MANUAL XEN-5320 CAN

Manual XEN-5320 CAN ATEX version only

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Contents

1	Proc	duct Description	3
	1.1	Applied Standards	3
	1.2	Marking	4
	1.3	Specific Conditions of Use	5
	1.4	Safety references	5
	1.5	Mounting	5
	1.6	Installation	6
	1.7	Operation, Maintenance and Elimination of Disturbances	6
	1.8	Maintenance and repair	7
	1.9	Service address	7
2	Inst	allation	8
3	Lab	VIEW communication software	9
	3.1	Installation	9
	3.2	The Connection Setup Page	10
	3.3	The Measurement Mode page	12
	3.4	Set Output Zero Page	13
	3.5	Gain Calibration Page	14
	3.6	Custom Curve Page	15
	3.7	Change Sensor Name	16
	3.8	Change CAN settings Page	17
	3.8.		
	3.9	Alarm Page	19
	3.10	The Reception History Page	20
	3.10	0.1 The displayed data	20
	3.10	0.2 Explanation of the columns	21
	3.11	The filed data	22
	3.12	The Graphs Page	23
	3.13	Trouble shooting	24



1 Product Description

The XEN-5320 is an intelligent gas sensor for the measurement of gas composition, such as helium in air (hydrogen mimicking), oxygen (diving applications) or nitrogen; hydrogen in air or nitrogen (fuel cell applications). In addition, it can serve as a thermocouple-vacuum sensor, and it can give a general output signal, useable for other gas compositions.

The sensor is based on the measurement of the thermal conductivity of the ambient gas, using the proven thermal conductivity sensor XEN-TCG3880.

To compensate for the influence of temperature and humidity, these are measured separately and a correction is made for them in the micro-controller. Each device is factory calibrated (zeroed), the customer can re-zero. Gain adjustment is also possible.

The Intelligent gas sensor XEN-5320-CAN is built according to ATEX Directive 2014/34/EU and UKCA SI 2016 No. 1107 (as amended) Category 3G. The Intelligent gas sensor is built for local installation in **ATEX zone 2**.

1.1 Applied Standards

The Intelligent gas sensor XEN-5320-CAN is in conformity with Directive 2014/34/EU (ATEX 114) and UKCA SI 2016 No. 1107 (as amended) according to the following harmonized/designated standards:

EN 60079-0:2018 EN 60079-7:2015/A1:2018 EN 60079-11:2012 EN 60079-18:2015/A1:2017 EN 61326-1 (2013) (Emission) EN 61326-1 (2013) (Immunity) EN 301 489-01 V1.9.2 & EN 301 489-03 V1.6.1 (Emission/Immunity) 47 CFR 15 & ICES-003 (Issue 6) (Emission) FCC Public Notice DA 09-2478 (Emission) KDB Publication 714737 (Emission)



1.2 Marking

The equipment is marked according to European Directive 2014/34/EU UKCA SI 2016 No. 1107 (as amended):

UK CE E II 3G Ex ec ic mc IIC T4 Gc X Ta = -20°C to +55°C

In which:

П	:	Equipment group II for use above ground
3G	:	Category 3G for use in zone 2
Ex ec	:	Type of protection increased safety
ic	:	Type of protection intrinsically safe
mc	:	Type of protection encapsulation
IIC	:	Gasgroup IIC, for use in IIA, IIB and IIC environments
T4	:	Temperature class T4, maximum surface temperature 135°C
Gc	:	Equipment protection level Gc for use in zone 2
Х	:	Specific Conditions of Use
Та	:	Ambient temperature range



1.3 Specific Conditions of Use

- Maximum voltage that can be applied to the non-intrinsically safe connection facilities without invalidating the type of protection Um = 30 Vdc
- Prospective short circuit current is limited to 50A.
- The XEN-5320-CAN shall be used only with dedicated extension cables and terminators Type XEN-84...
- The connectors, terminators and cables shall be protected from UV light when installed.
- Sensor and connectors comply with low risk for mechanical danger, which means that they shall be protected from any high risk of mechanical danger.
- Do not connect or disconnect connectors when energized.
- Potential electrostatic charging hazard, connectors shall only be cleaned with a damp cloth.
- Tightening torque for the connectors is 0.49 Nm to 0.6 Nm.
- Cable gland is an integral part of the sensor and cannot be replaced.

1.4 Safety references

Devices in hazardous area must be installed, supervised, maintained and kept in good conditions by the owner of the plant. Part of this is an inspection after the transport to identify possible damages caused during the transport.

Only qualified workers are allowed to install and dismount as well as doing maintenance work on the Intelligent gas sensor XEN-5320-CAN. All universally valid rules and laws and other binding directives for the safety of people and environment must be kept.



WARNING – DO NOT CONNECT OR DISCONNECT CONNECTORS WHEN ENERGIZED

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – CLEAN ONLY WITH A DAMP CLOTH

1.5 Mounting

The Intelligent gas sensor XEN-5320-CAN must be protected against aggressive and unusual environmental conditions which could cause damages on the equipment. This could be e.g. acids or high and low temperatures other than the allowed ambient temperature range.

The maximum process temperature on the sensor side is limited to +55°C.

For installation, please refer to EN 60079-14 and other valid standards and directivities on the place of erection.



1.6 Installation

The sensor shall be connected with following dedicated extension cable and terminators:

XEN-84005 Cable 0.5 m male M12 - female M12 connector XEN-84010 Cable 1 m male M12 - female M12 connectors XEN-84020 Cable 2 m male M12 - female M12 connectors XEN-84040 Cable 4 m male M12 -female M12 connectors XEN-84100 Cable 10 m male M12 - femaleM12 connectors XEN-84200 Terminator set 120 Ohm male M12 and female M12 connectors

The XEN-5320-CAN contains an external equipotential bonding conductor terminal which is designed for a minimum cross-section of 4 mm².

When installing the equipotential bonding conductor, be sure that the conductor is routed properly in a fixed position to ensure that the conductor will not rotate or become loose. A strain relief must be applied within 30 cm of the external equipotential bonding conductor terminal.

The earthing resistance shall be below 1 M Ω (preferably below 10 Ω) and shall be checked before initial operation and yearly.

- Observe all specific conditions of use above!
- Protect the M12 connectors efficiently against damage.
- The cables must be firmly laid and effectively protected against damage.
- Connectors must always be closed with a counterpart. They may be left open in the field only briefly for servicing purposes.

1.7 Operation, Maintenance and Elimination of Disturbances

Devices in hazardous area must be installed, supervised, maintained and kept in good conditions by the owner of the plant. For information, refer to EN 60079-17. Only skilled workers are allowed to do maintenance and the elimination of disturbance work.

Before doing this work, the safety requirements must be kept!

For elimination of disturbances, only original spare parts after consulting with RS Products Solutions B.V. are allowed to use. Before using them again, the safety requirements must be kept.

For information about operation, maintenance and elimination of disturbances for the internal components, please refer to the individual manuals of these components.



1.8 Maintenance and repair

The sensor or connectors shall not be modified nor can be repaired. In case of a fault please contact the manufacturer.

1.9 Service address

RS Products Solutions B.V. Distributieweg 58 2645 EJ Delfgauw

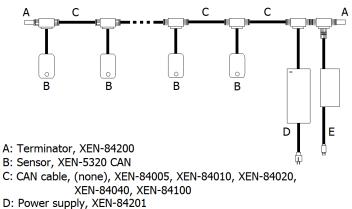


2 Installation

The CAN bus network for the XEN-5320 CAN sensors consists of the following items:

- Terminators
- XEN-5320 CAN sensor(s)
- CAN cables (optionally)
- Power supply, 12 V
- Kvaser CAN-USB interface

Connect the system as following:



E: Kvaser CAN-USB interface, XEN-84202

The CAN bus network consist of a central line (all the cables C), with CAN bus devices connected via T-pieces. The CAN bus line has to be terminated with 120 Ohm Terminators (A) on both ends. It is not allowed to split the central line, into a Y-shaped configuration. Only T sections to the XEN-5320 CAN sensors, power supply and CAN-USB interface (together called CAN bus devices, B) are allowed. The cables to the devices from the T-sections may not be longer than 30 cm.

The CAN-USB devices (B) can be at any location in the CAN bus line, in any order. The length of the cables (C) between the devices can range from zero to hundreds of meters. The total length of the CAN bus line is in general limited to a few hundred meters, also depending on the data rate.



3 LabVIEW communication software

3.1 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.



3.2 The Connection Setup Page

Before starting the XEN-5320-CAN software, make sure the Kvaser CAN-USB interface is installed and connected by an USB port to the computer.

When the XEN-5320-CAN program 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 Connect to CAN network can be pressed so a connection is made with the Kvaser CAN-USB interface. If a connection is made the green bulb Connected to CAN bus lights up continuously. Once the connection is made the button Find devices can be pressed to search for any connected XEN-5320-CAN sensors. Maximally 100 sensors can be found with CAN addresses in the range of 0000FF40*hex* and 0000FFA4*hex*. Searching for sensors will take a few seconds.

The **Enable** button has to be activated (indicated by the green light in the button) to actually measure the device.

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 too rapid. Standard is a data refresh time of 0.3 seconds, for up to about 25 sensors. With more sensors, the data refresh time will rise. The Delay is in seconds. Adding delay will reduce the measurements file size, and avoid eventual slowing down of the measurement refresh time if extreme long experiments are carried out (extending over days).

The Average measurements window allows to average measurements.

With the **Select CAN network** window the user can select a CAN network when multiple CAN networks are connected to the PC. Standard this setting should be 1.

When the **Enable remote control** button is enabled and multiple CAN networks are connected to the PC the user can control multiple instances of the software.

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.



	Connect to CAN network	۲			[™] C:\R	Select direct	ctory for saving /27\data	j measuremen	it data	6	Enable ren	
	Find devices	Error			Select C	AN baudrate Sa aud 🔽	ave CAN baudi	ate	Select CAN	l network	contro	-
	Device Address	Enable	Sensor Name	Factory ID	Firmware	Measurement Mode	Gain	Speed	Warning	Alarm	_	
0										۲	^	
										0		
										•		
									•	•		
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											CAN	

Before the connection to the CAN network is made the user can select the desired baudrate with the **Select CAN baudrate** drop down menu. Connected sensors should all have the same baudrate to be able to work properly.

The selected CAN baudrate can be saved by pressing the Save CAN baudrate button.

The **Warning** and **Alarm** lights on the right will light up at the appropriate sensor if a warning or alarm has been issued. The codes are listed on the Reception history page of the sensor in question, and the code will also be written into the file of that sensor. See the Par. on Alarm Page data for the codes, and consult the data sheet for background information.

A general **Warning** and **Alarm** light is at the bottom of all pages. This page indicates for which sensor(s) the warning or alarm is given.



3.3 The Measurement Mode page

Fig. 2 shows the measurement mode page. On this page the curve used to calculate the output signal is chosen.

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.

5 CAN communication.vi	-		×
Connection Setup Calibration and Settings Reception history Graphs			
Select sensor 07H34 I			
Measurement Mode Set Output Zero Gain Calibration Custom Curve Change Sensor Name Change CAN settings Alarm Admin			
Measurement mode and speed read from sensor Select measurement mode and speed H2, normal			
Instructions:			
 Make sure no measurements are running (Running light must be off) Select the sensor and check if the Device ID is displayed Select the measurement mode and press the "Change measurement mode" button If the measurement mode and press the "Change measurement mode and speed is shown in the "Measurementmode and speed read from sensor" field If the measurement mode correctly has been changed the new measurement mode and speed is shown in the "Measurementmode and speed read from sensor" field By pressing the button "Check measurement mode and speed" the current measurement mode and speed is read from the sensor and displayed 			
Remote Start Stop Running Warning Alarm Delay (s) Average measurements Quit	CAN	Ø	
ure 2: 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.

3.4 Set Output Zero Page

The Set Output Zero Page (see Fig. 3) allows zeroing of the device. The zeroing data are stored in the memory of the XEN-5320 CAN, and zeroing can be carried out when so desired. First **Select sensor** to be zeroed (left top), then select if the zeroing should be performed on only the connected sensor or on all connected sensors. Start zeroing by pushing the **Start set output zero** button (after stopping the measurements). The zeroing takes a number of seconds, and takes longer when multiple sensors are zeroed at the same time. The busy light is flashing green and yellow.

1p_CAL	CAL Temp	After set zero				re set zero		
		AL TF_CAL	V AU C			e set zero	Befor	
5720	20 21 6757		ne Y_AH_CA	Device Nar	Temp_CAL	TF_CAL	Y_AH_CAL	Device Name
	31.0/5/	21.860939	0.997185	07H34	25.789000	20.965000	0.995915	07H34
_								
utput zero on	Perform set out	Busy	В					
	0-	• finished	: zero Set zero	Start set output				
ed sensor	The selected		Servero					
	 The selected All connected 	O				light must be off)	running (Running	measurements an
outp		۲	7870	Start set output				

Figure 3: The Set output zero Page, with data of the device before and after zeroing.



3.5 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 (see Fig. 4).

There should be no measurement running.

In HE measurement mode, 100% helium should be present around the sensor head, in H2 mode 100% hydrogen. First **Select sensor** (top left) then push the **Start set gain** button, and 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 3 percent, for instance in air, the error light will shine and a gain factor of unity is returned. This is also the method to reset the gain factor. The gain factor is stored in the memory of the XEN-5320 CAN.

The gain calibration can be performed on only the selected sensor or on all connected sensors by selecting the desired setting in the **Perform gain calibration on** menu.

CAN communication.vi	-				-		
nnection Setup Calibration and Setting	Reception histo	ory Graphs					
Select sensor 07H34							
Measurement Mode Set Output Zero	Gain Calibration	Custom Curve Change Se	nsor Name Change CAN settings Alarm	Admin			
	Before g	ain calibration	After gain calibration	า			
	Device Na		Device Name Gain				
				_			
				_			
	l –			_			
	J			¥			
			_	Busy	Perform gain calibration on:		
nstructions: Make sure no measurements are running Select a sensor			Start gain calibration Gain calib	oration finished	• The selected sensor		
Make sure the sensor is measuring in the Place the sensor in 100 % H2 or He Select if the gain calibration should be p				۲	○ All connected sensors		
 Start gain calibration and wait until the b Check if the data which is received befor If an error occurs during the gain calibrat 	e and after the gain	calibration is correct		Error			
	-						
Remote Start	Stop	Running Warning Ala	beidy (d) interagen	neasurements		$\widehat{\times}$	•
	•						
are 4: The Gain Calibration							Ĺ



3.6 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. 5 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. 6 shows an example of the custom-curve txt file.

Yes CAN communication.vi — 🗆 X	
Connection Setup Calibration and Settings Reception history Graphs	
Select sensor	
07H34	
Measurement Mode Set Output Zero Gain Calibration Custom Curve Change Sensor Name Change CAN settings Alarm Admin	
Curve name Curve name 3 Select curve	
Send curve to the	
Gas fraction Corr transfer Load curve from sensor selected sensor Gas fraction Corr transfer Load curve from file	
3 Send curve to all sensors 3 3	
6 6 6 6	
14 14 14	
15 15 15 15 15 15 16 16 16 16 16	
16 16 16 16 16 16 17 17 17 17 17	
18 Instructions: 18 18	
19 19 Make sure no measurements are running (Running light must be off) 19 19 20 20 20 20 20 20	
20 20 - Security station 20 20 20 21 21 21 - Prest the Load curve from file button 21 21 21	
22 22 - Check if the curve is correct - Press the Send curve to the selected sensor 22 22 22	
23 23 button or the Send curve to all sensors button 23 23 23 - Press the Load curve from sensor button	
and check if the curve is correctly loaded	
Remote Start Stop Running Warning Alarm Delay (c) Average measurements Quit	
Remote Start Stop Running Warning Alarm Delay (s) Average measurements Quit	
Figure 5: The Custom Curve page.	Figure 6: The helium.txt custom
rigue of the custom curve page.	curve text file.

To use a Custom curve, first **Select sensor**. Then **Select curve** from the directory where the custom curves are stored (user chosen). Then push **Load curve from file**, the curve should now appear in the right columns. Upload this curve to the selected sensor by pushing **Send curve to sensor**. By pushing **Load curve from sensor** the curve currently stored in the sensor's memory will appear in the left columns.

There should be no measurement running.



3.7 Change Sensor Name

The Change Sensor Name page allows changing the device name of the XEN-5320 CAN. 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. 7.

First **Select sensor**, then enter the new name in the **Give new device name** field, and by pressing the button **Give new device name** the name is transferred to the XEN-5320 memory. Once the transfer is complete the new name is read back from the XEN-5320 and shown in the **New Device name read from sensor** field. The **Incorrect name** light burns when the field **Give new device name** is empty or contains more than 10 characters. There is no check for duplicate names.

There should be no measurement running.

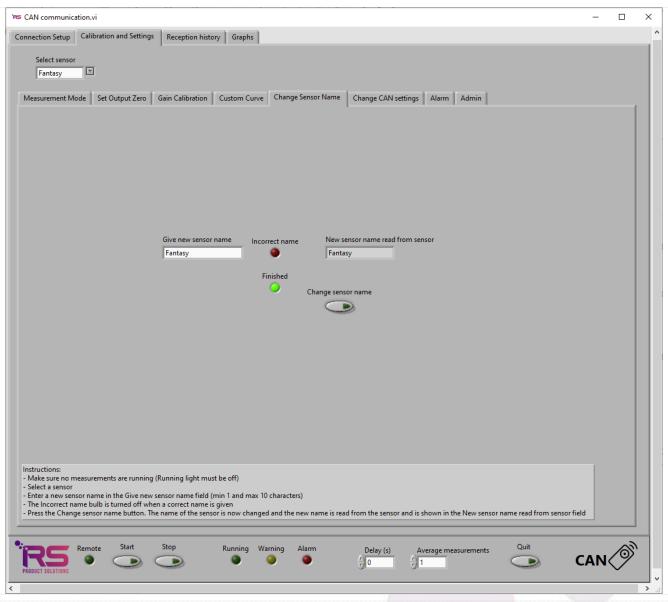


Figure 7: The Change Device Name page, used to change the device name of the XEN-5320 CAN

3.8 Change CAN settings Page

For the CAN bus to work properly, each XEN-5320-CAN device needs an unique CAN address in the CAN network. The page that can be used to change the CAN address is shown in Fig. 8. Be sure that no measurement is running. If two devices have the same address, one of the two needs to be disconnected in order to change the address of the other one.

nnection Setu	p Calibration and Setting	s Reception his	tory Graphs						
inicetion setu	P	Reception mat							
Select sen									
07H034	T								
Measurement	Mode Set Output Zero	Gain Calibration	Custom Curve C	hange Sensor Name	Change CAN setti	ngs Alarm Ad	Imin		
				-					1
			Error CAN address						
	Select new CAN address		already in use	New Devic	e address read from s	ensor Chang	e device address		
		T	۲						
nstructions: Make sure pr	o measurements are running	a (Running light m	ust he off)						
Select a sens	or				10-11 I II	CAN1 11	、		
The Error CA	CAN address (each sensor n N address already in use bul	b will turn on when	n the selected CAN addr	ress has already beer	n used by another sen	sor.			
 Press the Characteristic sensor field 	ange device address button.	The CAN address of	of the device is now cha	nged and the new (AN address is read fro	om the sensor and is	shown in the New Devic	e address read from	
	Remote Start	Stop	Running Warnin	g Alarm	Delay (s)	Average measure	Quit		0)
			• •	۲				CAN	()
スリ		and the second se							\sim
RODUCT SOLUTION	S								
RODUCT SOLUTION	s ange CAN setting								



3.8.1 Instructions

- Make sure no measurements are running (Running light must be off)

- Select the XEN-5320 CAN device for which the settings needs to change. This is done by selecting the XEN-5320 CAN device in the Select sensor drop down menu.

- Select a new CAN address in the Select new CAN address drop down menu.

- Press the Change device address button

If the selected CAN address already exists in the CAN network the Error CAN address already in use bulb will light up and no changes will be made. When the selected CAN address not already exists in the CAN network the CAN address will be changed. When the CAN address is successfully changed the new device address is shown in the New Device address read from sensor field.

Note: The software does not work correctly if multiple XEN-5320 CAN devices have the same CAN address.



3.9 Alarm Page

The Alarm page shows the cumulative codes of a selected group of warnings and errors, calculated by the LabView program, see Fig. 9. 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.

nection Setup Calibration and Set	ttings Reception history Graphs					
Select sensor						
07H034						
,						
Neasurement Mode Set Output Z	ero Gain Calibration Custom Curve Chang	je Sensor Name 🛛 Chan	ge CAN settings	s Alarm Admin		
		Alarm or Warning	Codo	-1		
	No warning or alarm	Alarm or warning	Code 0	-		
	Tsensirion < -20°C or Tsensirion > +55°C	Warning	1	-		
	Tsensirion < -70°C or Tsensirion > +90°C	Alarm	2			
	Tsensirion - Tsensirion -15 sec > 1 °C	Warning	10			
	RH - RH -15 sec > 1 kPa	Warning	20			
	Output < -0.5 %	Warning	50			
	Incorrect data received	Warning	100	_		
	Ph < 0.4 mW or Ph > 1.6 mW Transfer < 3 or Transfer > 200	Alarm	200 500	_		
	Usyst < 2.7 V or Ubat < 3.5 V	Alarm	1000	_		
	USyst < 2.7 V OF OBAL < 5.5 V	Aidrm	1000			
				J		
ote: a alarm code chown in the file and	reception history is the added amount of all the ala	rms and warnings				
ample code 152 consists of the follo	owing errors and warnings:	rms and warnings.				
correct data received + Output < -0	0.5 % + Tsensirion < -70°C or Tsensirion > +90°C					
Remote Start	Stop Running Warning				Quit	
Remote Start	Stop Running Warning		elay (s)	Average measurements		
ODUCT SOLUTIONS		• ÷	9	1		
re 9. The Alarm page A	which shows the different types of	f alarms and war	minos			
re 9: The Alarm page, v	which shows the different types of	f alarms and war	mings			



3.10 The Reception History Page

3.10.1 The displayed data

On the Reception history page, the measurement data are shown as numbers, see Fig. 10. The reception history can be shown for one sensor at a time, by selecting the desired sensor from the **Select Sensor** drop down menu. 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.

Time 15:04:04.16 15:04:03.26 15:04:03.26	Firmware vo C2.8 Output (%) 0.0000 0.0015	H		mode	Gain 1.000	_								
D Time 15:04:04.16 15:04:03.86 15:04:03.56	C2.8 Output (%) 0.0000	H. Transfer (V/W)	2	mode										
n Time 15:04:04.16 15:04:03.86 15:04:03.56	C2.8 Output (%) 0.0000	H. Transfer (V/W)	2	mode										
n Time 15:04:04.16 15:04:03.86 15:04:03.56	C2.8 Output (%) 0.0000	H. Transfer (V/W)	2	mode										
n Time 15:04:04.16 15:04:03.86 15:04:03.56	C2.8 Output (%) 0.0000	H. Transfer (V/W)	2	mode										
n Time 15:04:04.16 15:04:03.86 15:04:03.56	Output (%) 0.0000	Transfer (V/W)			1.000									
15:04:04.16 15:04:03.86 15:04:03.56	0.0000		Tsens (°C)											
15:04:04.16 15:04:03.86 15:04:03.56	0.0000		Tsens (°C)											
15:04:04.16 15:04:03.86 15:04:03.56	0.0000		Tsens (°C)											
15:04:03.86 15:04:03.56		21.86275		RH (%)	AH (kPa)	Corr transfer (-)		lh (mA)	Uh (mV)	Ph (mW)	Usyst (V)			
15:04:03.56	0.0015		31.43	25.72	1.2	0.999996	25.8462	1.28812	917.78	1.18220	3.30	0		
	0.0000	21.86261	31.40	25.71	1.2	0.999972	25.8460	1.28812	917.78	1.18220	3.30	0		
	0.0000	21.86289 21.86240	31.43 31.41	25.69 25.70	1.2	0.999996	25.8463 25.8457	1.28812	917.78	1.18220 1.18220	3.30 3.30	0		
15:04:03.20	-0.0005	21.86240	31.41	25.70	1.2	1.000008	25.8457	1.28812	917.78 917.76	1.18220	3.30	0		
15:04:02.90	0.0005	21.86282	31.36	25.70	1.2	0.999966	25.8458	1.28808	917.78	1.18217	3.30	0		
15:04:02.36	0.0010	21.86254	31.43	25.69	1.2	0.999984	25.8453	1.28812	917.76	1.18217	3.30	0		
15:04:02.06	-0.0010	21.86338	31.43	25.70	1.2	1.000020	25.8458	1.28808	917.76	1.18215	3.30	0		
15:04:01.76	0.0005	21.86296	31.40	25.71	1.2	0.999990	25.8458	1.28812	917.76	1.18217	3.30	0		
15:04:01.46	-0.0015	21.86345	31.44	25.70	1.2	1.000026	25.8457	1.28808	917.76	1.18214	3.30	0		
15:04:01.16	-0.0005	21.86352	31.39	25.70	1.2	1.000014	25.8464	1.28812	917.76	1.18217	3.30	0		
												-		
												-		
											3.30	0		
15:03:59.06	0.0005	21.86282	31.43	25.67	1.2	0.999996	25.8455	1.28808	917.76	1.18216	3.30	0		
15:03:58.76	-0.0020	21.86366	31.46	25.69	1.2	1.000044	25.8465	1.28812	917.76	1.18217	3.30	0		
15:03:58.46	0.0005	21.86303	31.39	25.70	1.2	0.999990	25.8468	1.28812	917.78	1.18222	3.30	0		
15:03:58.16	0.0000	21.86310	31.41	25.69		1.000002	25.8465	1.28812			3.30			
	0.0000										3.30	0		
15:03:56.06	0.0025	21.86184	31.42	25.69	1.2	0.999948	25.8454	1.28812	917.78	1.18222	3.30	0		
15:03:55.77	-0.0020	21.86380	31.42	25.69	1.2	1.000038	25.8464	1.28808	917.76	1.18216	3.30	0		
15:03:55.46	0.0000	21.86303	31.42	25.68	1.2	1.000002	25.8460	1.28808	917.78	1.18218	2.20			
						1.000002	23.0400	1.20000	917.70	1.10210	3.30	0	T	
	15:04:02.06 15:04:01.76 15:04:01.76 15:04:01.76 15:04:00.36 15:04:00.26 15:03:59.96 15:03:59.96 15:03:59.96 15:03:59.96 15:03:58.46 15:03:58.46 15:03:57.26 15:03:57.26 15:03:57.26 15:03:56.06 15:03:56.06 15:03:56.06	15:04:02.06 -0.0010 15:04:02.06 -0.0005 15:04:01.76 0.0005 15:04:01.76 -0.0005 15:04:01.76 -0.0005 15:04:01.16 -0.0005 15:04:00.26 0.0000 15:04:00.26 0.0000 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:59.96 0.0005 15:03:58.46 0.0005 15:03:57.26 0.0000 15:03:57.26 0.0000 15:03:56.96 -0.0015 15:03:56.96 0.0000 15:03:56.36 0.0000 15:03:56.36 0.0000 15:03:56.36 0.0000	15:04:02.06 -0.0010 21.86338 15:04:01.76 0.0005 21.86326 15:04:01.46 -0.0015 21.86345 15:04:01.6 -0.0005 21.86345 15:04:01.6 -0.0005 21.86345 15:04:01.6 -0.0000 21.86322 15:04:00.26 0.0000 21.86328 15:03:59.66 0.0005 21.86333 15:03:59.36 0.0005 21.86338 15:03:59.36 0.0005 21.86338 15:03:59.36 0.0005 21.86338 15:03:59.46 0.0005 21.863303 15:03:59.76 0.0005 21.86366 15:03:57.86 0.0000 21.86303 15:03:57.76 0.0000 21.86303 15:03:57.26 0.0000 21.86310 15:03:56.66 -0.0015 21.86333 15:03:56.66 -0.0005 21.86333 15:03:56.66 0.0005 21.86333 15:03:56.66 0.0005 21.86333 15:03:56.66 0.0005 21.86	15:04:02.06 -0.0010 21.86338 31.43 15:04:02.06 -0.0010 21.86338 31.43 15:04:01.76 0.0005 21.86296 31.40 15:04:01.6 -0.0015 21.86345 31.43 15:04:01.6 -0.0005 21.86317 31.42 15:04:00.86 -0.0005 21.86317 31.42 15:04:00.26 0.0000 21.86282 31.39 15:03:59.36 0.0000 21.86282 31.43 15:03:59.36 0.0005 21.86338 31.40 15:03:59.36 0.0005 21.86338 31.40 15:03:59.36 0.0005 21.86338 31.40 15:03:59.36 0.0005 21.86303 31.38 15:03:59.46 0.0005 21.86303 31.41 15:03:57.86 0.0000 21.86303 31.41 15:03:57.86 0.0000 21.86303 31.41 15:03:57.86 0.0000 21.86303 31.41 15:03:57.76 0.0000 21.86310 31.42	15:04:02.06 -0.0010 21.86338 31.43 25.70 15:04:01.76 0.0005 21.86296 31.40 25.71 15:04:01.76 0.0005 21.86296 31.40 25.71 15:04:01.6 -0.0015 21.86345 31.43 25.70 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1.000020 15:04:01.76 0.0005 21.86296 31.40 25.71 1.2 0.999990 15:04:01.6 -0.0015 21.86296 31.40 25.71 1.2 1.000026 15:04:01.6 -0.0005 21.86345 31.44 25.70 1.2 1.000014 15:04:01.6 -0.0005 21.86327 31.39 25.70 1.2 1.000014 15:04:01.6 -0.0005 21.86289 31.42 25.70 1.2 0.999996 15:04:00.26 0.0000 21.86282 31.43 25.69 1.2 0.999994 15:03:59.66 0.0005 21.86338 31.40 25.69 1.2 0.99996 15:03:59.66 0.0005 21.86338 31.40 25.69 1.2 1.000008 15:03:59.66 0.0005 21.86303 31.43 25.69 1.2 1.000044 15:03:58.76 0.0005 21.86303 31.41 25.69	15:04:02.06 -0.0010 21.86338 31.43 25.70 1.2 1.000020 25.8458 15:04:01.76 0.0005 21.86296 31.40 25.71 1.2 0.999990 25.8458 15:04:01.46 -0.0015 21.86345 31.44 25.70 1.2 1.000026 25.8457 15:04:01.66 -0.0005 21.86345 31.44 25.70 1.2 1.000014 25.8464 15:04:01.66 -0.0005 21.86327 31.32 25.68 1.2 1.000014 25.8464 15:04:00.26 0.0000 21.86289 31.42 25.70 1.2 0.999996 25.8461 15:03:59.66 0.0000 21.86282 31.38 25.69 1.2 0.999984 25.8461 15:03:59.66 0.0005 21.86383 31.40 25.69 1.2 1.000008 25.8455 15:03:59.66 0.0005 21.86383 31.43 25.67 1.2 0.999996 25.8455 15:03:58.76 0.0005 21.86303	15:04:02.06 -0.0010 21.86338 31.43 25:70 1.2 1.000020 25.8458 1.28808 15:04:01.76 0.0005 21.86296 31.40 25:71 1.2 0.999990 25.8458 1.28812 15:04:01.64 -0.0015 21.86345 31.44 25:70 1.2 1.000014 25.8454 1.28812 15:04:01.66 -0.0005 21.86352 31.39 25:70 1.2 1.000014 25.8464 1.28812 15:04:01.66 0.0000 21.86289 31.42 25:69 1.2 0.999996 25.8461 1.28812 15:04:00.26 0.0000 21.86282 31.38 25:69 1.2 0.999996 25.8461 1.28812 15:03:59.36 0.0005 21.86338 31.40 25:69 1.2 0.999996 25.8461 1.28812 15:03:59.36 0.0005 21.86338 31.40 25:69 1.2 1.000008 25.8455 1.28088 15:03:59.36 0.0005 21.86338 31.40	15:04:02.06 -0.0010 21.86338 31.43 25.70 1.2 1.000020 25.8458 1.28808 917.76 15:04:01.76 0.0005 21.86296 31.40 25.71 1.2 0.999990 25.8458 1.28812 917.76 15:04:01.46 -0.0015 21.86345 31.44 25.70 1.2 1.000020 25.8458 1.28812 917.76 15:04:01.16 -0.0005 21.86345 31.44 25.70 1.2 1.000014 25.8464 1.28812 917.76 15:04:01.6 -0.0005 21.86328 31.42 25.70 1.2 1.000014 25.8464 1.28812 917.76 15:04:00.26 0.0000 21.86282 31.43 25.69 1.2 0.999996 25.8471 1.28812 917.76 15:04:00.26 0.0000 21.86282 31.43 25.69 1.2 0.999996 25.8461 1.28812 917.78 15:03:59.06 0.0005 21.86338 31.40 25.69 1.2 0.999996	15:04:02.06 -0.0010 21.86338 31.43 25.70 1.2 1.000020 25.8458 1.28008 917.76 1.18215 15:04:01.76 0.0005 21.86296 31.40 25.71 1.2 0.999990 25.8458 1.28012 917.76 1.18217 15:04:01.6 -0.0015 21.86345 31.44 25.70 1.2 1.000026 25.8457 1.28088 917.76 1.18217 15:04:01.6 -0.0005 21.86317 31.42 25.68 1.2 1.000014 25.8464 1.2812 917.76 1.18219 15:04:00.26 0.0000 21.86282 31.43 25.69 1.2 0.999996 25.8461 1.2812 917.76 1.18219 15:04:00.26 0.0000 21.86282 31.38 25.69 1.2 0.999996 25.8461 1.28812 917.76 1.18219 15:03:59.66 0.0005 21.86282 31.38 25.69 1.2 0.999996 28.8451 1.28812 917.78 1.18220	15:04:02.06 -0.0010 21.86338 31.43 25.70 1.2 1.000020 25.8458 1.28808 917.76 1.18215 3.30 15:04:01.76 0.0005 21.86296 31.40 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3.30 0 15:03:59.06 0.0005<	15:04:02.06 -0.0010 21.86338 31.43 25.70 1.2 1.000020 25.8458 1.28008 917.76 1.18215 3.30 0 15:04:01.76 0.0005 21.86296 31.44 25.71 1.2 0.999990 25.8458 1.28812 917.76 1.18217 3.30 0 15:04:01.6 -0.0005 21.86345 31.44 25.70 1.2 1.000014 25.8457 1.28808 917.76 1.18217 3.30 0 15:04:01.6 -0.0005 21.86317 31.42 25.68 1.2 1.000014 25.8464 1.28812 917.76 1.18219 3.30 0 15:04:00.56 0.0000 21.86282 31.43 25.69 1.2 0.999996 25.8461 1.28812 917.76 1.18219 3.30 0 15:04:00.26 0.0000 21.86282 31.38 25.69 1.2 0.999996 25.8461 1.28812 917.76 1.18219 3.30 0 15:03:59.06 0.0005 21.86282 31.38 25.69 1.2 1.000008 25.8458 1.2

3.10.2 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. However, when importing the data into EXCEL, the time is displayed only in full seconds, unless the notation is changed into an adjusted notation (go to cell properties, and use an adjusted notation as u:mm:ss.00).

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.

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 ^QC is the temperature measured with the Sensirion humidity sensor, which is located in the thermal conductivity sensing-element housing.

RH (Relative Humidity in %) is the RH measured by the Sensirion RH sensor, which is located in the thermal conductivity sensing-element housing.

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, but normalized to the transfer in the base gas) 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 in mV 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 Chapter for the codes.



3.11 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. 11 below (with some long numbers reduced in length):

	А	В	С	D	E	F	G	н	1	J	K	L	М	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	FF42	04DC25	04DC25	C1.3	H2	1.004	Norm	0.996501	21.471613	30.401989				
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	03:39.0	5 C	21.466	30.09	38.69	1.6	1	19.945	1.24	748	0.929	3.26	0
5	1	03:40.0	-0.004	21.468	30.07	38.65	1.6	1.0001	19.948	1.24	748	0.929	3.26	0
6	2	03:40.0	5 - 0.00 4	21.468	30.1	38.69	1.6	1.0001	19.95	1.24	748	0.929	3.26	0
7	3	03:40.9	-0.012	21.471	30.06	38.69	1.6	1.0002	19.949	1.24	748	0.929	3.26	0
8	4	03:41.2	0.016	21.46	30.09	38.68	1.6	0.9997	19.944	1.24	748	0.929	3.26	0
9	5	03:41.5	0.004	21.465	30.06	38.68	1.6	0.9999	19.943	1.24	748	0.929	3.26	0
10	6	03:41.8	-0.004	21.468	30.05	38.69	1.6	1.0001	19.95	1.24	748	0.929	3.26	0
11	7	03:42.3	L 0.004	21.465	30.09	38.7	1.6	0.9999	19.949	1.24	748	0.929	3.26	0
12	8	03:42.4	-0.624	21.716	30.12	38.74	1.7	1.0117	20.186	1.24	748	0.929	3.26	50
14 4	▶ ▶ Blad1	Blad2 / Blad3	2							111				

Figure 11: The Filed data.

The **Device address** is the CAN bus address of the XEN-5320 CAN device.

The **Device ID** is a unique coding for each XEN-5320 CAN.

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 the mode the XEN-5320 CAN is using to measure.

The Gain is the factor by which the output is multiplied to get a 100% output value for 100% second gas.

The **Speed** is the measurement speed.

Y_AH_Cal (-) is the correction factor used for humidity during calibration.

TF_Cal (V/W) is the transfer during calibration.

Temp_Cal (°C) is the temperature during calibration.

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 with a 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.

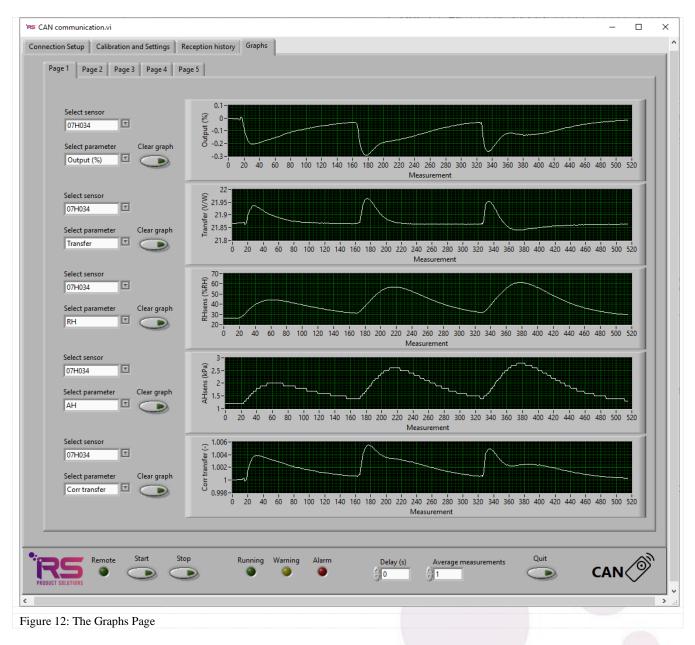


3.12 The Graphs Page

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.

There are 5 pages with displays and each page has 5 displays per sub-page. Each display can show one parameter from one sensor. So it is possible to use 5 displays to show 5 parameters from 1 sensor, but it is also possible to use 5 displays to show 1 parameter of 5 sensors.

Fig. 12. shows several data of sensor 07H034: output (%), Transfer (V/W), RH (%RH), AH (kPa) and Corrected transfer (-), for some 520 measurements. The graph shows the effect of breathing in and out over the XEN-5320 CAN.





3.13 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.
The connected to CAN bus bulb is flashing.	Make sure the Kvaser CAN-USB interface is installed and connected to a USB port before the LabView software is started.
The bulb Error burns at the Connection setup page and the devices are not correctly shown after finding devices.	Two or more XEN-5320 CAN devices have the same CAN bus address. Remove one or more XEN-5320 CAN devices with duplicate addresses from the CAN bus network and appoint a different CAN bus address for each XEN-5320 CAN device.
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 BV or search the website for updated information:

- Tel +31 639268377
- Email rene@rsproductsolutions.nl
- Web www.xen5320.com

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