XEN-5320-USB v2 LabView program
USB communication software

For read-out of the XEN-5320-USB sensors a LabView program is available from RS Product Solutions.

This manual describes the installation and operation of this LabView software.

Contents

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1 Installation

The LabVIEW software can be downloaded from our website:

https://www.xen5320.com/Downloads/

Unzip the installation package and install the software to a directory with read and write permissions.

2 The Connection Settings Page

When the software opens, the Connection Setup page comes up automatically, see Fig. 1. In the Connection Setup page, the file path for filing the measurement data has to be given. Then, the button Find devices can be pressed to search for any connected XEN-5320-USB sensors.

The **Start** button at the bottom of the Settings page (and all other pages) starts the measurements, indicated by a green **Running light**.
The **Stop** button stops the measurements.
The **Quit** button exits the program.
The **Delay** window allows to slow up the measurements if they go to rapid. The Delay is in seconds.
The **Average measurements** window allows to average measurements.

In the **Select directory for saving measurement data** window the file name for storing the data shown the Reception History can be given by the user. Each measurement is immediately stored in the file, there is no need for any further action to save data. A file for each sensor is made. For the first measurement of the day, a new file is created. Subsequent measurements on the same day are appended to the existing file.

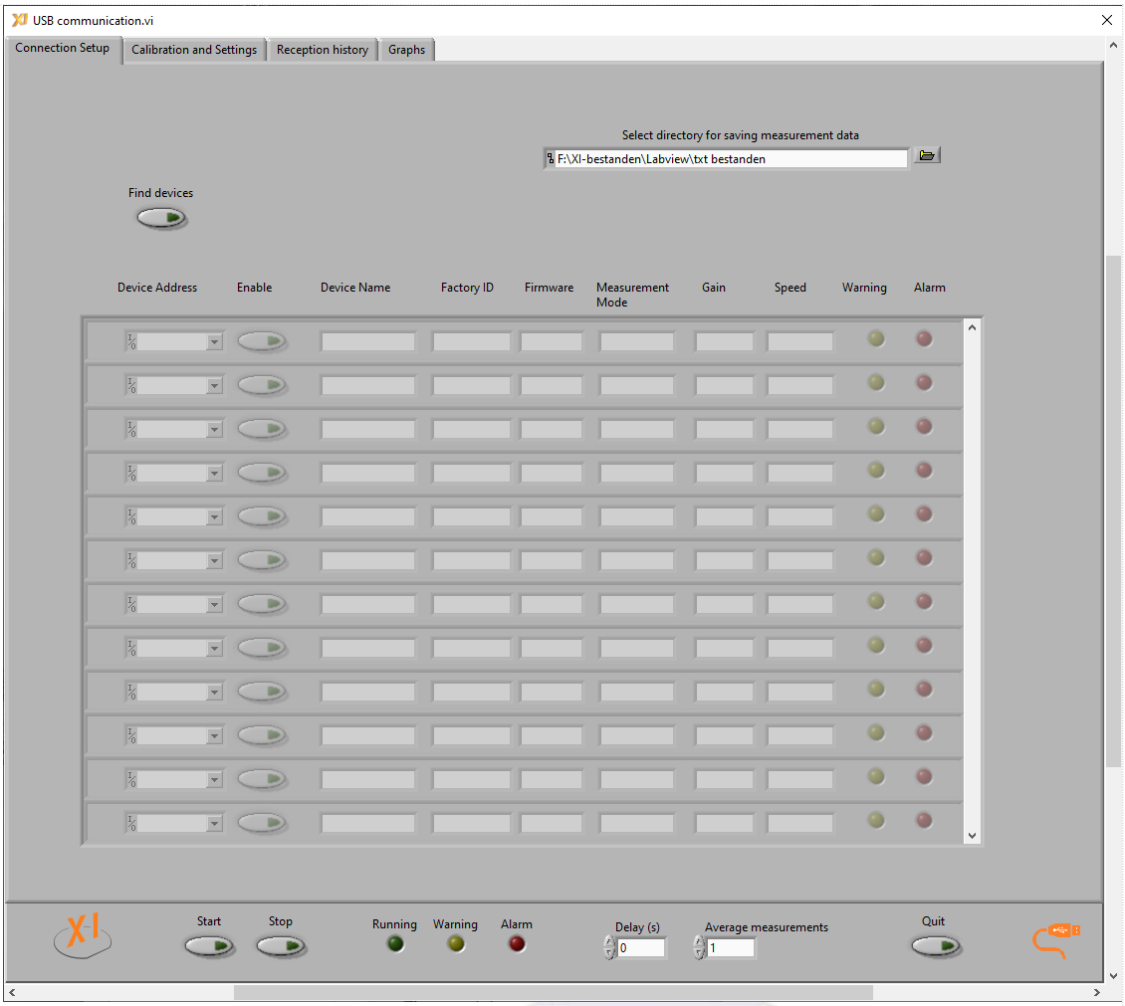

Figure 1: The Connection Settings page

The **Warning** and **Alarm** lights will light up at the appropriate sensor if a warning or alarm has been issued. The codes are listed on the Alarm page on the Calibration and Settings tab The code will also be written into the file of the sensor.
A general **Warning** and **Alarm** light is at the bottom of all pages. This indicates if any warning or alarm is given.

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3 The Measurement Mode page

Fig. 3 shows the measurement mode page. On this page the curve used to calculate the output signal is chosen. Also chosen is the measurement speed: Standard (3.3 Hz) or Fast (≈40 Hz).
If H2 or He is chosen, a look-up table will be used to convert the change in transfer (the deviation of the Corrected Transfer from unity) into the output signal.
For GEN the change in corrected transfer is simply displayed.
When the Custom Curve is chosen, a user provided 23-point look up Table will be used to calculate the output (%) signal.

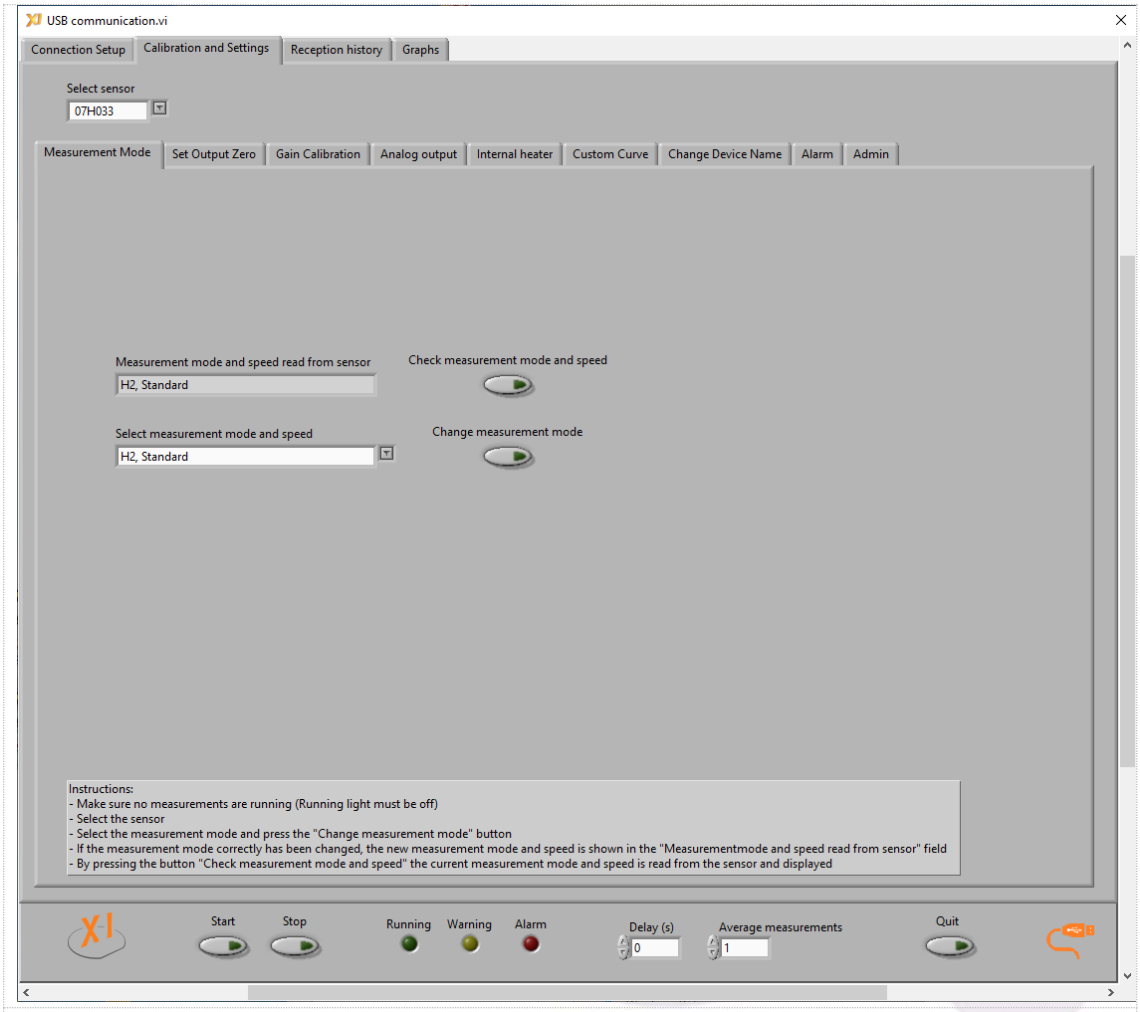

Figure 3: The Measurement Mode Page

Be sure to stop the measurement first, before checking or changing the measurement mode. If there is still a measurement running (green light below Running), then nothing will happen.

4 Set output zero Page

The Set output zero Page (see Fig. 4) allows zeroing of the device. The zeroing data are stored in the memory of the XEN-5320, and zeroing can be carried out when so desired. Zeroing starts by pushing the Start set output zero button (after stopping the measurements). The zeroing takes a number of seconds, the busy light is flashing green and yellow.

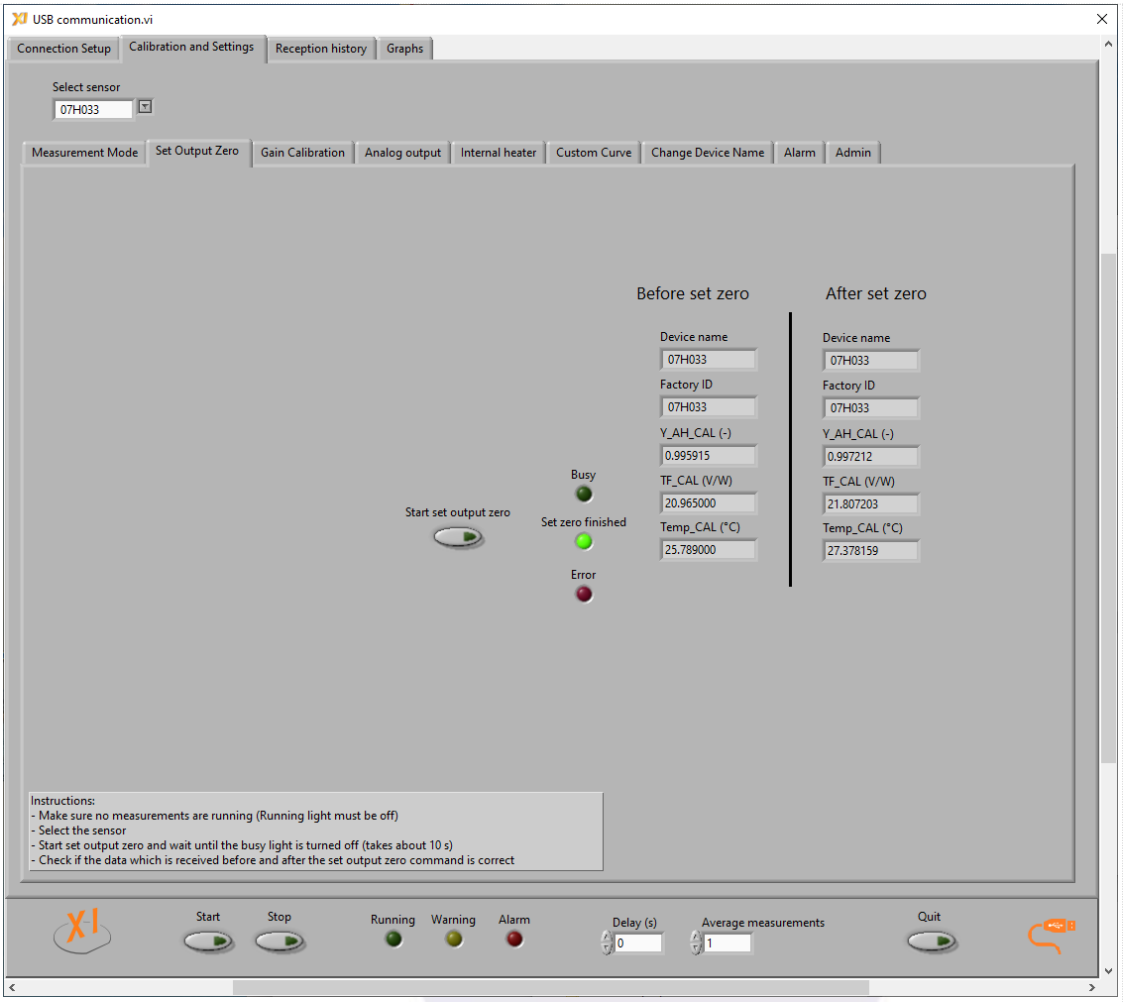

Figure 4: The Start output zero Page, with data of the device before and after zeroing.

5 Gain Calibration Page

The Gain Calibration page allows for calibration of the 100% value for the helium or hydrogen signal in the helium or hydrogen measurement modes. The measurements should be stopped.
In HE measurement mode, 100% helium should be present around the sensor head, in H2 mode 100% hydrogen should be present. When the **Start set gain** button is pushed, the program will perform a measurement, calculate the output and calculate a

gain factor to adjust the output to 100%. If the adjustment that is required is more than a few percent, the error light will shine and a gain factor of unity is returned (see Fig. 5). The gain factor is stored in the EPROM of the sensor.

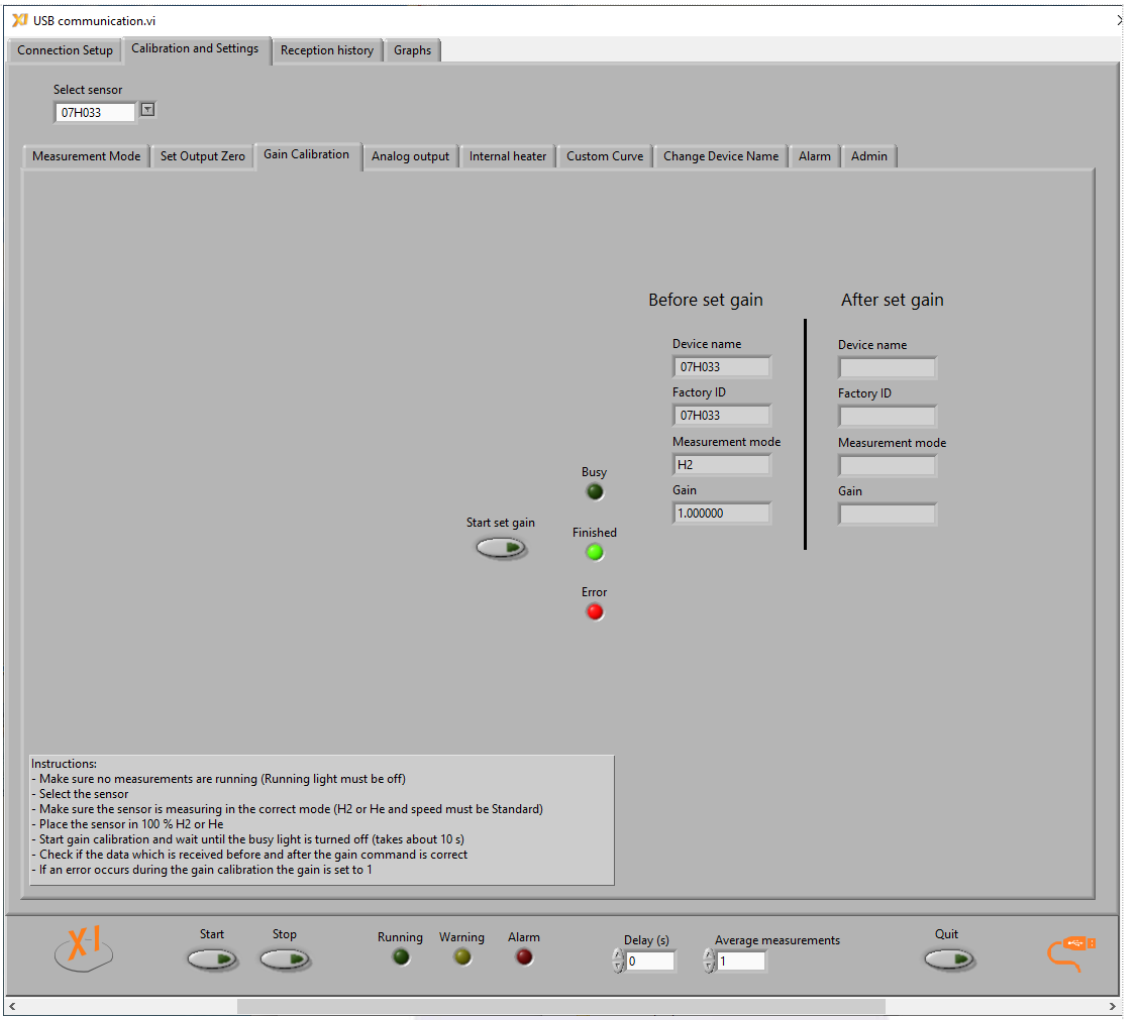

Figure 5: The Gain Calibration page.

6 Analog output Page

The analog output page allows to change the analog output range of the sensor. The desired output range can be selected and is sent to the sensor when the button **Change analog output range** is pressed. The current setting can be read back from the sensor by pressing the **Check analog output range** button.

The analog output is always in the range of 0.5V to 2.5V.

Output 1 is valid for all sensors, output 2 is only valid for certain custom made sensors with two analog outputs.

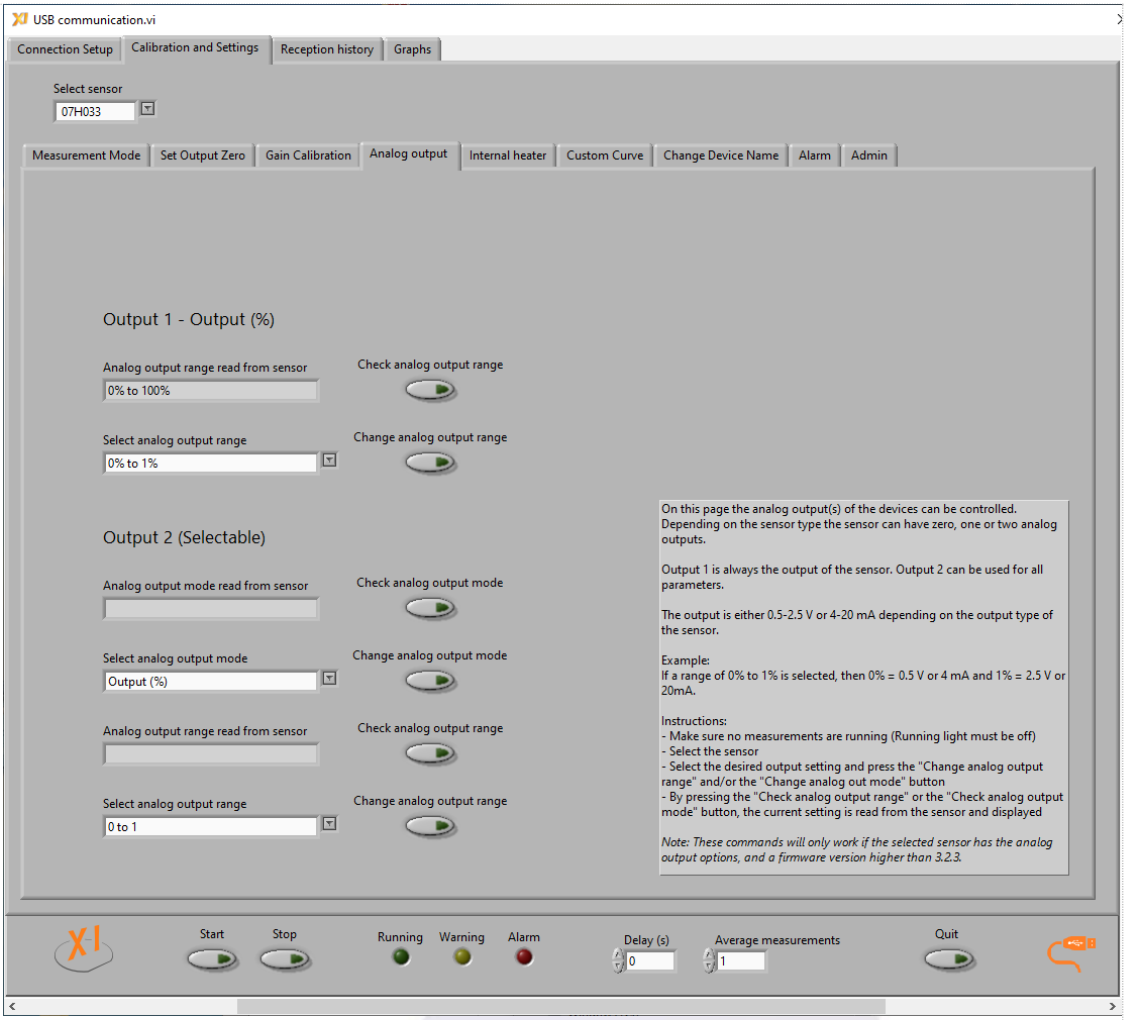

Figure 6: The Analog output page.

7 Internal heater Page

The Internal heater page allows to turn on or to turn off the internal heater of the sensor. Only certain custom made sensors have an internal heater.

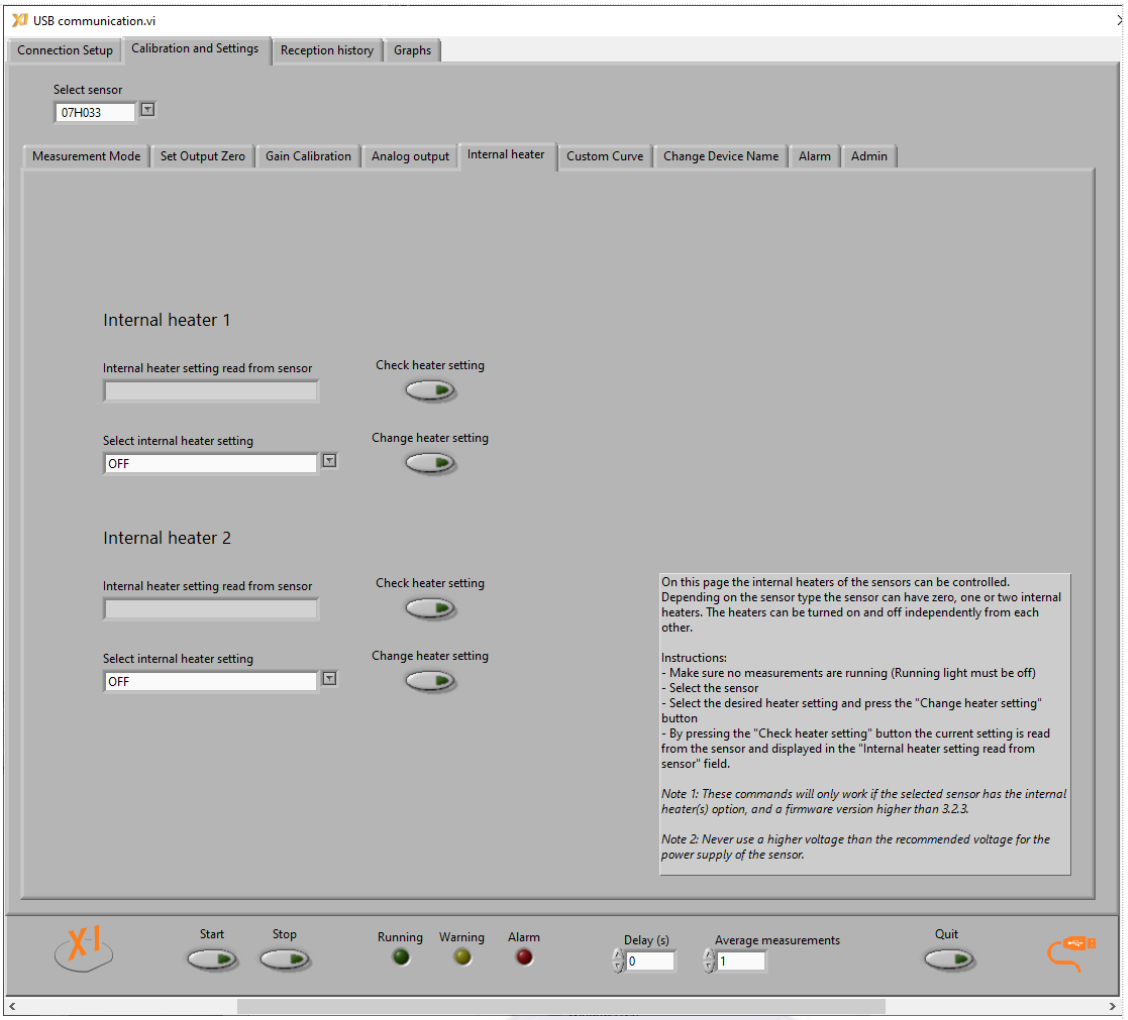

Figure 7: The Internal heater page.

8 Custom Curve Page

The Custom Curve page allows uploading (and checking by downloading) of a 23-point look up Table into the XEN-5320. Fig. 7 shows a custom helium curve. The points of such a curve may be generated, for instance, using EXCEL. The points do not need to be equidistant. Fig. 9 shows a custom curve txt file which is available on request.

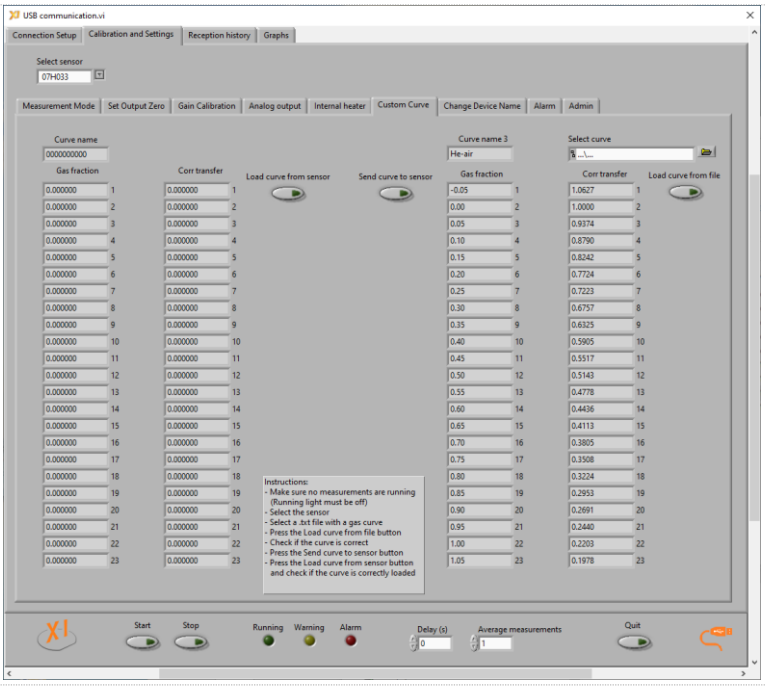

Figure 8: The Custom Curve page.

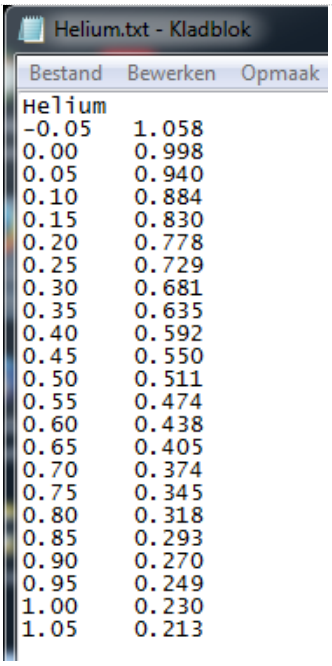

Figure 9: The helium.txt custom curve text file.

9 Change Device Name Page

The Change Device Name page allows changing the device name of the XEN-5320. The device name can store a min of 1 and a max of 10 characters and can be used to give each device a customized name, see Fig. 10. The device name is stored into the XEN-5320 hardware.
The Incorrect name light burns when the field Give new device name is empty or contains more than 10 characters. By pressing the button **Change device name** (after stopping the measurements) the contents of the Give new device name field is transferred to the XEN-5320 hardware. Once the transfer is complete the new name is read back from the XEN-5320 hardware and is shown in the New Device name read from sensor field.

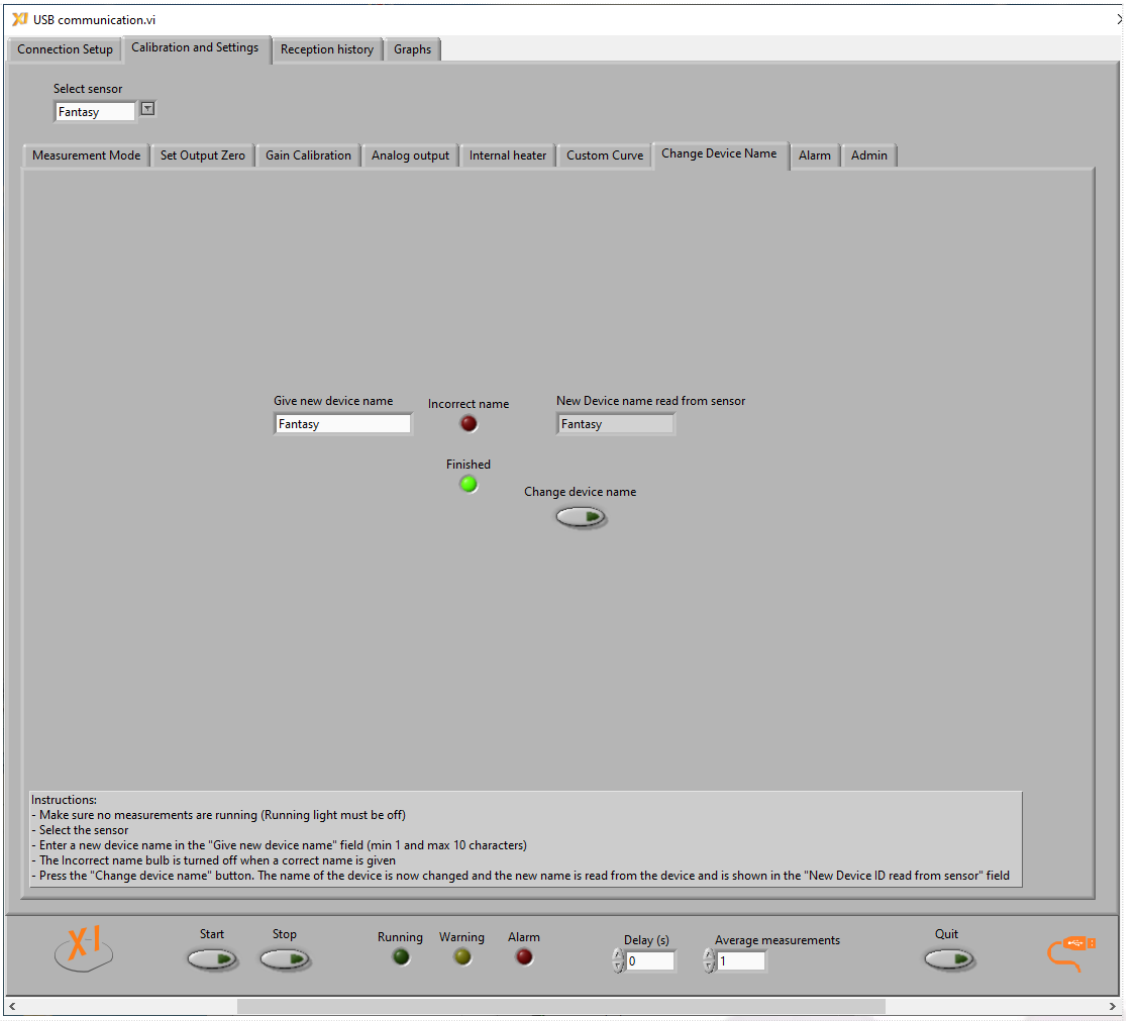

Figure 10: The Change name device ID page, which can be used to change the device ID of the XEN-5320

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10 Alarm Page

The Alarm page shows the cumulative codes of a selected group of warnings and errors, calculated by the LabView program, see Fig. 11. The code is stored at each measurement, and warns if anything is out of the ordinary or even wrong. For each sensor a light will shine on the Connection Setup Page to indicate for which sensor the alarm is going off. On the sensor's Reception History Page, or in the file, the codes can then be found and checked. The higher the code, the more serious the problem.

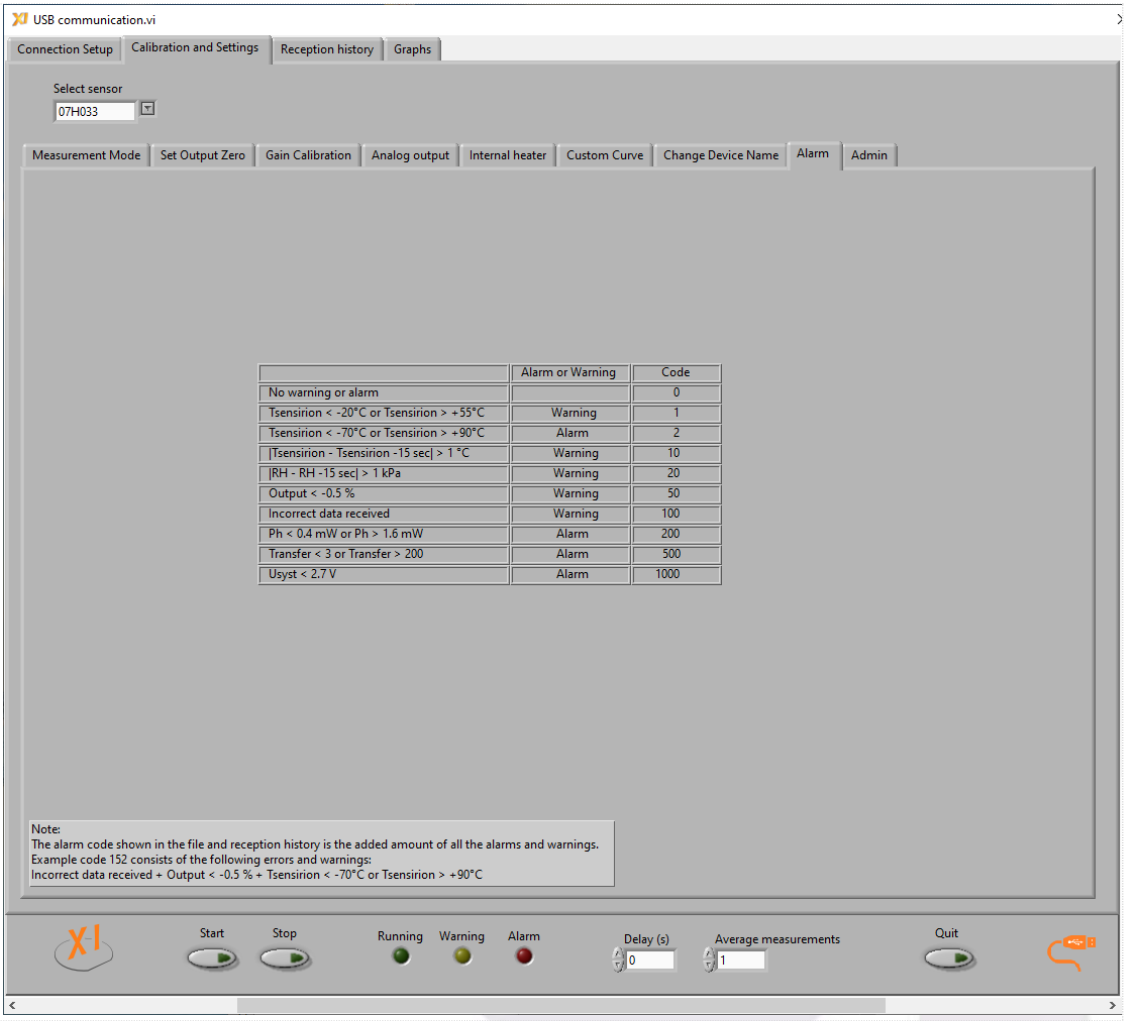
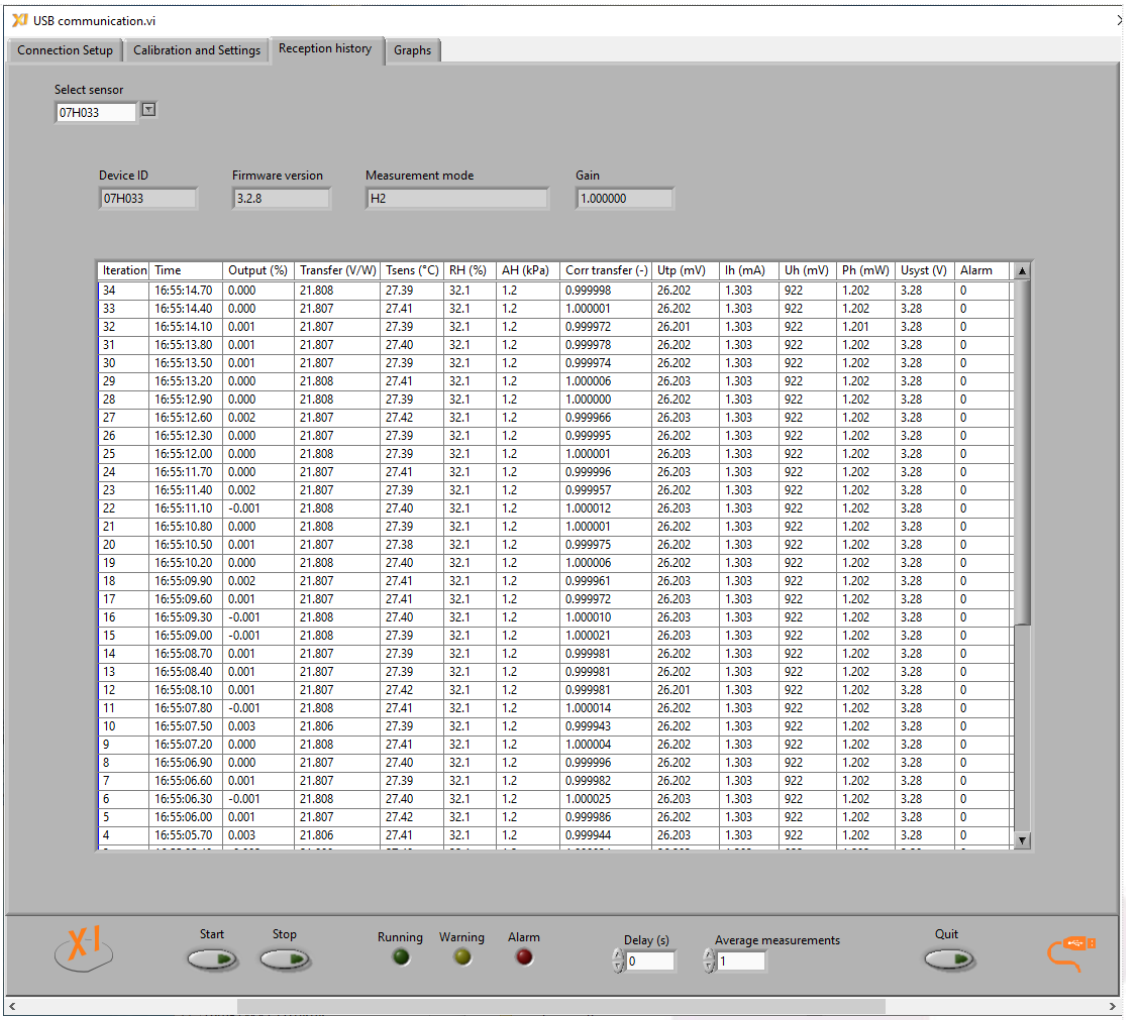


Figure 11: The Change name device ID page, which can be used to change the device ID of the XEN-5320

11 The Reception History Page

11.1 The displayed data

On the Reception history page, the measurement data are shown as numbers, see Fig. 12. There is a Reception history page for each sensor. At the top of each page, the **Sensor ID**entification is shown, the **Firmware version** of the sensor, the **Measurement mode**, i.e., the conversion curve used to calculate the output in %. This can be altered on the Measurement mode page. And finally the **Gain** is shown, the gain can be calibrated on the Gain Calibration page. The output values are multiplied with the gain to get a 100% output when 100% of the second gas type is present. For instance, for an air-helium curve, gain calibration is performed in 100% helium. The gain factor is calculated to get the displayed output also to 100%. If the calculated value deviates too much (more than a few percent), for instance, when a wrong gas mixture is present, the gain is set to unity instead.



Iteration	Time	Output (%)	Transfer (V/W)	Tsens (°C)	RH (%)	AH (kPa)	Corr transfer (-)	Utp (mV)	Ih (mA)	Uh (mV)	Ph (mW)	Usyst (V)	Alarm
34	16:55:14.70	0.000	21.808	27.39	32.1	1.2	0.999998	26.202	1.303	922	1.202	3.28	0
33	16:55:14.40	0.000	21.807	27.41	32.1	1.2	1.000001	26.202	1.303	922	1.202	3.28	0
32	16:55:14.10	0.001	21.807	27.39	32.1	1.2	0.999972	26.201	1.303	922	1.201	3.28	0
31	16:55:13.80	0.001	21.807	27.40	32.1	1.2	0.999978	26.202	1.303	922	1.202	3.28	0
30	16:55:13.50	0.001	21.807	27.39	32.1	1.2	0.999974	26.202	1.303	922	1.202	3.28	0
29	16:55:13.20	0.000	21.808	27.41	32.1	1.2	1.000006	26.203	1.303	922	1.202	3.28	0
28	16:55:12.90	0.000	21.808	27.39	32.1	1.2	1.000000	26.202	1.303	922	1.202	3.28	0
27	16:55:12.60	0.002	21.807	27.42	32.1	1.2	0.999966	26.203	1.303	922	1.202	3.28	0
26	16:55:12.30	0.000	21.807	27.39	32.1	1.2	0.999995	26.202	1.303	922	1.202	3.28	0
25	16:55:12.00	0.000	21.808	27.39	32.1	1.2	1.000001	26.203	1.303	922	1.202	3.28	0
24	16:55:11.70	0.000	21.807	27.41	32.1	1.2	0.999996	26.203	1.303	922	1.202	3.28	0
23	16:55:11.40	0.002	21.807	27.39	32.1	1.2	0.999957	26.202	1.303	922	1.202	3.28	0
22	16:55:11.10	-0.001	21.808	27.40	32.1	1.2	1.000012	26.203	1.303	922	1.202	3.28	0
21	16:55:10.80	0.000	21.808	27.39	32.1	1.2	1.000001	26.202	1.303	922	1.202	3.28	0
20	16:55:10.50	0.001	21.807	27.38	32.1	1.2	0.999975	26.202	1.303	922	1.202	3.28	0
19	16:55:10.20	0.000	21.808	27.40	32.1	1.2	1.000006	26.202	1.303	922	1.202	3.28	0
18	16:55:09.90	0.002	21.807	27.41	32.1	1.2	0.999961	26.203	1.303	922	1.202	3.28	0
17	16:55:09.60	0.001	21.807	27.41	32.1	1.2	0.999972	26.203	1.303	922	1.202	3.28	0
16	16:55:09.30	-0.001	21.808	27.40	32.1	1.2	1.000010	26.203	1.303	922	1.202	3.28	0
15	16:55:09.00	-0.001	21.808	27.39	32.1	1.2	1.000021	26.203	1.303	922	1.202	3.28	0
14	16:55:08.70	0.001	21.807	27.39	32.1	1.2	0.999981	26.202	1.303	922	1.202	3.28	0
13	16:55:08.40	0.001	21.807	27.39	32.1	1.2	0.999981	26.202	1.303	922	1.202	3.28	0
12	16:55:08.10	0.001	21.807	27.42	32.1	1.2	0.999981	26.201	1.303	922	1.202	3.28	0
11	16:55:07.80	-0.001	21.808	27.41	32.1	1.2	1.000014	26.202	1.303	922	1.202	3.28	0
10	16:55:07.50	0.003	21.806	27.39	32.1	1.2	0.999943	26.202	1.303	922	1.202	3.28	0
9	16:55:07.20	0.000	21.808	27.41	32.1	1.2	1.000004	26.202	1.303	922	1.202	3.28	0
8	16:55:06.90	0.000	21.807	27.40	32.1	1.2	0.999996	26.202	1.303	922	1.202	3.28	0
7	16:55:06.60	0.001	21.807	27.39	32.1	1.2	0.999982	26.202	1.303	922	1.202	3.28	0
6	16:55:06.30	-0.001	21.808	27.40	32.1	1.2	1.000025	26.203	1.303	922	1.202	3.28	0
5	16:55:06.00	0.001	21.807	27.42	32.1	1.2	0.999986	26.202	1.303	922	1.202	3.28	0
4	16:55:05.70	0.003	21.806	27.41	32.1	1.2	0.999944	26.203	1.303	922	1.202	3.28	0

Figure 12: The Reception History Page

Explanation of the columns.
Iteration is the number of the measurement, this is counted per device and starts at 0. The iteration restarts at 0 after a stop and (re)start of the measurements.

Time is the computer time of the measurement. It is given in increments of 10 ms.

Output in % is the deviation of the corrected transfer with respect to the calibration transfer.
In case the **Measurement mode** is H2 for hydrogen, the output is given as % H2 concentration.
In case the **Measurement mode** is He for helium, the output is given as %helium. T
In case the **Measurement mode** is GEN, a general output is given as % of the difference between the calibration transfer and the corrected transfer.

Transfer in V/W (output voltage of the thermocouple sensing element divided by the heater power) is what has been measured.

Tsens in ºC is the temperature measured with the Sensirion humidity sensor.

RH (Relative Humidity in %) is the RH measured by the Sensirion RH sensor.

AH shows the absolute humidity pressure in kPa. It equals the RH times the saturation water vapor pressure at **Tsens**.

Corr_transfer, the corrected transfer gives the nominal transfer (but not in V/W) as calculated after correcting for the differences between the temperature and humidity during calibration and during measurement. The remaining difference from unity is then ascribed to the parameter to be measured.

Utp is the output voltage of the thermopile measuring the temperature elevation of the heater element.

Ih in mA is the current through the heater element on the sensing element's membrane.

Uh in mV is the voltage across the heater element on the sensing element's membrane.

Ph in mW, the multiplication of **Ih** and **Uh** is the power dissipated in the membrane. The Thermocouple voltage **Utp** divided by the Heater Power **Ph** gives the measured **Transfer**.

USyst in V gives the power supply voltage of the XEN-5320 after stabilization. This should normally read as about 3.3 V.

Alarm shows a code for a selected number of warnings and errors. Se the Alarm Chap. for the codes.

11.2 The filed data

All data are stored in a text file, with a name starting with the date (yyyy-mm-dd), followed by the device name. If no file for the current date exists, a new file will be made. Otherwise, the data are appended to the existing file.
For each device and day, a new file is made. The file starts with some general data on the device, with subsequently all the measurement data. If the measurement is stopped and then started again, the header data are repeated.
The header resembles the data shown in Fig. 13 below (with some long numbers reduced in length):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Device address	Device ID	Factory Device ID	Firmware	Measurement mode	Gain	Speed	Y_AH_Cal (-)	TF_Cal (V/W)	Temp_Cal (°C)				
2	ASRL8::INSTR	07H033	07H033	3.2.8	H2	1	Standard	0.997218	21.807154	27.377625				
3	Iteration	Time	Output (%)	Transfer (V/W)	Tsens (°C)	RH (%)	AH (kPa)	Corr transfer (-)	Utp (mV)	Ih (mA)	Uh (mV)	Ph (mW)	Usyst (V)	Alarm
4	0	59:40.6	0	21.808	27.41	32	1.2	1.000008	26.204	1.303	922	1.202	3.28	0
5	1	59:40.8	0.001	21.807	27.4	32	1.2	0.999982	26.204	1.303	922	1.202	3.28	0
6	2	59:41.1	-0.001	21.808	27.39	32.1	1.2	1.000015	26.203	1.303	922	1.202	3.28	0
7	3	59:41.4	0	21.807	27.41	32	1.2	0.999998	26.204	1.303	922	1.202	3.28	0
8	4	59:41.7	0	21.808	27.4	32	1.2	1.000003	26.203	1.303	922	1.202	3.28	0
9	5	59:42.0	-0.001	21.808	27.41	32	1.2	1.000026	26.204	1.303	922	1.202	3.28	0
10	6	59:42.3	0.002	21.807	27.39	32.1	1.2	0.999967	26.204	1.303	922	1.202	3.28	0
11	7	59:42.6	0.001	21.807	27.41	32	1.2	0.999985	26.204	1.303	922	1.202	3.28	0
12	8	59:42.9	-0.002	21.808	27.4	32	1.2	1.000031	26.204	1.303	922	1.202	3.28	0
13	9	59:43.2	0	21.807	27.42	32.1	1.2	0.999997	26.204	1.303	922	1.202	3.28	0
14	10	59:43.5	-0.001	21.808	27.42	32	1.2	1.000011	26.204	1.303	922	1.202	3.28	0
15	11	59:43.8	0	21.808	27.41	32	1.2	1.000004	26.203	1.303	922	1.202	3.28	0

Figure 13: The Filed data.

The **Device ID** is a unique coding for each XEN-5320.
The **Factory Device ID** is the name given to the device by the manufacturer.
The **Firmware** is the version of the microcontroller program.
The **Measurement mode** is explained above.
The **Speed** is the measurement speed.
TC Transfer is the correction factor in the firmware for temperature changes.
Y_AH_Cal (-) is the correction factor used for humidity during calibration.
TF_Cal (V/W) is the transfer during calibration.
Temp_Cal (ºC) is the temperature during calibration.
The **Gain** is the factor by which the output is multiplied to get a 100% output value for 100% second gas.
These three factors give the XEN-5320 measurement data during calibration. It is possible to update these calibration data by performing a new calibration using the Calibration Page.
These data are used, together with subsequent temperature and humidity measurement to first calculate the corrected transfer at the subsequent measurement. Then difference between the corrected and actually measured transfer is used to calculate the output signal, either using the Sensitivity, or with a more complicated formula or look-up Table.

Then the same data are given as displayed in the reception page.
Each measurement data line occupies about 0.1 kB of file size.
Thus, a file with 500 000 measurements is about 50 MB large.

12 The Graphs Page

On the Graphs Page, one of all the parameters that are shown in the reception can be displayed against the iteration number. Time cannot be displayed.
Fig. 14. shows several data of sensor 07H033: output (%), Transfer and Utp for some 185 measurements. The data refresh time is about 300 ms for the normal measurement speed used here. The graph shows the effect of breathing in and out over the XEN-5320. An average Absolute Humidity (AH) of about 4 kPa is attained, where the Maximum Saturation pressure of water vapor at 37 ºC is 6 kPa.

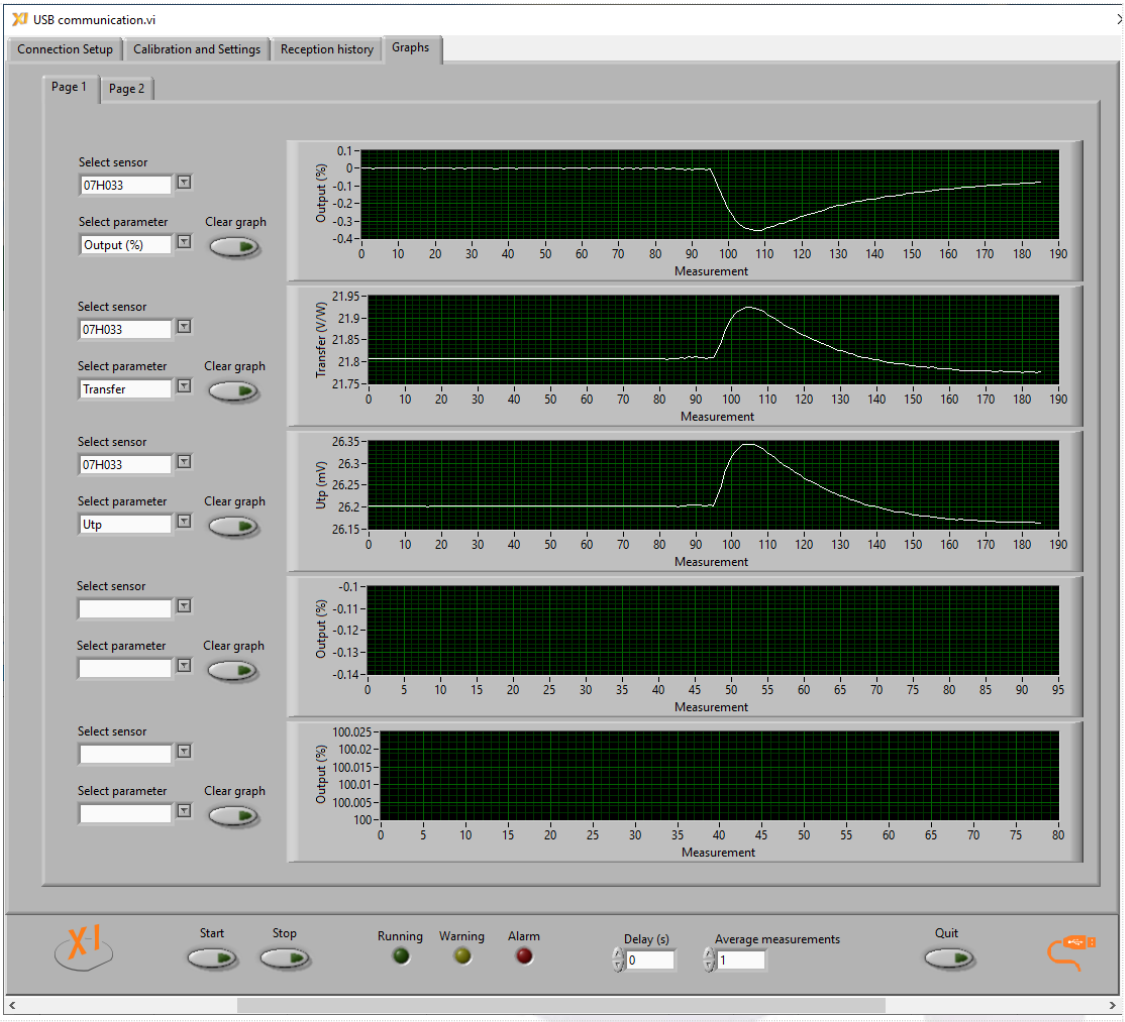


Figure 14: The Graphs Page

13 Communication commands

For those who want to organize their own communication between XEN-5320 and control device (computer, laptop, smart phone?), the communication commands are on request.

14 Trouble shooting

The measurement data show a lot of zero's instead of real data.	It can be that your computer shows only zeros after the decimal separator, if this separator is a comma. This separator should be changed into a point(.), and then, correct trailing digits will appear. This can be done in the Country & Language part of the configuration screen of your PC.
The time data are wrong when importing the measurement file into EXCEL.	Be sure to define the time data column as u:mm:ss.00 in the cell properties, adjusted format.
When importing the measurement data into EXCEL they are of an incorrect magnitude.	This is a point/comma settings result. When importing the data in EXCEL, use the advanced settings to exchange the designation of a point and a comma.
Commands in the Calibration and Settings Page do not work.	Stop the measurement before performing these actions.

For any further questions, problems or remarks, please contact RS Product Solutions or search the website for updated information:

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