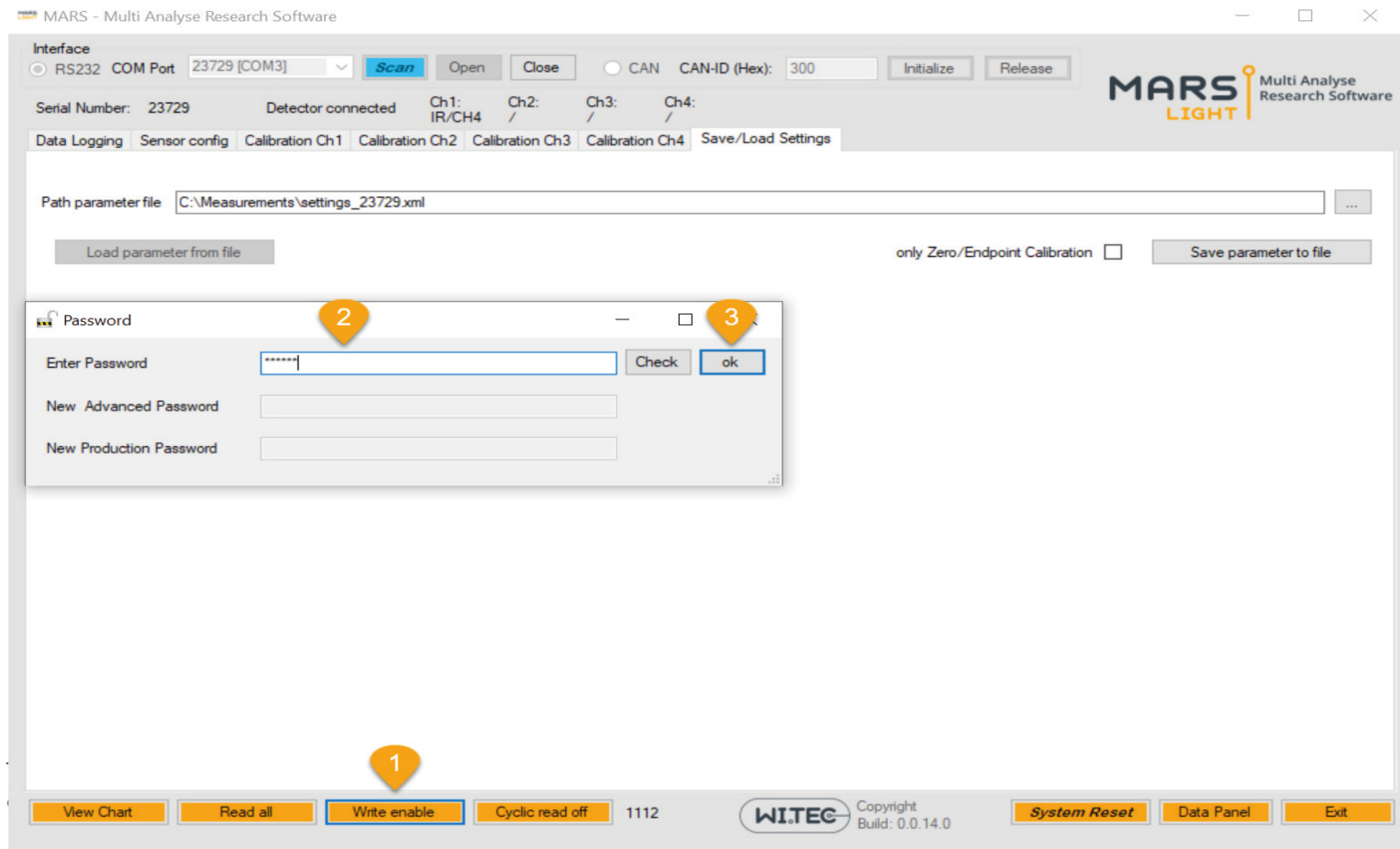


Figure 4: Surface Description of Production Tab

- 1 Click write enable to start the password manager
- 2 Select the user role:
  - a. Standard – no password
  - b. Advance – **Adv123**
  - c. Expert – **Exp456**
- 3 Press [OK] if the password is selected

## 1.4.1 User level

Function	User „Standard“	User „Advance“	User „Expert“
Read data logging	x	x	x
Read sensor config	x	x	x
Set zero/endpoint calibration	x	x	x
Read calibration Chx	x	x	x
Save the sensor parameter to XML	x	x	x
Set alarm level IR source		x	x
Set AZF function		x	x
Set measurement unit/range		x	x
Load parameter from XML		x	x
Sensor diagnosis values (ADC, modulation)		x	x
Set sensor damping values			x
Set CAN settings			x
Set endpoint factor direct			x
Ext. sensor tab (calibration ext. sensors)			x
Bootloader mode (firmware tab)			x

## 1.5 Surface description save / load settings

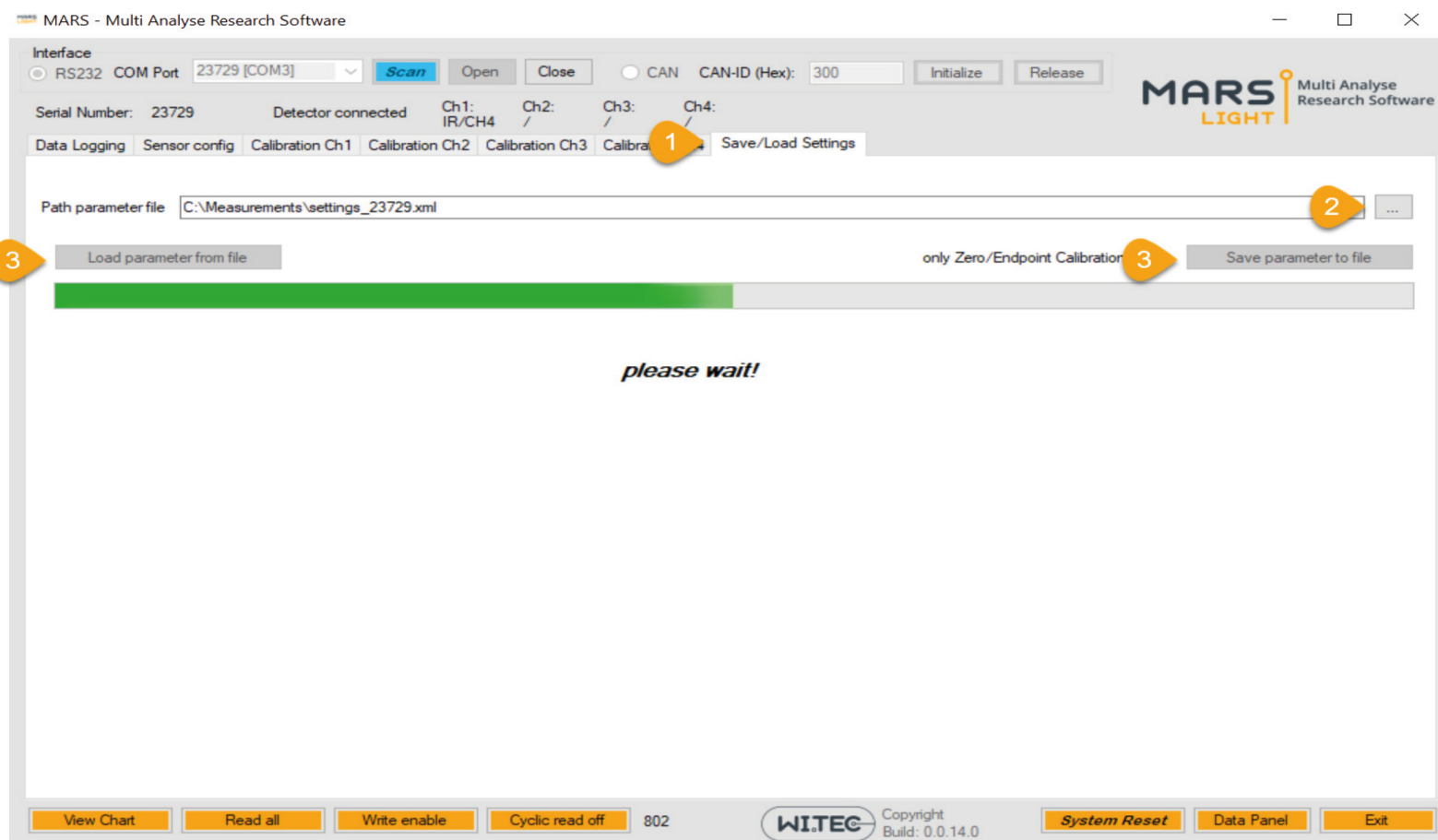


Figure 5: Surface description of save / load settings tab

- 1 Save / load Settings tab. All sensor parameters can be saved or loaded via XML file
- 2 Select the relevant path to store the sensor settings or load
- 3 Save or load the parameter

**Note:** The \*.xml file can be edit with a standart XML viewer

**Please note:** We recommend to save the XML parameter before you are plan to change some settings

## 2. Equipment

You need additional equipment to connect to your sensor.

- PC with Windows 7 or newer (all other necessary accessories are available for purchase from Micro-Hybrid upon request)
- IA Power supply 24 VDC (300 mA) Order number VKM500044
- Data cable RS232 Order number VKM500040 or CAN-BUS Order number VKM500041
- USB adaptor RS232 Order number VKM500042 or CAN-BUS Order number VKM500043

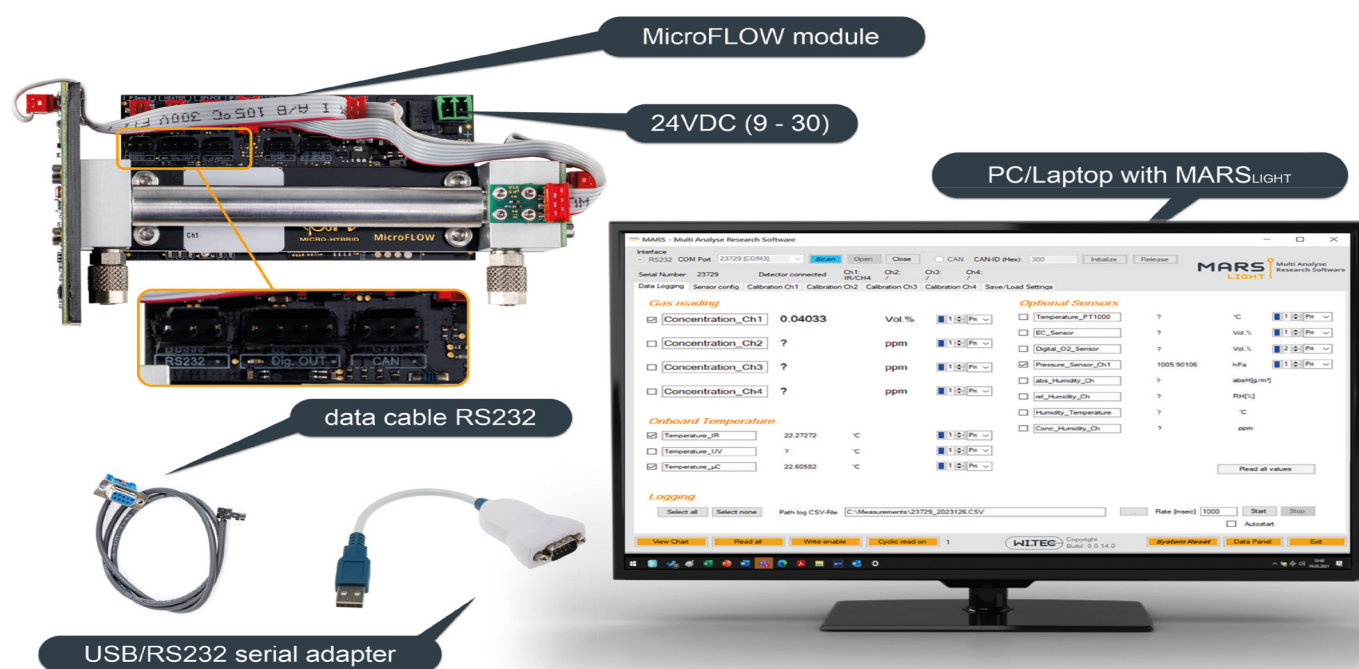


Figure 6: Connection between the module and the PC / laptop



## 2.1 Starting the program

The program directly started from the directory, it is not necessary to install anything.

**Right click** on MARS\_Tool.exe and open with administration rights!

Connect the sensor with a serial data cable on the COM port and power the sensor.

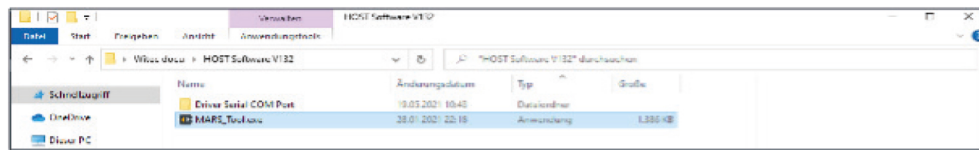


Figure 7: USB stick Witec docu > HOST Software V132 > MARS\_Tool.exe

## 2.2 Connecting the sensor

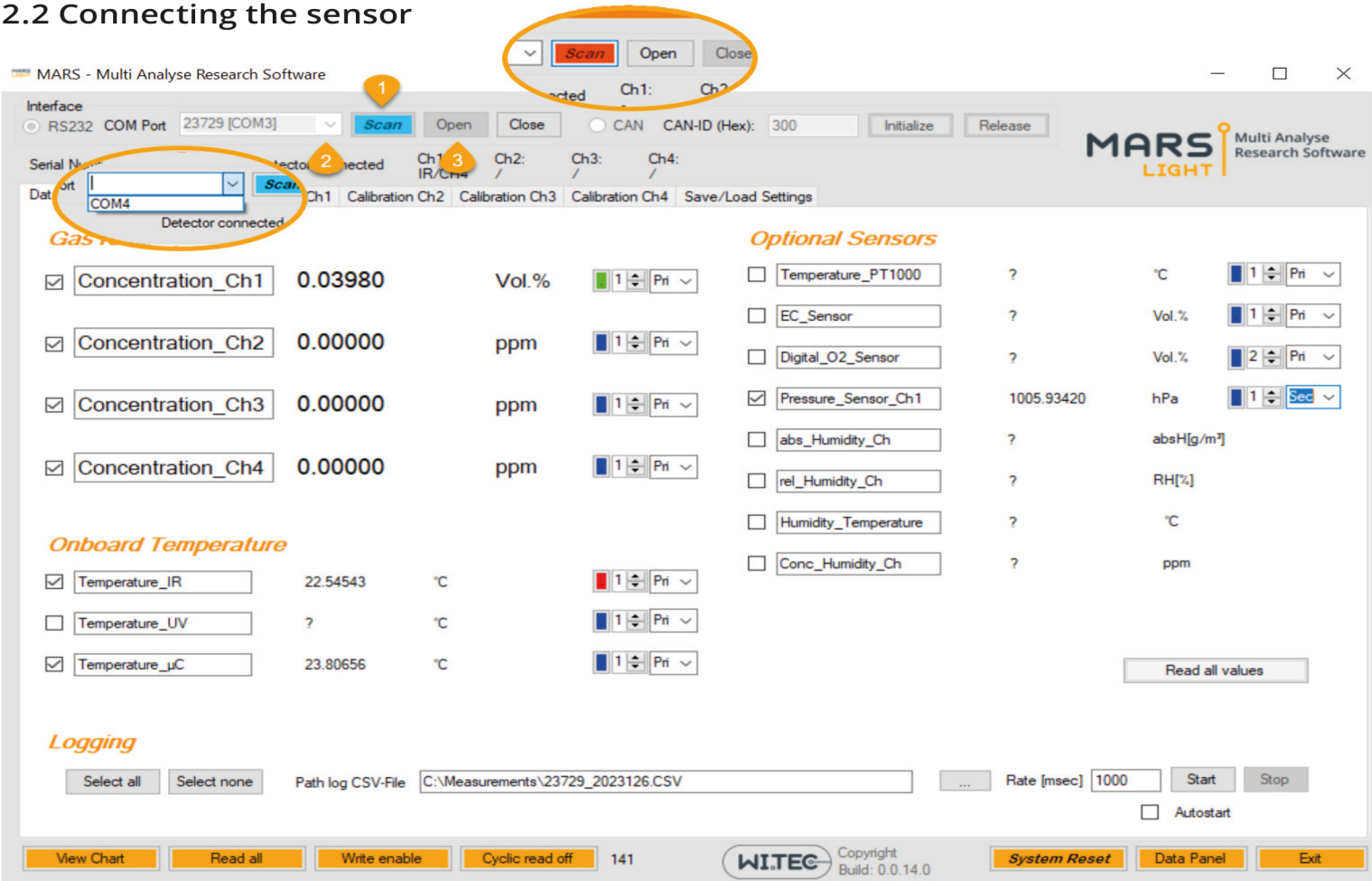


Figure 8: Starting a measurement

- 1 Click the button [scan] it will change from blue to red in the time when it scans the COM ports from your PC, when it is ready the button change to blue again
- 2 Click on the dropdown menu and choose the serial number from your sensor you will find it on the label
- 3 click the button [open] > serial number and sensor configuration are displayed

## 2.3 Zero- and end-point calibration

For a high accurate gas measurement, it is necessary to check the zero-point and span-point on a regular basis.

- Zero check every 24 h
- Span check every week

In case of a deviation (e.g. > 2 % of span) the MARS<sub>light</sub> has a function to set the zero- and span-point easily.

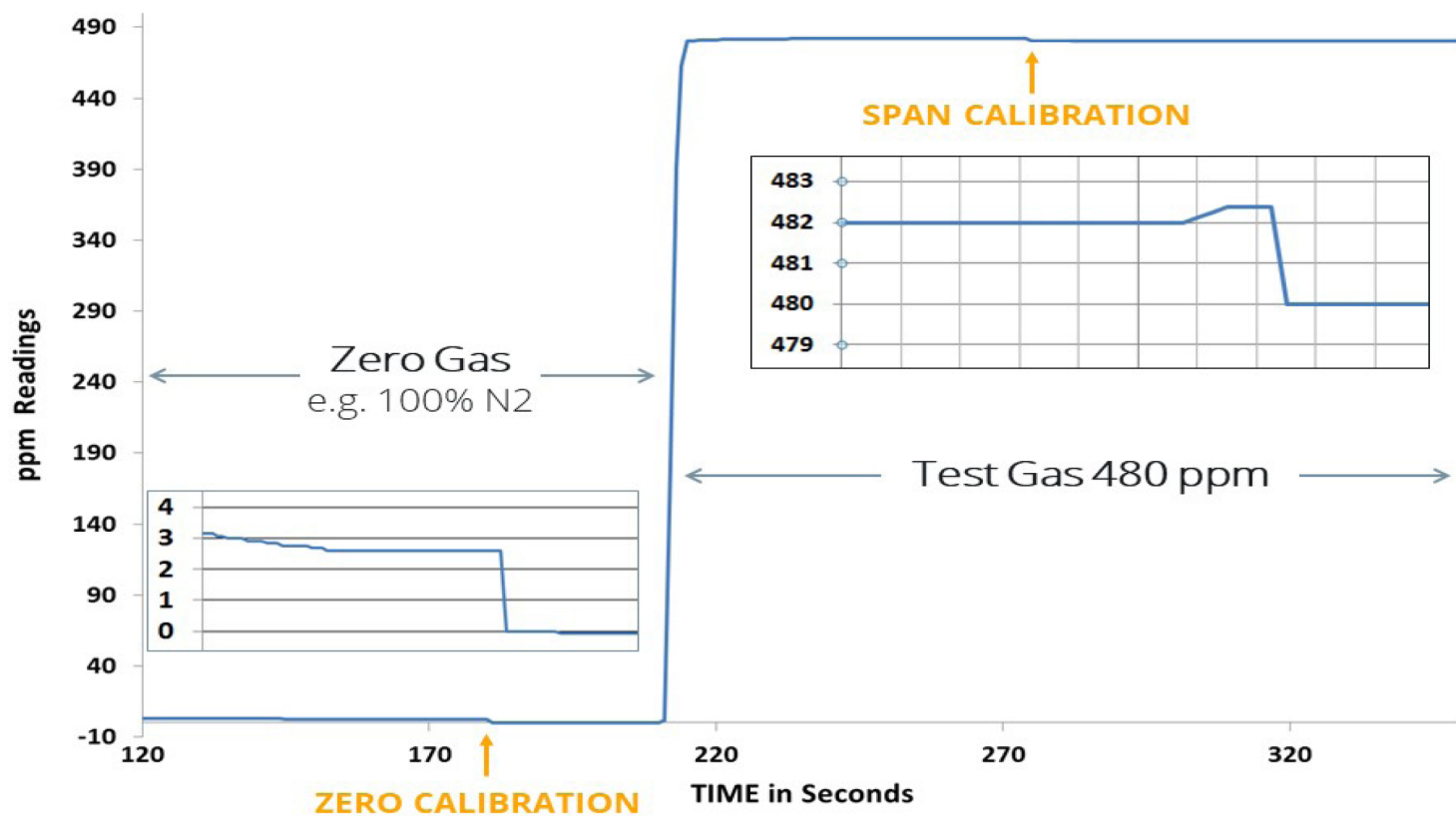


Figure 9: The behaviour of the concentration readings during zero- and span-point calibration

## 2.3.1 Zero-point calibration

Purge the entire gas measurement system with a sufficient volume (1 l/min) of zero gas (e.g. N<sub>2</sub>, Ar, H<sub>2</sub> or cleaned air) and wait until the gas concentration reading is stable (< 1 % F.S.).

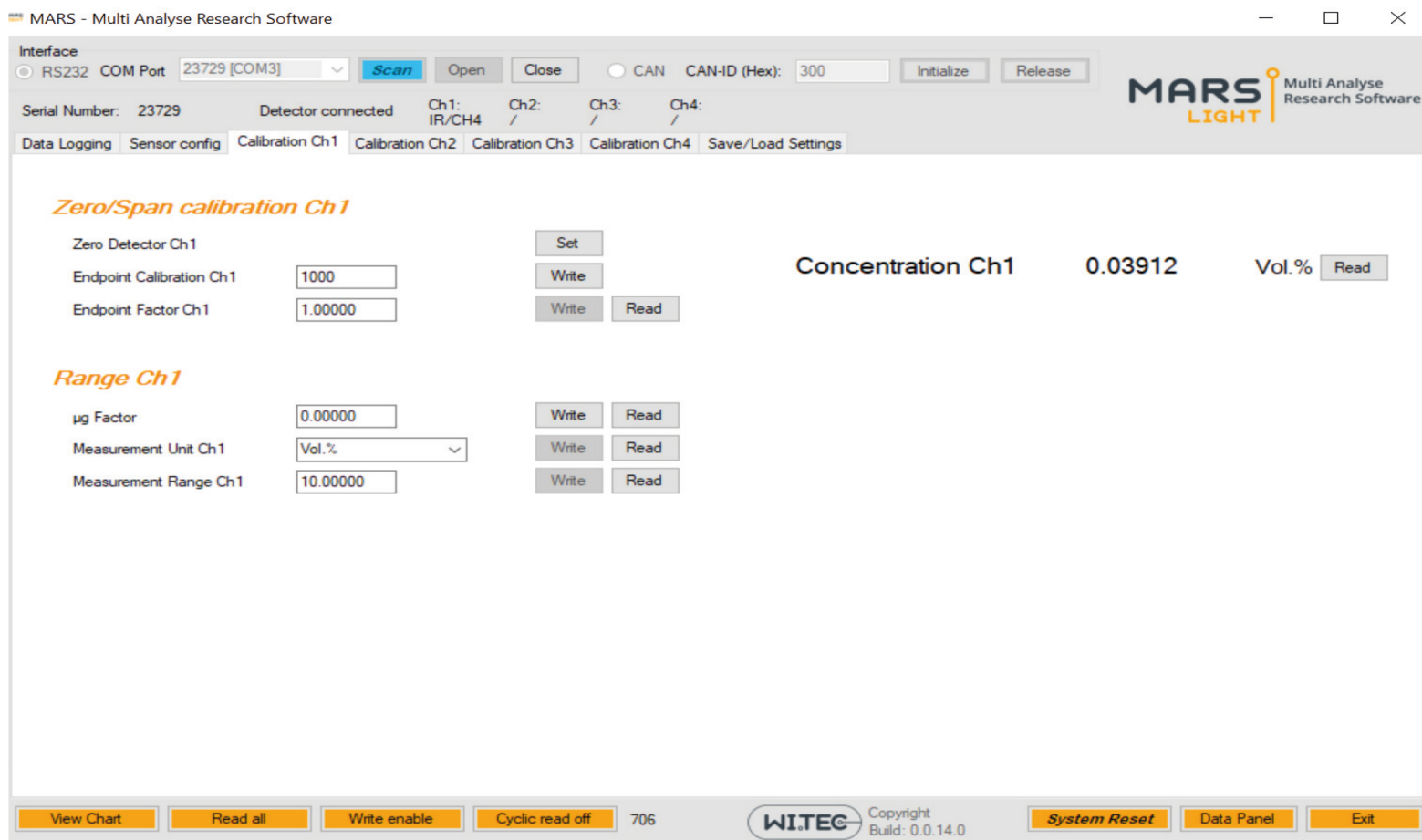


Figure 10: Zero-point calibration

- 1 Click the button [Set] behind zero detector all channel
- 2 Click the button [ja] to do a zero-point calibration > The concentration reading is now 0.0000 ppm

## 2.3.2 End-point calibration

For setting the endpoint it is necessary to use a well-known concentration of test gas. If you use a certified test gas-bottle (cylinder) you will find the gas concentration value on the label or in the provided certificate (e.g. 1000.00 pp CO<sub>2</sub>)

- Before applying the end-point calibration, it is important to do a zero-point calibration with N<sub>2</sub> (inert gas) to set the offset to zero
- Make sure that the test gas concentration does not deviate more than 10 % from F.S.
- Purge the entire gas measurement system with sufficient volume (1 l/min) of test gas and wait until the gas concentration reading is stable (< 1% of span).

MARS - Multi Analyse Research Software

The screenshot shows the MARS LIGHT software interface for end-point calibration. The 'Zero/Span calibration Ch1' section is active, with a 'Set' button and a 'Write' button. The 'Range Ch1' section is also visible, with 'Write' and 'Read' buttons. The 'Concentration Ch1' is displayed as 0.03912 Vol.%. The interface also shows a status bar at the bottom with buttons like 'View Chart', 'Read all', 'Write enable', 'Cyclic read off', 'System Reset', 'Data Panel', and 'Exit'.

Figure 11: End-point calibration

- 1 Type the flowing test gas concentration in the textbox
- 2 Click the button [write] to do the end-point calibration

## 2.4 Panel view with data panel

In this mode you are capable to show the relevant measurement signal in front panel design mode. This can be useful thing to demonstrate the measurement or make some diagnostics with the sensor.

To open the data panel click the button [Data Panel] (see figure 1 button no. 25).

**Note:** before you can use the panel view you must have established a connection with the sensor (see sec. 2.2)

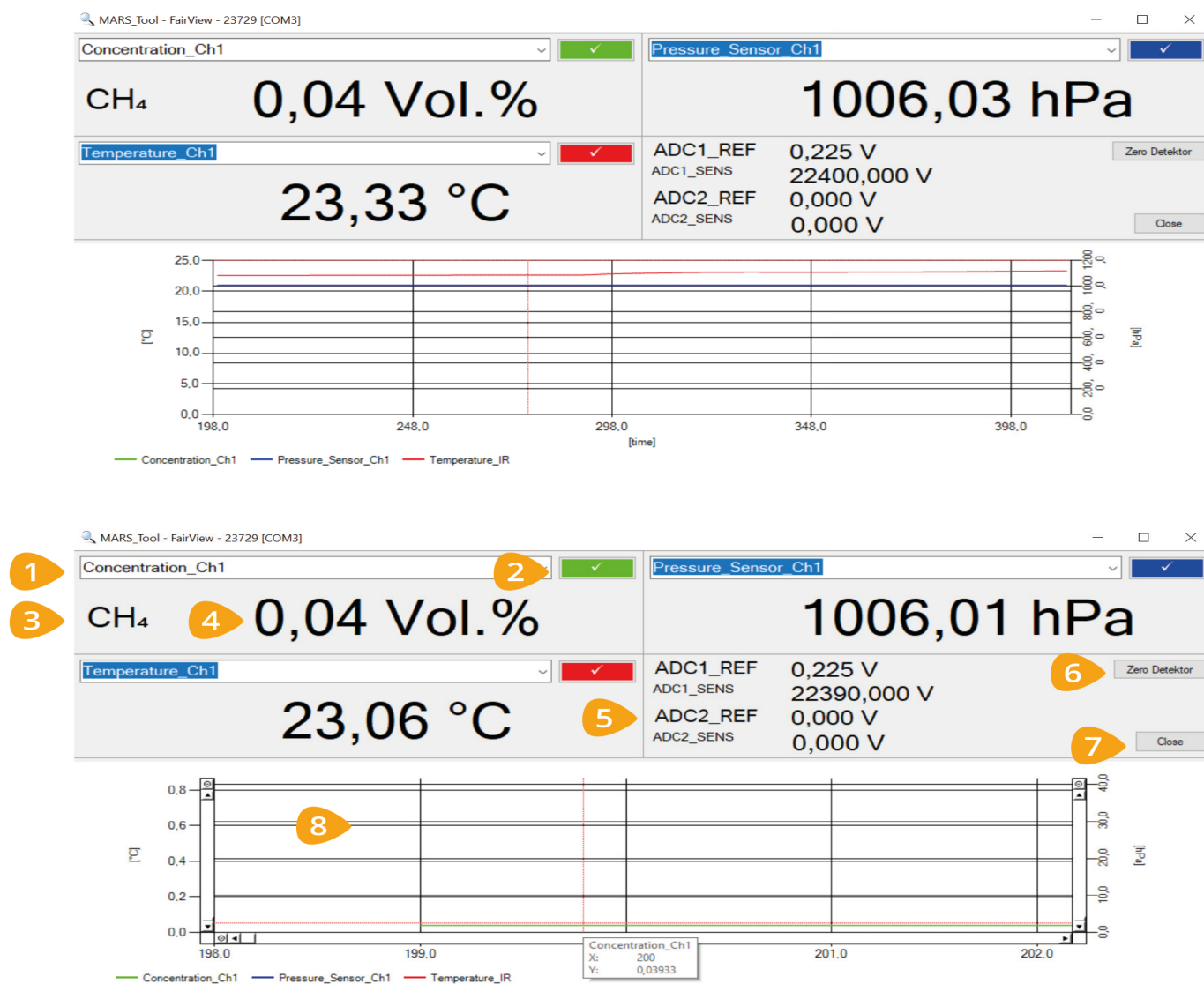


Figure 12: Data panel view

1 Data channel selection

2 Activate / deactivate data logging

3 Gas component of the selected channel

4 Actual gas concentration readings

5 Raw data values (preamp signals)

6 Sets all channel to zero (with inert gas N<sub>2</sub>, H<sub>2</sub>)

7 Close panel view, the settings will be saved

8 Signal plot

To open the data panel click the button  
[Data Panel] (see figure 1 button no. 25).

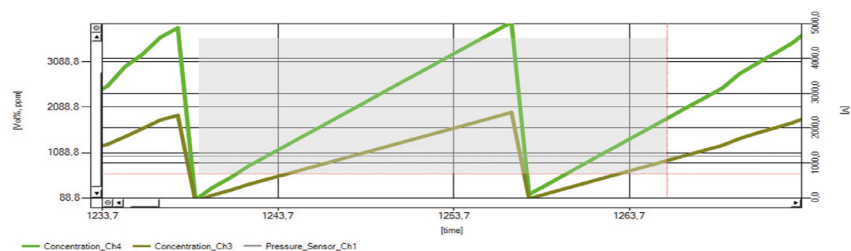


Figure 13: Data panel with zooming function

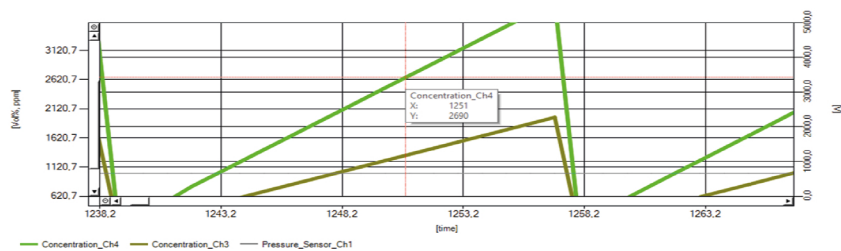


Figure 14: Data panel with label

If you move the mouse over the area, a label with the exact measurement values will be displayed.