Manual

ODOR easy

Version 12/2016

Axel Semrau GmbH & Co. KG
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Contents

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1 Introduction

1.1 Intended use

Dear Customer,

The ODOR easy is a device for the detection of sulphurous odorants in low pressure applications up to 2 bar that has been designed with special attention to automated measurement.

Typical odorants are:
Tetrahydrothiophene (THT)
Tertiary butyl mercaptan (TBM)
Ethyl mercaptan (EM)
Mixtures of mercaptan and/or sulphides (Scentinel™ E, Spotleak™ 1004, Captan™)

The device is not certified for use in areas with potentially explosive atmospheres and may only be used for monitoring sulphurous odorants and odorant mixtures in natural gas, biogas and liquefied gas in areas that are not subject to explosion hazards. The operating company must ensure that the operating location is sufficiently ventilated. The device is not explosion protected and must not be operated in such areas.

Yours AXEL SEMRAU GmbH & Co. KG

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1.2 Safety instructions

Symbols and signal words are used to call your attention to the usage and potential consequences of safety information.

⚠ **DANGER**   Calls your attention to a dangerous situation
that **will** result in serious injury or death
if it is not avoided.

⚠ **WARNING**   Calls your attention to a dangerous situation
that **could** result in serious injury or death
if it is not avoided.

⚠ **CAUTION**   Calls your attention to a dangerous situation
that **could** result in minor to moderate injury
if it is not avoided.

NOTICE: Calls your attention to potential material damage
and other important information.

1.3 Installation requirements

The manual contains all the information concerning the controls, usage, maintenance and adjustment of the device, as well as all the technical data. The operating manual is an integral part of the ODOR EASY. You should therefore keep the manual close at hand so that it is readily accessible for the necessary information.

Read the operating manual carefully. The manual must be understood and followed in all respects by those people who are responsible for the installation, operation and maintenance of the devices.

The place of use must be sufficiently dry. There is no protection against moisture or dripping water. The service life of the electrochemical sensor is reduced by overheating, so the ODOR easy should be protected from direct sunlight. A voltage supply of 115V/230V, 50Hz/60Hz AC is needed for operation. Conversion to a 12 V DC voltage supply is possible. The measured value is output using a 4-20 mA current interface.

The current interface is not electrically isolated, hence there is a connection to the internal earth of the device. Incorrect connection could result in damage to the device.

The ODOR easy is supplied ready for use with an electrochemical sensor for the detection of THT or mercaptans.

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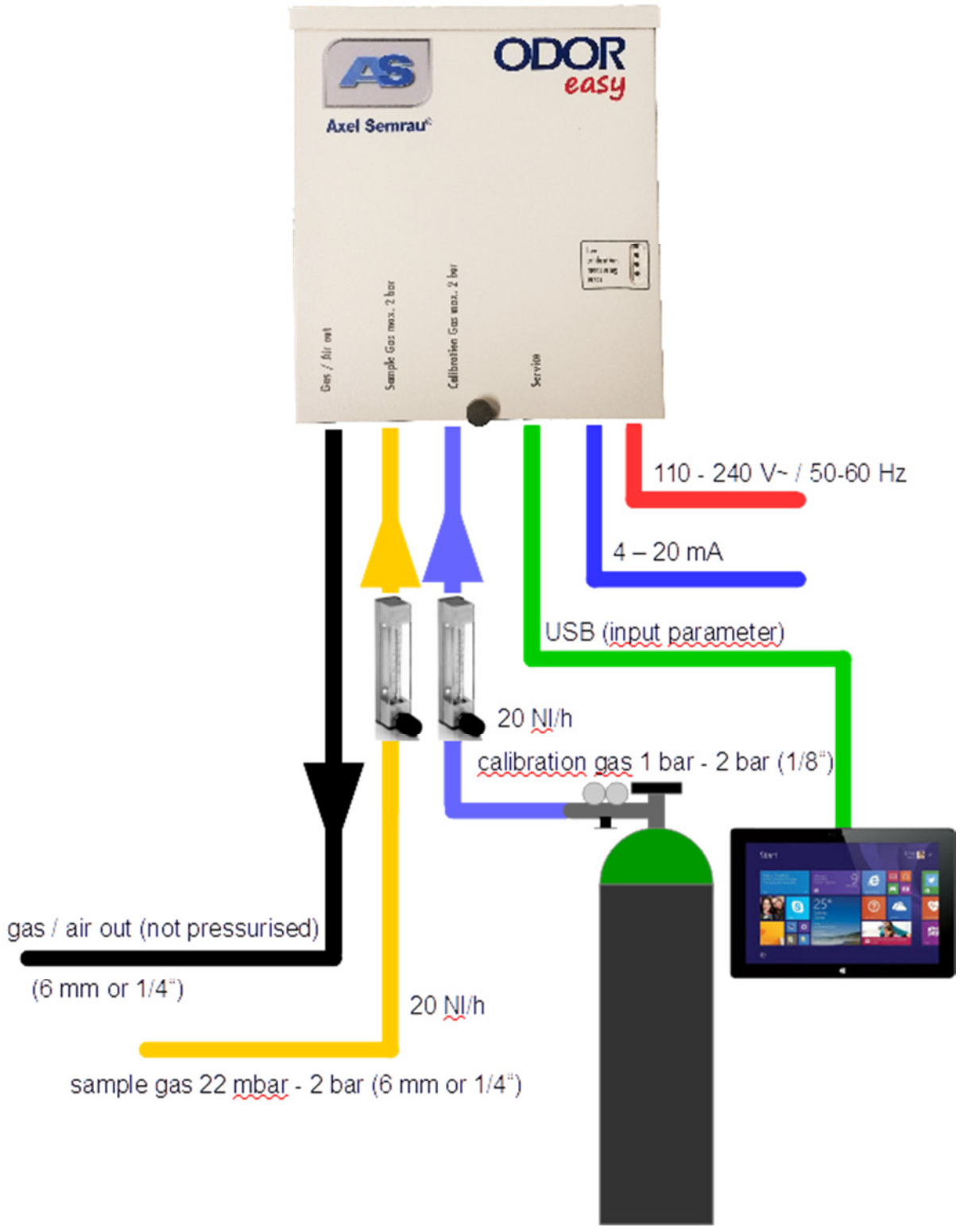
Fig. 1: ODOR easy system overview

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1.3.1 Dimensions

ODOR easy	270 x 240 x 90 mm
ODOR easy with rotameter	450 x 240 x 90 mm
Weight of ODOR easy:	approx. 3.7 kg

We recommend wall mounting out of direct sunlight in order to prevent overheating.

A suitable holder for the gas bottles must be present immediately adjacent to the device. (Calibration gas bottle with 10 l capacity: Height 110cm; diameter 16cm; 30cm wide incl. pressure reducer)

1.3.2 Electrical connections

ODOR easy: 110/240V AC 50/60Hz, max. 24W, conversion to 12 V DC possible

The power supply does not need to be backed up by a UPS. The device has a restart function that activates following a power failure.

1.3.3 Gas connections

Natural gas

Natural gas line with shut off valve (Pressure 20 mbar to max. 2 bar constant +/-10%, approx. 20 l/h). The device is supplied with 6 mm or ¼" Swagelok tube fittings. Please provide corresponding piping. If the sampling point is far away from the device, a higher outflow may be required by using a bypass.

Calibration gas:

The calibration gas (approx. 1 bar, max. 2 bar, approx. 20 l/h) is a mixture of the odorant in nitrogen N_2. The calibration gas connection is supplied with 1/8" Swagelok tube fittings. The calibration gas must contain the substances (odorant) that are to be quantified. The concentration should correspond to the concentration for which the highest measuring accuracy is desired.

Example mixture for THT measurement: 15 mg/m³ tetrahydrothiophene in nitrogen

Example mixture for mercaptan measurement: 9 mg/m³ Scentinel E® in nitrogen

The calibration gas should be in close proximity to the device so as to keep the purging times and hence the calibration gas consumption low. 1/8" PFA hose should be used as the material for the supply line. The pressure reduction unit should have a low dead volume and low adsorption for sulphur compounds.

Exhaust gas:

Exhaust line to open air (throughput approx. 20 l/h during measurement). The device is supplied with 6 mm or ¼" Swagelok tube fittings. Corresponding gas lines must be provided.

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1.3.4 Ambient conditions

Outside the Ex zone (e.g. electrical equipment room)

Temperature range: 0 - 40°C

Relative humidity: 10-90%, no condensation

> ⚠ **DANGER** The device is not explosion protected and must not be operated in such areas. The place of use must be sufficiently dry. There is no protection against moisture or dripping water.

1.3.5 Remote transmission

Output: 4-20mA (not electrically isolated)

> ⚠ **DANGER** The current interface is not electrically isolated, hence there is a connection to the internal earth of the device. Incorrect connection could result in damage to the device.

1.3.6 Information concerning the delivery of the system

The system is normally delivered by a shipping company. It is important to note a few things on accepting delivery of the system so that no problems arise due to any damage that may have occurred during transit.

The delivered goods should be checked to ensure that:

> ➢ they are complete
> ➢ the packaging is externally intact
> ➢ they are in perfect condition

Please inform us immediately in writing by fax and by telephone if acceptance is refused.

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2   Scope of delivery for ODOR EASY

ODOR easy basic unit with THT or mercaptan sensor for detection of the odorant.
USB storage medium with HyperTerminal software.

2.1   Other accessories

Mains cable
USB cable type B
Rotameter for setting the flow rate for the sample gas and the calibration gas

<u>**Additionally required material:**</u>
These items can be ordered direct for ODOR EASY from AS.

Calibration gas:	The concentration of all substances to be measured in N_2 should be close to the concentration in the sample gas to be analysed.
	Low absorption pressure reducer
PC/laptop/tablet:	Minimum configuration: One free USB port Windows 7/8/10 operating system
Connection lines:	6 mm, 1/4" or 1/8", other tube fittings on request
NOTICE:	Please use PTFE or PFA lines for the calibration gas so as to avoid adsorption of the gas.

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3 Connecting the system

The cover must be removed in order to connect the device.

⚠ DANGER Installation and commissioning must only be performed by trained personnel. Connections to gas lines and electrical connections need to be established.
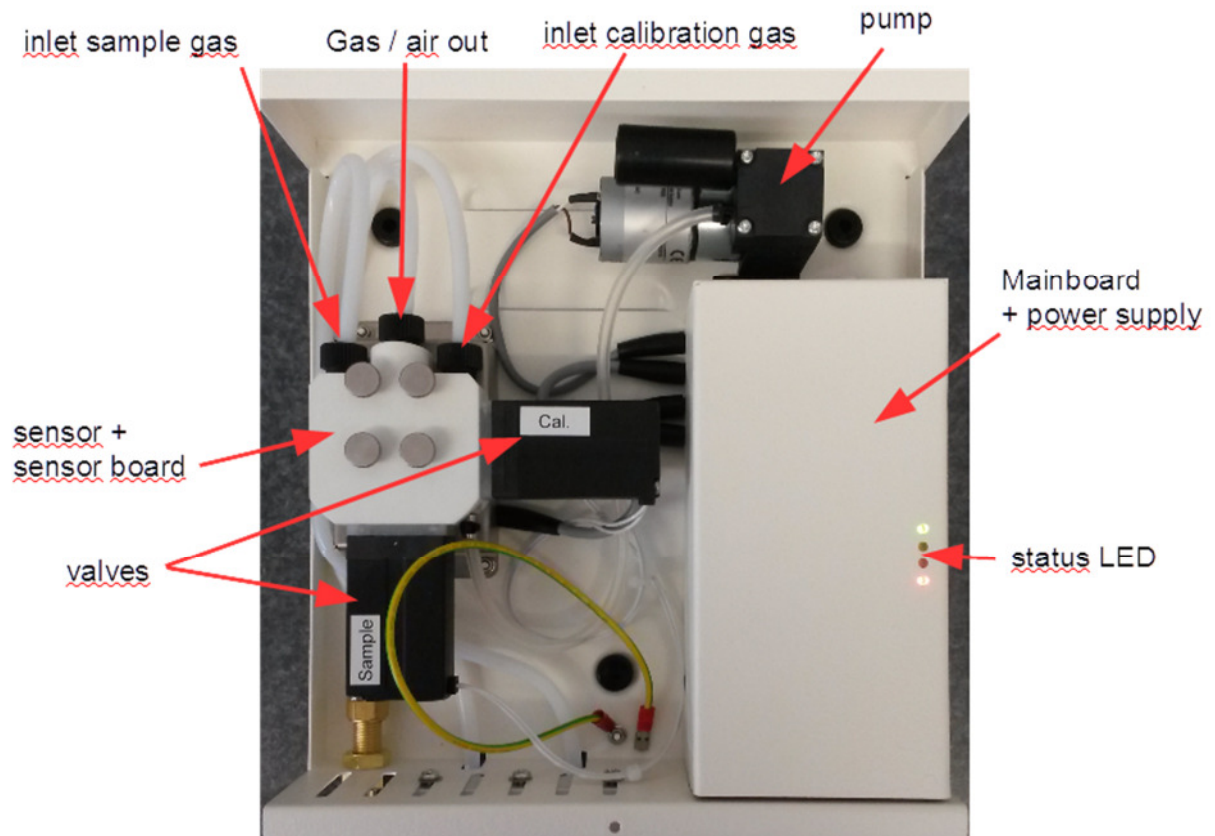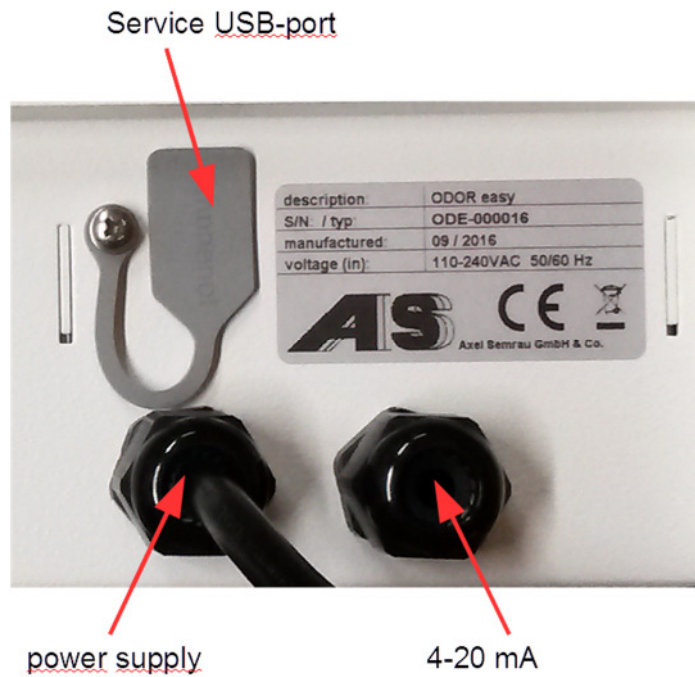

Fig. 2: Interior view of ODOR easy

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Fig. 3: Connector panel of ODOR easy

Status LED

The ODOR easy has 4 status LEDs:

live: flashing green; device is waiting for the next action

calibration: continuous green; device is calibrating with test gas

measuring: continuous yellow; device is measuring the sample gas
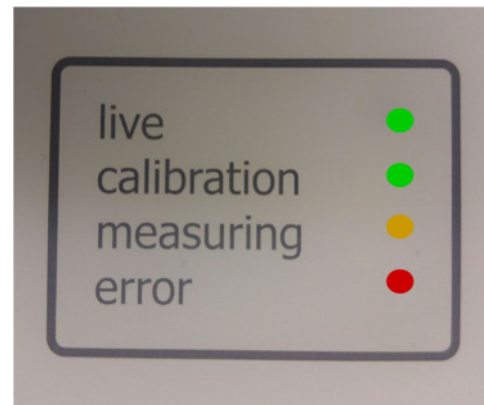
error: continuous red; an error has occurred

Fig. 4: Status LED

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3.1 Gas connections

> ⚠ **DANGER**   Setting higher gas pressures could result in the release of flammable gases.

The gas lines (sample gas, calibration gas and gas/air out) are connected using a compression fitting. The manufacturer's instructions for the compression fittings must be followed. The respective inlet pressures must be observed.
Make the following connections:

Fig. 5: Front panel of rotameter

1.) Connection of GAS / AIR OUT to the exhaust line (not pressurised), 6 mm or ¼" tube fittings.

2.) Connection of SAMPLE GAS to the natural gas line (minimum 22 mbar, maximum 2 bar, throughput 20 l/h). The ODOR easy can be ordered either with or without an optional rotameter. If a rotameter has not been ordered, all gas connections are present in either 6 mm or 1/4" tube fittings on the underside of the device. There is no need to use a rotameter to set the flow rate when using a pressure of 22 mbar, and the gas may be connected directly to the ODOR easy using the screw fitting. For higher pressures, a rotameter must be used. The inlet to the rotameter can be designed to accept either a 6 mm or 1/4" line. Setting the gas flows is covered in Section 4.1.

3.) Connection of CALIBRATION GAS to the pressure reducer for the calibration gas bottle (maximum pressure 2 bar, throughput 20 l/h). The inlet to the rotameter is designed to accept a 1/8" PTFE or PFA line.

Fig. 6: Back panel of rotameter

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3.2   Electrical connections

The ODOR easy can be supplied with or without a mains cable. If the mains connection and the connection to the signal output are to be made on site, the cover of the electronics housing must be removed (see Fig. 2) by undoing two nuts on the housing and then pushing it upwards and out of the guide.

3.2.1   Connecting the supply voltage

⚠ **CAUTION**   The electrical wiring is freely accessible after opening the electronics housing.

⚠ **DANGER**   Installation and commissioning must only be performed by trained personnel.

The ODOR easy can be ordered with or without a mains cable. Hence the power supply cable may also be attached directly to the power supply unit.
The device can be supplied with 110V - 240V AC 50 / 60 Hz. The connection is made directly to the power supply unit and to the grounding pin on the floor of the housing. The cable grommet must be securely tightened in order to provide adequate strain relief.
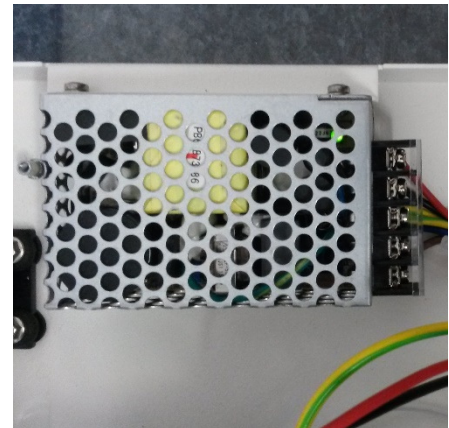

Fig. 7: Internal power connection

3.2.2   Signal output

The active 4-20 mA interface is able to drive a load resistance of 0 to 500 ohms. The relation to the measuring result is set through the parameters in the firmware. In the event of an error message, the current output falls to 0 mA until a correct calibration/measurement is performed again.
The signal is output via a 3-pin connector on the mainboard. Incorrect connection could result in destruction of the device.

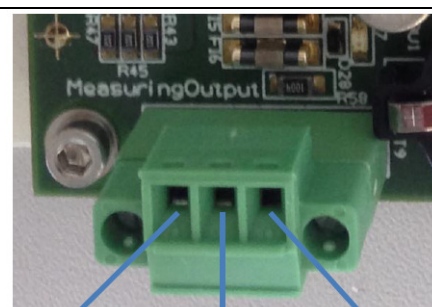| Pin	Signal
1	Plus
2	Minus (device earth!)
3	Not used

Fig. 8: 4-20 mA signal output

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3.2.3   Connecting a PC/laptop/tablet to the ODOR EASY

The ODOR EASY works fully automatically without a permanent connected PC/laptop/tablet, but a PC/laptop/tablet is required in order to set the device parameters (e.g. to input the concentration of the odorant in the calibration gas). The measuring instrument is equipped with a USB port (see Fig. 3), which can be used for configuration and, if necessary, maintenance purposes. This is only for the use of trained and qualified personnel.

The power supply to the ODOR easy must be established before it is possible to enter the settings for the PC/laptop/tablet link.

Use the USB cable to connect the USB port of your PC to the ODOR easy.

At first use, please continue at 13.3 **Setting up the USB interface by Hyperterminal** page 36.

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4 Commissioning

> *NOTICE*: The electrochemical sensor in the ODOR easy requires a bias voltage in order to measure correctly. Following a new installation, the replacement of a sensor or a long period without any power supply, the sensor requires 6 hours after switching on the device to attain its normal sensitivity.

In order to be able to commission the device, the ODOR easy must be connected to the power supply, the link to the PC/laptop/tablet must be set up and the calibration gas must be available.

4.1 Setting the gas flows

> ⚠ **DANGER** Setting gas pressures higher than those permitted could result in the release of flammable gases.

> *NOTICE*: After connecting the gas lines, check the joints for any leakage.

4.1.1 Gas connections

The gas lines (sample gas and calibration gas) are connected using a tube fittings (Swagelok). The pressure reducer for the calibration gas bottle must be purged three times with the calibration gas before connection. (See Section 6)

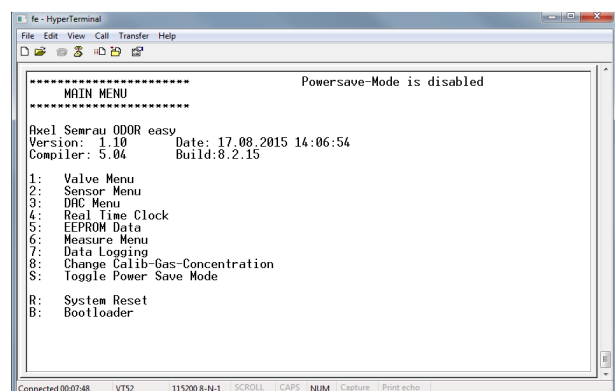> ⚠ DANGER Setting gas pressures higher than 2 bar could result in the release of flammable gases.

Fig. 8: Back panel of rotameter

4.1.2 Opening HyperTerminal

The ODOR easy must first be connected to a control computer (PC, laptop, tablet with HyperTerminal) with a USB cable. (See Section 3.2.3)
After doing so, start the HyperTerminal and open the file "ODOR easy.ht". The display is refreshed by pressing the space bar, and pressing the number "0" takes you to the "MAIN MENU" of the control software.
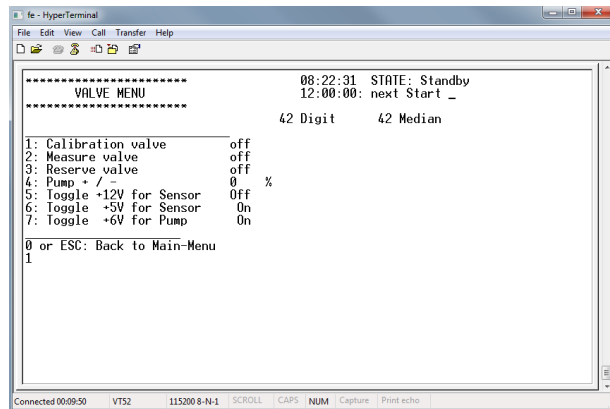
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4.1.3 Opening the valves and setting the gas flows

Pressing the number "1" takes you to the "VALVE MENU". Pressing the number "1" opens the calibration gas valve. The calibration gas flow can now be set to 20 ± 5 l/h at the needle valve of the corresponding rotameter. Press "1" to close the valve again.

The valve for the sample gas is opened in in a similar fashion using the number "2", and the flow is set in the same manner. It is important that the two gas flows are approximately equal.


```
********************                    08:22:31  STATE: Standby
     VALVE MENU                         12:00:00: next Start _
********************
                                          42 Digit     42 Median
_____

1: Calibration valve          off
2: Measure valve              off
3: Reserve valve              off
4: Pump + / -                 0    %
5: Toggle +12V for Sensor     Off
6: Toggle  +5V for Sensor     On
7: Toggle  +6V for Pump       On

0 or ESC: Back to Main-Menu
1
```
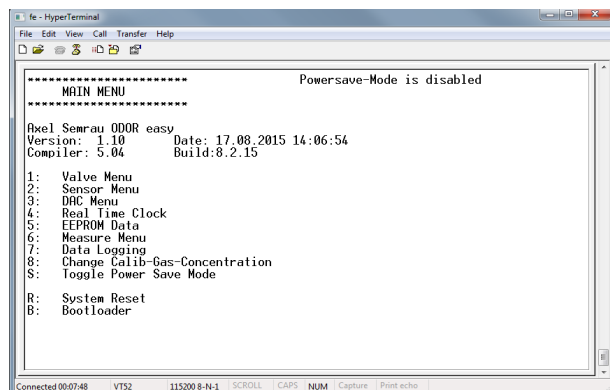

Fig. 9: Rotameter

4.2 Setting the calibration gas concentration

4.2.1 Opening HyperTerminal

The ODOR easy must first be connected to a control computer (PC, laptop, tablet with HyperTerminal) with a USB cable.

After doing so, start the HyperTerminal and open the file "ODOR easy.ht". The display is refreshed by pressing the space bar, and pressing the number "0" takes you to the "MAIN MENU" of the control software.


```
********************                   Powersave-Mode is disabled
     MAIN MENU
********************

Axel Semrau ODOR easy
Version:  1.10        Date: 17.08.2015 14:06:54
Compiler: 5.04        Build:8.2.15

1:   Valve Menu
2:   Sensor Menu
3:   DAC Menu
4:   Real Time Clock
5:   EEPROM Data
6:   Measure Menu
7:   Data Logging
8:   Change Calib-Gas-Concentration
S:   Toggle Power Save Mode

R:   System Reset
B:   Bootloader
```

4.2.2 Calibration gas input
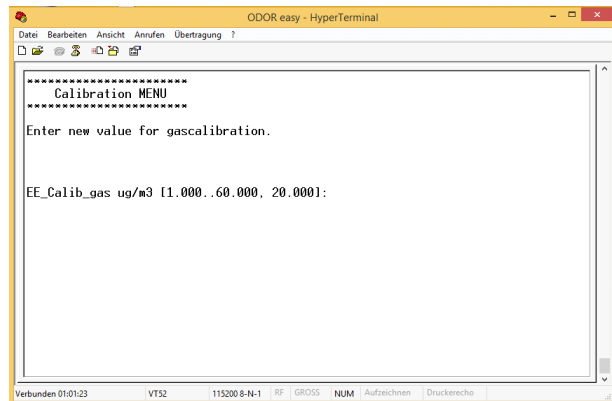
Pressing the number "8" takes you to the "Calibration MENU". Enter the new concentration in µg/m³ and confirm the new value with "ENTER".

Example:
The certificate for the calibration gas bottle specifies a value of 15.3 mg/m³ THT.

Enter in the ODOR easy: 15300
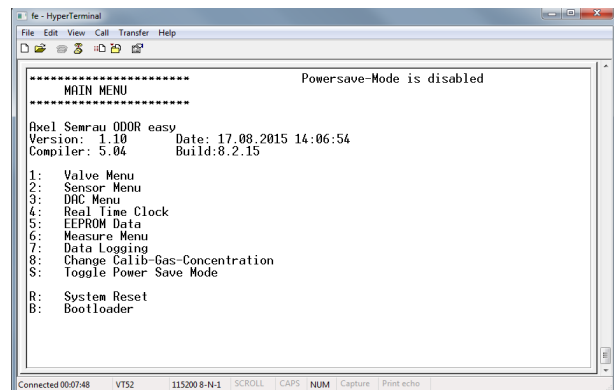"Enter"

A dot is placed automatically as the 1000 separator.

4.3 Starting the test measurement

4.3.1 Opening HyperTerminal

The ODOR easy must first be connected to a control computer (PC, laptop, tablet with HyperTerminal) with a USB cable.
After doing so, start the HyperTerminal and open the file "ODOR easy.ht". The display is refreshed by pressing the space bar, and pressing the number "0" takes you to the "MAIN MENU" of the control software.

4.3.2 Opening the measuring menu

Pressing the number "6" takes you to the "MEASURING MENU". Start the new measurement by pressing the "S" key. The full cycle comprises purging with external air (prepurge) when setting the zero point, measuring the calibration gas, purging, measuring the sample gas and purging again.

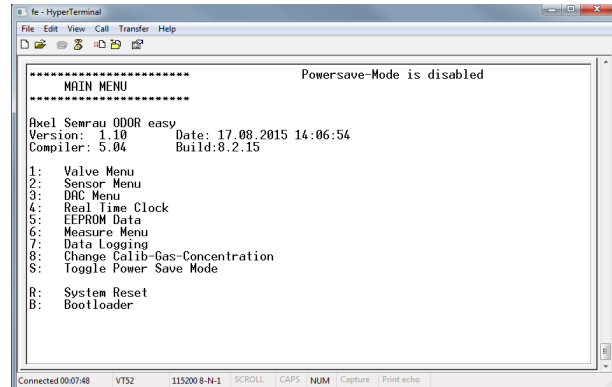The measurement can be cancelled at any time by pressing the "A" key.
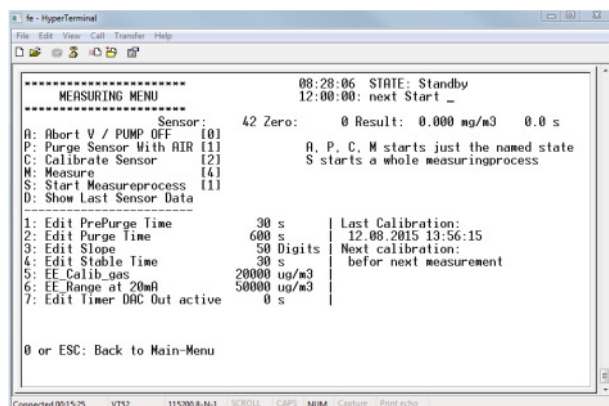
4.4   Testing the analogue output signal

4.4.1   Opening HyperTerminal

The ODOR easy must first be connected to a control computer (PC, laptop, tablet with HyperTerminal) with a USB cable.
After doing so, start the HyperTerminal and open the file "ODOR easy.ht". The display is refreshed by pressing the space bar, and pressing the number "0" takes you to the "MAIN MENU" of the control software.

4.4.2   Opening the DAC menu

Pressing the number "2" takes you to the "Sensor MENU".

Various output signals can now be simulated here.

With the number "1": 00 mA
With the number "2": 10 mA
With the number "3": 20 mA
With the number "4": freely selectable output signals.

After exiting the menu, the last value that was set is retained and is replaced only when the next measurement is performed.
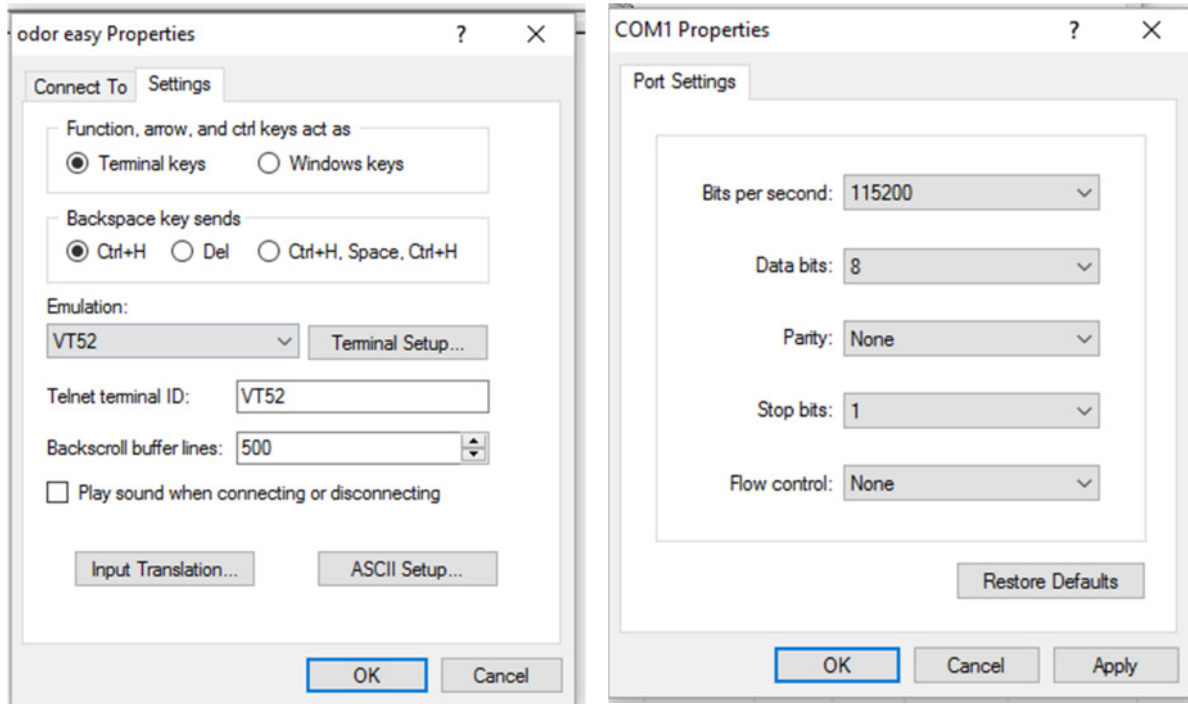
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5 Settings

5.1 Connection parameters

A standard terminal program, e.g. HyperTerminal under Windows, is needed in order to establish a connection to the device.

The following parameters must be set here:

Please make sure that the correct COM port has been selected.
In the case of a virtual port, this can be found in the Windows Device Manager; see above.

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```
************************          Powersave-Mode is disabled
     MAIN MENU
************************

Axel Semrau ODOR easy
Version:  1.10       Date: 17.08.2015 14:06:54
Compiler: 5.04       Build:8.2.15

1:    Valve Menu
2:    Sensor Menu
3:    DAC Menu
4:    Real Time Clock
5:    EEPROM Data
6:    Measure Menu
7:    Data Logging
8:    Change Calib-Gas-Concentration
S:    Toggle Power Save Mode

R:    System Reset
B:    Bootloader
```

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5.2 Firmware

A standard terminal program, e.g. Windows HyperTerminal, is needed in order to establish a connection to the device.

The firmware functions are sorted according to function within a menu structure and can each be reached using the symbol or key displayed before the function title, e.g. "1: Valve Menu" by pressing the "1" key.

The main menu gives access to various sub-menus (1-8) and three basic functions.

"S": Activates or deactivates power save mode.

"R": Performs a device reset; the device reboots with its default settings.

NOTICE: After a reset, it may be necessary to re-enter all of the settings.

"B": Calls the bootloader; this is only needed when performing a firmware update. This function can only be excited by performing a firmware update or switching off the device.

NOTICE: Perform an update only after consultation with the manufacturer!

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5.2.1 Service menu

Menus 1-3 are intended just for checking the hardware. 4, 5 and 8 are used for configuration, while 6 and 7 are for monitoring.
In addition, the current status is displayed at the top right of all sub-menus.
Line 1: Current time and system status
Line 2: Start of the next measurement

The following system statuses (sys-states) are used:
0: Standby: Valves and pumps are unpowered; last measured value is output over the current interface
1: PrePurge: Pump is purging the sensor with air for x seconds; stable sensor before measuring
2: Calibr.: Calibration with calibration gas, until sensor signal is stable
3: Purge: Purging with air for x seconds
4: Measuring: Measuring with sample gas, until sensor signal is stable
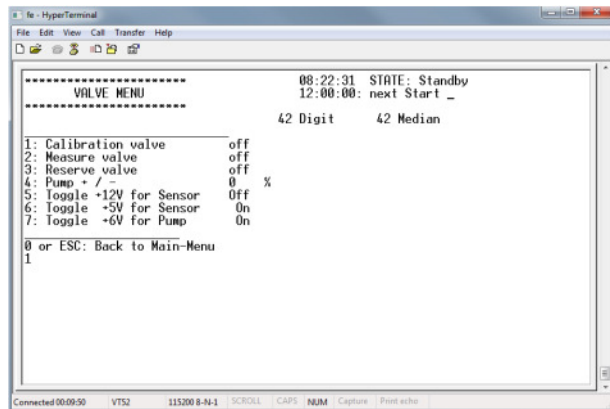5: Purge: Purging with air for x seconds

The following diagram gives an overview of the process of automatic measurement:
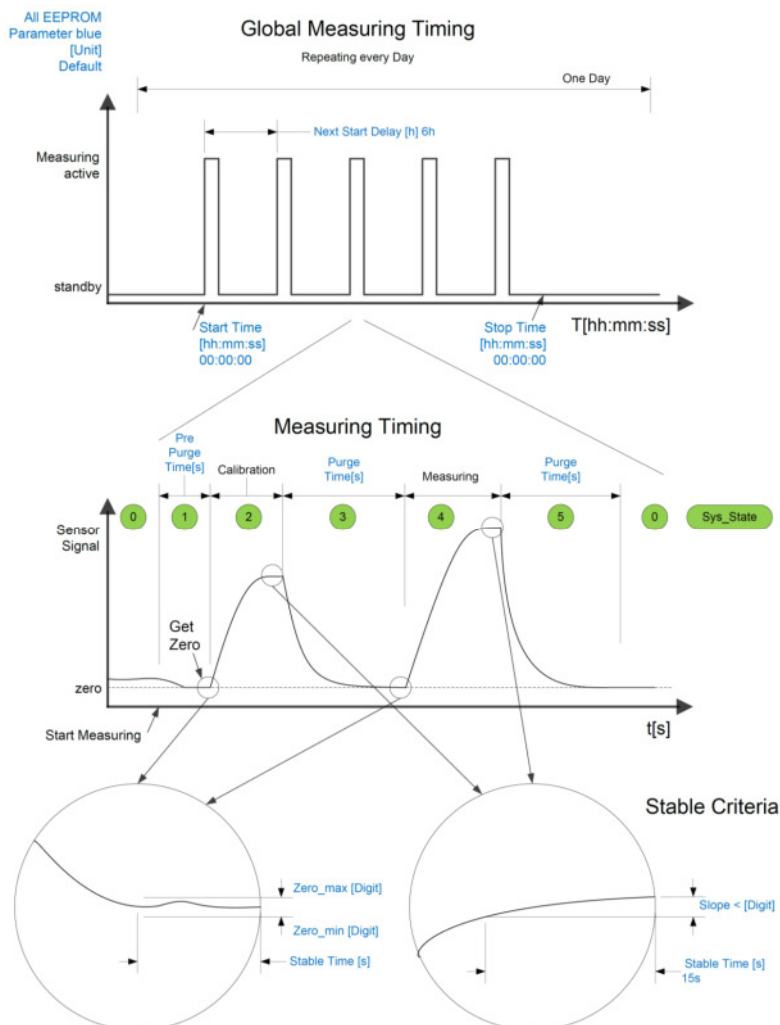
All of the captions shown in blue are EEPROM parameters, each of which can be set using the corresponding menu; see also the "Parameters and configuration" section.

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5.2.2 Valve menu

This menu allows the valves to be switched on/off and tested individually. The pump can be switched on/off and controlled using +/-. The voltage supplies (12V, 5V) to the sensor circuit board and the voltage supply (6V) to the pump can be switched on/off.
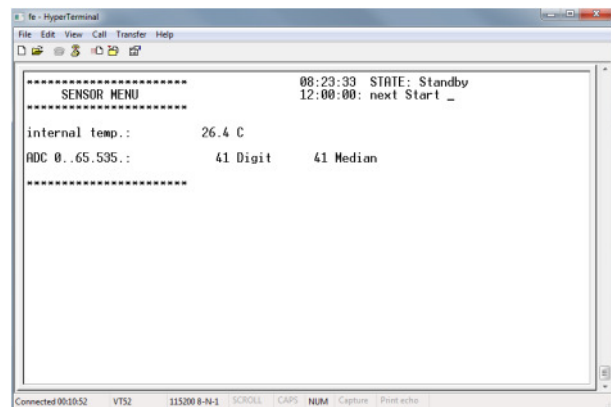
```
********************                    08:22:31  STATE: Standby
      VALVE MENU                        12:00:00: next Start _
********************
                                        42 Digit      42 Median
_____
1: Calibration valve          off
2: Measure valve              off
3: Reserve valve              off
4: Pump + / -                 0    %
5: Toggle +12V for Sensor     Off
6: Toggle  +5V for Sensor     On
7: Toggle  +6V for Pump       On

0 or ESC: Back to Main-Menu
1
```

5.2.3 Sensor menu

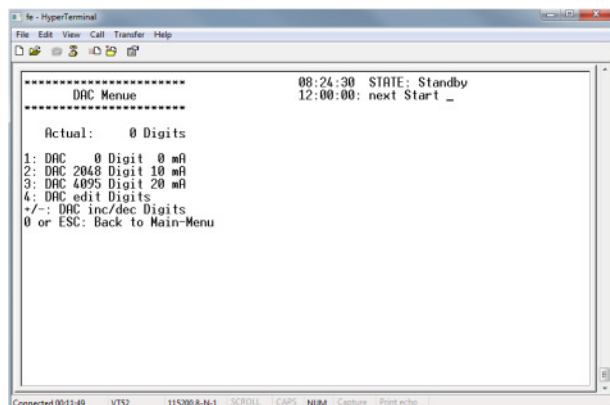Displays the internal temperature sensor and the raw values of the AD converter.

```
************************                 08:23:33  STATE: Standby
      SENSOR MENU                        12:00:00: next Start _
************************

internal temp.:         26.4 C

ADC 0..65.535.:             41 Digit      41 Median

************************
```

5.2.4 DAC menu

The current output can be set manually here. This is used for testing the interface after connecting the device.

```
************************                 08:24:30  STATE: Standby
      DAC Menue                          12:00:00: next Start _
************************

    Actual:      0 Digits

1: DAC     0 Digit  0 mA
2: DAC  2048 Digit 10 mA
3: DAC  4095 Digit 20 mA
4: DAC edit Digits
+/-: DAC inc/dec Digits
0 or ESC: Back to Main-Menu
```
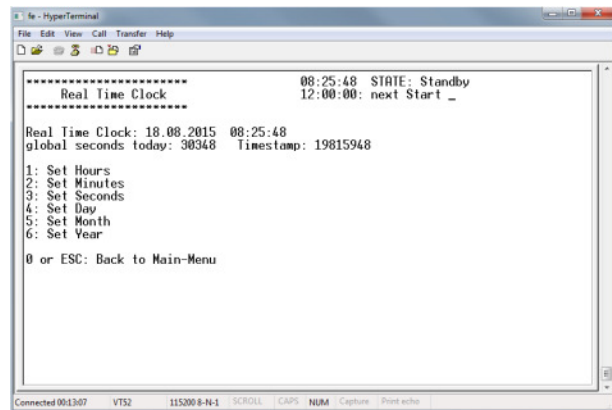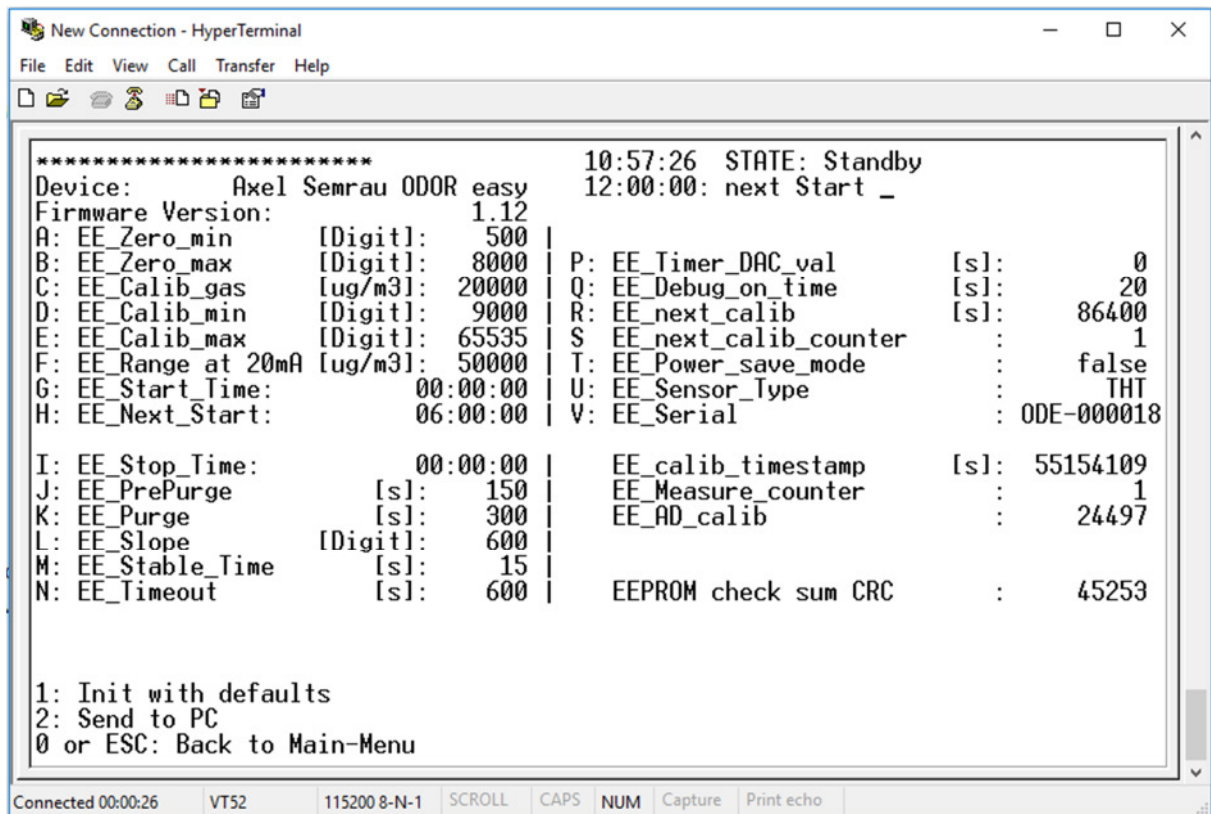
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5.2.5 Clock menu

Allows checking and setting of the real-time clock.

5.2.6 EEPROM data

All the parameters important for the device and for measuring can be set here.
The following parameters can be set via the EEPROM menu:

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Parameter	Min	Max	Default	Unit	Description
EE_Zero_min	1	10 000	500	Digits	Minimum value that must be exceeded when setting the zero value.
EE_Zero_max	1 000	30 000	6 000	Digits	Maximum value that must not be exceeded when setting the zero value.
EE_Calib_gas	1 000	60 000	20 000	µg/m³	Concentration of the calibration gas
EE_Calib_min	5 000	60 000	7 500	Digits	Minimum digits that must be exceeded during calibration.
EE_Calib_max	20 000	65 535	60 000	Digits	Maximum digits that must not be exceeded during calibration.
EE_Range	10 000	100 000	30 000	µg/m³	Scaling of the current interface. Value for which 20 mA is output. 4 mA always corresponds to 0 µg/m³. The error signal is 0 mA.
EE_Start_Time	0	86 399	0 corresponds to 00:00:00	s	Start time in seconds. Measurements are started daily at this time.
EE_Next_Start	1	86 399	21 600 corresponds to 06:00:00	s	Time interval before the next measurement is started, so long as the stop time has not been exceeded. 0.5 h corresponds to 1800 s 1 h corresponds to 3600 s 2 h corresponds to 7200 s 3 h corresponds to 10800 s 4 h corresponds to 14400 s 5 h corresponds to 18000 s 6 h corresponds to 21600 s 7 h corresponds to 25200 s 8 h corresponds to 28800 s 9 h corresponds to 32400 s 10 h corresponds to 36000 s 11 h corresponds to 39600 s 12 h corresponds to 43200 s and so on.
EE_Stop_Time	0	86 399	0 corresponds to never	s	Stop time. No measurements are performed after this time on this day. A setting of 0 switches off this function!
EE_PrePurge	0	4 000	100	s	Time for which the device is purged with air before the zero value is set.
EE_Purge	0	4 000	150	s	Time for which the device is purged with air before and after a measurement.
EE_Slope	1	5 000	300	Digits	The sensor signal is permitted to fluctuate by a maximum of this value during the stable_Time. This applies to measurement and calibration.
EE_Stable_Time	1	120	20	s	Time interval for which the Slope value no longer changes in order to indicate a stable measured value.

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EE_Timeout	60	4 000	600	s	Setting the zero value, calibrating and measuring are terminated after this time has elapsed if the signal has not reached the required stability.
EE_Timer_DAC_val			20	s	This time specifies how long the value is maintained at the current interface after a measurement. A value of "0" means that the signal is maintained indefinitely.
EE_Debug_on_time			5	s	Time after which the system goes into sleep mode if no key is pressed. In sleep mode, the power consumers are reduced to a minimum between measurements.
EE_next_calib			86 400	s	Indicates the time until the next forced calibration.
EE_next_calib_counter			3		Minimum number of measurements before the next calibration.
EE_Power_save_mode			False		Switches power save mode on or off.
EE_Sensor_Type			THT		Selects the sensor: THT or TBM
EE_Serial					Serial number of the ODOR easy device.

5.2.7 Measure menu

This menu can be used to manually start either a measurement or the various segments of the process. Furthermore, several parameters used for measurement can be changed under 1-7. The same parameters can also be edited under the EEPROM menu. Displayed are:

- The current sensor value

- The zero value of the sensor stored during prepurging

- The last calculated concentration

- Internal timers for each of the measurement phases (1-5)

Actions	Description
Abort V / Pump Off	Terminates any action immediately.
Purge Sensor with Air	Starts purging the sensor with air.
Calibrate Sensor	Opens the calibration gas valve and begins calibration.
Measure	Opens the sample gas valve and begins a measurement.
Start Measure process	Starts the next measurement process, beginning with the PrePurge. If the next action in the sequence is a measurement without calibration, it is performed in exactly the same manner.
Show last Sensor Data	Shows the last sensor signals (digits).

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```
■ fe - HyperTerminal
File  Edit  View  Call  Transfer  Help
D 🖙 📠 🍰 ⬚📋 ⬚🔒 🖆

 *********************           08:28:06  STATE: Standby
    MEASURING MENU              12:00:00: next Start _
 *********************
              Sensor:     42 Zero:      0 Result:  0.000 mg/m3    0.0 s
 A: Abort V / PUMP OFF    [0]
 P: Purge Sensor With AIR [1]              A, P, C, M starts just the named state
 C: Calibrate Sensor     [2]              S starts a whole measuringprocess
 M: Measure              [4]
 S: Start Measureprocess [1]
 D: Show Last Sensor Data
 -----------------------
 1: Edit PrePurge Time         30 s    | Last Calibration:
 2: Edit Purge Time           600 s    |  12.08.2015 13:56:15
 3: Edit Slope                 50 Digits | Next calibration:
 4: Edit Stable Time           30 s    |  befor next measurement
 5: EE_Calib_gas            20000 ug/m3 |
 6: EE_Range at 20mA        50000 ug/m3 |
 7: Edit Timer DAC Out active    0 s    |



 0 or ESC: Back to Main-Menu


Connected 00:15:25    VT52    115200 8-N-1   SCROLL  CAPS  NUM  Capture  Print echo
```

Parameter	Min	Max	Default	Unit	Description
Edit_PrePurge	0	4 000	100	s	Time for which the device is purged with air before the zero value is set.
Edit _Purge	0	4,000	150	s	Time for which the device is purged with air before and after a measurement.
Edit _Slope	1	5 000	300	Digits	The sensor signal is permitted to fluctuate by a maximum of this value during the Stable_Time. This applies to measurement and calibration.
Edit _Stable_Time	1	120	20	s	Time interval for which the Slope value no longer changes in order to indicate a stable measured value.
EE_Calib_gas	1,000	60 000	20 000	µg/m³	Concentration of the calibration gas
EE_Range at 20mA	10 000	100 000	30 000	µg/m³	Scaling of the current interface. Value for which 20 mA is output. 4 mA always corresponds to 0 µg/m³. The error signal is 0 mA.
Edit Timer DAC Out active			0	s	To save electricity in energy-saving mode, the 4-20 mA output can be configured such that the output signal is only maintained for a limited period of time. Otherwise a value of 4 mA is held. The error signal is still 0 mA.

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6 Changing the calibration gas cylinder

⚠ **CAUTION**   The calibration gas is under pressure.

*NOTICE***:** The calibration gas cylinder should be changed as soon as the **pressure drops below 10 bar**. When the pressure is too low there is no certainty that the calibration gas has the concentration shown.

NOTICE: The calibration gas cylinder should also be changed when the **use by date is exceeded.** Please find the use by date for the calibration gas on the calibration gas certificate.

- No calibration or measurement should have been started before changing the calibration gas bottle. Please take note of the diodes on the front panel.
- Every time the calibration gas cylinder is changed check that the gasket on the pressure reducer is in perfect working order.
- Purge the pressure reducer at least three times before connecting it to the measuring instrument. Do this by first opening the main valve on the bottle so as to fill the pressure reducer, and then closing the bottle again and releasing the pressure from the low pressure side. You will need to unscrew the supply line to the measuring instrument for this.
- After attaching the calibration gas bottle to the measuring instrument, check to ensure that the calibration gas flow is still correct. Set a value of 20 l/h using the needle valve.
- As the final step, the current calibration gas concentration must be entered.

7 Changing the sensor

The ODOR easy is equipped with an electrochemical sensor. This sensor loses its sensitivity over the course of time and must then be replaced. Specified in the ODOR easy is a minimum signal strength that a calibration must reach in order to be accepted as valid (see Section 5.2.6, parameter EE_Calib_min.). This value is set in accordance with the measuring task. If this value is not reached, the calibration is deemed invalid.
The sensor is replaced as follows:

- No calibration or measurement should have been started before changing the sensor. Please take note of the diodes on the front panel.

⚠ **CAUTION**   Changing the sensor during measurement could allow natural gas to be released.

- Open the sensor receptacle by undoing the 4 knurled screws, and then take the old sensor out vertically, together with the sensor seal. The sensor seal comprises a metal ring with 2 O-rings.

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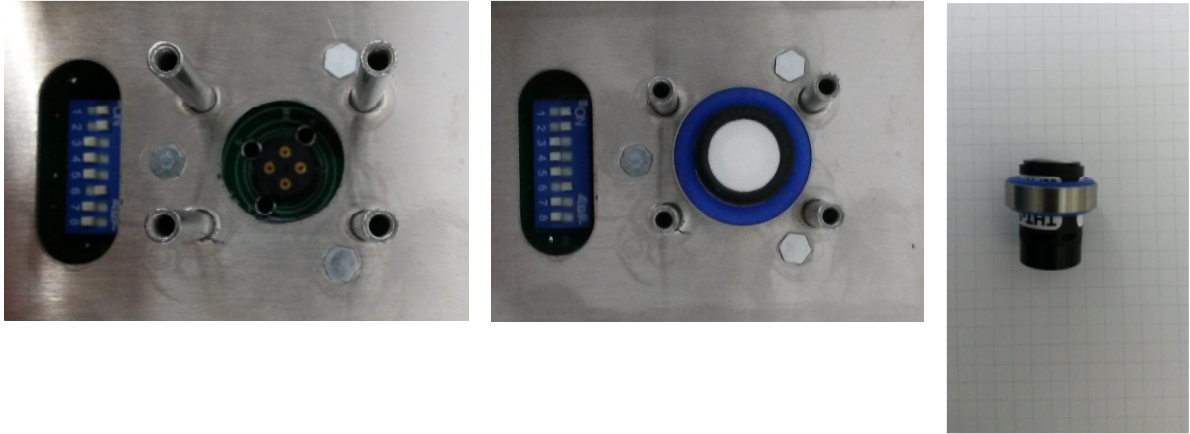
Fig. 10: Sensor socket and sensor seal

- Fit the new sensor with the sensor seal and seat the new sensor vertically in the socket. As you do so, note that the position of the sensor is defined by a lug.
-
    NOTICE: Incorrect installation of the sensor could damage it.

- Close the sensor receptacle again, and tighten the knurled screws until they are finger tight.

    NOTICE: The sensor requires about 6 hours to stabilise after installation.
    Hence error messages and inaccurate measurement results may occur during this time.
    It may be necessary to check the sensor parameters after this time has elapsed.
    (See Appendix.)

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8 Power failure

The ODOR easy is designed in such a way that the system will automatically restart after a power failure and continue running it's programmed measuring task. After a long power failure, it may take several hours before the sensor has stabilised again and is able to output correct measured values.

9 Visual checks

The following visual inspections should be carried out regularly:

Calibration gas: Calibration gas cylinder pressure > 10 bar
                        Calibration gas flow 20 l/h

Natural gas: Sample gas flow 20 l/h

Zero point: The measured zero point should lie between the values for Zero min. and Zero max.

Calibration: The measured calibration value should lie between the values for Cal min. and Cal max.

10 Error messages

The following errors may be displayed in the status (top right):

Error message	Cause	Action
'ERROR: Measuring '	A stable signal was not obtained within the time EE_Timeout (10 minutes default) during a measurement. >> Measurement cancelled	Check the sample gas.
'ERROR: Critical Temperature'	The temperature in the device exceeds 60°C due to a high outside temperature or incident sunlight.	Shade the device.
'ERROR: Calibration '	During calibration, the sensor signal did not exceed the value EE_Calib_min or a stable signal was not obtained. The time EE_Timeout is also used here. >> Measurement cancelled	- Check the calibration gas!
'ERROR: Get Zero '	A stable signal between EE_Zero_min and EE_Zero_max was not obtained during the EE_PrePurge time. Hence it is not possible to save a valid zero value. >> Measurement cancelled	- Check the pump and sensor.
'ERROR: Temperature Sensor '	The internal temperature sensor is not outputting valid data, or the temperature is outside its range (-55 to +150°C!).	Defective temperature sensor, or check temperature!
'ERROR: EEPROM or FLASH '	A CRC error has occurred in the EEPROM memory	

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	(parameters) or in the program memory.	
	EEPROM >>	Is automatically overwritten with new default values.
	FLASH >>	Invalid program in memory, return to the manufacturer.
'ERROR: ADC Error '	AD converter at its limit (0 or 65 535 digits).	Check the sensor or sensor circuit board.

11 Technical data

11.1 General requirements

ID	Dimensions	Note
1.10	Dimensions approx. 270 x 240 x 90 mm	
1.20	Weight approx. 3700 g	

11.2 Electrical requirements

ID	Specification/requirement	Note
2.10	Supply voltage 110/240V AC 50/60Hz, max. 24W; 12 V DC, optional	
2.20	Current interface for outputting the measured results 4-20 mA	
2.30	USB Interface type B	

NOTICE: Please contact the manufacture beforehand if you wish to use the device in 12 V low voltage mode without a power supply unit.

ID	Specification/requirement	Note
2.40	Supply voltage 12V DC max. 24W	
2.50	Power consumption at 12 V: at least 1 Ah per day	Depends on the parameter settings.

11.3 Mechanical requirements

ID	Specification/requirement	Note
3.10	Inlet pressure of test gas 22 mbar to 2 bar	
3.20	Inlet pressure of sample gas 22 mbar to 2 bar	
3.30	Sample gas outlet not pressurised	

11.4 Ambient conditions

ID	Specification/requirement	Note
4.10	Ambient temperature 0..40°C	
4.20	Humidity 10..90%, no condensation	
4.30	Protection class IP23	
4.40	Not for use in Ex areas	

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11.5 Software/firmware

ID	Specification/requirement	Note
5.10	The firmware can be loaded using a bootloader.	
5.20	The device performs measurements autonomously.	
5.30	The results of the measurements are output via a 4-20 mA interface.	

11.6 Measurement area

ID	Specification/requirement	Note
6.10	THT: 0-100 mg/m³	Measuring accuracy: ±10% for 10-25 mg/m³
6.20	TBM: 0-50 mg/m³	Measuring accuracy: ±10% for 2-10 mg/m³
6.30	EM: 0-90 mg/m³.	Measuring accuracy: ±10% for 2-10 mg/m³

11.7 Measuring frequency

ID	Measuring frequency	Note
7.10	1 to 24 measurements per day	

11.8 Safety

ID	Specification/requirement	Note
8.10	The measuring instrument complies with EN 61010-1, Electrical Safety of Laboratory Equipment.	

12 Disposal

Notice: The device contains electronic components and must be disposed of in a professional manner.

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13 Appendix

13.1 Setting the sensor type and the gain

In order to change the settings, the screws must be undone from the sensor receptacle/electronics and the cover removed. The receptacle for the sensor and a DIP switch for setting the sensor type (THT or TBM (mercaptan)) and the gain are located here.
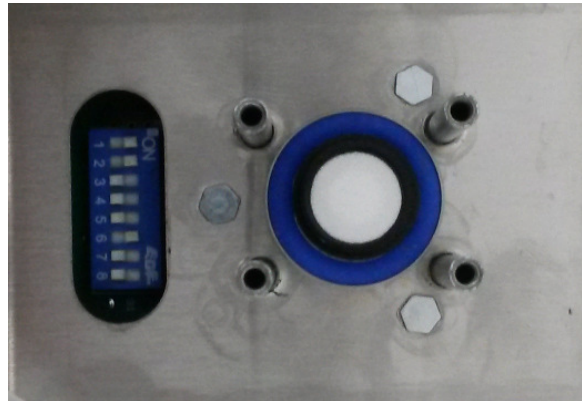
Fig. 11: Sensor receptacle

Switch positions:

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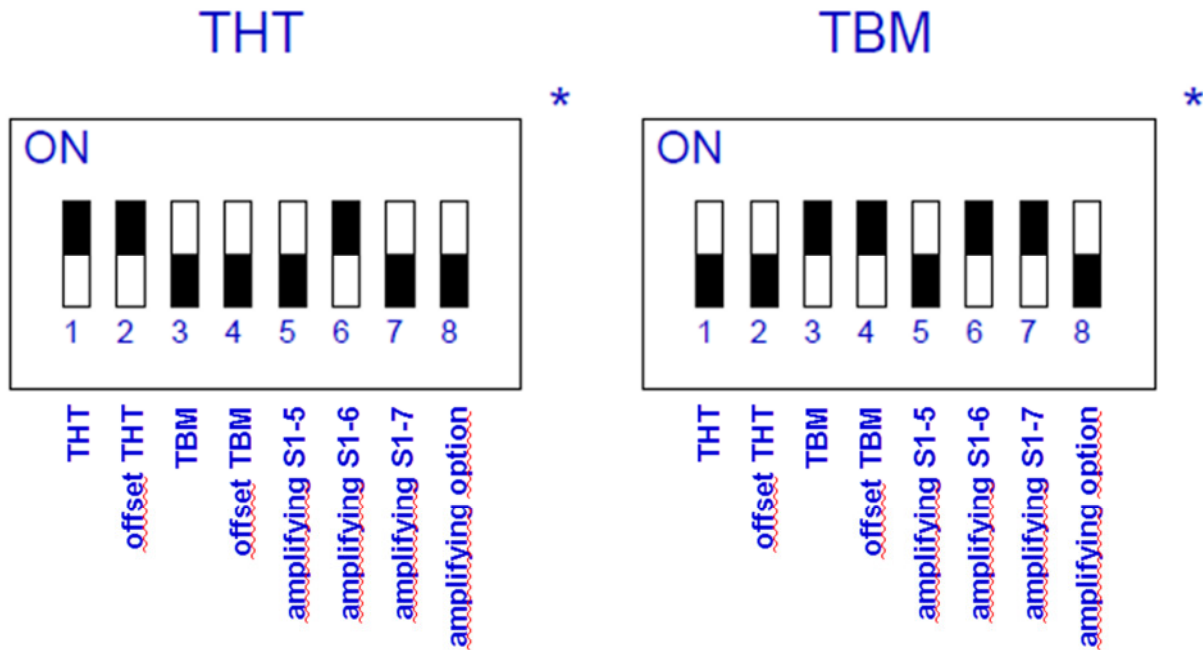
Verstärkung

		V1	V2	V3	V4	Vges
	0	-500	0	10	-1	0
	1	-1000	0	10	-1	0
	2	-500	-1	10	-1	-5 000
	3	-1000	-1	10	-1	-10 000
	4	-500	-2	10	-1	-10 000
THT	5	-1000	-2	10	-1	-20 000
	6	-500	-5	10	-1	-25 000
	7	-1000	-5	10	-1	-50 000
	8	-500	-10	10	-1	-50 000
	9	-1000	-10	10	-1	-100 000
	10	-500	-20	10	-1	-100 000
	11	-1000	-20	10	-1	-200 000
	12	-500	-50	10	-1	-250 000
TBM	13	-1000	-50	10	-1	-500 000
	14	-500	-100	10	-1	-500 000
	15	-1000	-100	10	-1	-1 000 000

Einstellung Verstärkung (V1)
(optional)

	S1-8	V1
0		-1000
1		-500

Einstellung Verstärkung (V2)

		S1-5	S1-6	S1-7	V2
	0	0	0	0	0
	1	1	0	0	-1
THT	2	0	1	0	-2
	3	1	1	0	-5
	4	0	0	1	-10
	5	1	0	1	-20
TBM	6	0	1	1	-50
	7	1	1	1	-100

Fig. 11: Setting the gain

13.2 Setting the offset voltages

The ODOR easy is designed in such a way that the system will automatically restart after a power failure and continue running it's programmed measuring task. After a long power failure, it may take several hours before the sensor has stabilised again and is able to output correct measured values.

If measuring ranges other than the default ones should be needed, or if other sensors are employed, it may be necessary to readjust the offset voltage. The sensor block must be detached for this. Located below the sensor block is the sensor circuit board with trimmer potentiometers for setting the offset voltages.

The offset voltages are set by adjusting the resistance values of the trimming potentiometers.
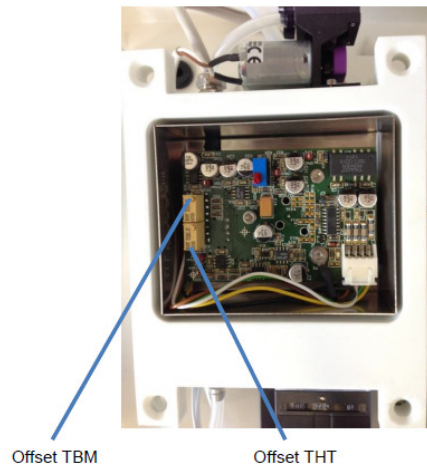
Fig. 12: Offset adjustment at the rear of the detector

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```
fe - HyperTerminal

File  Edit  View  Call  Transfer  Help

Axel Semrau ODOR easy
Version:  1.10        Date: 17.08.2015 14:06:54
Date;Time;Next Start;State;Measure Timer;Error Flags;Temp;ADC;Zero;Result;DAC;Va
lves;
18.08.2015;08:29:39;12:00:00;0;   0.0;0;    26.6;     42;0; 0.000;0;0;
18.08.2015;08:29:40;12:00:00;0;   0.0;0;    26.6;     42;0; 0.000;0;0;
18.08.2015;08:29:41;12:00:00;0;   0.0;0;    26.7;     41;0; 0.000;0;0;
18.08.2015;08:29:42;12:00:00;0;   0.0;0;    26.7;     41;0; 0.000;0;0;
18.08.2015;08:29:43;12:00:00;0;   0.0;0;    26.7;     42;0; 0.000;0;0;
18.08.2015;08:29:44;12:00:00;0;   0.0;0;    26.6;     41;0; 0.000;0;0;
18.08.2015;08:29:45;12:00:00;0;   0.0;0;    26.6;     41;0; 0.000;0;0;
18.08.2015;08:29:46;12:00:00;0;   0.0;0;    26.6;     42;0; 0.000;0;0;
18.08.2015;08:29:47;12:00:00;0;   0.0;0;    26.6;     42;0; 0.000;0;0;
18.08.2015;08:29:49;12:00:00;0;   0.0;0;    26.6;     41;0; 0.000;0;0;
18.08.2015;08:29:50;12:00:00;0;   0.0;0;    26.7;     42;0; 0.000;0;0;
18.08.2015;08:29:51;12:00:00;0;   0.0;0;    26.6;     41;0; 0.000;0;0;

Connected 00:17:11      VT52      115200 8-N-1    SCROLL   CAPS   NUM   Capture   Print echo
```

13.3 Setting up the USB interface by Hyperterminal

The "HyperTerminal" program with drivers and system settings are saved on the supplied USB drive. These must be copied to the PC.	
The "Device Manager" must then opened in Windows. Having done so, double click with the left mouse button on "Ports (COM & LPT) (structure element)" in the "Device Manager".	
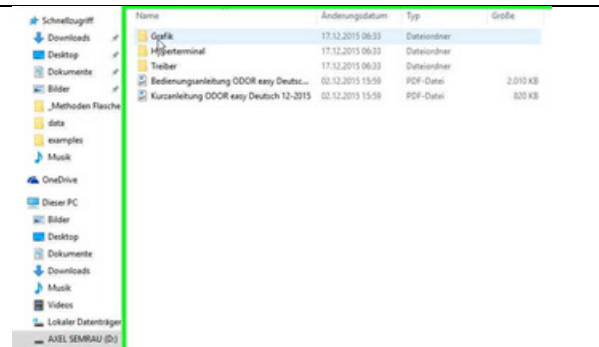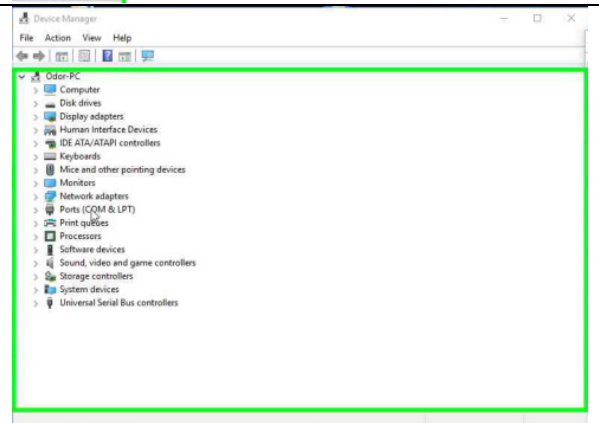
The available COM and USB interfaces are then displayed. Now connect the ODOR easy to the PC using the USB cable. An additional USB serial port is then displayed and automatically assigned a COM number (in brackets), COM8 in this example. This number depends on your computer, though, and will vary from computer to computer.	
Double click with the left mouse button on "USB Serial Port" in the "Device Manager".	
Click with the left mouse button on "Driver" in "USB Serial Port Properties"	
The user clicks with the left mouse button on "Update Driver..." in "USB Serial Port Properties".	
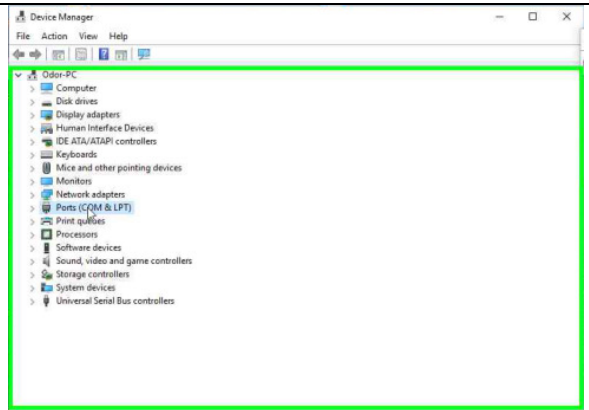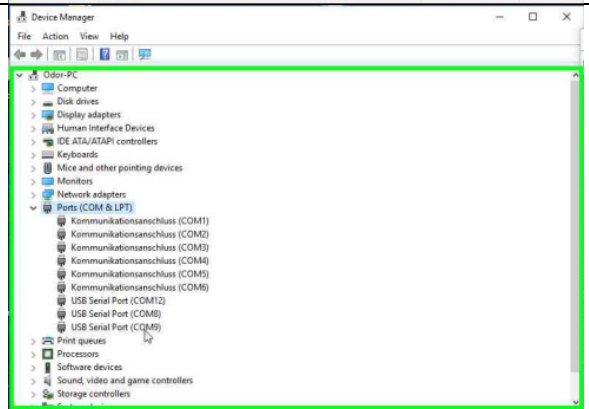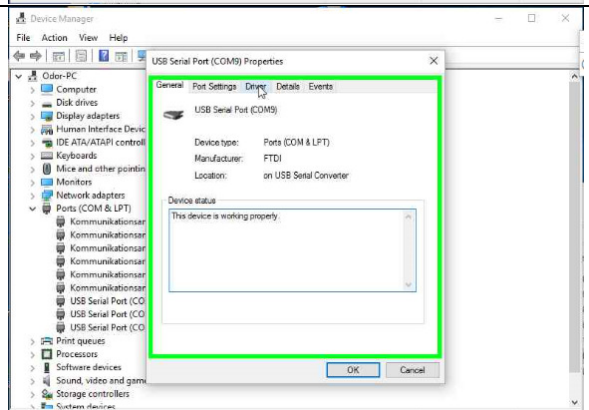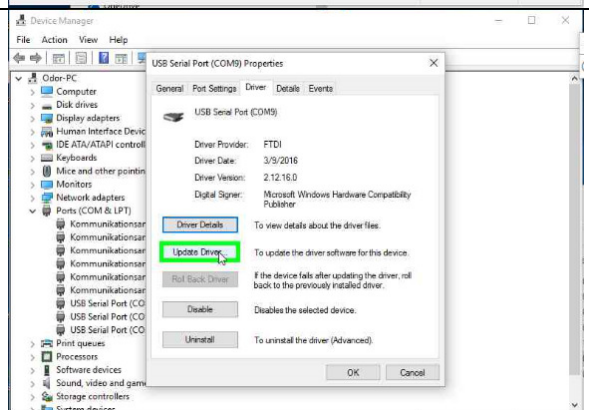
The user clicks with the left mouse button on "Browse my computer for driver software".	
The user clicks with the left mouse button on "Desktop" in "Browse for Folder".	
The user clicks with the left mouse button on "Close".	
The user clicks with the left mouse button on "Close" in "USB Serial Port Properties".	
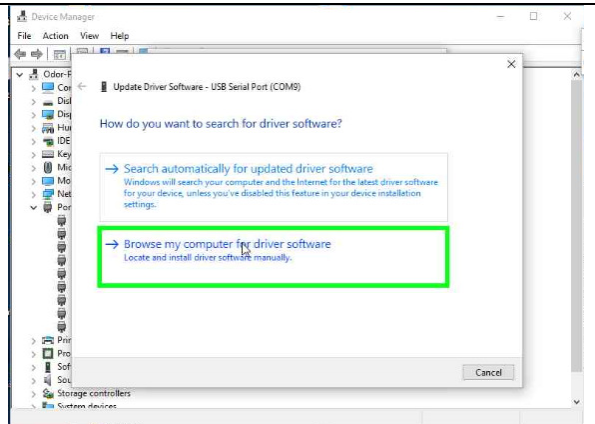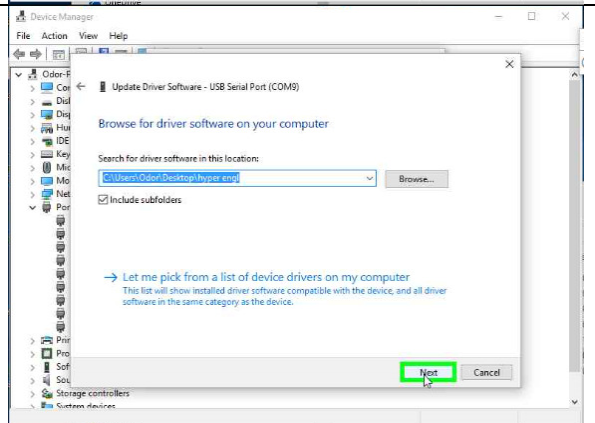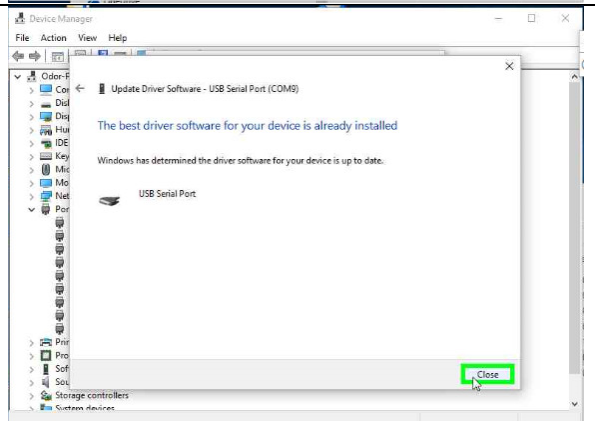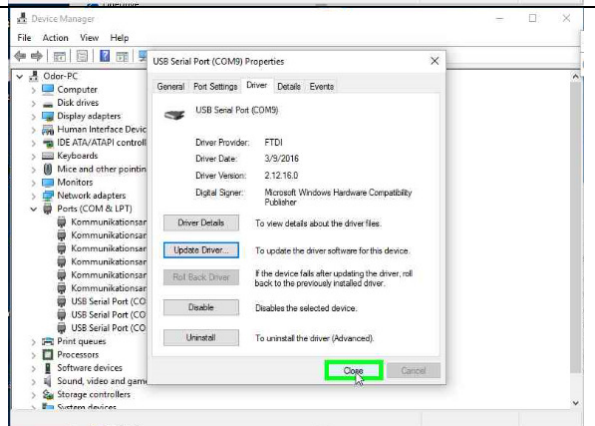
Setting up the HyperTerminal link:

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The user double clicks with the left mouse button on "ODOR easy" in "HyperTerminal".	
Depending on the basic settings of the computer, there may be a query as to whether a modem is to be installed. Since the ODOR easy is not a modem, the query should be answered in the negative. The user clicks with the left mouse button on "No" in "HyperTerminal".	
Depending on the basic settings of the computer, there may be a query as to whether a new connection should be created; the query should be answered in the negative. The user clicks with the left mouse button on "Cancel" in "Connection Description".	
The user clicks with the left mouse button on "File" in "New Connection - HyperTerminal".	
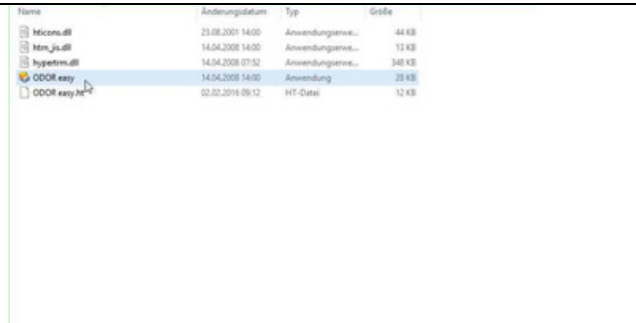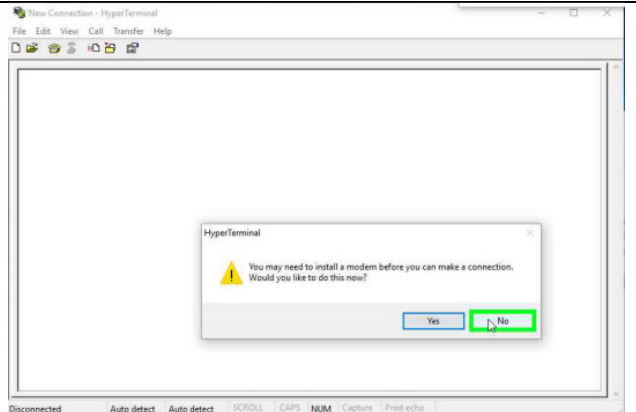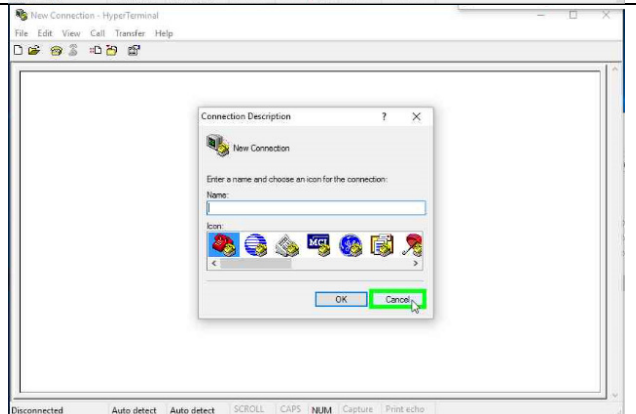
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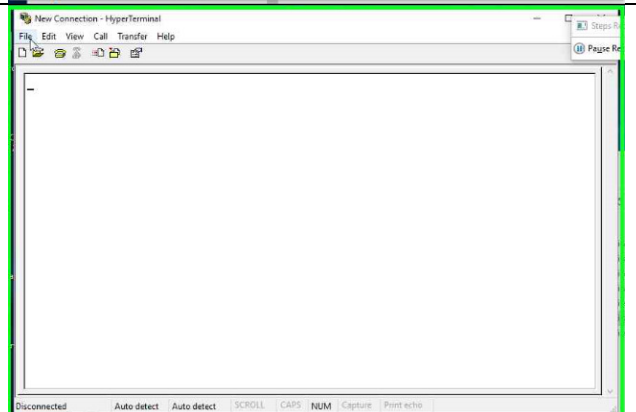
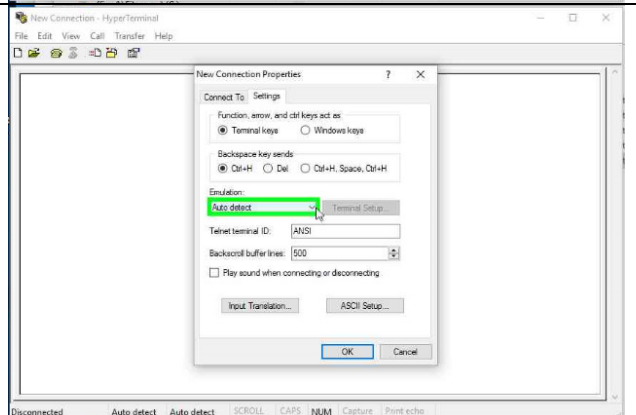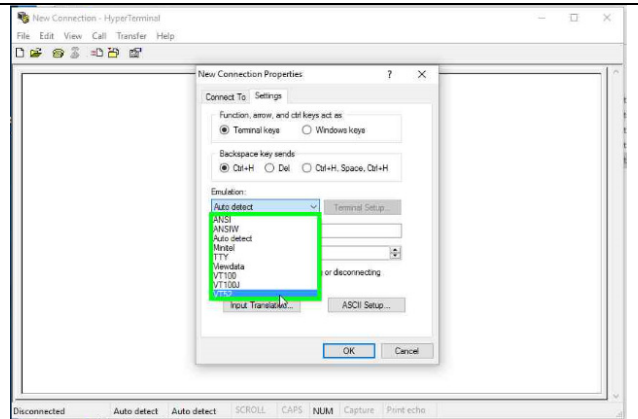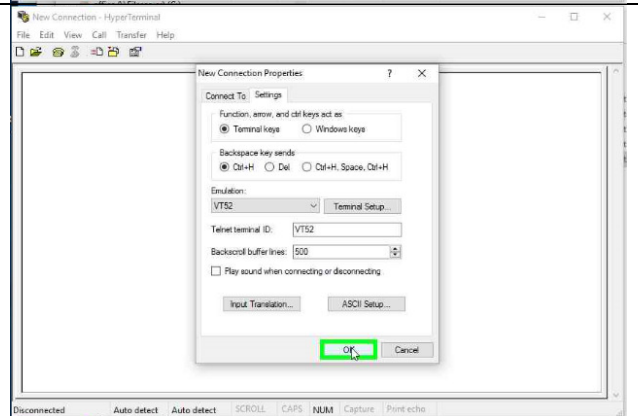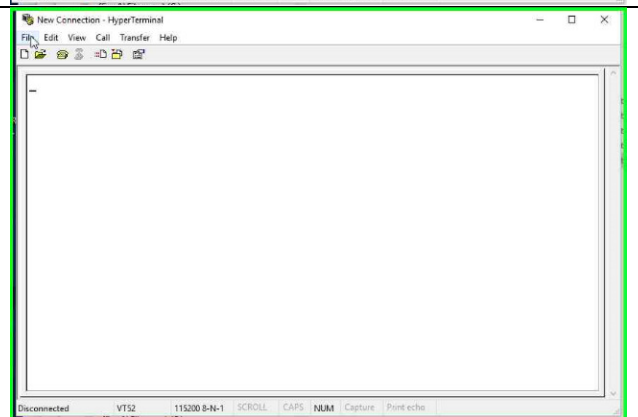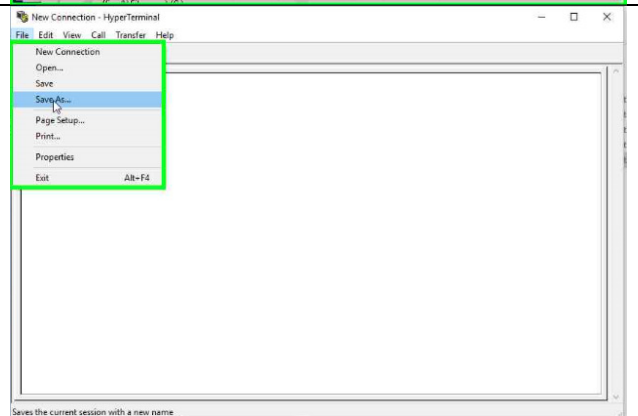|	
The user clicks with the left mouse button on "Properties".	
The user clicks with the left mouse button on "Open" in "New Connection Properties".	
The user clicks with the left mouse button on "COM9" (example!). The COM port number is assigned differently by each computer.	
The user clicks with the left mouse button on "Configure…" in "New Connection Properties".	
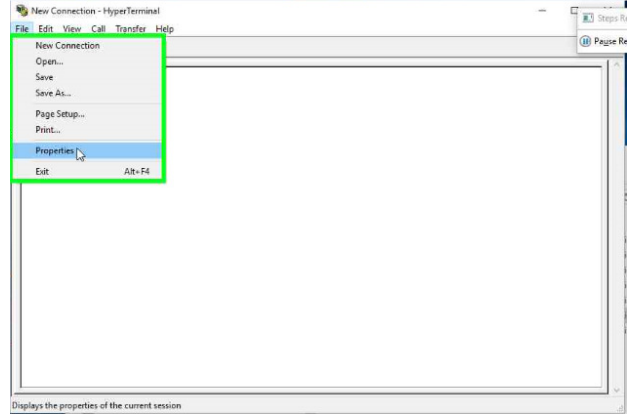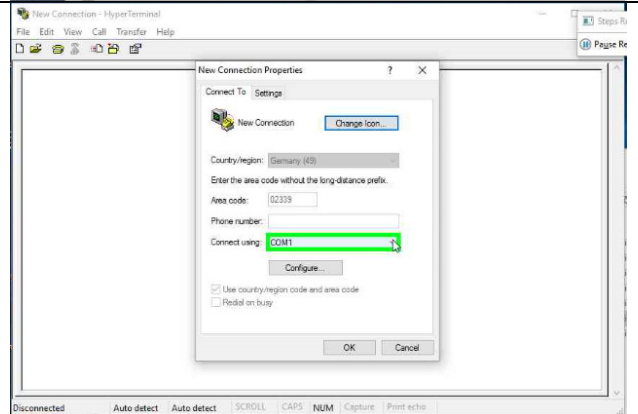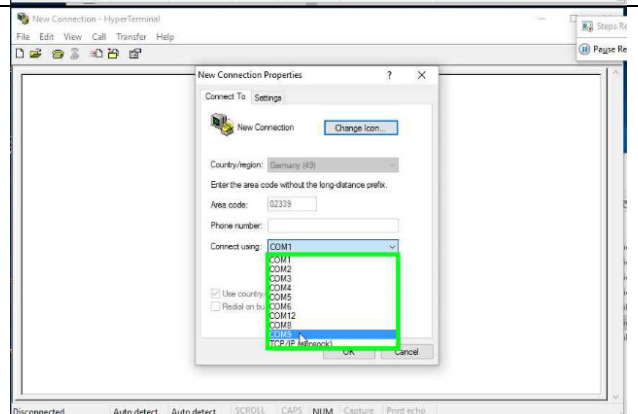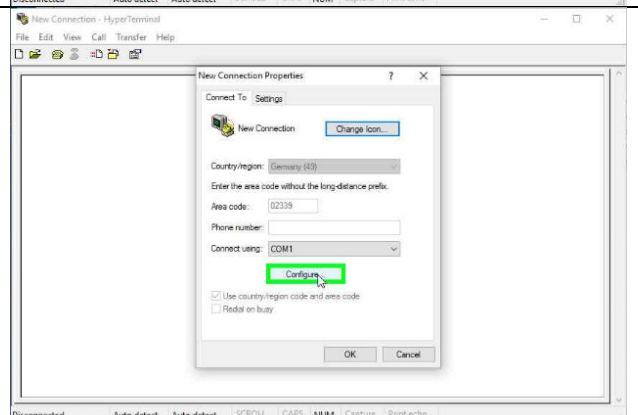
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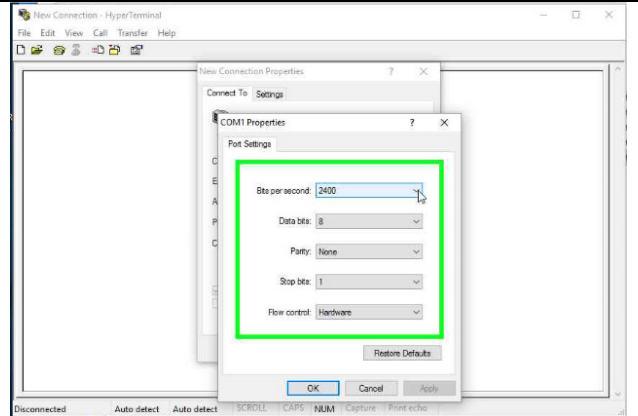
The user clicks with the left mouse button on "Open" in "COM9". (example!) The COM port number is assigned differently by each computer.	
The user clicks with the left mouse button on "115200".	
The user clicks with the left mouse button on "Open" in "COM9". (example!) The COM port number is assigned differently by each computer.	
The user clicks with the left mouse button on "None".	
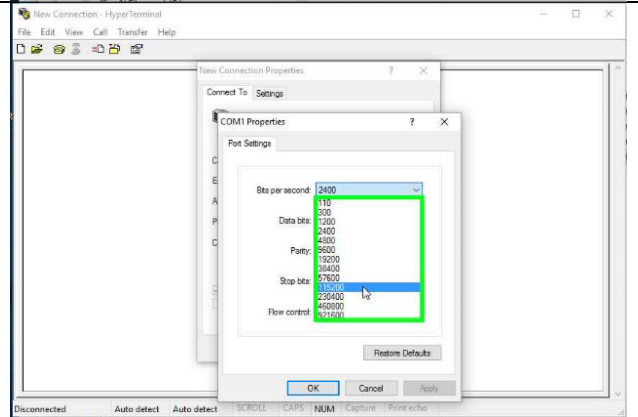
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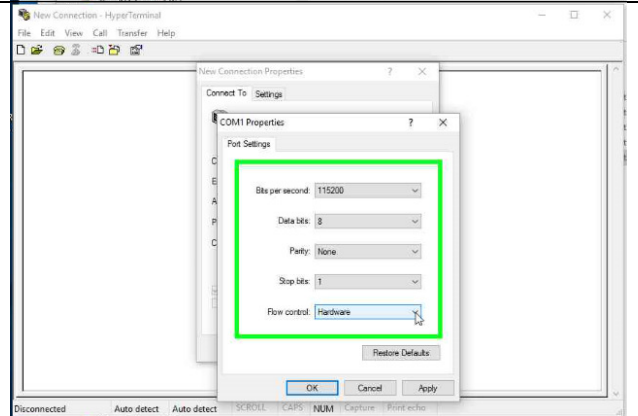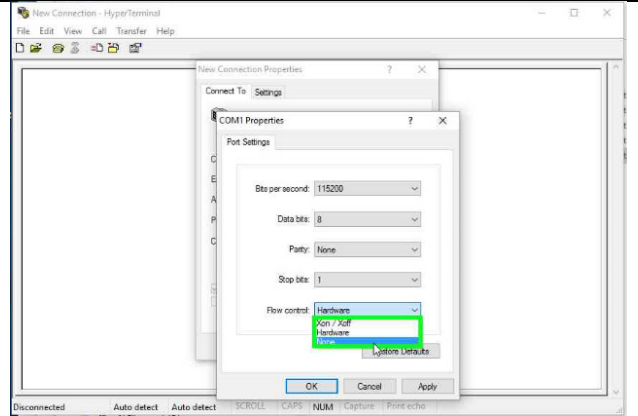
The user clicks with the left mouse button on "Apply" in "COM9 Properties" (example!). The COM port number is assigned differently by each computer.	
The user clicks with the left mouse button on "OK" in "COM9 Properties" (example!). The COM port number is assigned differently by each computer.	
The user clicks with the left mouse button on "Settings" in "New Connection Properties".	
The user clicks with the left mouse button on "Emulation" in "New Connection Properties".	
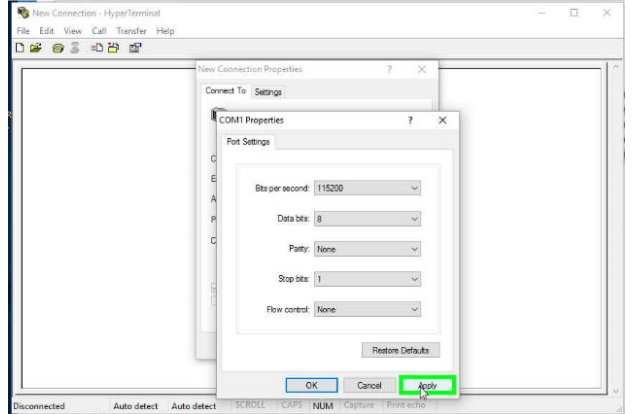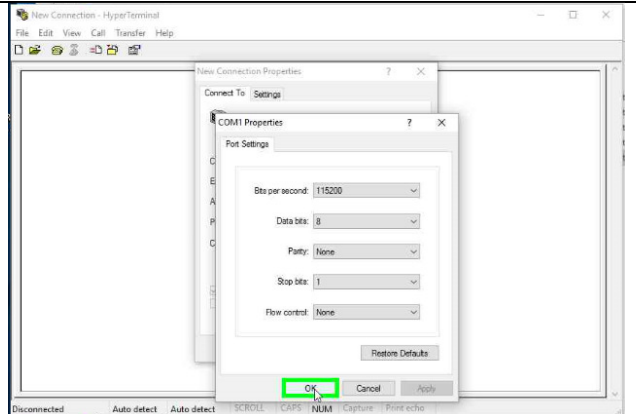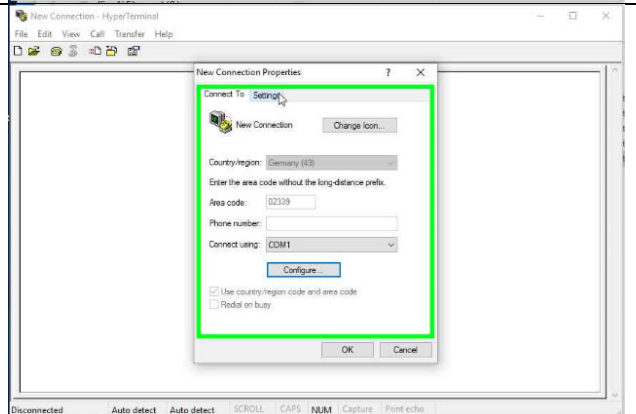
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The user clicks with the left mouse button on "VT52".	
The user clicks with the left mouse button on "OK" in "New Connection Properties".	
The user clicks with the left mouse button on "File" in "New Connection - HyperTerminal".	
The user clicks with the left mouse button on "Save as...."	

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The user clicks with the left mouse button on "ODOR easy.ht" in "Save...." The settings are now saved in the file "odor easy.ht" and can easily be reloaded at a later time.	
The user clicks with the left mouse button on "Open…"	
The user clicks with the left mouse button on "ODOR easy.ht" in "Open".	
The user clicks with the left mouse button on "Open" in "Open".	
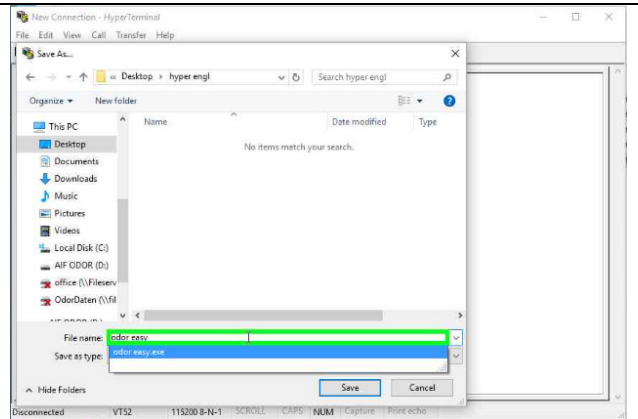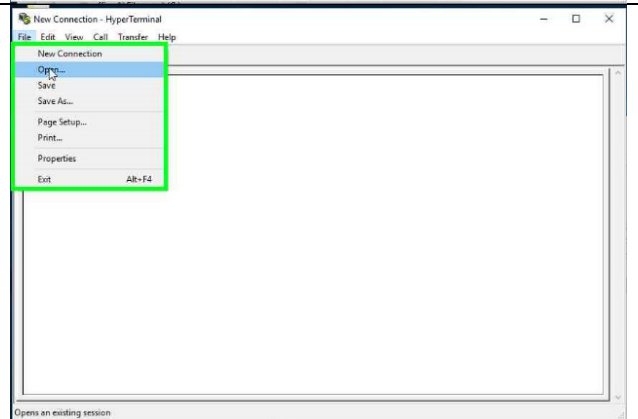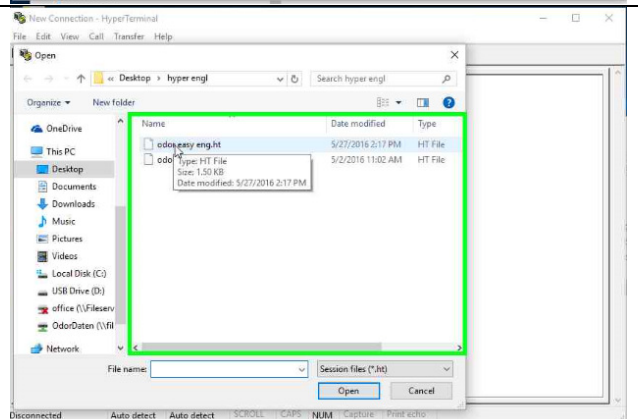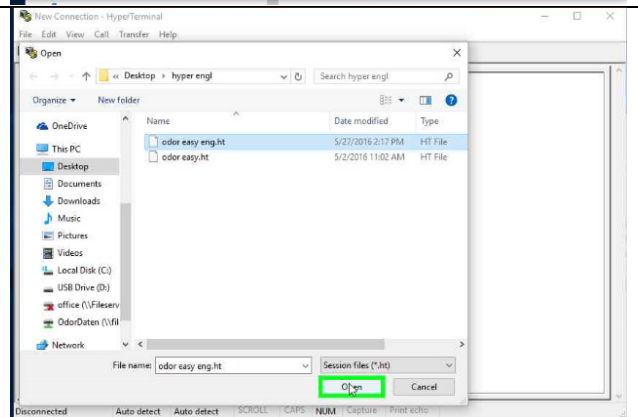
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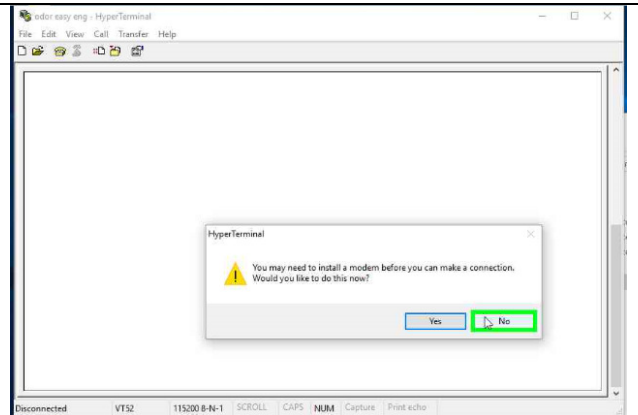
Depending on the basic settings of the computer, there may be a query as to whether a modem is to be installed. Since the ODOR easy is not a modem, the query should be answered in the negative. The user clicks with the left mouse button on "No" in "HyperTerminal".	
If you now start communication, a key press (e.g. space bar) brings up the following main menu or the last menu that was opened. Pressing the ESC key or "0" (zero) will then always take you to the main menu.	
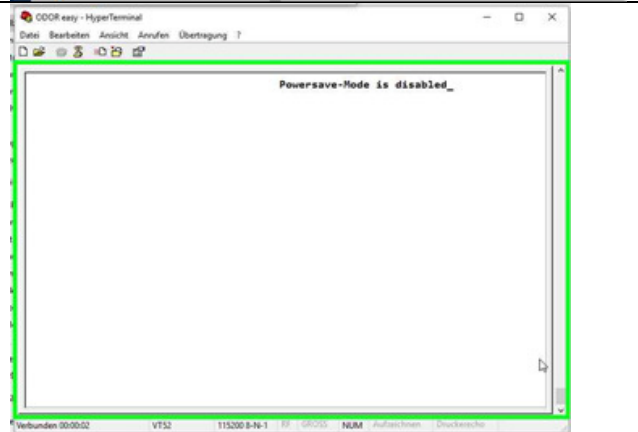
13.4 Data Logging

NOTICE: The ODOR easy does not store any measurement data from previous measurements.
The data logging function is intended only for logging device parameter data for fault diagnosis or sensor adjustment.

All of the important system data are output here every second. The values can be recorded with the help of HyperTerminal. If you save them as a CSV file, they can be imported directly into Excel and presented.

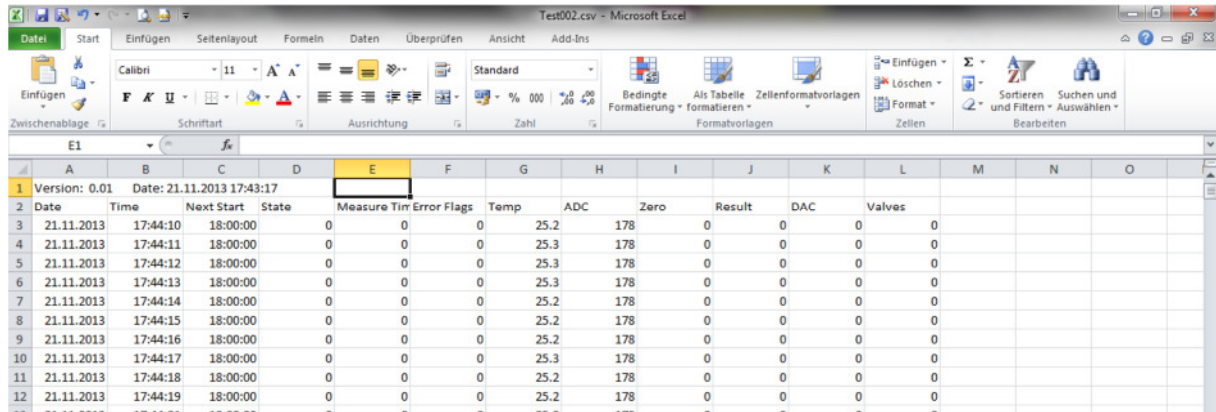Proceed as follows to make a recording:

- Make sure that the device is displaying the main menu.
- Start data recording in HyperTerminal by selecting "Transfer/Capture Text". Take care to enter the file name as a CSV file:

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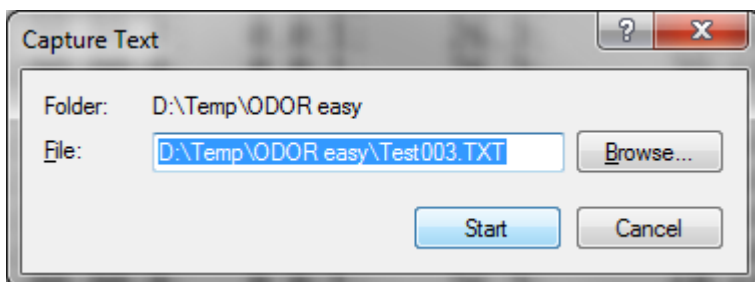
- Once you have started, press the "7" key to switch to the Data Logging menu.
- All data will now be recorded.

When you are ready to stop recording and wish to evaluate the data, follow the following steps:

- This time specifies how long the value is maintained at the current interface after a measurement.
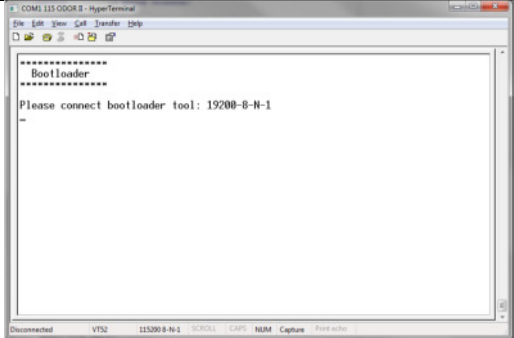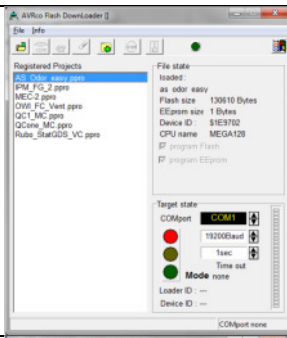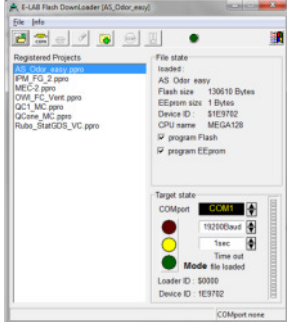- Open the saved file with a spreadsheet program (e.g. Excel).
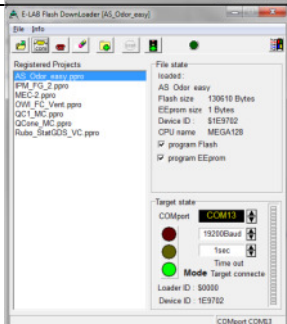
	A	B	C	D	E	F	G	H	I	J	K	L
1	Version: 0.01	Date: 21.11.2013 17:43:17										
2	Date	Time	Next Start	State	Measure Tim	Error Flags	Temp	ADC	Zero	Result	DAC	Valves
3	21.11.2013	17:44:10	18:00:00	0	0	0	25.2	178	0	0	0	0
4	21.11.2013	17:44:11	18:00:00	0	0	0	25.3	178	0	0	0	0
5	21.11.2013	17:44:12	18:00:00	0	0	0	25.3	178	0	0	0	0
6	21.11.2013	17:44:13	18:00:00	0	0	0	25.3	178	0	0	0	0
7	21.11.2013	17:44:14	18:00:00	0	0	0	25.2	178	0	0	0	0
8	21.11.2013	17:44:15	18:00:00	0	0	0	25.2	178	0	0	0	0
9	21.11.2013	17:44:16	18:00:00	0	0	0	25.2	178	0	0	0	0
10	21.11.2013	17:44:17	18:00:00	0	0	0	25.3	178	0	0	0	0
11	21.11.2013	17:44:18	18:00:00	0	0	0	25.2	178	0	0	0	0
12	21.11.2013	17:44:19	18:00:00	0	0	0	25.2	178	0	0	0	0

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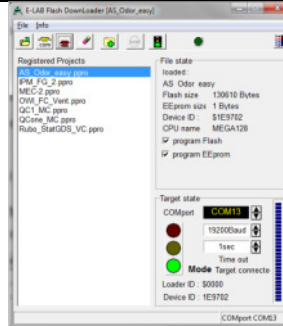
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13.5 Updating the firmware

> *NOTICE:*   Perform an update only after consultation with the manufacturer!

The system firmware can be flashed over the USB interface using a bootloader. Carry out the following steps to perform an update:

In the main menu, press the "B" key to put the system into its bootloader mode. The device can only be put back into operation by performing an update or restarting it (by switching off the power supply).	
Terminate the connection in HyperTerminal.	
Start the Windows Flash loader program and load the project named "Odor_easy". If this is not available, copy the hex file and the project file for the new firmware into a local folder, and then import this by clicking "Add Project" with the right mouse button in the project area. Set the appropriate COM port, and make sure that the baud rate is set to 19 200 baud.	
Now check whether a connection to the bootloader can be established.	
Once the connection is established, a green light is displayed and the update process can be started. While the process is running, it must not be interrupted under any circumstances! Should this happen, the device must be returned to the manufacturer.	

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The progress of the update is signalled by the corresponding progress bar. Once the update has finished (see illustration), the device can be restarted by clicking the "traffic light" button.	
The device can now be operated in the normal way using HyperTerminal. Now check in the main menu to see if the version displayed matches the update. Example: Version 1.10	
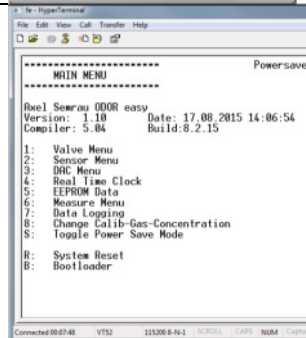
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EG – Konformitätserklärung
(CE Konformität)

Hiermit erklären wir, dass die Bauart des nachfolgend bezeichneten Gerätes in der von uns in den Verkehr gebrachten Ausführung den unten genannten einschlägigen EG-Richtlinien entspricht.

Durch nicht mit uns abgestimmte Änderungen verliert diese Erklärung ihre Gültigkeit.

Bezeichnung: ODOR *easy*

Gerätetyp: ODOR *easy*

Einschlägige EG-Richtlinien:

Niederspannungsrichtlinie	2006/95/EG
EMV-Richtlinie	2004/108/EG

Angewendete harmonisierte Normen:

EN 61010-1	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte Teil 1: Allgemeine Anforderungen
EN 61326-1	Elektrische Messt-, Steuer-, Regel und Laborgeräte, EMV-anforderungen; Teil1: Allgemeine Anforderungen

F. Sasse

Frank Sasse
Geschäftsführer
Leiter des Geschäftsbereiches
Erdgas-Analytik/Odorierungskontrolle

12/2015

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