airpointer®

Version 2.11 T USER VERSION

mlu - recordum®
Environmental Monitoring Solutions

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Contents

1. Introduction

CAUTION:

Please read this manual carefully. Operating the airpointer according to this manual is essential for safe and proper function. Otherwise the safety in use may be influenced.

Thank you for purchasing the airpointer®!

This device is a self-contained measuring platform for one or more air pollutants. The airpointer is constructed for indoor and outdoor use and continuous operation. Key features comprise:

- Several analyzing modules can be built in: SO_2, $NO/NO_2/NO_x$, O_3, CO, H_2S, VOC, BTEX, Methane/Non-methane, electrochemical sensors, NH_3, TDS (Traffic sensor data), PM10 or PM2,5, and sensors for indoor air quality (IAQ) measurement, upgradeable.

  Taylor it to your specific needs with our unique SIP (sensor interface platform).
- SO_2, NO_x, O_3, CO sensors use the respective EU reference method.
- Complete meteorology available (optional).
- Housing made of double-wall coated aluminium plate, providing excellent isolation from temperature and electrical radiation.
- Two standard cylinder locks for main door and maintenance door, which could also be part of a key system.
- Compact system, easy to operate and maintain.
- Internal air condition and temperature management system, providing optimized energy consumption.
- Low power consumption of 670W max (2000W max for the High Capacity version)
- Rugged, unobtrusive, burglar proof and weatherproof design.
- No need for special preparation of measuring site.
- Operation control and data view via web browser and Internet
- Analyzing modules on drawers for easy expansion of the system as well as good serviceability. Cables and tubing protected against mechanical damage.
- Internal zero air supply for periodical zero check or calibration. Optional span modules are available.
- The powerful data management system allows implementation of additional monitoring devices including particulate matters like the TEOM/FDMS or βgauge analyzers.

- Made in Austria, Europe

2. SAFETY MESSAGES

Your safety and the safety of others is very important. We have provided many important safety messages in this manual. Please read these messages carefully. A safety message alerts you to potential hazards that could hurt you or others. Each safety message is associated with a safety alert symbol. These symbols are found in the manual and inside the instrument. The definition of each symbol is described below:

	**GENERAL SAFETY HAZARD: Refer to the instructions for details on the specific hazard.**
	**CAUTION: Electrical shock hazard.**
	**ATTENTION: Sharp surface.**
	**ATTENTION: Device is heavy. To avoid personal injury, use several persons to lift and carry it.**
	**CAUTION: Hot Surface Warning.**

	**CAUTION: Ozone is a toxic gas.**
	**CAUTION: Toxic gas! Take precautions!**
	**ATTENTION: UV light! May cause injuries.**
	**CAUTION: Vacuum inside the device!**
	**ATTENTION: Do NOT dispose with ordinary trash!**
	**RECYCLING**

3. Specifications

The airpointer consists of the base unit and depending on the configuration of several gas modules plus a meteorology and communication unit. The base unit includes housing with pump, an air conditioner and a data logger (RDPP) plus software and two Ethernet 10/100 MBit/s Interfaces. Depending on the configuration of your airpointer, several modules (SO_2, O_3, NO_x, CO, particle, H_2S, TDS (traffic data sensor), electrochemical and VOC analyzer) can be built in to measure various pollutants in ambient air. Refer to Section 5.5 for the location of the SO_2, O_3, NO_x, or CO module.

Additionally, an internal calibration control (ISM - Internal Span Module) can be installed for the SO_2, O_3, NO_x, or CO Module on the respective module. The specifications and further information of the additional sensors and modules are given in the respective chapters.

For additional components and more information please ask your distributor.

3.1. General Specifications

Sample Flow Rate	Less than 3000cc/min depending on configuration additional about 2000cc/min for Particular Matter Monitor
Dimensions (H x D x W)	Base Unit 2D (up to two drawers): 890x782x400mm/35x30,8x15,8in Base Unit 4D (up to four drawers): 1120x782x400mm/44,1x30,8x15,8in Base Unit +PM (up to four drawers): 1200x782x615mm/47,2x30,8x24,2in
Weight	airpointer Base unit 2D: 65,8kg/145.1lbs airpointer Base unit 4D: 73,9kg/162,9lbs airpointer HC: 110kg/242,5lbs O_3 Analyzing Module: 5,8kg/12,8lbs SO_2 Analyzing Module: 8,5kg/18,7lbs CO Analyzing Module: 9kg/19,8lbs NO_x Analyzing Module: 12,0kg/26,5lbs PM Analyzing Module: < 4,0kg/8,8lbs
Operating Temperature	-20 to +42°C (sensor specs valid within this rage)

Range	Optional heater for -40°C available. For higher temperatures an additional shelter with additional air condition is available.
Power	two versions are available: 115V/60 Hz or 230V/50 Hz, min 10A fused. Typically, 350W for three and 490W for four modules. Max. short term power consumption: 670W. The HC unit has a maximal consumption of 2000W
Configuration	Combination of several analyzer modules and various meteorological and other sensors are possible, upgradeable
Rate of protection	IP54 (measurement area), IP44 (pump room)
Sound pressure level	58 dB in 1 m distance
Rating of power socket at the main computer housing	115V/230V (depending on instruments version), max. 1A.

CAUTION:

Please ensure to connect your airpointer to its correct voltage. Information can be found on its type label!

3.2 Overview Specifications of the Modules

Module	CO	O_3	NOx	SO_2
Measurement Principle	Non-dispersive Infrared (NDIR) (EN 14626)	Ultraviolet Photometry (EN 14625)	Chemiluminescence (EN14211)	Ultraviolet Fluorescence (EN 14212)
Measurement Units	ppm, ppb, µg/m³, mg/m³	ppm, ppb, µg/m³, mg/m³	ppm, ppb, µg/m³, mg/m³	ppm, ppb, µg/m³, mg/m³

Dynamic Range	up to 10.000ppm	up to 200ppm	up to 20ppm	up to 10ppm
Lower Detectable Limit	0.04ppm	0.5ppb	0.4ppb	0.5ppb
Zero Noise	0.02ppm RMS	0.25ppb RMS	0.2ppb RMS	0.25ppb RMS
Zero Drift (24 hours)	< 0.1ppm	< 1.0ppb	< 0.4ppb	< 1.0ppb
Span Drift (24 hours)	± 1% of reading > 10ppm	± 1% of reading or 1 ppb (whichever is greater)	± 1% of reading > 100ppb	± 1% of reading >100ppb
Response time	< 60 seconds	< 30 seconds	< 60 seconds	< 90 seconds
Precision	± 0.1 ppm	1ppb	1% of reading or 1 ppb (whichever is greater) @ <500ppb	1% of reading or 1 ppb (whichever is greater)
Linearity	± 1% of reading < 1000 ppm	± 1% of reading > 100 ppb	± 1% of reading >100ppb	± 1% of maximum > 100 ppb
Sample flow rate	approx. 500ml/min	approx. 1000ml/min	1000ml/min	500ml/min

3.3. Warranty

Prior to shipment, the equipment is thoroughly inspected and tested. Should functional failure occur, we assure our customers that prompt service and support will be available. All equipment originally manufactured by Recordum Messtechnik GmbH found to be defective will be repaired or replaced subject to the following considerations.

All equipment is warranted for 12 months, consumables not included. Any warranty is limited to 12 months. Warranty is limited to equipment and does not cover losses such as data loss or its effects.

Warranty is to be understood as the substitution or repair at Recordum Messtechnik GmbH's or its distributors discretion without charge, including the cost of labor, of the component parts of the equipment recognized as defective at source owing to flaws in their manufacture.

All units or components should be properly packed for handling and returned freight prepaid to the distributor they were purchased from. After repair, the equipment will be returned, freight prepaid.

Our warranty commences with shipment of the equipment. After expiry of warranty period and throughout the equipment's life time, Recordum Messtechnik GmbH or its distributors readily provide on site service at reasonable prices similar to those of other manufacturers in the industry.

Equipment provided but not manufactured, though normally offered by Recordum Messtechnik GmbH, is warranted and will be repaired to the extent and according to the current terms and conditions of the respective equipment manufacturer's warranty.

Recordum Messtechnik GmbH, ITS DEALERS, DISTRIBUTORS, SUB-CONTRAC-

TORS, AGENTS OR EMPLOYEES SHALL NOT IN ANY EVENT BE LIABLE FOR

ANY DAMAGES INCLUDING SPECIAL, DIRECT, INDIRECT, INCIDENTAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS OR ANY OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE INSTRUMENT OR THE DOCUMENTATION.

Subject to change without notice. No liability for technical failures or omissions.

3.4. Declarations and Certifications

Figure 3.1.: Recordum ISO Quality Management System Certificate

qualityaustria
Succeed with Quality

CERTIFICATE

Quality Austria Training, Certification and Evaluation Ltd. awards this Quality Austria Certificate to the following organisation(s):

This Quality Austria Certificate confirms the application and further development of an effective

recordum Messtechnik GmbH
A-2340 Mödling, Jasomirgottgasse 5

ENVIRONMENTAL MANAGEMENT SYSTEM
complying with the requirements of standard
ISO 14001:2004

Quality Austria Training, Certification and Evaluation Ltd. is accredited according to the Austrian Accreditation Act by the BMWA (Federal Ministry of Economic Affairs and Labour).

Quality Austria is accredited as an organization for environmental verification by the BMLFUW (Federal Ministry of Agriculture, Forestry, Environment and Water Management).

Quality Austria is authorized by the VDA (Association of the Automotive Industry).

For accreditation and registration details please refer to the applicable regulations and decisions published in the Federal Law Gazette or recognition documents.

Quality Austria is the Austrian member of IQNet (International Certification Network).

Doc. No. FO_24_012

Registration No.: 00395/0
Date of initial issue: 3 November 2004
Valid until: 26 August 2014

qualityaustria

The validity of the Quality Austria Certificate will be maintained via annual surveillance audits and one renewal audit after three years.

Vienna, 1 December 2011

Quality Austria Training,
Certification and Evaluation Ltd.

Konrad Scheiber
General Manager

Ing. Wolfgang Hackenauer, MSc
Specialist representative

The current validity of the certificate is documented exclusively on the Internet under
http://www.qualityaustria.com/en/cert EAC: 18

Figure 3.2.: Recordum ISO Environmental Management System Certificate

Declaration of Compliance

Manufacturer: Recordum Messtechnik GmbH

Jasomirgottgasse 5

Mödling, 2340 Austria

Phone: +43(0)2236/860 562

Fax: +43(0)2236/860 562-61

Email: info@recordum.com

Recordum Messtechnik GmbH declares that the product specified herein

Product name:	airpointer
Description:	Air pollution monitoring system
Product options:	SO_2, NO_x, O_3, CO, Meteo
Date of marking:	30th of March 2005
in accordance with the directives	73/23/EEC
	89/336/EEC

is in compliance with the following:

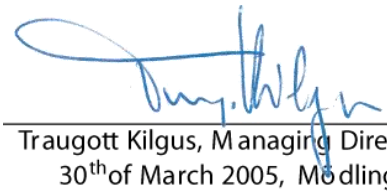
Product Safety Standards:

EN61010-1:2001 + Corrigendum:2002-08 + Corrigendum:2004-01

EMC Directive:

EN61326:1997 + A1:1998 + A2:2000 + A3:2003

Emission measurements	Susceptibility immunity tests
EN55022 Class B	EN61000-4-2
EN61000-3-2	EN61000-4-3
EN61000-3-3	EN61000-4-4
	EN61000-4-5
	EN61000-4-6
	EN61000-4-8
	EN61000-4-11



Traugott Kilgus, Managing Director
30th of March 2005, Mödling

Deutscher Akkreditierungs Rat
DAP-PL-3856.99

TÜVRheinland®
Precisely Right.

CONFIRMATION

German Federal Environmental Agency (UBA)

Announcement about the uniform practice in monitoring emissions and ambient air, circular from the Federal Environment Ministry (BMU) of 2009-08-03, publication BAnz. 2009-08-25, no. 125, page 2934

II. Suitability of measuring equipment for the continuous monitoring of ambient air

With reference to number 3.2 of the announcement of the Bodies, which are responsible for the implementation of the Council Directive 96/62/EG from 27th September 1996 on ambient air quality assessment and management from 1st October 1998 (BAnz. page 15126) the suitability of the following measuring system is announced on behalf of BMU:

2 Multi component measuring equipment
2.2 airpointer for NO, NO_2, NO_x, SO_2, O_3 and CO

Manufacturer:
recordum Messtechnik GmbH, Mödling

Suitability:
For stationary, continuous measurement of nitrogen oxide, sulphur dioxide, ozone and carbon monoxide in ambient air.

Measuring ranges during the suitability test:

Measurement ranges according to VDI 4202		
Component	MR	Unit
NO_2	0 - 400	µg/m³
SO_2	0 - 700	µg/m³
O_3	0 - 360	µg/m³
CO	0 - 60	mg/m³

Measurement ranges according to EN standards		
Component	MR	Unit
NO	0 - 1200	µg/m³
NO_2	0 - 500	µg/m³
SO_2	0 - 1000	µg/m³
O_3	0 - 500	µg/m³
CO	0 - 100	mg/m³

Software version:
1.001 (analytical module)

Restriction:
-

Remark:
see page 2

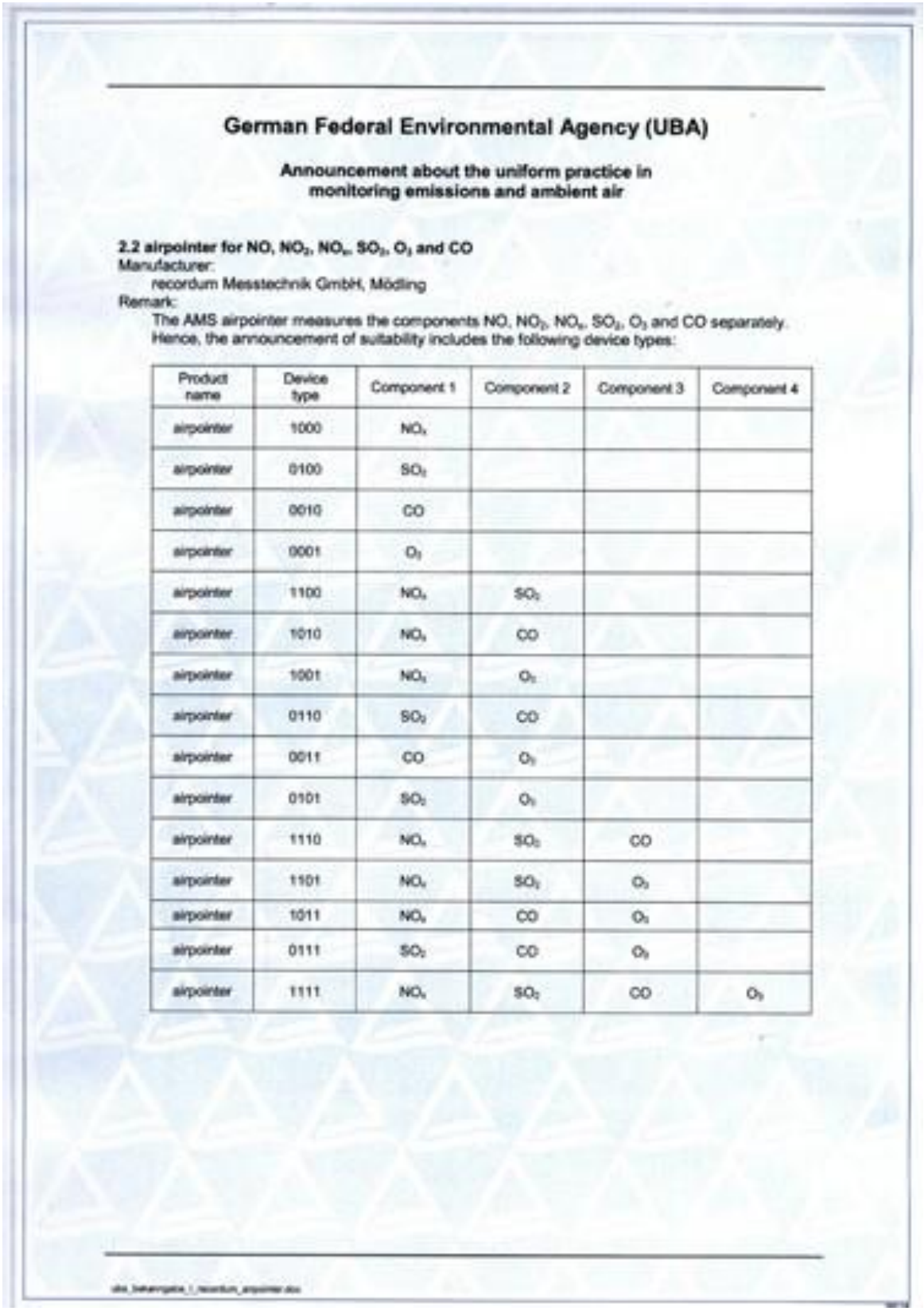
Test Report:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln,
Report No. 936/21209700/A 2009-01-15

Köln, 2009-09-17 Dr. P. Wilbring Dipl.-Ing. K. Pletscher

www.umwelt-tuv.de
se@umwelt-tuv.de
Tel. +49 - 221 - 806 - 2275

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
TÜV Rheinland Group
Am Grauen Stein, 51105 Köln

Figure 3.3.: Confirmation for the airpointer for continuous measurement and multi component measurement



German Federal Environmental Agency (UBA)

Announcement about the uniform practice in monitoring emissions and ambient air

2.2 airpointer for NO, NO_2, NO_x, SO_2, O_3 and CO

Manufacturer:
recordum Messtechnik GmbH, Mödling

Remark:
The AMS airpointer measures the components NO, NO_2, NO_x, SO_2, O_3 and CO separately. Hence, the announcement of suitability includes the following device types:

Product name	Device type	Component 1	Component 2	Component 3	Component 4
airpointer	1000	NO_x			
airpointer	0100	SO_2			
airpointer	0010	CO			
airpointer	0001	O_3			
airpointer	1100	NO_x	SO_2		
airpointer	1010	NO_x	CO		
airpointer	1001	NO_x	O_3		
airpointer	0110	SO_2	CO		
airpointer	0011	CO	O_3		
airpointer	0101	SO_2	O_3		
airpointer	1110	NO_x	SO_2	CO	
airpointer	1101	NO_x	SO_2	O_3	
airpointer	1011	NO_x	CO	O_3	
airpointer	0111	SO_2	CO	O_3	
airpointer	1111	NO_x	SO_2	CO	O_3

Figure 3.4.: Confirmation for the Airpointer for continuous measurement and multi component measurement

4. Getting Started

CAUTION:

The airpointer weighs about 80 to 110kg (depending on the configuration)!

To avoid personal injury, we recommend at least three persons to lift and carry the airpointer

4.1. Overview

1. Unpacking (store the multi-ply board and the special wooden pallet for further reuse) (chapter 4.2).
2. Verify that all optional hardware ordered with the unit is installed (according to the included printed record) and inspect the interior (chapter 4.3).
3. Mounting (Take care of the required ventilation clearance and maintenance space) (chapter 4.4).
4. Remove the red shipping screws from the piston pump (chapter 4.3).
5. Mount the sample inlet and further optional equipment, like e.g.: 3G/4G antenna, wind sensor and sample inlet for the particle sensor, on top or at the side of the airpointer (chapter 4.4).
6. If an optional Internal Span module for NO_x and/or SO_2 module is installed, then install the respective permeation tube. Generally, it is not included. You must provide it in the desired concentration.

NOTE

The airpointer should be on site in upright position for at least one hour before the first power-up.

7. Put all necessary cables (e.g.: power line, cable for the wind sensor) through the cable passage and the strain relief and connect them (Figure 5.15).

NOTE

Check voltage and fuse!

8. Boot up the airpointer.

NOTE

The airpointer boots up, when the internal temperature is above 5°C.

9. Connect your Laptop with the delivered cross patch cable with the LAN connector in the maintenance door. Boot up the laptop and configure your internet connection.

NOTE

Make sure that you can log in as administrator at your laptop and at the airpointer.

10. Configure your modem connection (optional).
11. Connect your PC with the airpointer via the Recordum portal. The URL of the airpointer is in the following model: https://airpointer-YYYY-00123.recordum.net/ The first 4 digits are the year it was produced, and the following 5 are an increment, for example https://airpointer-2018-00999.recordum.net/
12. Open the User Interface on your PC.
13. Change the password.
14. In the User Interface deviations of the measurement values outside the chosen warning and failure limits are shown.

NOTE
The fail or warn sign is shown as red FAIL and orange WARN, respectively, overhead in the User Interface. If you click the sign you will get the correct side in the LinSens Service Interface with further details ('LinSens Service Interface'5.7.2). Failure messages are written in red and warn messages in orange.

15. Wait until all warn and fail signs cease (this should require 15 to 30 minutes depending on the configuration). Then the green LED in the maintenance door lights (Figure 4.13) and the airpointer is ready for operation.
16. Check the measured values, whether they are plausible (especially the temperature).

    All values should be within the chosen limits.

NOTE
The value -9999,0 is equivalent to a non-existing or inoperative value, analogue to MS Excel.

17. Perform a leak check.
18. Perform a sample flow check.
19. If possible test the air condition. Does it cool down the internal air with respect to the ambient air? If not, please make sure that the suction grills at the bottom of the airpointer are clean and that there is enough ventilation space
20. Calibrate the airpointer as described in chapter 5.6 'Calibration'.
21. Define the setpoints and the cycles for the Internal Span Module.
22. Leave the maintenance mode and start the measurement.

4.2. Unpacking the airpointer

Follow these steps to unpack the airpointer:

1. Remove the transparent weather protection foil.
2. Inspect the received packages (see Figure 4.1) for external shipping damage. If damaged, please advise the shipper first, then your distributor.
3. Do NOT cut the multi-ply board box. It can be reused for later shipment. Open the multi-ply board box (see Figure 4.2).

Figure 4.1.: The Package

Figure 4.2.: Opened Multi-Ply the airpointer board box

4. Lift and remove the multi-ply board box.
5. Store the wooden pallet and the multi-ply board box for later reuse.

Figure 4.3.: Store the multi-ply board box for later reuse

Figure 4.4.: Cut the plastic retaining bands

6. Unpack the airpointer.
7. Check for content of delivery inside the enclosed boxes.
8. Cut the plastic retaining bands that fixes the airpointer to the special wooden pallet (see Figure 4.4) and remove the transparent plastic protection (see Figure 4.5).
9. Put the device in an upright position.

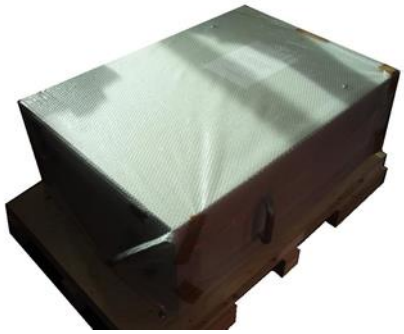


Figure 4.5.: airpointer with protection removed

Figure 4.6.: Unpacked airpointer

4.3. Checking the airpointer after Unpacking

NOTE
With the airpointer, you should have received a box with all of the accessories, including this manual.

Checking the airpointer after unpacking:

1. Put the device in an upright position, i.e. the name 'airpointer' is readable and the sample inlet opening is on the top (see Figure 4.8). Open the main door of the analyzer and check for internal shipping damage.

   Included with your analyzer is a printed record of the final performance characterization performed on your instrument at the factory.

NOTE
The included printed record is an important quality assurance and calibration record for this instrument. Please preserve it.

2. Open the main door.

CAUTION: **The door opens with gas-pressure damper. Hold it down with one hand and open it slowly.**
CAUTION: **When opening the main door take care that you have enough space to open the door.**

3. Inspect the interior of the instrument to make sure all circuit boards and other components are in good shape and properly seated.

CAUTION:

Printed Circuit Assemblies (PCA) are static sensitive. Electrostatic discharges, too small to be felt by humans, are large enough to destroy sensitive circuits.

Before touching a PCA, fasten a properly installed grounding strap to your wrist or touch a bare metal part of the housing to discharge any electrostatic potentials.

Never disconnect electronic circuit boards, wiring harnesses or electronic sub-assemblies while the unit is under power.

4. Check the connectors of the various internal wiring harnesses and pneumatic hoses to make sure they are firmly and properly seated.
5. Verify that all optional hardware ordered with the unit has been installed. These are checked on the printed list shipped with the analyzer.

CAUTION:

If you modify anything inside the airpointer, check that the airpointer is unplugged!

6. Once you are at the designated installation site and you have determined that no shipping damage exists and that the unit includes all expected hardware options, remove the two red colored shipping screws from the bottom of the pump from the outside of the airpointer (shown in Figure 4.7) before you switch on your airpointer. Save these shipping screws.

CAUTION:

DO NOT reach inside the ventilation blades of the pump!

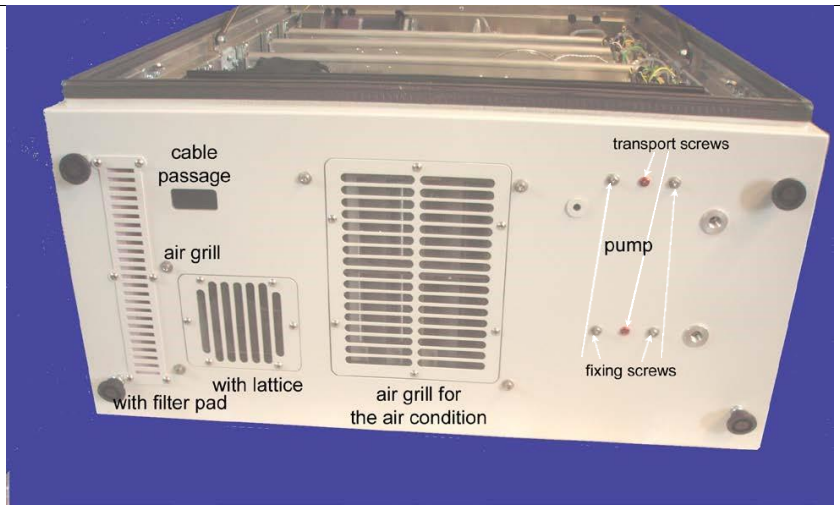


Figure 4.7.: Bottom of the airpointer

7. Close the main door and secure the airpointer if necessary.

NOTE

Whenever you ship the airpointer, re-install the shipping screws and use the special wooden pallet and the multi-ply box which you got with the

airpointer.

4.4. Mounting the airpointer

NOTE

For air quality measurement free air circulation is essential. Please refer to local requirements for selection of a good mounting site for the airpointer.

Preparing the installation site and mounting the airpointer:

1. Power connection 115V/60 Hz or 230V/50 Hz, min 10A fused (depending on version) is needed at the installation site.
2. Optionally, establishing Internet connection for the airpointer preparations may be necessary.
3. Loosen the screw for the sample inlet. Push the sample inlet into its final position (see Figures 4.8 to 4.9) and fasten the screw till the sample inlet cannot be rotated any more.

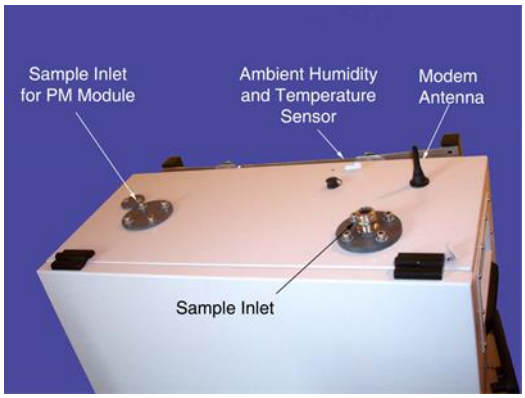


Figure 4.8.: Housing with roof passage

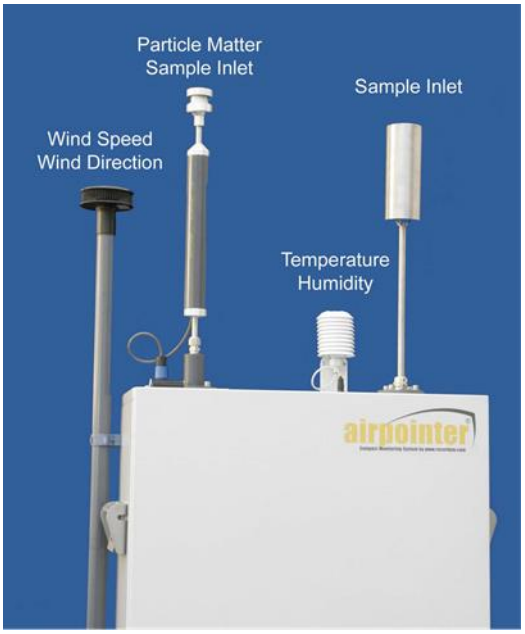


Figure 4.9.: Sample Inlet mounted

4. Mount all external sensors (optional) and connect them. The wind sensor is fixed with a collar on the left side, all other sensors (e.g.: humidity and temperature), the modem and the sample inlet for particle measurement are mounted and connected on the top of the airpointer.

NOTE

The cable for the wind sensor leads through the cable passage and the strain relief to the connector above the master switch (see Figure 4.17).

5. The airpointer should be mounted stationary. We recommend using one of three mounting kits available. Mounting Kit M for mast mounting (with variable or fixed diameter) and Mounting Kit W for wall mounting (see Figure 4.10).

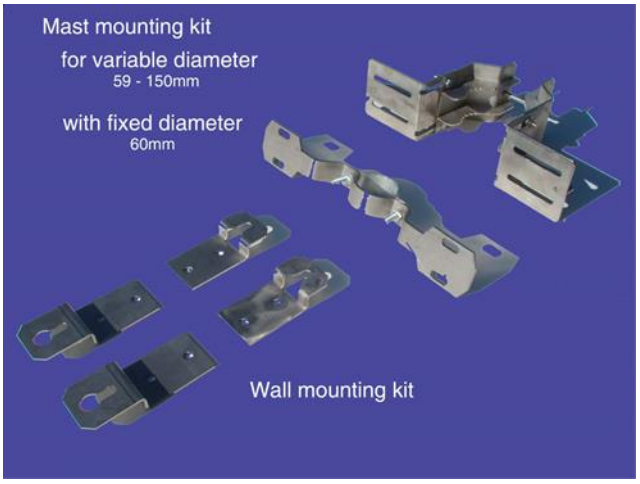


Figure 4.10.: Clamping claws and mounting brackets

Figure 4.11.: fixation of mounting kit W for wall mounting on a frame

NOTE

Use the four M10 screws on the back side of the housing for Wall Mounting or Mast Mounting the airpointer, only.

- **Wall Mounting Kit W:** Place each of the four wall mounting kits vertically and fix them with 2 M10 washers and screws delivered with the kit.
- **Mast Mounting Kit M:** Place each of the two mast mounting kits horizontally and fix them with 4 M10 washers and screws delivered with the kit.
- **Further Mounting possibilities:** Please ask your distributor for additional mounting possibilities (e.g.: lift mounting and trolley).

NOTE

The two handles on the left and on the right side of the airpointer have only to be used for lifting the airpointer. Do NOT use these handles for permanent fixation.

A certain ventilation clearance and maintenance space is required for the operation of the analyzer:

	Required clearance minimum [1]
Above the instrument housing [2]	≥70cm
Right side of the instrument (maintenance door) 2D/4D	≥30cm
Right side of the instrument (maintenance door) HC	≥50cm
Below the instrument 2D/4D[3]	≥50cm
Below the instrument HC[3]	-
In front of the airpointer 2D (main door)[3]	≥88cm
In front of the airpointer 4D/HC (main door)[4]	≥110cm

Table 4.1.: Required Ventilation Clearance and Maintenance Space

CAUTION:

Ensure the airpointer is operated in a sufficiently ventilated area. If the airpointer contains a NO_x module, its pump outlet gas contains NO_2 and – in case the ozone scrubber does not work properly– also ozone. If sufficient ventilation cannot be assured, connect the pump outlet via tubing to a well-ventilated area. If an airpointer with NO_x module is used indoors use a charcoal scrubber (part number: 800-201300).

6. Check once again that the two red coloured shipping screws from the bottom of the pump room are already removed (as shown in Figure 4.7). If not, please do so now as described in Section 5.3.
7. After finishing the mounting procedure read Section 4.5 to get familiar with the layout of the airpointer. Then continue with Section 4.6 for the start-up of the device.

4.5. airpointer Layout

At various circumstances, text passages refer to components of the airpointer. Figures 4.12 and 4.13 depict some of these components. Figure 4.12 shows the configuration inside the airpointer,

[1] For air quality measurement free air-streams are essential. Please refer to local requirements for selection of a good site for the airpointer.

[2] Minimum distance required for installation of the sampling head; for indoor use make sure that the clearance is large enough to allow undisturbed sampling.

[3] If you have less front space, please contact your distributor for special solutions

and Figure 4.13 shows the inside of the maintenance door. Depending on your configuration one or more of these components may not be installed.

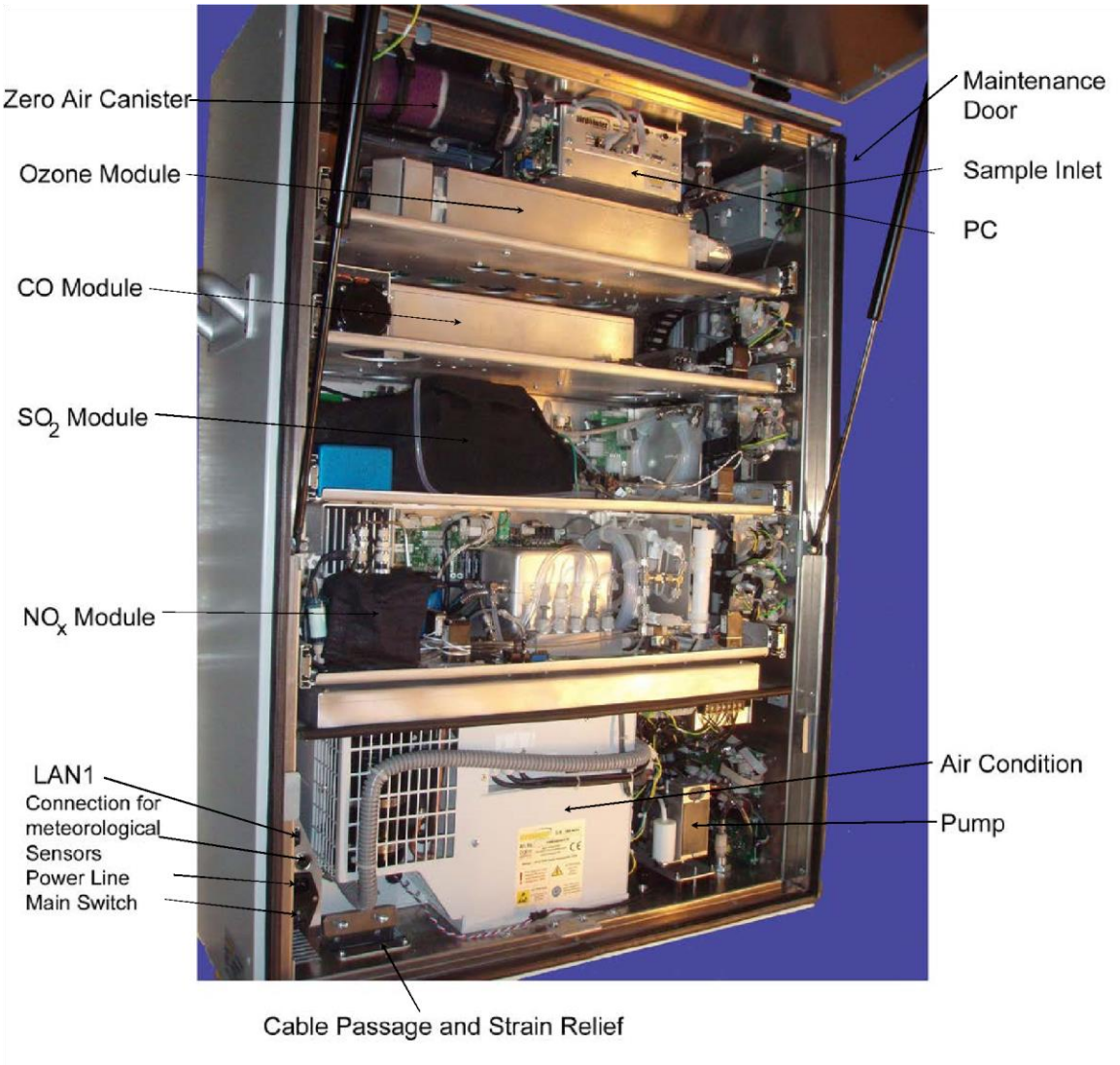


Figure 4.12.: Inside the airpointer with four drawers (4D)

Figure 4.13.: Inside the Maintenance Door of the airpointer

NOTE
The external power adapter is configured for maximum 100W and temporary use, only!

4.6. Initial Start Up

The procedure in this section assumes that the airpointer is on site and all sensors are installed. In order to guarantee a safe and proper operation of the airpointer, several steps have to be taken prior to operation.

Follow these steps to assure a safe installation:

1. Place the airpointer always in an upright position (now the name airpointer is readable and the sample inlet opening is on the top (see also front page)).
2. Ensure sufficient space for air ventilation and maintenance access above, underneath, on the right side and in front of the device by following the installation hints (see Table 4.1).
3. To avoid damaging the cooling aggregate, let the airpointer acclimate for at least 1 hour in an upright position before Power-Up.

CAUTION:

Let the airpointer acclimate for at least 1 hour in an upright position before power up.

4. Ensure the airpointer is operated in a sufficiently ventilated area. If the airpointer contains a NO_x module, its pump outlet gas releases harmful gases (NO_2, and if the scrubber does not work properly, ozone). If sufficient ventilation cannot be assured, connect the pump outlet via tubing to a well-ventilated area or use a charcoal cartridge.
5. Open the main door.
6. Open the cable passage and the strain relief.
7. Lead the power line through the cable passage and connect it witch the power adapter (Figure 4.14). Close the strain relief and the cable passage.
8. Check the power supply voltage. A Power line 115V/60 Hz or 230V/50 Hz, min 10A fused (depending on version) is needed to operate the airpointer. Lead the power cord through the cable passage and connect it with the main power socket (see Figure 4.14). The external power adapter in the maintenance access (see Figure 4.14) can be used to supply e.g. your notebook in the field (115VAC or 230VAC/1A maximum, depending on version, max 100W). This power socket can be used e.g. during maintenance but should not be used continuously.
9. Make sure the airpointer is connected to an appropriate grounded line.

CAUTION:

Do not install the airpointer in a way that emergency disruption of the power supply is obstructed.

10. To power up the airpointer, press the Master Switch (see Figure 4.14).

NOTE

Two temperature sensors are checking the internal temperature of the airpointer. To protect the hard disk, the computer boots when the temperature is above 5°C.

11. Wait a few minutes while observing the status diodes (yellow and red LEDs light) until only the green LED lights up. The LEDs are located on the left side of the maintenance access on the right side of the airpointer housing (Figure 4.13). The pump has started by now.

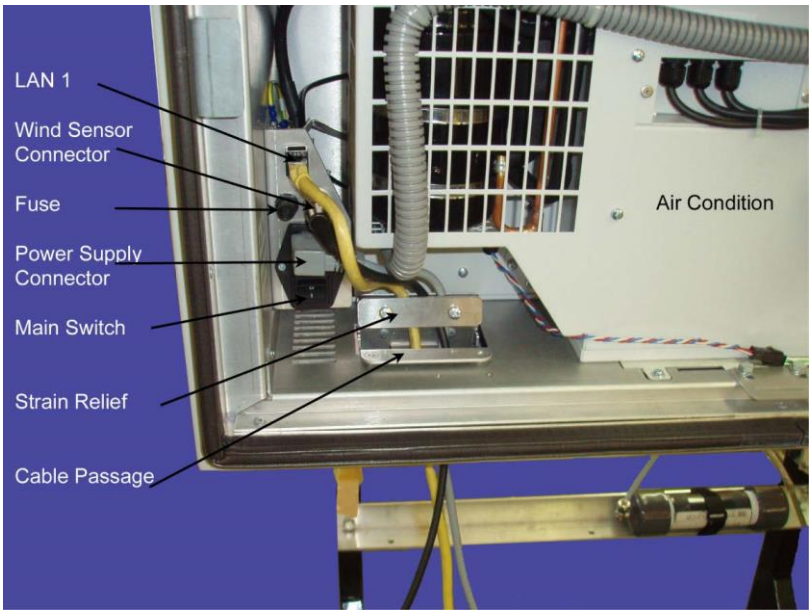


Figure 4.14.: Position of the Power Supply and Connector of the Master Switch, at the Left Bottom of the airpointer

12. When the green LED ('Status OK') lights up (Figure 4.14), operating status is achieved.
13. Close main- and maintenance door.

CAUTION:

When closing the main door make sure that the power cord is not crimped. Use the cable passage.

At this point the airpointer will already produce data which is stored on the internal hard disk memory.

NOTE

Now the internet connection can be configured. For the first time this has to be done on site.

The User Interface of your airpointer is completely implemented in software. It is called up by a web browser.

In terms of networking, the airpointer can be regarded as a server providing special services by its various connectors.

In general, the connection with an airpointer

- can be established directly with a cross patch cable,
- can be established as member of a local network,
- or can be established over an Internet connection.

Description of Status LEDs

At the left side of the maintenance access three Status LEDs are located (see Figure 4.14). If the system is running the LEDs have a definite status.

green: Everything is running normally. There is no status (warning or failure).

orange: There is at least one warning. For more details see the User Interface (see section 5). After the login you can see next to the name of your airpointer 'WARN' written in black letters. Click 'WARN' and a window witch detail information will be open. Alternatively, you can open the 'LinSens Service Interface' (see section 5.7.2). If you open a new window in the User Interface the sign is updated.

red: There is at least one errors(fail). For more details use the User Interface (see section 5.7). After the login you can see next to the name of your airpointer 'FAIL' is written in black letters. Click 'FAIL' and a window witch detail information will be open. Else you can open the 'LinSens Service Interface' (see section 5.7.2). If you open a new window in the User Interface the sign is updated.

flashing: The LEDs are flashing when the airpointer is operating in the maintenance mode. The color code is the same as described above. **all three light up**: The airpointer is shutting down.

5. User Interface

5.1. General

You can configure your airpointer completely via software. It is accessed by a web browser, where the connection with your airpointer can be established according to Chapter 6.

If you are connecting the first time to your airpointer please refer to Section 5.7 to make the appropriate settings. The pre-installed password is listed on page 5-20.

NOTE
Some settings are visible with a certain priority, only! The here described interface might only be visible for an Administrator.

5.1.1. Login

For Login to the User Interface of the airpointer you need a user name and a password. The pre-installed password is listed on page 5-20.

For a successful Login, Java Script must be activated in your web browser. You will find setup instructions in the Chapter 'Getting Started' in Section 5.7.

The password is transferred by your web browser with a random encoding to the airpointer ®.This ensures that for each login your password is transferred via Internet as a different string of characters. This string of characters is useless for a third person, who may be reading this by chance as well, because it can be used only once for your very own login.

5.1.2. Supported Web Browsers

The User Interface of airpointer runs on most modern browsers. We tested the Software on the following. Note that it might be possible to use other browsers like e.g. Opera, though these will not be mentioned in this manual. The most basic requirement a browser should meet is the support of JavaScript. Older versions of the mentioned browsers might work as well, but these may display the website not 100% correctly.

For Microsoft Windows™

- Internet Explorer (version 11 or above)
- Mozilla Firefox (version 52 or above)
- Google Chrome (version 57 or above)

For Linux

- Mozilla Firefox (version 11 or above)

For Mac OS

- Mozilla Firefox (version 11 or above)
- Safari (version 9 or above)

5.1.3. Architecture of airpointers

The User Interface of the airpointer consists of modules which can be selected from a horizontally arranged tab bar.

The following modules are available:

Graph

The module ‘Graph’ enables the presentation of measurement signals. Single measurement signals of all installed sensors are shown in diagrams as well as designs (compilation of several measurement signals) created by users. You and/or other users can call up these designs in the module ‘Graph’, depending on the visibility assigned.

Download

In the module Download selected measurement data can be downloaded in chosen time frame. The download configuration can be saved locally.

Stationbook

This module provides a notepad for you. Your notes are visible to all users per default, you can also set single entries to be visible only to yourself.

Overview

This module is designed to give a quick summary of selected parameters. You can see your device’s measurement data at a glance. See section 7.10 for details.

Calibration

The module ‘Calibration’ provides you with the items "‘Valve Control"’ and "‘Calibration"’. With "‘Valve Control"’ the valves of the internal zero measurement and the internal span control (optional) can be controlled. In the menu "‘Calibration"’ the setpoints for the calibration can be set and the calibration can be tracked.

Setup

The module ‘Setup’ provides system information, configuration of sensors, system and interfaces of the airpointer. Furthermore, user management of the User Interface to the airpointer is available here. I.e. the user’s personal settings to the User Interface can be adjusted according to your wishes. In the subsection ’Rules & Actions’ periodical processes can be defined. In the module ’LinLog’ the software connection to external analyzers is located. You can select which parameter should be stored and make simple calculations. Furthermore, it is possible in the ‘Setup’ module to update the software and to install, uninstall, start and stop services of the server.

Logout

Click this tab to leave the User Interface of airpointer

NOTE
Remember that the airpointer features a very flexible design and can have numerous hardware configurations, the screenshots in this chapter might not be 100% conform with your device. Your software depends on your hardware configuration.

5.2. Graph

The module ‘Graph’ enables the presentation of measurement signals. Single measurement signals of all sensors installed are shown in diagrams as well as designs (compilation of several measurement signals) created by users. You and/or other users can call up these designs in the module ‘Graph’, depending on the visibility assigned.

The functions of the module ‘Graph’ include:

1. Creation and View of Diagrams
2. View of the measurement signals of all installed modules and sensors
3. Trace of a measurement - automatic update of the view is possible
4. View of the airpointer’s system parameters
5. View of the signals of externally installed sensors
6. Selection of time sequence (Weekly-, Daily-, 3-hour-, 1-hour- and Manual View)
7. Selection of time resolution (different average values)
8. Selection of the diagram (xy-graph, windrose, or radar graph)
9. Default setting of the y-axis, selection between automatic and manual
10. Selection of the picture size
11. Zoom of a part of the picture
12. Reading measurement values from the graph
13. Create tables of values including average values, minimum and maximum value

5.2.1. Menu Tree

To plot any data, you must start with selecting a data source in the menu tree. Clicking an item in the sub-menu will collapse or expand the underlying parameters to select. By selecting a parameter, it will show up in the main part of the ‘Graph’ window. You have the choice to either select a pre-configured design or create a new one, both possibilities will be explained in the following paragraphs.

Selecting a User Defined Design

Selecting a User Defined Design, you will find previously saved designs under ‘My Designs’. If a design is already saved on the system, you can load the designs parameters into the main window, by clicking on it.

Selecting a Measurement Signal

Each of the items below ‘My Designs’ stands for a connected and configured measurement device. You can select an item and thereby add it to the plot as parameter. To add multiple parameters, tick the corresponding check box in the main view. The airpointer has some internal parameters, that can be displayed as well. These items can be found under ‘System’.

5.2.2. Main Window

The main view lets you define multiple settings and plot the actual graph. To print a graph, you must start with selecting some data to plot, as explained in the previous section. After you selected a parameter you can define some settings for the graph, e.g. the time period to plot. The following paragraphs describe settings and functions of a plot and how to configure them.

Select the Type of Graph

Next to the label ’Graph’ you can select the type of the graph from a dropdown menu. The available types are: XY-Graph, Wind Rose Graph, and Radar Graph. If you choose Wind Rose or

Radar Graph a direction value must be measured and selected as reference value. A direction value could be for example 'wind direction'.

XY-Graph

If you choose XY Graph, you can select up to six parameters. These parameters will be plotted versus the time axis. It is possible to configure a second Y axis under **'Advanced'**. Four types of the XY-graph are available: Line, Filled Line (the area below the measurement line is coloured in the selected colour), Steps, and Bar (in the selected colour without border. The graphs of the measurement values are plotted in order of the values from top to bottom. The graphs which are plotted versus the Y2 axis lie under the graphs versus the Y1 axis. Therefore, those measurement values can be hidden. If there is a break in the measurement, no values will be plotted, and the graph is interrupted. If this is not desired, you can select 'No Gaps' on the right side of the graph selection under **'Advanced'**. With this option selected, the measurement values will be connected. If you do not want to show all parameters at once, deselect their graphs in the 'Advanced' tab.

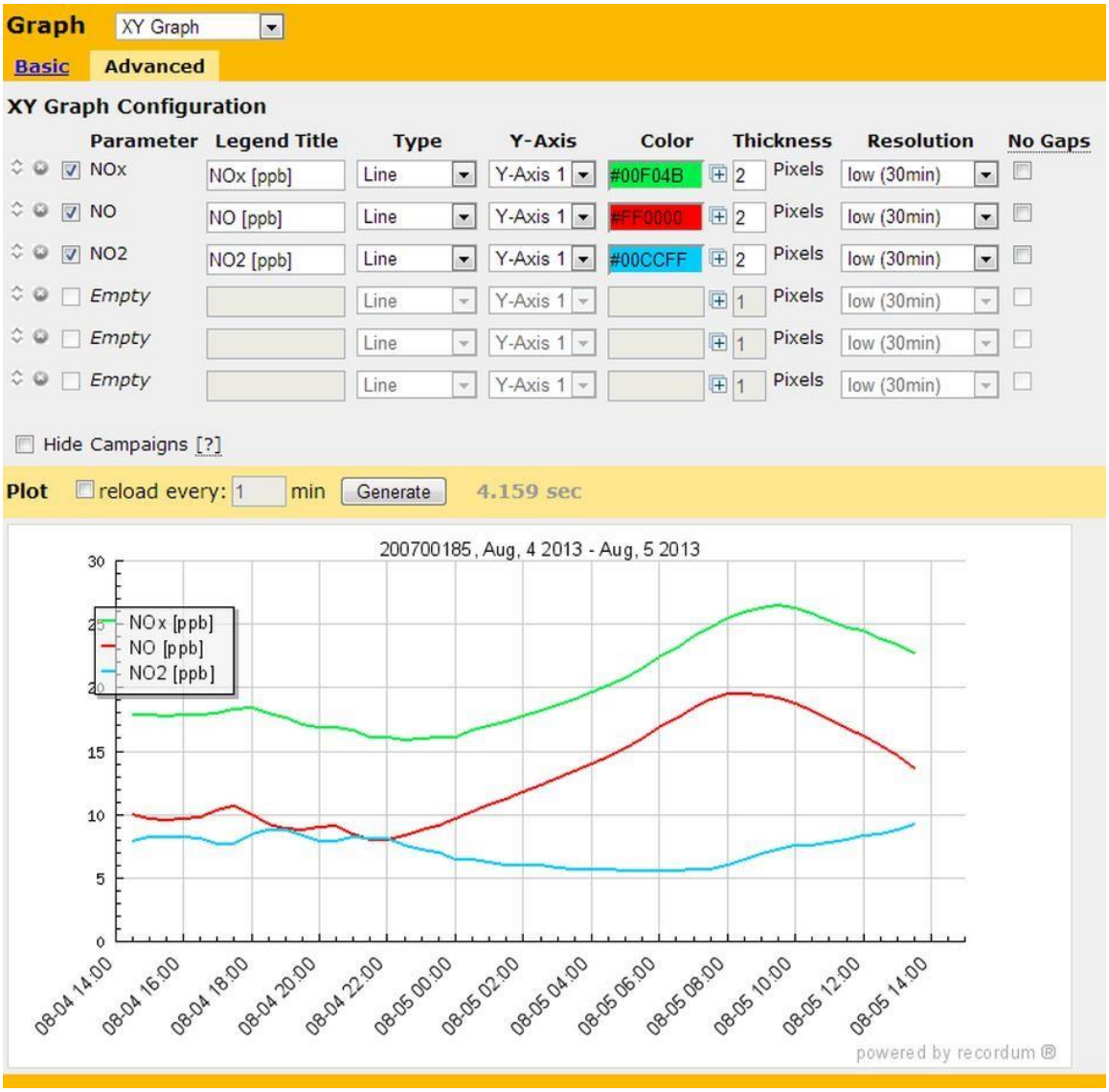


Figure 5.1.: Example of an XY Graph

5.3. Download

NOTE
We recommend downloading your data regularly.

The **'Download'** window houses a wizard which guides you through the download of your data. Roughly explained, the wizard runs through 3 steps:

1. Select the parameters to export and which average value to take,
2. Define settings for export, like e.g. time interval,
3. Set the file properties of the exported file.

CAUTION:

You can only download data with active group and parameter name. If you have changed the name, the old data cannot be downloaded any more.

Before you start, keep in mind that you can save a configuration of download settings for later reuse. You can select an existing configuration from the list on the top part of the 'Download' window. To **save a new configuration** click 'Create' next to "New Configuration" and give the new configuration a name. Now proceed with Step 1 described below.

5.3.1. Step 1: Select parameters

Under "Select parameters" you can see a list of installed devices. Select the desired parameters and suitable average values. When you are satisfied with your selection scroll to the bottom of the page and click next. Figure 5.2 gives you an impression how your screen may look like.

The **'Quick Download'** option allows you to download data with the same parameters as the last download. This is useful when configuration does not change too often.

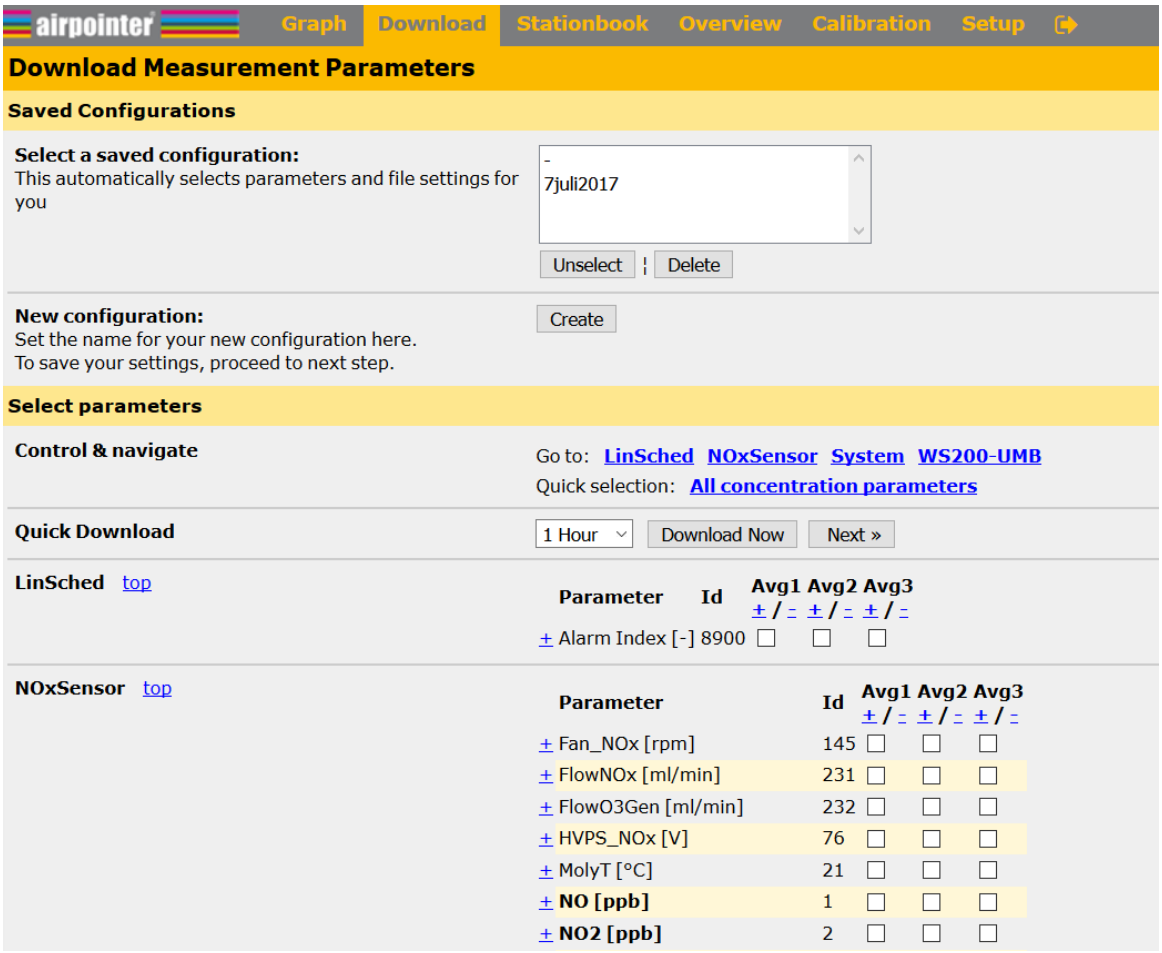


Figure 5.2.: Step 1 of download procedure

5.3.2. Step 2: Configure export settings

The next screen in the wizard (see figure 7.6) gives you the possibility to:

- **Delimit the time interval** of the exported data,
- **Define a Time Source (or reference)**. In case one sensor does not deliver constant data, you can select another measurement signal as time reference. All selected values will be documented, but only when the reference parameter is available. Table 7.1 shows an example.
- Define multiple parameters for the output file such as the file type. Adjust these parameters to suit your needs for post processing your data, with e.g. MS Excel.

  The default configuration is:

  - Filetype: ".csv"
  - Separator: ";"
  - File System "UNIX"
  - Decimal Separator: "Comma" Status flags:

- As an option, you can add **status flags** to every parameter value.
- **Fields surrounded by quotes:** As an option, you can put each single data field of the data file in a high comma, per default disabled.

- **Interpolate non-existing values:** As an option, missing datasets are filled up. The y-value for missing values is set to -9999.
- **Compression**
  - Text only: no compression
  - Zip compression: To optimize the file size, the file is zipped as standard resulting in a file ending '.zip'. In this case, your work station needs a program for unpacking data to get the data file embedded compressed in the zip file.
  - Self-extracting Zip File: Here you can generate a self-unpacking zip file. This increases you file size by about 90 kB.

Make sure to define all parameters according to your needs. If you encounter difficulties reading or processing the downloaded file, check these parameters. You might want to consider platform specific changes (e.g. line endings). Furthermore, you have the option to compress the data as a .zip file to save bandwidth. If you created a new configuration, you now have the option to save the specified parameters to it. If you did not create a new configuration of just want to download the data click on "Next". This will prepare your file for download.

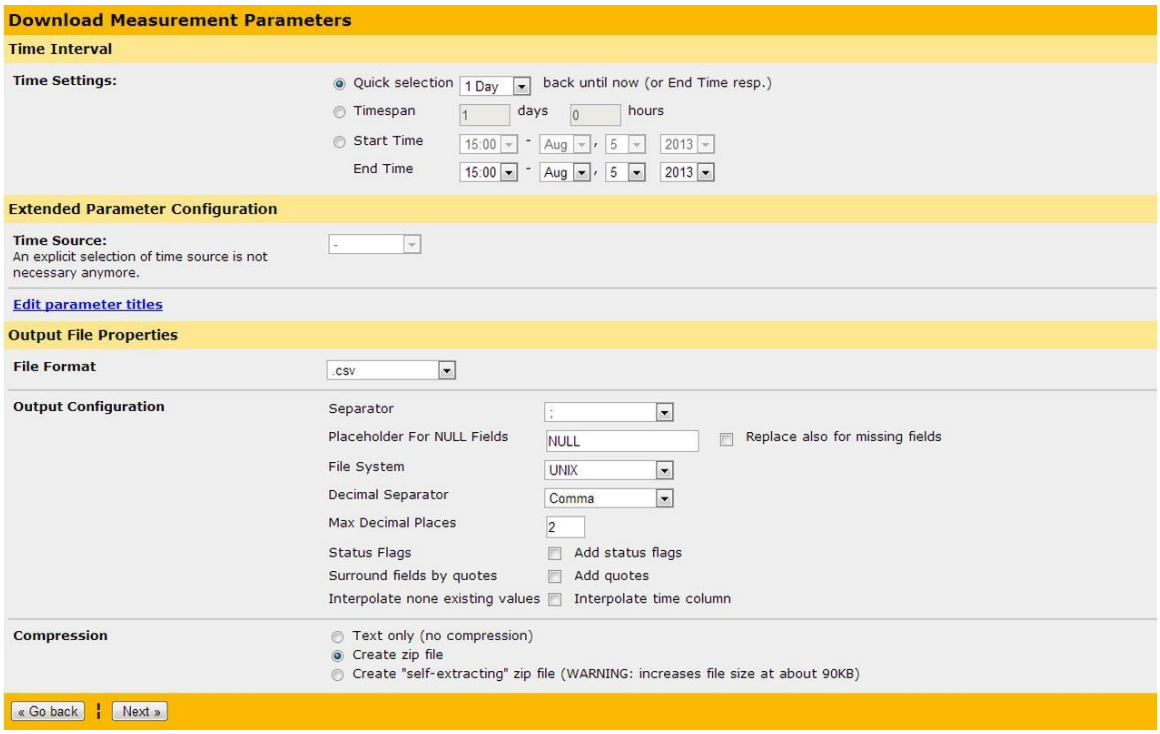


Figure 5.3.: Step 2 of download procedure

5.3.3. Step 3: Download the data

In the last screen a status bar indicates your files progress. Depending on the amount of data, this might take some time. If an error occurs, it will be displayed above the status bar. In the lower section you can see a summary on what data has been exported. When the file is complete, you may right-click on "Download data file" and choose "Save target as..." to finally get your file.

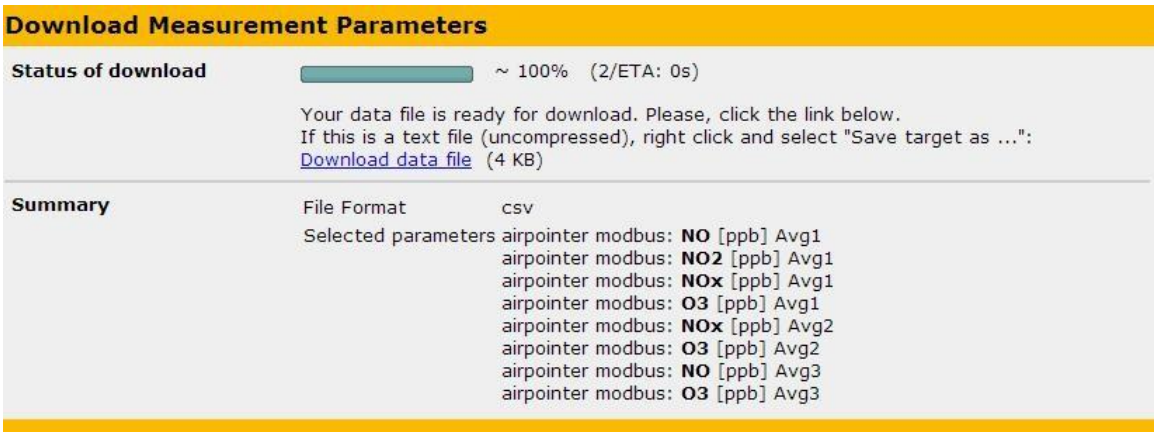


Figure 5.4.: File was successfully generated for download

5.4. Stationbook

This module provides a notepad for you. By default, your notes are visible to all users. You can also set single entries to be visible only to yourself.

If you choose 'Stationbook' from the menu, all available entries are listed. By clicking on the title, the whole note shows up. See Figure 5.5 for an example Stationbook.

Figure 5.5.: The Stationbook Module

The main options are: Add, edit and delete a note. The user who added the note can set access rights, i.e. define whether others can read it.

Depending on the given rights, later editing and deleting of that particular note is also possible.

Recommended entries into the Stationbook are all operations resulting from the table Maintenance Schedule in the manual, and:

- Relocation of your airpointer
- Calibration accomplished on/by
- Filter replacements
- Service works
- Maintenance works
- Air condition control
- Possibly occurred errors
- Peculiarities

5.5. Overview

5.5.1. Sensors Overview

The idea behind this screen is to give the user a quick summary of selected measurement data and whether there is a fail state for a parameter. The status is set to be "Ok" in two occasions:

- There is no rule set for this Parameter value
- The values are within range which was set in the rule If the values aren't within range the status changes to "FS".

Figure 5.6.: Sensors Overview

To select the item to display:

- Go to **Setup**.
- Open **Configuration** from the subtree.
- Select **Parameters**.
- Select all parameters you want to appear in the overview by ticking their box in the "Overview" column.

It might practical to make the "Overview" your home-screen. That way you can see the selected parameters at a glance right after the login. If you want to setup the start screen:

- Go to **Setup**
- Open **User interface** from to subtree.
- Open **Personal Settings**
- Select "Overview" from the dropdown list labelled "Default module for startup".

5.5.2. Commands

With the "Commands" interface you can set individual modules into **maintenance mode**. Just press the corresponding button to do so. Furthermore, it is possible to turn the (optional) Alarm Device on and off with a single click.

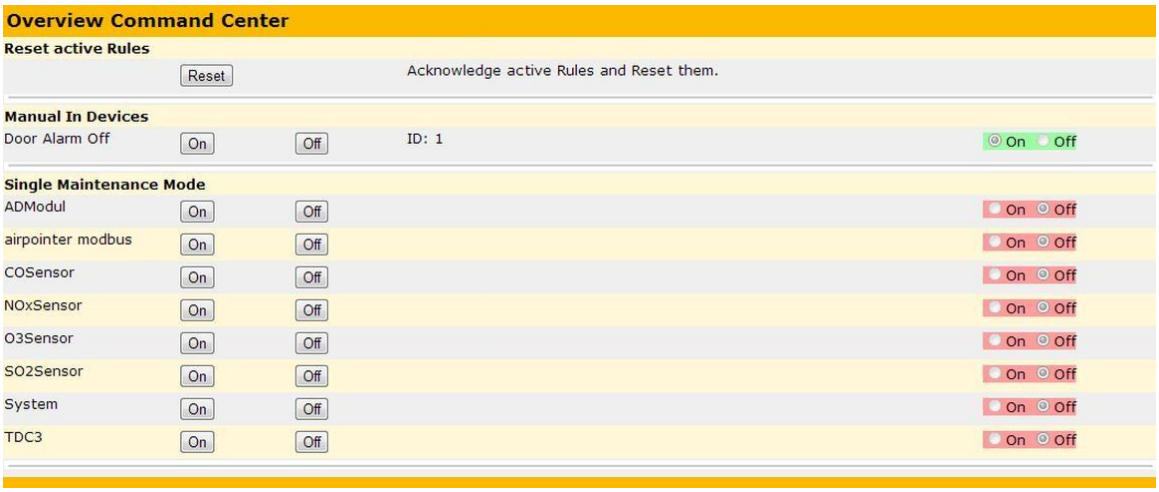


Figure 5.7.: Overview Commands

5.6. Calibration

5.6.1. General

Definition The calibration described in this section is defined as establishing a relationship between introduced gas samples and the adjusted measurement device.

This relationship is derived from the instrumental response to successive samples of different known concentrations. The airpointer allows the definition of a zero point and a span point, hence a linear calibration relationship.

Equipment The reliability and usefulness of all data derived from airpointer depends primarily upon its state of calibration. To ensure accurate measurements of the modules:

1. The airpointer must be calibrated at the time of installation and recalibrated as necessary.
2. To ensure that high quality, accurate measurement information is obtained at all times, the airpointer must be calibrated prior to use.
3. The airpointer should be in operation for at least several hours (preferably overnight) before calibration so that it is fully warmed up and its operation has stabilized.

5.6.2. Calibration frequency

Due to physical properties all measurement instruments are subject to some drift and variation in internal parameters and therefore cannot be expected to maintain accurate calibration over long periods of time. That implies that it is necessary to check the calibration relationship on a predetermined schedule. We suggest calibrating the airpointer approximately 4 times per year.

An analyzer should be calibrated (or recalibrated): [**?**]

- upon initial installation
- following physical relocation
- after any repairs or service that might affect its calibration
- following an interruption in operation of more than a few days
- upon any indication of analyzer malfunction or change in calibration
- at some routine interval

5.6.3. Performing a calibration

The module 'Calibration' of the airpointer software includes the following functions:

1. Start Calibration
2. Calibration of the PMT
3. Calibration of a module
4. Determination of the CE Factor
5. Test of the internal Zero Air

5.6.4. Start Calibration

This module provides you with the possibility to perform a calibration, to switch the calibration valves or to track a calibration of an external analyzer.

NOTE
Please check that you have administrator rights on the airpointer.

To carry out a calibration, login to the User Interface.

NOTE
A calibration should only be carried out if you have sufficient time!

After selecting 'Start Calibration' in the module 'Calibration', you get two subsections as described below.

The section calibration has two subsections:

1. Valve control

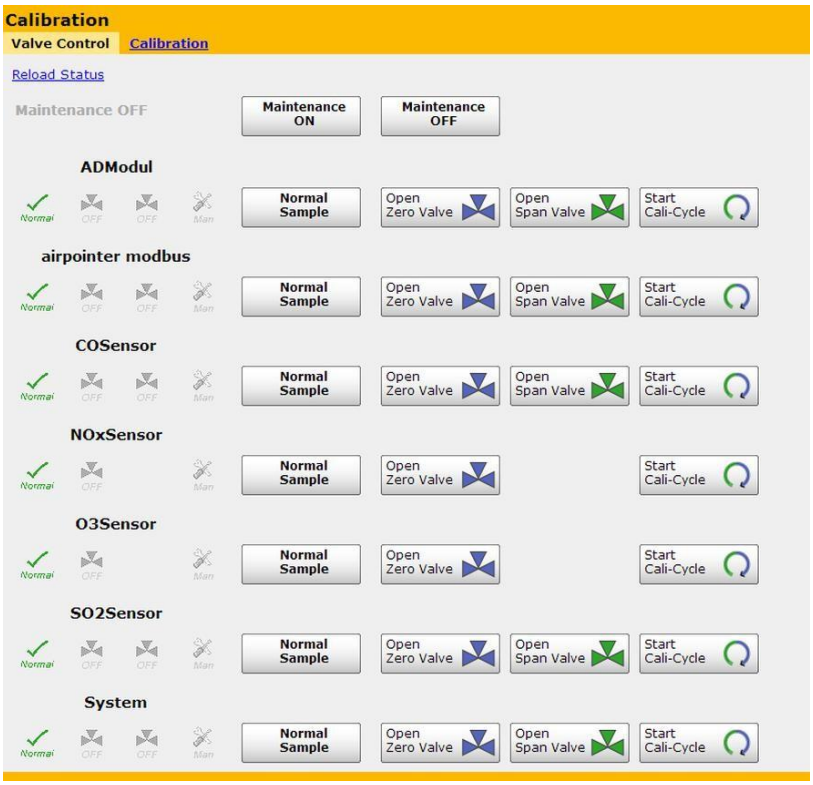


Figure 5.8.: Valve control

- If you click 'Reload Status' you will get the actual status (Maintenance ON or OFF), at once.
- Here you can activate and deactivate the maintenance mode with clicking 'Maintenance ON' and 'Maintenance OFF', respectively.
- This section provides you with the valve control (sample/Zero measurement) for the whole system (all modules are affected) or for just one module.
  - 'Normal Sample': Standard measurement of sample and span gas, respectively.
  - 'Open Zero valve': The valves switch to internal zero measurement. If this is valid for the 'System', then all modules switch to internal zero measurement. If you click it for a specific module only this module will be affected.

– ’Start Cali-Cycle’: Start of the function control: internal zero measurement followed by internal span gas measurement if your airpointer has ‘Internal Span Module’ (optional) installed. Else just an internal zero point control takes place.

NOTE
Internal span measurement is only available if your airpointer has an Internal Span Module installed - optional

2. Calibration
   - Select the module
   - Set point of span gas and zero air.
   - Displayed measurement

5.6.5. Types of Calibration

A distinction is made between

1. Initial Calibration, hardware calibration (see Section 5.6.6) and
2. Calibration of a module (see Section 5.6.7).

5.6.6. Initial Calibration, Hardware Calibration, PMT Calibration

When: This calibration has already been factory made. In contrast to a normal calibration, these settings refer to the direct output of the hardware, excluding any further interpretation via software. Accordingly, you must perform your settings via potentiometers direct on the hardware. This is valid for calibration of all pressure sensors and the temperature sensor of the Molybdenum converter of the NO_x Module. The high voltage of the PMT of the SO_2 and the NO_x Module is adjusted via the user interface.

It will be necessary to repeat the calibration of the PMT if one of the following requirements is not fulfilled anymore:

In the ‘NOx Sensor’ *folder:*

(see airpointerSetup →→ Configuration →→ NOx Sensor)

$0.3 < NOSlope < 3$

$0.3 < NOxSlope < 3$

$-50 < NOOffset < 50$

$-50 < NOxOffset < 50$

In the ‘SO2 Sensor’ *folder:*

(see airpointerSetup →→ Configuration →→ SO2 Sensor)

$0.3 < SO2Slope < 3$

$-50 < SO2Offset < 50$

Procedure to calibrate the PMT:

1. Log in as a member of the administrator group at the User Interface of the airpointer.
2. Maintenance Mode: It is highly recommended to mark the measurement data stored during the procedures described in the following using the 'Maintenance On' switch as shown in Figure 5.8.
3. Resetting the values for 'Slope' to 1 and 'Offset' to 0 will create a defined start point.

   NO_x: In Setup →→ Configuration →→ NOx Sensor, set the values for the following settings:

NOOffset	0
NOSlope	1
NOxOffset	0
NOxSlope	1

   SO_2: In Setup →→ Configuration →→ SO2 Sensor, set the values for:

SO2Offset	0
SO2Slope	1

4. Apply Span gas to the system according to Figure 5.9
5. In the LinSens Service Interface, open folder 'Actual'. As these values are updated almost every second, the results of your settings can be observed immediately.
6. Adjust the high voltage of the PMT ('NOx HV set' and 'SO2 HV set', respectively) in 'Setup'→→ 'Configuration'→→ 'NOx Sensor' or 'SO2 Sensor', respectively→→ 'Calibration setup' until the actual value refers the Span gas concentration for NO or SO2, respectively.
7. The calibration values are automatically stored and taken over.
8. Open the service manager →→ 'measurement software' and restart the software to adopt the boundaries to the new values
9. Set the Maintenance Mode to 'Off' as shown in Figure 5.8.
10. Continue the calibration for the NO or SO2 sensor using the procedure described in 'Performing a Calibration', Section 5.6.7.

5.6.7. Calibration of a module

When: This calibration should be carried out regarding your calibration rules and given calibration intervals or if any of the maintenance operations requires to do so (see section 5.6.2).

Calibration Philosophy of the airpointer:

The airpointer provides a simple possibility of dividing between applying span gas to the analyzer on-site and entering the calibration factors into the analyzer by the operator.

With the airpointer, the person responsible for calibration does not have to be on-site anymore. Using the airpointer User Interface and an Internet connection, this can be done remotely, even over a very far distance.

Entry of the calibration factors will be done by the person responsible for calibration after watching the calibration signals in the calibration assistant until a stable course can be seen. The user is on-site, applying span gas to the analyzer.

Naturally, entering the calibration factors can be done on-site as well. In this case, your laptop must be connected using the cross-patch cable to the airpointer ethernet socket LAN2 in the maintenance access (see Figure 5.9).

Various Possibilities of Applying Span Gas to the airpointer:

Figure 5.9.: Applying Calibration Gas to the airpointer

- **External, using the span gas inlet at the maintenance door (see Figure 5.10), Swagelok 1/4**"

  The span gas tube is screwed to the Swagelok 1/4". There is an internal T-piece for bypass for pressure compensation of the span gas. Thus, span gas flows through the T-piece to the sampling filter and further on to the sensors.

- **External, using the sampling hat**

  In this case, the complete sampling system is included. Applying span gas is done by a hood which is put on the sampling hat.

- **External, using the screwing for the sampling hat tube 15mm**

  After removing the high-alloyed sampling, span gas is applied using the PG screwing for the tube with a diameter of 15mm.

- **Internal, using the SPAN valve (optional)**

  Span gas is applied at the span valve which is available as an option for the airpointer. Thus, span gas flows through the T-piece as pressure compensation of the SPAN valve and is then led further on to the sensors.

Required Span Gas Flow (and External Zero Air)

NOTE

In any case, use a separate and calibrated flow meter for ranges of 0 to 3000 ml/min to determine the analyzer's flow.

Never use the software display of the analyzer. This measurement only shows flow interruptions caused by clogging or loose tubing.

The required span gas flow for the airpointer can be easily determined using the following table.

Module	Sample Flow[ml/min]
O_3	1000
CO	500
SO_2	500
NO_x	1000
+ Excess	300

Table 5.3.: Calibration Gas Flows

The sum of the required span gas flow is calculated by the sum of the flows for the modules installed in your airpointer plus the addition of an excess of 300ml/min. For example: Your airpointer has a O_3 and SO_2 module installed. The required span gas flow is therefore: 550 (O_3) + 550 (SO_2) + 300 (excess) = 1400ml/min. This value should be checked using your calibrated flow meter.

Various Possibilities of Applying Zero Air to the airpointer

- **On the part of the customer**

  See above Section 'Various Possibilities of Applying Span Gas to the airpointer'.

- **Using the airpointer's internal zero air supply.** Only to use for as function control

Handling of Zero Air and Span Gas

NOTE

Use your respective calibration devices and calibration rules.

Please take into consideration the interferences of O_3 and NO, otherwise mixtures are generally suitable as span gas as well.

To ensure an exact calibration, span gases are certified for a certain accuracy.

Span gas is a special mixture to reproduce a chemical composition of the gas to be measured, representing about 80% of the desired working range of the gas sensor. For example, for a range of 500ppb, the span gas concentration should be 400ppb of the gas to be calibrated.

Tubing of span gas and, if applicable, of zero air to the airpointer should be made of

Teflon.

Zero Air

Zero Air is similar in chemical composition to the Earth's atmosphere but scrubbed of all components that might affect the analyzers reading.

For the airpointer calibration you can use either the internal zero air or apply external zero air.

The internal zero air of the airpointer is scrubbed of interfering components in three levels.

- At heated palladium on aluminium pills CO from zero air is oxidized to CO_2.
- Purafil oxidizes NO to NO_2.
- Activated charcoal removes the O_3, SO_2 and NO_2 components. • Additional scrubbers are

placed on the Modules

NOTE
Using the internal zero air, humidity still present will not be dried. There is no special gas dryer in the internal zero air module.

Calibration Procedure

Preparatory Phase and Applying Gas

1. Activate the Maintenance mode for marking the measurement data for the calibration period by pressing the switch 'Maintenance On' for 10 seconds, the respective status LEDs will change from constant to flashing light. Alternatively, you can activate the Maintenance mode of the airpointer by activating User Interface →→ Calibration →→ Start Calibration →→ Valve Control →→ Maintenance ON (see Figure 5.8).

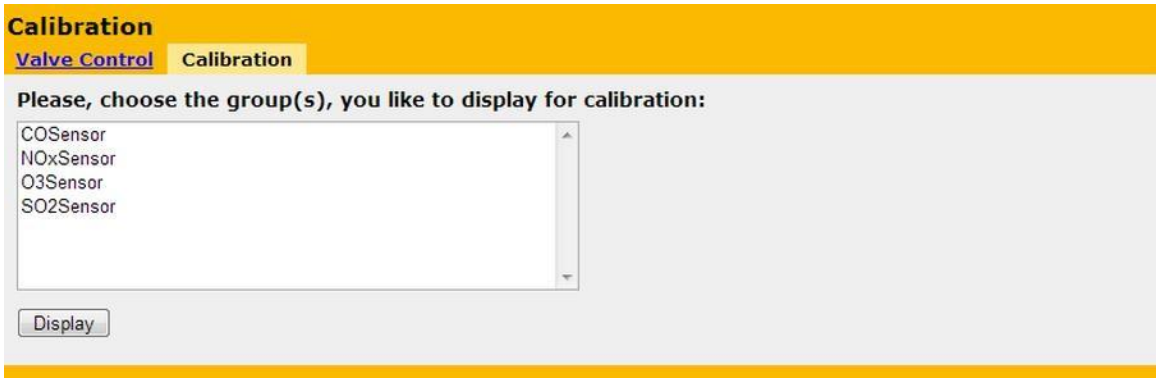


Figure 5.10.: Select a module for calibration

2. Select the module which you want to calibrate in the selection shown in User Interface →→ Calibration →→ Start Calibration →→ Calibration and click 'Display'.

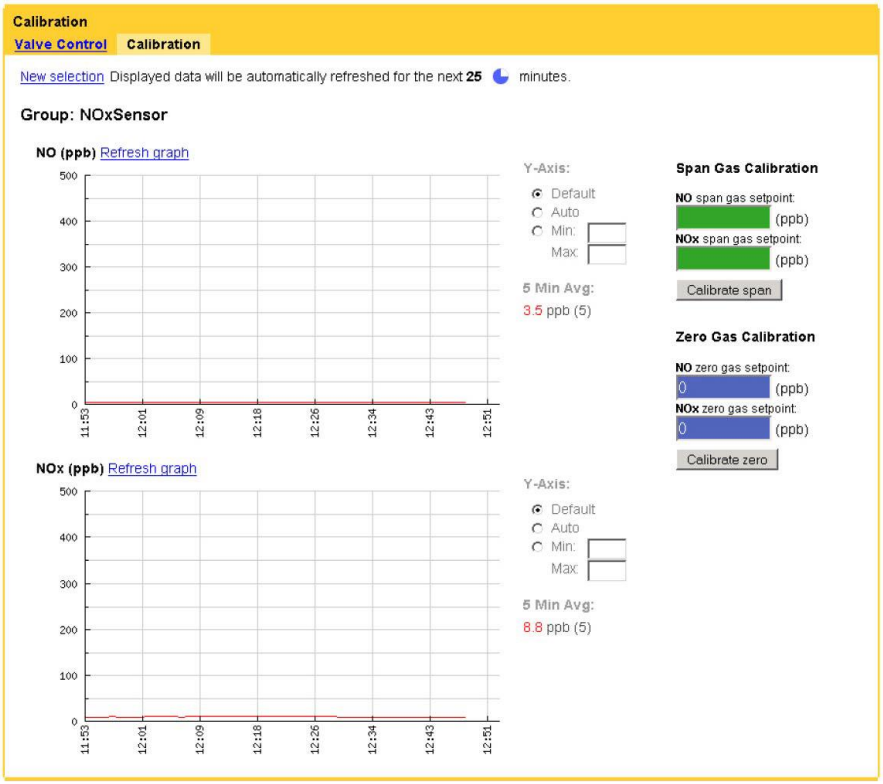


Figure 5.11.: Display of the calibration and input of the setpoints

3. Fill in the setpoint of your span gas in ’span gas setpoint’ in given concentration.
4. Fill in the setpoint of the external zero gas in ’zero gas setpoint’ in given concentration. For zero point measurement use external zero air. It can be connected in the same way as span gas.

NOTE
Use external zero air for zero calibration of a module.

5. Apply span gas to the airpointer according to the possibilities stated. Select the gas flow needed for your airpointer using Table 5.3.
6. Apply each span gas, wait for a stable measurement signal (about 10 to 15 minutes).

   The measurement graph is shown on this site.

NOTE
In the LinSens Service Interface folder ‘Actual’ values are updated almost every second and therefore a more precise observation is possible there. The results of your settings can be observed immediately.

   When the measurement signal is stable, accept the calibration values by clicking ’calibrate span’. Next, apply zero air externally to the respective sensor. Again, wait for a stable measurement (about 10 to 15 minute) and then accept the calibration value (click ’calibrate zero’). Apply each span gas, wait for a stable measurement signal (about 10 to 15 minutes) and then accept the calibration values.

   Repeat this procedure until the zero point deviation is within the required calibration tolerance.

7. The calibration values are automatically stored

8. Next, please set the Maintenance Mode to 'Off', either by pressing the switch Maintenance Off for 10 seconds (till the LEDs do not blink but light) or by selecting Calibration →→ Start Calibration →→ Valve Control →→ Maintenance OFF in the User Interface (See Figure 5.8).

9. The calibration of the airpointer is finished.

   Depending on your chosen calibration philosophy the person responsible for calibration will accept the calibration factors either on-site or remotely with the opportunity to access the airpointer using the Internet. To gain stable measurement values, the system should run at least five to ten minutes.

5.6.8. Determination of the CE Factor

Calibration of the NO_x sensor is done by applying NO Gas. For Checking the converter efficiency CE, please use a gas titration system (GPT). This converts NO span gas to NO_2 using Ozone. When using a perfect converter, the total amount of NO_x (the sum of NO + NO_2) should be constant before and after the conversion (see Figure 5.12). However, a real converter has an efficiency of < 1. Therefore, the converter efficiency CE results in

$$CE = \frac{\text{DisplayedValue}NO_x\,\text{with}GPT - \text{DisplayedValue}NO\text{with}GPT}{\text{DisplayedValue}NO_x\,\text{without}GPT - \text{DisplayedValue}NO\text{with}GPT} \quad (5.1)$$

A typical accuracy for NO_x gas is 1% or 2%. NO standards should be mixed with nitrogen (N_2) to avoid a long-term oxidation of NO to NO_2. NO_2 standards should be mixed with synthetic air to maintain the oxidation.

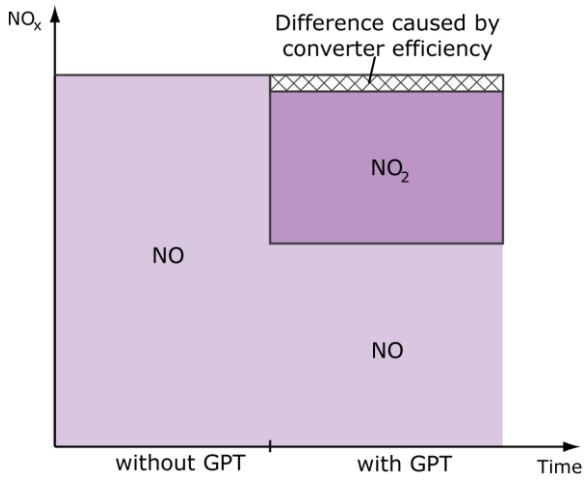


Figure 5.12.: Influence of the Converter Efficiency

To perform the CE calculation, follow these steps:

1. Apply NO span gas to the system as explained in Section 5.6.7 using a GPT system with 'O_3' off.
2. In the LinSens Service Interface, open folder 'Actual'.
3. Wait until the displayed concentrations stabilize.
4. Write down the displayed values for the NO and NO_x concentrations.

5. Next, turn on 'O_3' of the GPT system and wait for stabilization of the values again.
6. Write down the displayed values for the NO and NO_x concentrations with GPT.
7. Use Equation 5.1 to calculate the CE.
8. Write the calculated CE value in the user interface ('setup→→ configuration→→ NO_x Sensor')

As example: If you have 400ppb NO and 200ppb Ozone and you get 200ppb NO, 200ppb NO_2 and 400ppb NO_X with deviation smaller than ± 40ppb the converter works properly.

5.6.9. Test the internal Zero Air:

Test the internal Zero Air

1. Apply Span gas to the airpointer.
2. Read and note the concentration value.
3. Switch the valve to internal Zero Air and wait for ten minutes.
4. The concentration value should go to zero.
5. Read and note the value.

5.7. Setup

The 'Setup' module provides system information, configuration of sensors, system and interfaces of the airpointer. Furthermore, user management of the User Interface to the airpointer is available here. Here the user's personal settings to the User Interface can be customized.

5.7.1. Service Interface

Figure 5.13.: Invoking the Service Interface

5.7.2. LinSens

The LinSens Sensor Service Interface provides current sensors data of the airpointer. Clicking one of these links will open the LinSens Sensor Service Interface in a new window.

The first line shows the operation mode of the airpointer. Normal operation in black letters means everything is functioning well. Normal operation in red letters additionally displays the values considered to be faulty.

Figure 5.14.: View of the LinSens Service Interface

Home

This is the homepage with reference to the manufacturer.

Actual System Values

This survey shows the current values of all activated sensor modules (see Figure 5.15).

Actual System Values
no calibration active

System SensorInterface Board

RoomTempUp (4/35)	25.1	°C	PressPump (4/1)	316.5	mbar

Pump Control Board

AmbientTemp (4/8)	25.2	°C	DC5V (4/9)	5.17	V
PumpRoomTemp (4/7)	24.6	°C	DC12V (4/10)	12.0	V
FanPumpRoomRPM (4/13)	2700	rpm	DC15V (4/11)	14.9	V
FanSampleRPM (4/14)	3180	rpm	DCneg15V (4/12)	-15.1	V
Key 1 (4/43)	0		Key 2 (4/44)	0	

Clima Control Board

RoomTemp (4/18)	24.7	°C	CoolerOutTemp (4/19)	24.6	°C
Coolerpercent (4/20)	0.0	%	HeaterPercent (4/21)	0.0	%
ClimaActMode (4/22)	1	%	-		

Watchdog Board

DC5V_PC (4/26)	5.28	V	DC12V_Wtd (4/27)	11.87	V
Temp_PC (4/31)	25.5	°C	TempChipWatchdog (4/32)	20.9	°C
Countdown (4/28)	1459	sec	Restart in	00h 24min 19sec	
Restarts (4/29)	0		RestartSLT (4/30)	0	
FanUpSpeed (4/37)	3060	rpm			

Figure 5.15.: Actual Values Page

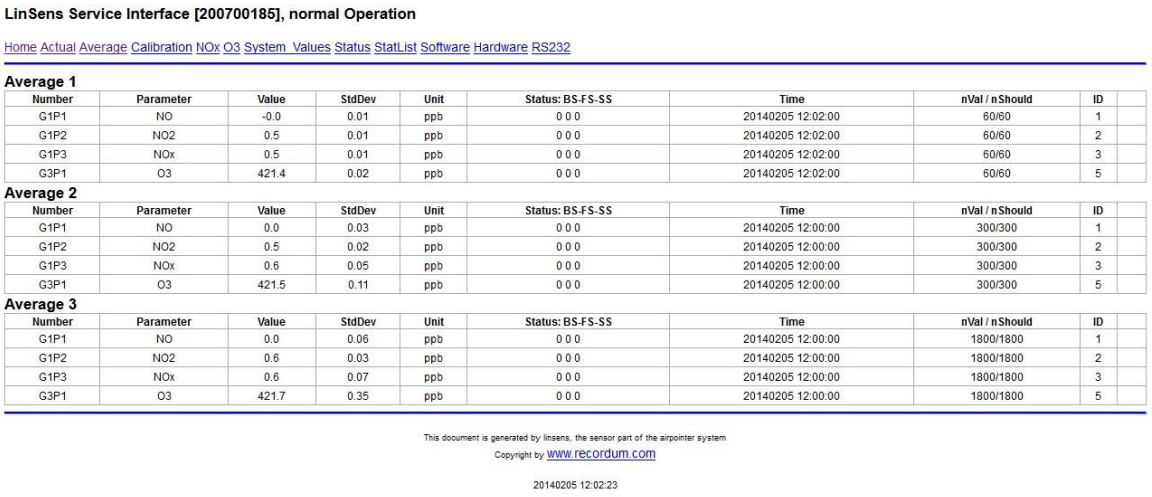
Error status, 0 = OK. You will find a list of all possible error status values in the appendix A.2 ‘Software Protocols’, Section ‘German Network Protocol’ in the manual and in table 5.4.

	BStatus (Operation mode)	**FStatus** (Fail Status)	**SStatus** (System Status)
Bit 0 (1)	Maintenance	Flow	Timeout (Value too old)
Bit 1 (2)	Zero	Pressure	

Bit 2 (4)	Span	Temperature	
Bit 3 (8)	Origin Bit	Lamp / Source / O3Gen / Flame	
Bit 4 (16)		Sensor Signals wrong / BadCal	
Bit 5 (32)		Warmup (WaterSens) / below detection limit / negative / Service required / Sensor Lifetime expired	
Bit 6 (64)		Cali check wrong	
Bit 7 (128)		Sum Fail	

Table 5.4.: Statustable

Average



LinSens Service Interface [200700185], normal Operation

Home Actual Average Calibration NOx O3 System_Values Status StatList Software Hardware RS232

Average 1

Number	Parameter	Value	StdDev	Unit	Status: BS-FS-SS	Time	nVal / nShould	ID
G1P1	NO	-0.0	0.01	ppb	0 0 0	20140205 12:02:00	60/60	1
G1P2	NO2	0.5	0.01	ppb	0 0 0	20140205 12:02:00	60/60	2
G1P3	NOx	0.5	0.01	ppb	0 0 0	20140205 12:02:00	60/60	3
G3P1	O3	421.4	0.02	ppb	0 0 0	20140205 12:02:00	60/60	5

Average 2

Number	Parameter	Value	StdDev	Unit	Status: BS-FS-SS	Time	nVal / nShould	ID
G1P1	NO	0.0	0.03	ppb	0 0 0	20140205 12:00:00	300/300	1
G1P2	NO2	0.5	0.02	ppb	0 0 0	20140205 12:00:00	300/300	2
G1P3	NOx	0.6	0.05	ppb	0 0 0	20140205 12:00:00	300/300	3
G3P1	O3	421.5	0.11	ppb	0 0 0	20140205 12:00:00	300/300	5

Average 3

Number	Parameter	Value	StdDev	Unit	Status: BS-FS-SS	Time	nVal / nShould	ID
G1P1	NO	0.0	0.06	ppb	0 0 0	20140205 12:00:00	1800/1800	1
G1P2	NO2	0.6	0.03	ppb	0 0 0	20140205 12:00:00	1800/1800	2
G1P3	NOx	0.6	0.07	ppb	0 0 0	20140205 12:00:00	1800/1800	3
G3P1	O3	421.7	0.35	ppb	0 0 0	20140205 12:00:00	1800/1800	5

This document is generated by linsens, the sensor part of the airpointer system

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20140205 12:02:23

Figure 5.16.: Average Values Page

This page provides a survey of the current averaging for Average 1, Average 2 and Average 3 (see Figure 7.26). After having finished the averaging of the respective value, the value is entered into the database and the display shows the process for the chronologically following next averaging.

Calibration

This page shows an overview of the available instruments for calibration data. (see Figure 5.20).

Figure 5.17.: Actual calibration values

NOTE
Values for span will only be shown, if the respective Internal Span module is installed.

NOx

This page shows the current data of the sensor module NO_x.

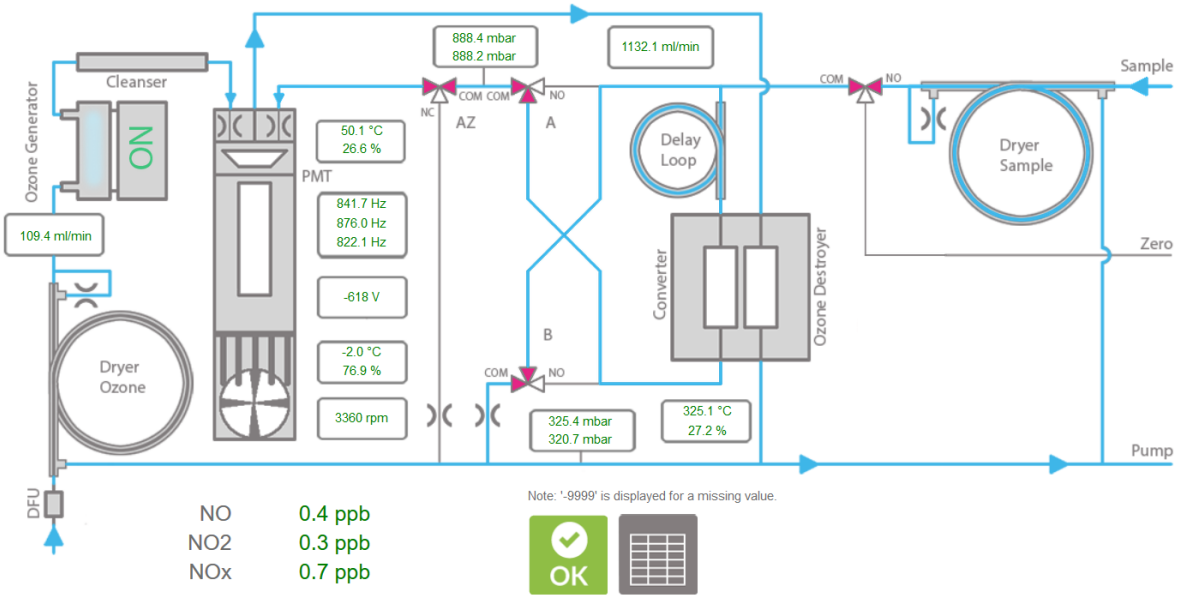

Figure 5.18.: Actual NO_x Values

CO

This page shows the current data of the sensor module CO.

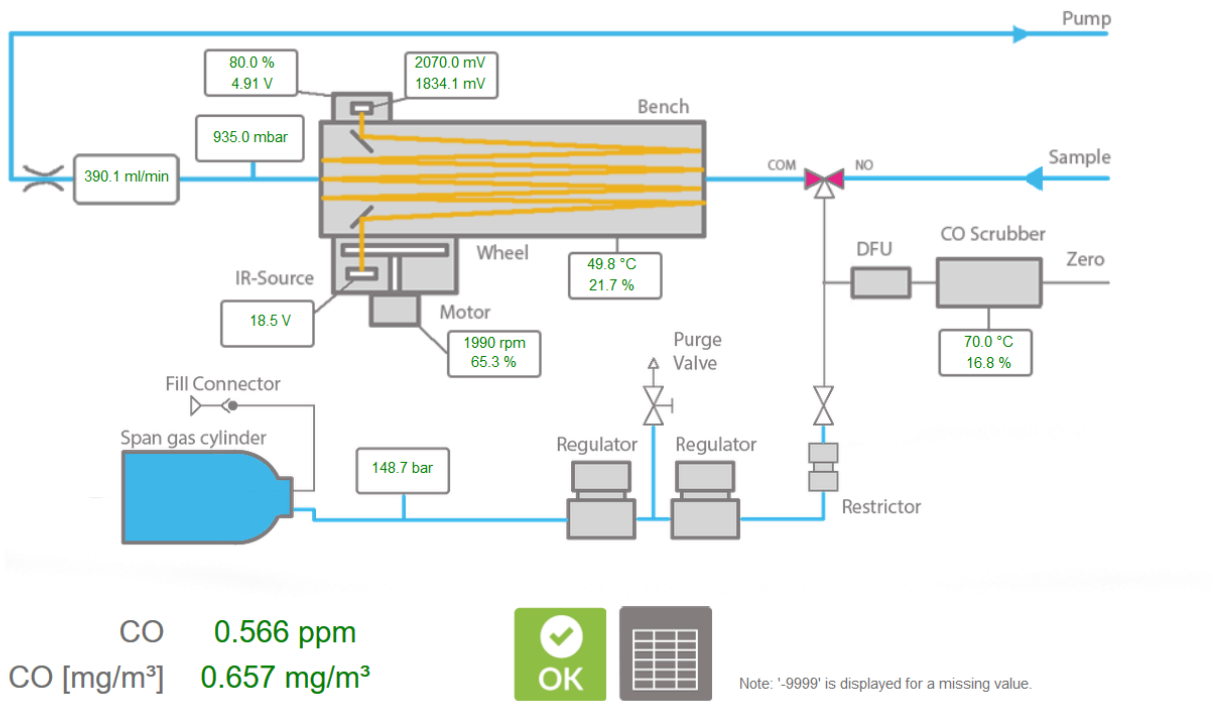

Figure 5.19.: Actual CO Values

O3

This page shows the current data of the sensor module O_3.

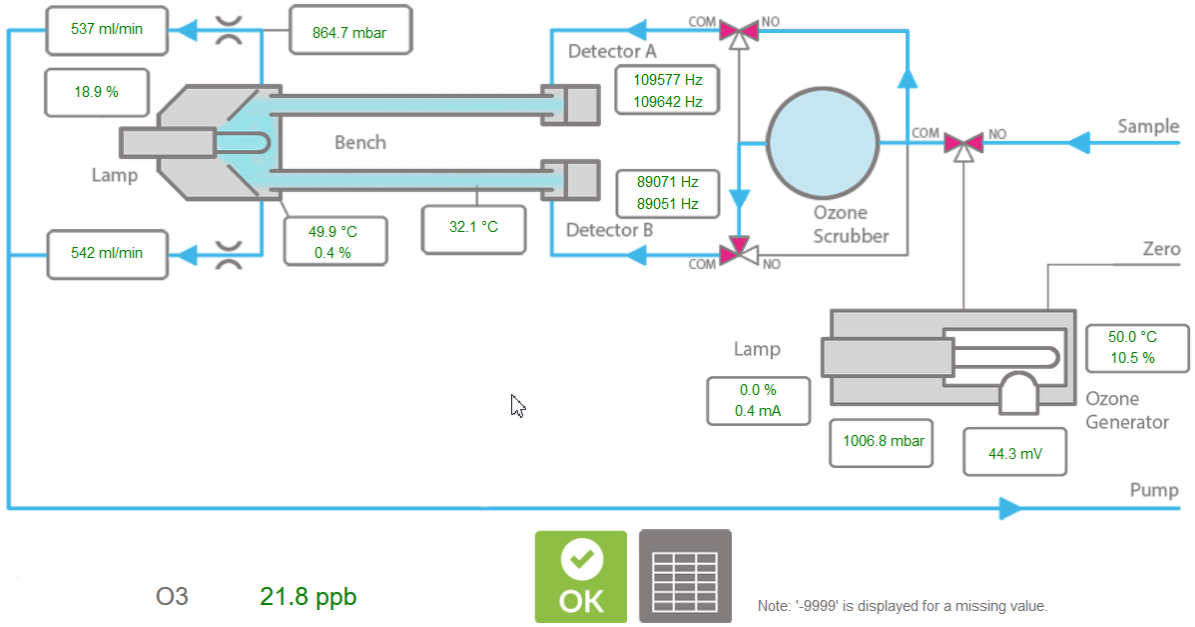

Figure 5.20.: Actual Ozone Values

SO2

This page shows the current data of the sensor module SO2.

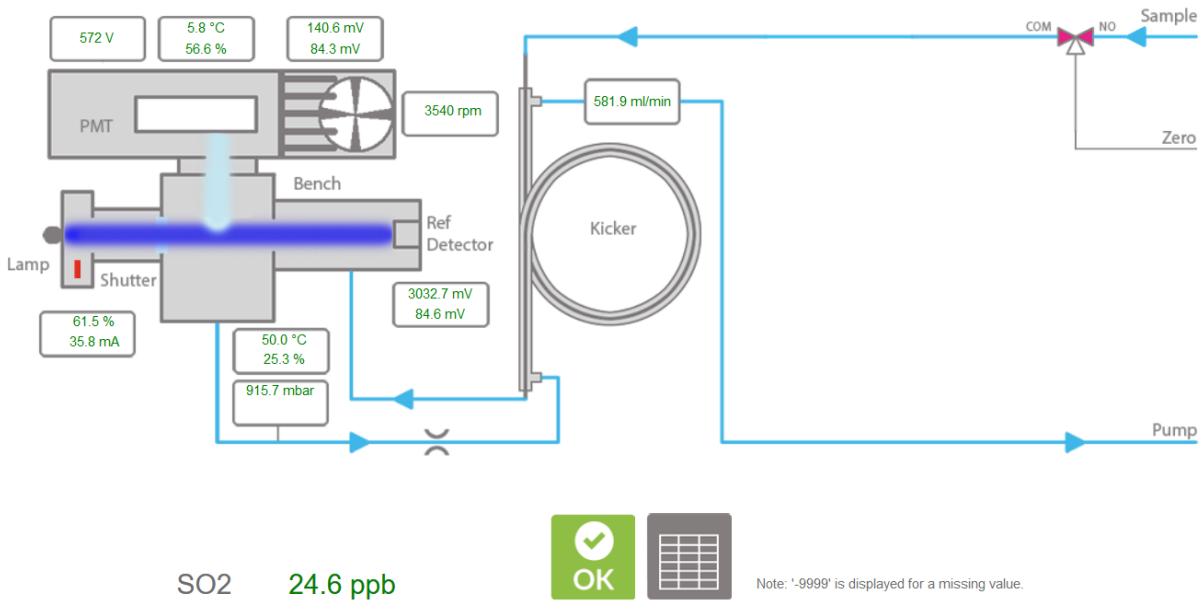

Figure 5.21.: Actual SO_2 Values

System Values (see Figure 5.22)

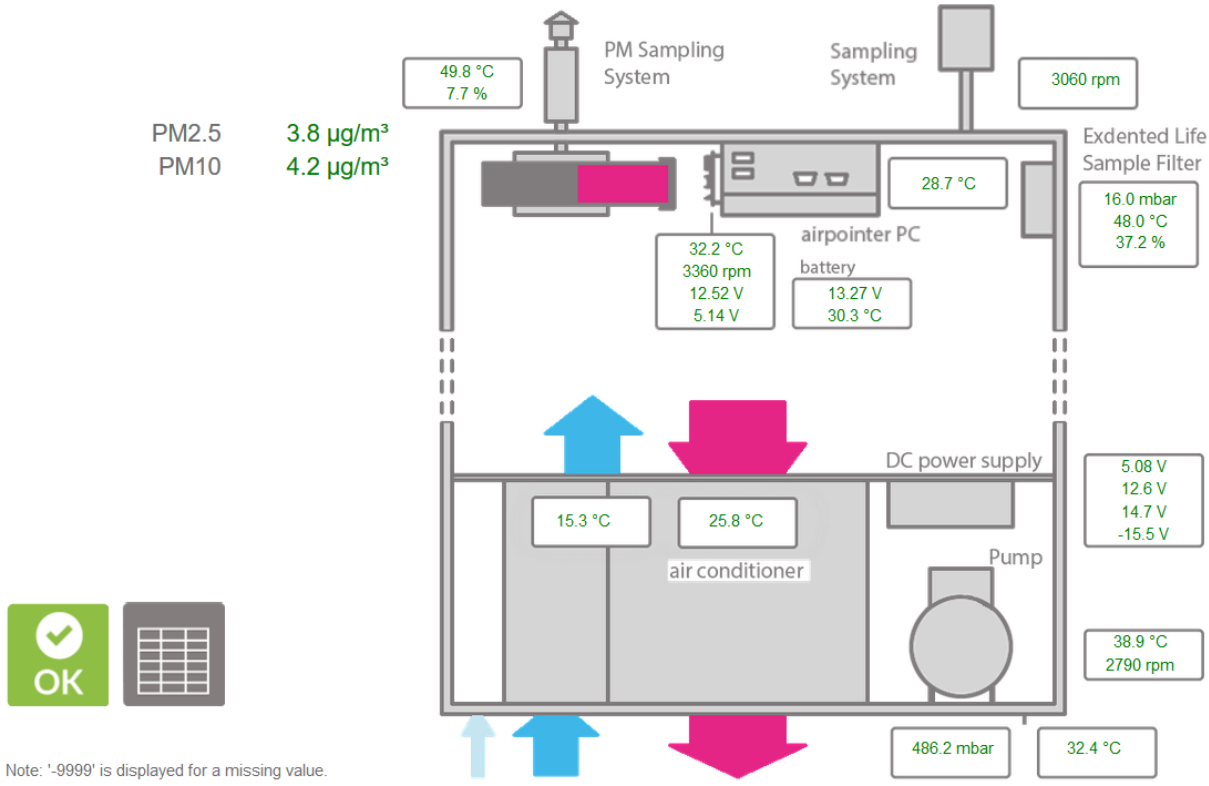

Figure 5.22.: Actual System Values

System SensorInterface Board

Status (see Figure 5.23)

LinSens Service Interface [200700185], normal Operation

Home Actual Average Calibration NOx O3 System_Values Status StatList Software Hardware RS232

Status no Status active

Number	Status	since	Parameter	Actual	Average	Unit	lower limit fail	lower limit warn	upper limit warn	upper limit fail
1										
2										
3										
4										
5										
6										
7										
8										

Figure 5.23.: Status System

This table shows the current error status values, in case there are any at all. If an error occurs, the point in time when it was noted first and its respective parameter, i.e. the value, lower and upper limit, lower and upper error limit are displayed.

StatList

LinSens Service Interface [200700185],

Home Actual Average Calibration NOx O3 System_Values Status StatList Software Hardware RS232

Status List Page (press reload to update)

NOxSensor

G/P	Status	Parameter	Actual	Average	Unit	lower limit fail	lower limit warn	upper limit warn	upper limit fail	Board Adr
G1P1	OK	NO	0.1	0.1	ppb	-	-	-	-	-
G1P2	OK	NO2	0.4	0.4	ppb	-	-	-	-	-
G1P3	OK	NOx	0.5	0.5	ppb	-	-	-	-	-
G1P4	OK	PressNOx	847.1	847.2	mbar	300.0	-	-	1300.0	081
G1P5	OK	RCellT	50.0	50.0	°C	45.0	47.0	55.0	56.0	097
G1P6	OK	MolyT	325.1	324.9	°C	290.0	300.0	335.0	340.0	097
G1P7	OK	PMTTemp	-2.0	-2.0	°C	-8.0	-5.0	3.0	5.0	097
G1P10	OK	PMTSigNO	4247.8	4266.2	Hz	-	-	-	-	081
G1P11	OK	PMTSigNOx	4317.6	4326.0	Hz	-	-	-	-	081
G1P12	OK	PMTSigAuto0	4276.5	4235.7	Hz	5.0	-	-	150000.0	081
G1P13	OK	PowerToRCell	21.4	20.9	%	-	-	-	-	097
G1P14	OK	PowerToMoly	15.0	16.7	%	-	-	-	-	097
G1P15	OK	HVPS_NOx	-675	-675	V	-800	-750	-650	-600	081
G1P16	OK	NO_all	0.1	0.1	ppb	-	-	-	-	-
G1P17	OK	NO2_all	0.4	0.4	ppb	-	-	-	-	-
G1P18	OK	NOx_all	0.5	0.5	ppb	-	-	-	-	-
G1P19	OK	Fan_NOx	0	1214	rpm	100	300	4000	4200	097
G1P20	OK	PressNO	847.5	847.5	mbar	300.0	-	-	1300.0	081
G1P21	OK	NOStdDev	0.28	0.32		-	-	-	-	-
G1P22	OK	NO2StdDev	0.40	0.37		-	-	-	-	-
G1P23	OK	NOxStdDev	0.29	0.29		-	-	-	-	-
G1P24	OK	PowerToPeltier	91.4	91.9	%	-	-	-	-	097
G1P27	OK	RCellPressNO	319.8	318.6	mbar	100.0	-	-	600.0	-
G1P28	OK	RCellPressNOx	318.9	318.2	mbar	100.0	-	-	600.0	-
G1P29	OK	FlowNOx	1031.5	1031.9	ml/min	700.0	800.0	1600.0	1700.0	-
G1P30	OK	FlowO3Gen	95.7	95.6	ml/min	50.0	60.0	150.0	200.0	081
G1P38	OK	NO_raw	0.1	0.4	ppb	-	-	-	-	-

Figure 5.24.: An excerpt from the Status List Page

Status List Page shows the current error status (colour coded) and value, unit, lower and upper error limit, lower and upper warning limit of each parameter from the system and the installed modules. If limits were set, OK, warning or fail status are shown. OK is written in green, warning in orange and fail in red.

NOTE

If a warn or fail status is shown, warn (in orange) or fail (in red) is written on the top left of the User Interface. This is a link to the site where the warn or fail parameter is listed.

Software (see Figure 5.25)

Software

Number	Name	Cycle Time avg [msec]	Cycle Time max [msec]	Cycle Time max since start [msec]	max at	last triggered	allowed timeout [sec]
0	Startup	11214	11214	11214	20140202 04:52:13	20140202 04:52:13	-
1	Startup syncsensors	1082	1082	1082	20140202 04:52:13	20140202 04:52:13	-
2	Startup Data, Param, Status Tables	1853	1853	1853	20140202 04:52:12	20140202 04:52:12	-
3	Write Database Thread	2	4	802	20140202 05:00:03	20140205 13:50:26	180
4	HTTP Thread	4	156	383	20140205 13:45:41	20140205 13:50:26	10
5	DataThread	35	36	191	20140204 13:30:00	20140205 13:50:26	30
7	Hardware Interface (If) Thread	37	79	553	20140202 15:45:00	20140205 13:50:26	60
8	Time in Hardware Interface Buffer	40	75	443	20140202 04:53:00	20140205 13:50:26	-
9	HW get all parameters	1463	1965	10610	20140203 08:47:37	20140205 13:50:25	-
10	ControlThread	100	102	374	20140202 15:45:00	20140205 13:50:26	60
11	StatusThread	35	37	105	20140202 12:28:00	20140205 13:50:26	180
12	Error Log Thread	10	15	68	20140202 04:52:32	20140205 13:50:26	60
14	CtrlDatalfThread	0	0	0	-	20140202 04:52:02	-

Internal Communication

RS232 Messages/sec	RS232 Messages/sec average	Boards missing	Entries in Hardware interface buffer	Entries in Write DB buffer	max Entries in Write DB	entries in Write DB Out	max Entries in Write DB Out
32	32	0	1	0	5	0	2

Software Version

Software Version LinSens	2.053	Date	23.Jan 2014
Analytical Module Version	1.001	Date	22.Apr 2008

Figure 5.25.: Software System

Hardware (see Figure 5.26)

Hardware

n	Adress	Board	S/N	Software Version	Hardware Rev	Board Status	COM Errors	Confirmation error	active	Answer in [msec]	Last OK	do LR	last RL
1	000	Sensor Interface System			-	0	2	0	Fail	1007	-	-	-
2	031	PumpControl			-	0	2	0	Fail	1008	-	-	-
3	068	COControl Board CO			-	0	1	0	Fail	108	-	-	-
4	081	SensorInterface2 NOx			-	0	1	0	Fail	108	-	-	-
5	083	SensorInterface2 O3			-	0	1	0	Fail	108	-	-	-
6	084	SensorInterface2 SO2			-	0	1	0	Fail	108	-	-	-
7	097	ValveHeater2 NOx			-	0	1	0	Fail	108	-	-	-
8	099	ValveHeater2 O3			-	0	1	0	Fail	108	-	-	-
9	100	ValveHeater2 SO2			-	0	1	0	Fail	108	-	-	-

Internal Communication

RS232 Messages/sec	RS232 Messages/sec average	Boards missing	Entries in Hardware interface buffer	Entries in Write DB buffer
1	-9999	9	-9999	0

Software Version

Software Version LinSens	2.053	Date	23.Jan 2014
Analytical Module Version	1.001	Date	22.Apr 2008

Figure 5.26.: Hardware

5.7.3. LinLog

LinLog Service Interface (see Figure 5.30) provides current data of airpointer's logger. Clicking the link displays the LinLog Service Interface in a new window. You can also reach the site, if you write

your airpointer's IP-address/linlog

into your browser's address bar.

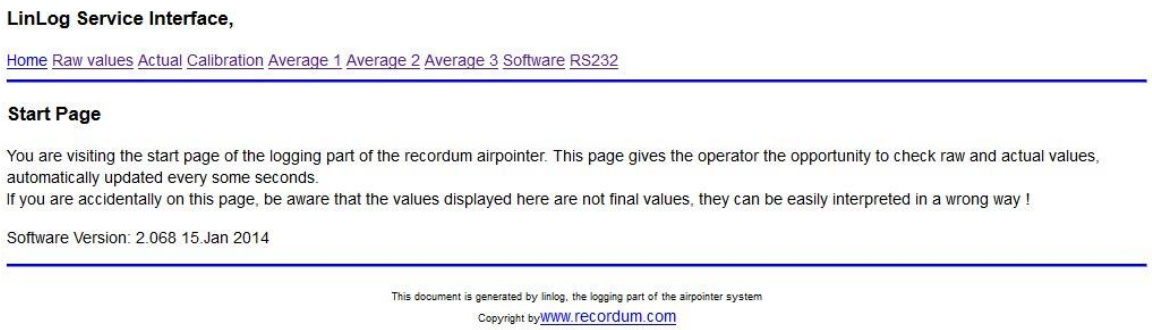

Figure 5.27.: View of the LinLog Service Interface

Home

This is the homepage with reference to the manufacturer.

Raw Values

Read in current values, arranged in groups.

Actual Values

Computed current values, arranged in groups.

Calibration

Choose group of calibration values

Average 1

Averaging of the computed current values for average 1, arranged in groups.

Average 2

Averaging of the computed current values for average 2, arranged in groups.

Average 3

Averaging of the computed current values for average 3, arranged in groups.

Software

Software

Number	Name	Cycle Time avg [msec]	Cycle Time max [msec]	Cycle Time max since start [msec]	max at	last triggered	allowed timeout [sec]
0	Startup	172	8617	8617	20140202 04:52:10	20140202 04:52:10	-
2	Error Log Thread	10	13	264	20140202 04:52:04	20140205 13:52:48	60
3	Write Database Thread	2	6	1122	20140202 05:00:04	20140205 13:52:48	180
4	HTTP Thread	3	20	28	20140205 12:27:52	20140205 13:52:47	10
5	DataThread	2	5	260	20140204 12:30:00	20140205 13:52:48	30
25	recordum modbus first src: 4	9	13	521	20140205 09:21:25	20140205 13:52:48	120
55	RSThread COM4 (55)	2980	4001	4019	20140205 02:44:05	20140205 13:52:45	60

Internal Communication

Entries in Write DB buffer	max Entries in Write DB	entries in Write DB Out	max Entries in Write DB Out
0	15	0	4

Software Version

Software Version LinLog	2.068	Date	15.Jan 2014

Figure 5.28.: Software Parameters

This page shows you some software parameters like software version number. The other parameters are for software developers.

RS232

Here you can check the communication via the COM ports. First, select a COM port (see Figure 5.32) to get an overview of the last communications via this port (see Figure 5.33).

You can check if the communication timing is set correctly.

Figure 5.29.: Choose a COM port

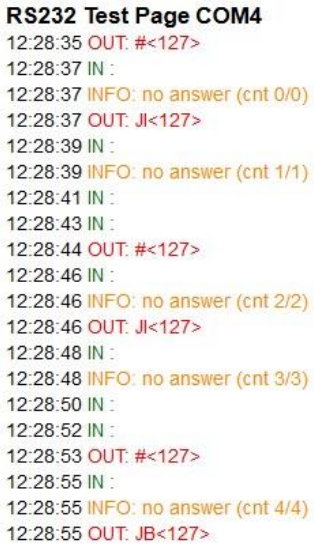

Figure 5.30.: Communication

5.7.4. User Interface

Groups

The user administration of the User Interface of the airpointer is divided into groups and users. All users are members of a group. The respective privileges for the visibility of the menu items are defined in the respective groups. The privileges of each single user depend on his belonging to the group.

To create a new group, simply click on <add> below the list of groups (see Figure 5.31).

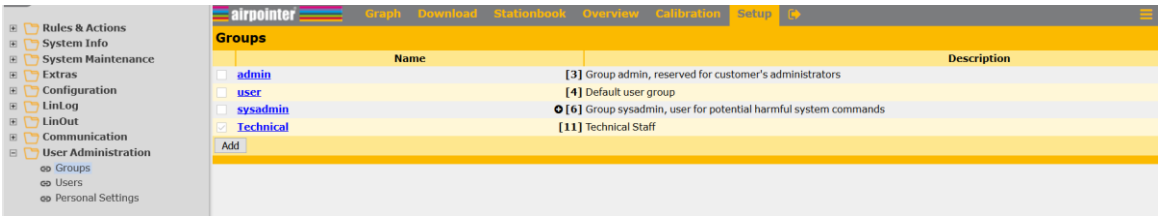

Figure 5.31.: List of groups

Then, select a group name and as an option, a description. You will assign the privileges to the group by selecting the available privileges in the bottom field and add them to the current group by double-clicking. You can take away privileges by selecting them in the top field and double-clicking (see Figure 5.32). Creating a new group is reserved for users who are members of the group admin (or have similar privileges).

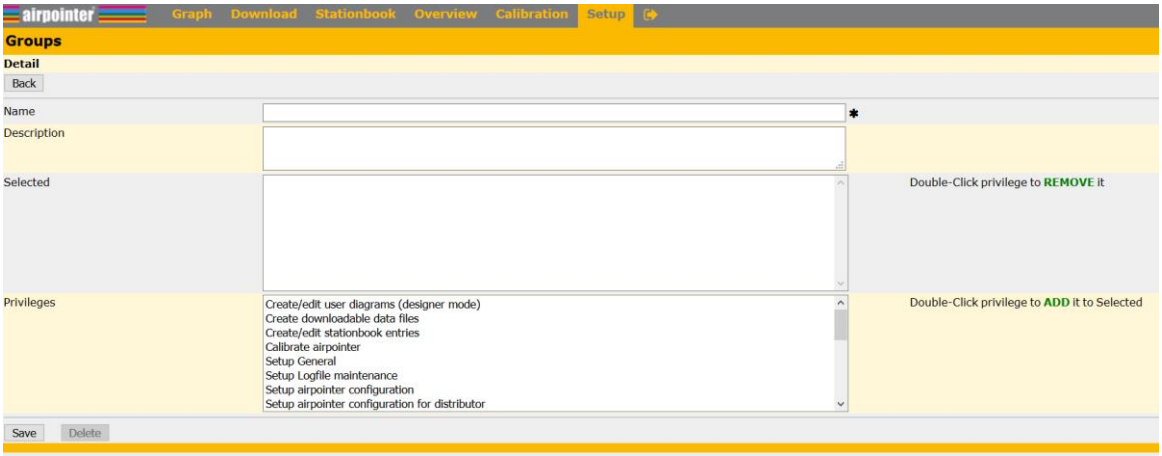

Figure 5.32.: Modify a group

You can also edit or delete already existing groups. The standard groups ‘admin’ and ‘user’ cannot be deleted. If you delete a group still containing members, the members in this group will be deleted too.

Users

In each group, users can be added. To create a new user, simply click on <add> in the desired group (see Figure 5.33).

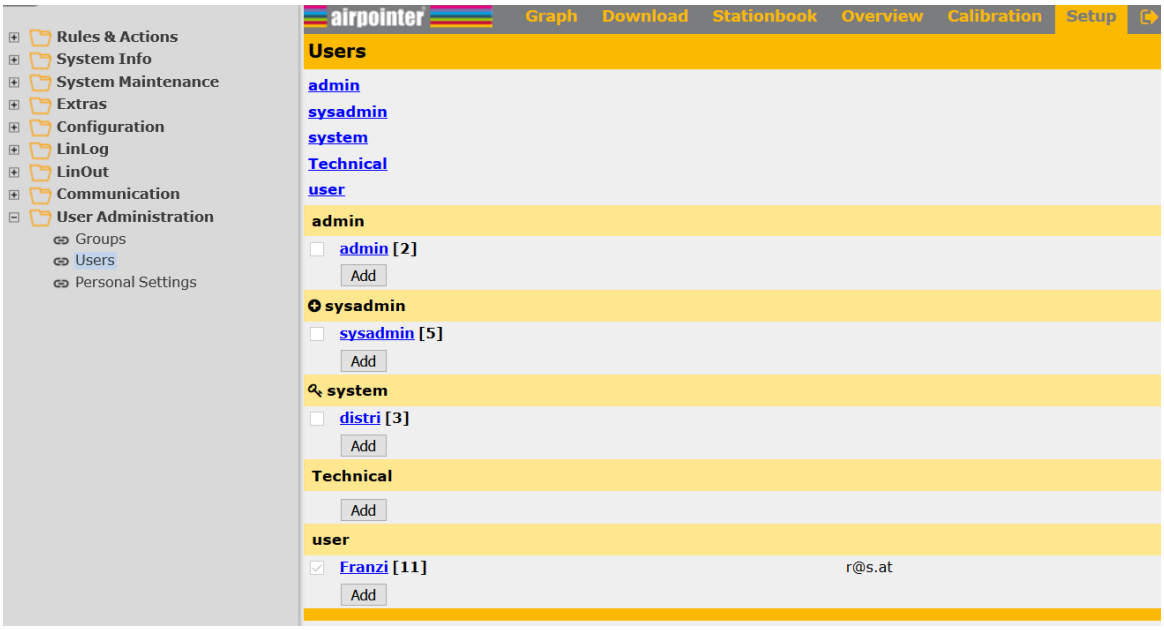

Figure 5.33.: List of users

Then enter name, a password, and as an option, a description, and a preferred language (See Figure 5.34). The password must contain at least 6 characters including at least 1 digit.

Creating a new user is reserved for users who are members of the group admin (or have similar privileges).

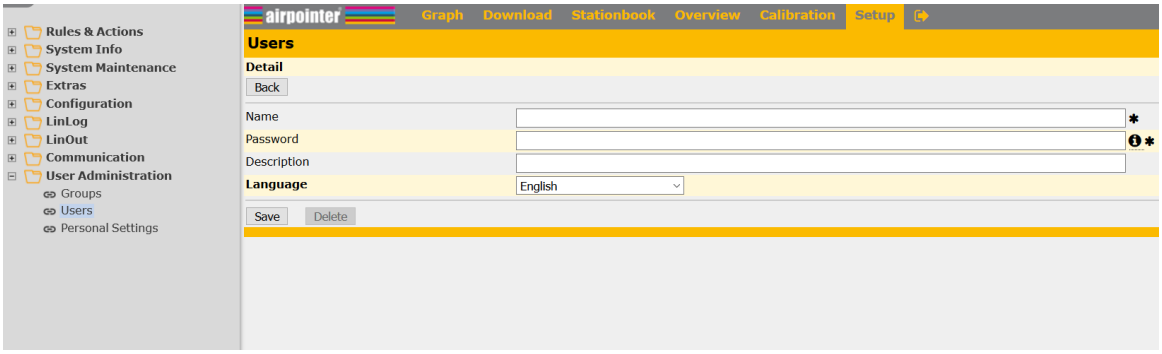

Figure 5.34.: Create a new user

You can also edit or delete a user by ticking the respective user and clicking ‘delete’.

Personal settings

Here you can edit your password to the User Interface of the airpointer, and at any time change the language of the user interface for your account (see Figure 5.35).

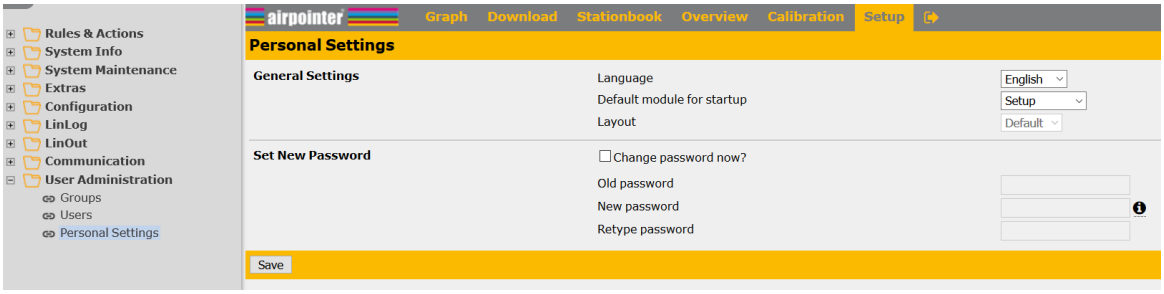

Figure 5.35.: Edit Personal Settings

6. Maintenance

Predictive diagnostic functions i.e. data acquisition, failure warnings and alarms built into the airpointer allow the user to determine when repairs are necessary without performing unnecessary, preventive maintenance procedures. These messages are viewable via the Service Interface outlined in Section 5.7.1. Therefore, regularly start the service interface and check for warning and error messages!

NOTE
Regularly start the service interface and check for warning and error messages.

At the service interface a red 'FAIL' or a black 'WARN' is written beside the name of your airpointer (top left on the User Interface), if there is a fail or a warning, respectively. The note is updated when you open a new page.

There is, however, a minimal number of simple procedures that, when performed regularly, will ensure that the analyzer continues to operate accurately and reliable over its lifetime.

NOTE
The operations outlined in this chapter must be performed by qualified maintenance personnel only.

6.1. Maintenance Procedures

NOTE
The service procedures in this manual are restricted to qualified service representatives.

The access for users allows to change the sample particulate filter, to directly connect a laptop (LAN2), to connect a calibration gas, switch the maintenance switches and provides a temporary power socket for e.g., a laptop.

CAUTION:

Risk of electrical shock. Disconnect power line before performing any operations that require entry into the interior of the airpointer.

Figure 6.1: airpointer with closed door

Figure 6.2.: Maintenance door

The following sections includes maintenance information and replacement procedures of following units:

1. General
2. Base Unit

CAUTION: **Do not use alcohol or other solvents for cleaning the components conducting gas!**
CAUTION: **Some internal components can be damaged by small amount of static electricity. A properly grounded antistatic wrist must be worn while handling any internal component.**
CAUTION: **Take care that screws and tools do not fall into the airpointer!** **Loose screws or tools can damage the airpointer!**

6.2. General

6.2.1. Main door

Use the following procedure to open the main door:

1. Unlock the main lock with your key (see Nr. 1 at Figure 6.3).
2. Unlock the two secondary locks consecutively by performing a 90° rotation with the key (see Nr. 2 at Figure 6.3). The two locks are open in vertical position and locked in horizontal position.

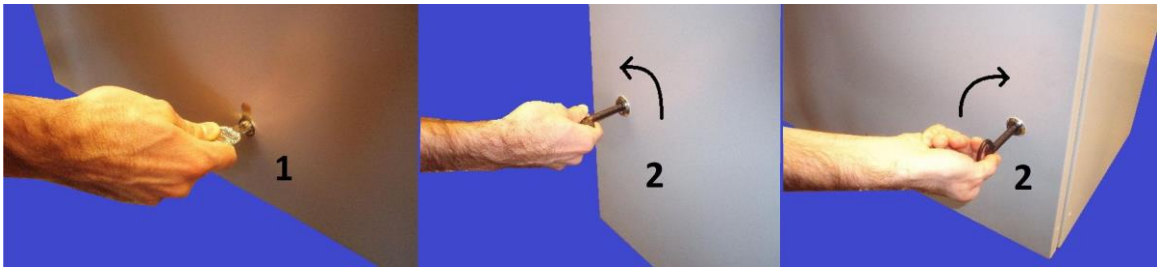

Figure 6.3.: Open and close main door

CAUTION:

Take care that you have enough space to open the door.

Use the following procedure to close the main door:

1. Close the door slowly.
2. Close the door and look the two locks and the main lock.

CAUTION:

You can always lock your airpointer by only using the main lock or the secondary locks independently of each other.

6.2.2. Maintenance door

Use the following procedure to open the maintenance door:

1. Unlock the lock with your key.
2. Pull the door.

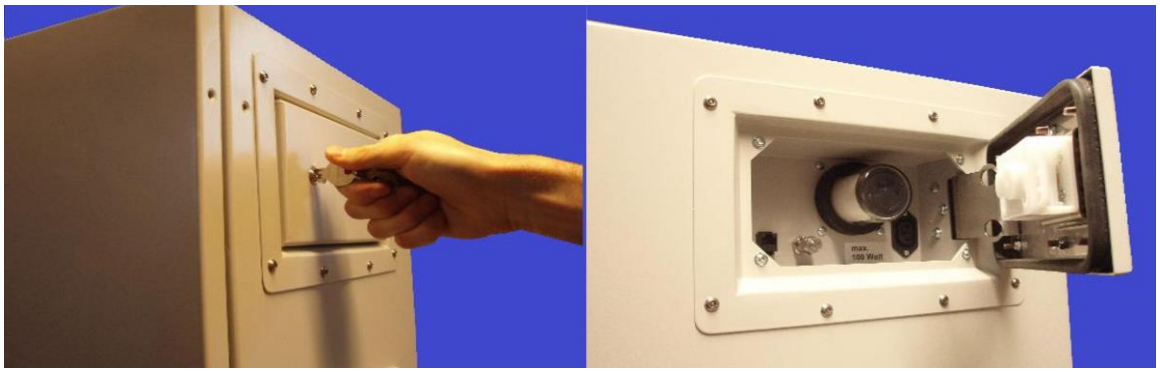

Figure 6.4.: Open and close the maintenance door

Use the following procedure to close the maintenance door:

1. Close the door.
2. Lock the door with your key.

6.2.3. Slide a Module

For most of the maintenance procedures it is sufficient to slide out the module.

Use the following procedure to slide a module:

1. Hold the Module on the left and right side and slide it out carefully.

NOTE **Pull and push simultaneously on both sides!**

2. When you slide in a module be careful not to quench any tubing or cable.
3. The module arrests with a light click

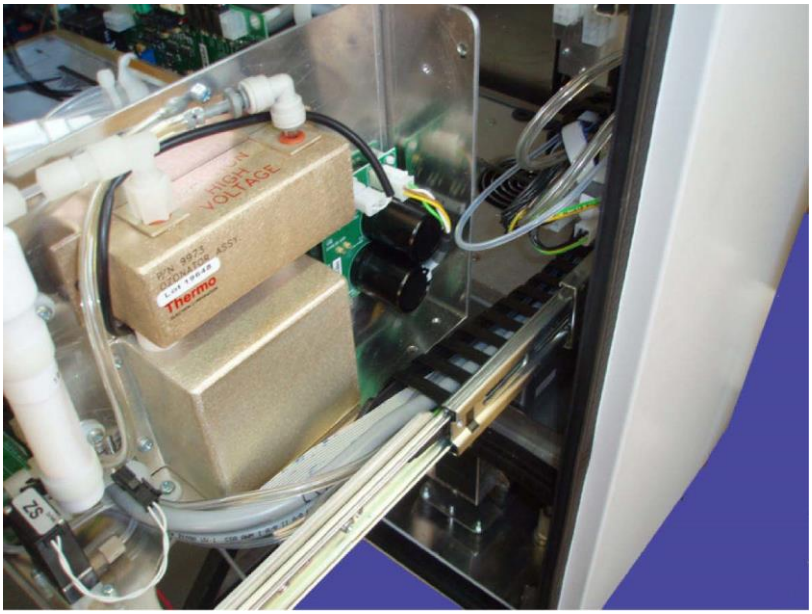

Figure 6.5.: Push and pull the module on both sides simultaneously

6.2.4. Lift a Module out or in

For most of the maintenance procedures it is sufficient to slide out the module. If you want to completely lift out a module use the following procedure.

NOTE
Note on which drawer the module was placed and where and how the chain with the tubing and cables is linked with the flow block of the base unit.

Use the following procedure to lift out a module:

1. Slide out the module as far as possible.
2. Loose the 7 connections of the connection chain on the right side. There are 3 tubes (Pump, Zero and Sample, 3 cables and one grounding).
3. The Zero and Pump Connection are fixed by two quick release fasteners which can be released by pushing down the grey ring (see figure below). The Sample connection has to be screwed.
4. Loose the clamp of the connection chain (quench).
5. Press the levers in both drawers up (left) or down (right) and simultaneously slide completely out the module.

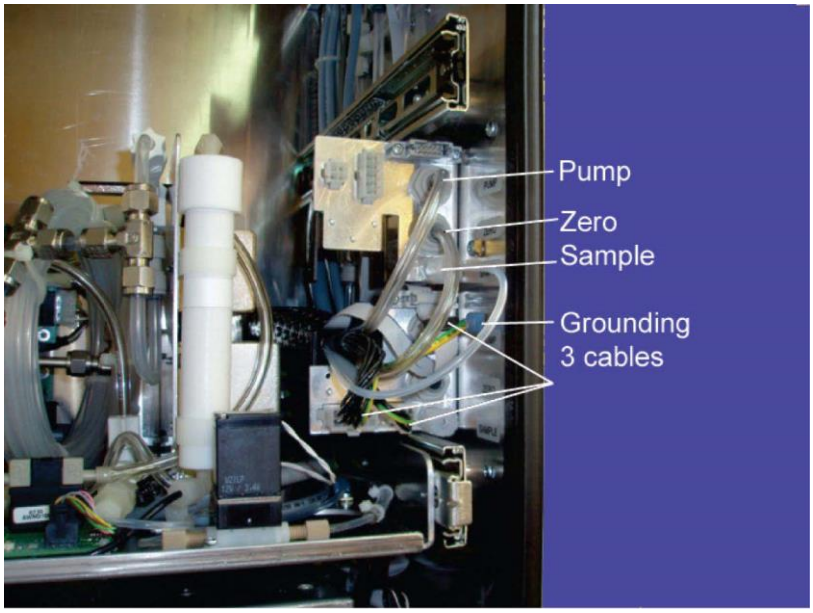

Figure 6.6.: Disconnect the seven connections of the connection chain.

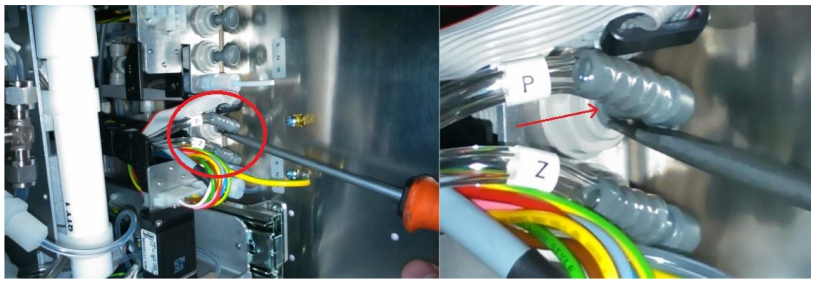

Figure 6.7.: Pushing down the grey ring with a screwdriver

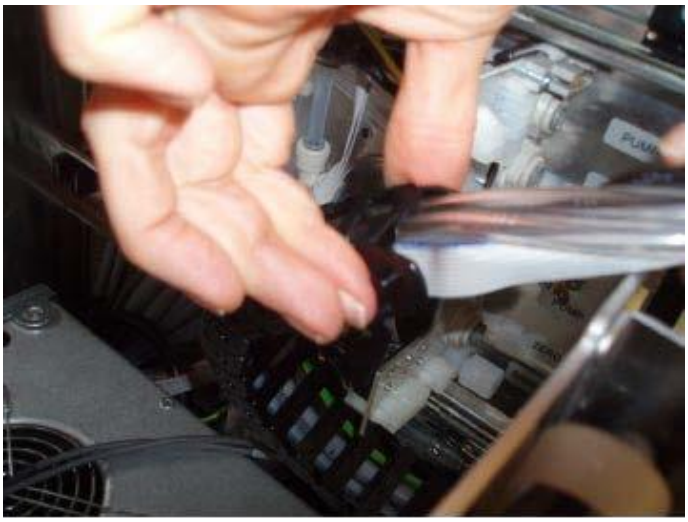

Figure 6.8.: Loose the clamp

Figure 6.9.: Press the small levers in both drawers up (left) or down (right).

CAUTION:

Be aware of the weight of the Module! The weight is listed in chapter 4 'Specification'.

Use the following procedure to lift in a module:

1. Locate the drawer and the flow block of the module and slide out the drawers a bit.
2. Hold the module with one arm near the drawers and arrange the connection chain. It should lay in the holder.

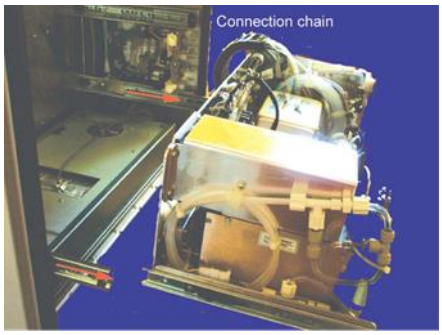

Figure 6.10.: Slide out the drawers a bit

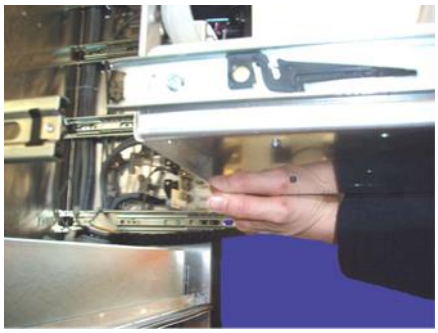

Figure 6.11.: Hold the module with one arm near the drawers

NOTE
Be careful not to squeeze any tubing or cables!

3. Slide in the module as far as possible. There is a light click at the end.
4. Connect the 7 connections on the right side. There are 3 tubes (Pump, Zero and Sample), 3 cables and one grounding.
5. Fix the connection chain into the clamp.

6.3. Maintenance of Base Unit (System parts)

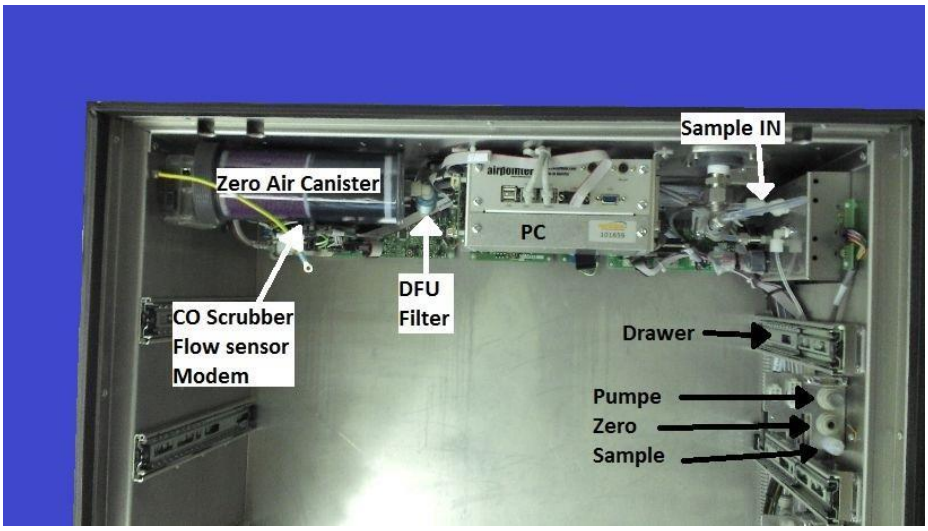

Figure 6.12.: System Components

This subsection includes following maintenance information and replacement procedures:

1. Sample Particulate Filter Inspection and Replacement
2. Visual Inspection and Cleaning
3. DFU Filter Replacement
4. Zero Air Scrubber Maintenance

5. Louvers Inspection and Cleaning
6. Cleaning the Cooling Aggregate
7. Air Condition
8. Pump Maintenance

6.3.1. Sample Particulate Filter

6.3.1.1. Regular sample particulate filter

The particulate filter should be inspected regularly for signs of plugging or excess dirt. If contaminated, replace the filter following the procedure outlined below. It should be replaced according to the service interval in Table 10.1 even without obvious signs of dirt. This is because filters with a pore size between 1 and 5µm can clog while retaining a clean look. We recommend handling the filter and the wetted surfaces of the filter housing with gloves and tweezers.

Follow these steps to change the sample particulate filter:

1. Open the maintenance door and locate the sample particulate filter (see Figure 6.2)
2. See Figure 6.13 for an exploded view of the filter assembly.

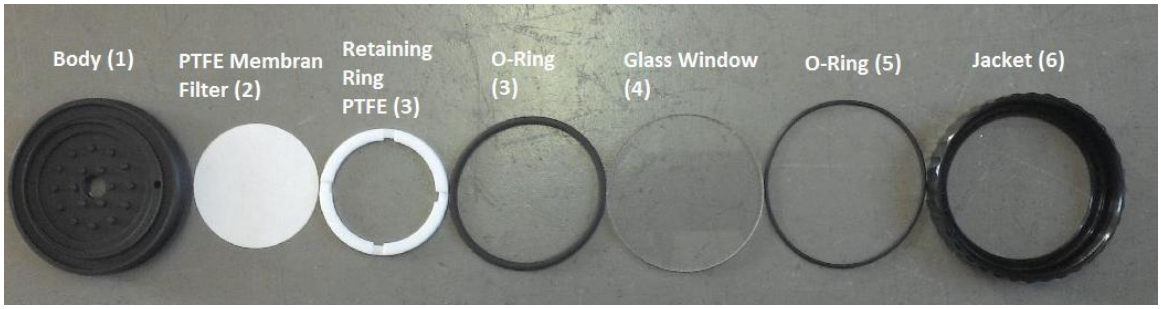

Figure 6.13.: Parts of the Sample Particulate Filter

3. Carefully open the jacket (6) with the glass window (4) which is attached by one O-Ring (5) and remove the retaining ring (3) and the filter element (2). In the side of the retaining ring is an additional O-Ring (3). The Body (1) itself stays in the airpointer. We recommend cleaning the glass window and O-Rings at least once monthly, weekly in very polluted areas.

NOTE
Clean with a soft cloth and if needed clean water.

4. If the O-Rings are porous replace them. After cleaning the O-Rings reinstall them.
5. Install a new filter element, carefully centring it in the bottom of the holder.

CAUTION:

Do not touch any part of the housing, filter element, PTFE retaining ring, glass cover and the O-Ring with bare hands.

6. Reinstall the PTFE O-Ring (Returning Ring) with the notches facing up (important!). Place the glass window, then screw on the nut and hand-tighten the assembly. Inspect the (visible) seal between the edge of the glass window and the O-Ring to assure proper gas tightness.

7. Check that the flows are within limits in the Linsens interface

6.3.1.2. Extended Lifetime Sample Filter

There is the Option of getting an extended Lifetime Filter with an 8-times larger surface which will last more than 10 times longer than the regular filter. The extended lifetime filter replacement is done the same way as for the regular filter.

If your airpointer is equipped with the Extended Lifetime Sample Filter the maintenance procedure does not change. If your airpointer also contains the High Humidity Option, you should also regularly check the water level in the water reservoir and empty it if necessary.

This Extended Lifetime Filter can be further equipped by two options:

1. SamFilter Board Option which provides an additional pressure measurement for monitoring the contamination level.
2. High Humidity Option which consists of a heating unit and a water reservoir for moisture whereby condensation is avoided. Additionally, there is an alarm sensor which prevents the reservoir from overflowing.

Figure 6.14.: The basic Extended Lifetime Filter

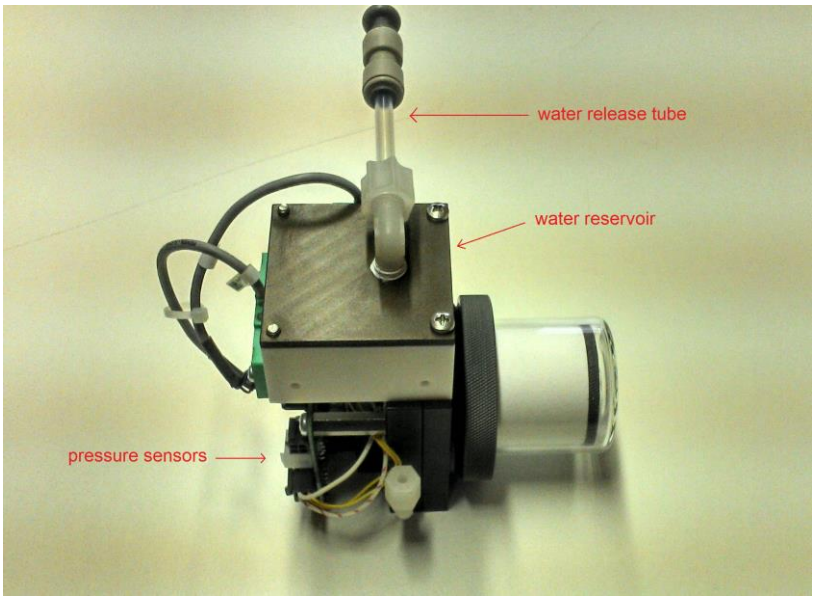

Figure 6.15.: An Extended Lifetime Filter with both options

6.3.2. Inspection and Cleaning of the ventilation grids (2D and 4D airpointer)

Follow these steps for inspection and cleaning of the air inlet grilles:

1. Open the main door and power down the airpointer
2. Locate the grids at the bottom of the airpointer (see figure 6.16).
3. Unscrew the holding screws of both grilles (six each).
4. Remove the grilles.
5. Clean the inner grids by blowing dust away with low pressure compressed air. Use a soft paint brush to remove stubborn dirt.
6. Reinstall the grilles and fasten the screws.
7. Power up the airpointer and close the main door.

Figure 6.16.: Ventilation grids of the airpointer

6.3.2. Inspection and Cleaning of the ventilation grids (HC airpointer)

Follow these steps for inspection and cleaning of the air inlet grilles:

1. Locate the grids at the right handside of the airpointer (see figure 6.17).
2. Unscrew the 4 holding screws of the grilles.
3. Remove the grilles.
4. Clean the inner grids using a soft paint brush to remove dust, dirt, and bugs (see figure 6.18).
5. Reinstall the grilles and fasten the screws.

figure 6.17.: HC airpointer grilles

figure 6.18.: HC airpointer inner grids

7.Troubleshooting

Whenever a module is in an error state, the message “There are errors! Click me to check the state.” appears in a red ribbon above the User Interface screen (see figure 7.1.). Clicking on the ribbon redirects to a status page giving information about the failing module and the type of error.

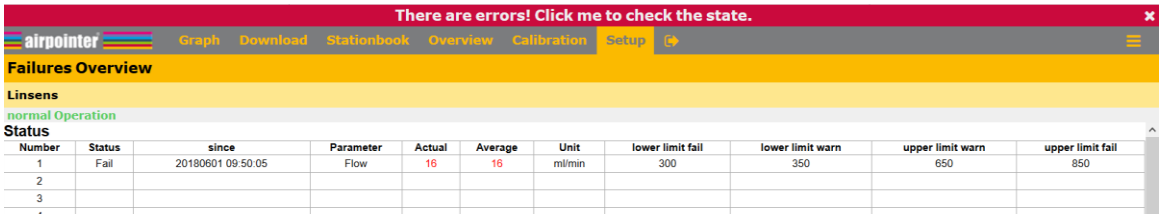

Figure 7.1.: example of failure in an ozone module

The errors can be seen also in the Linsens page of the respective module (see figure 7.2.).

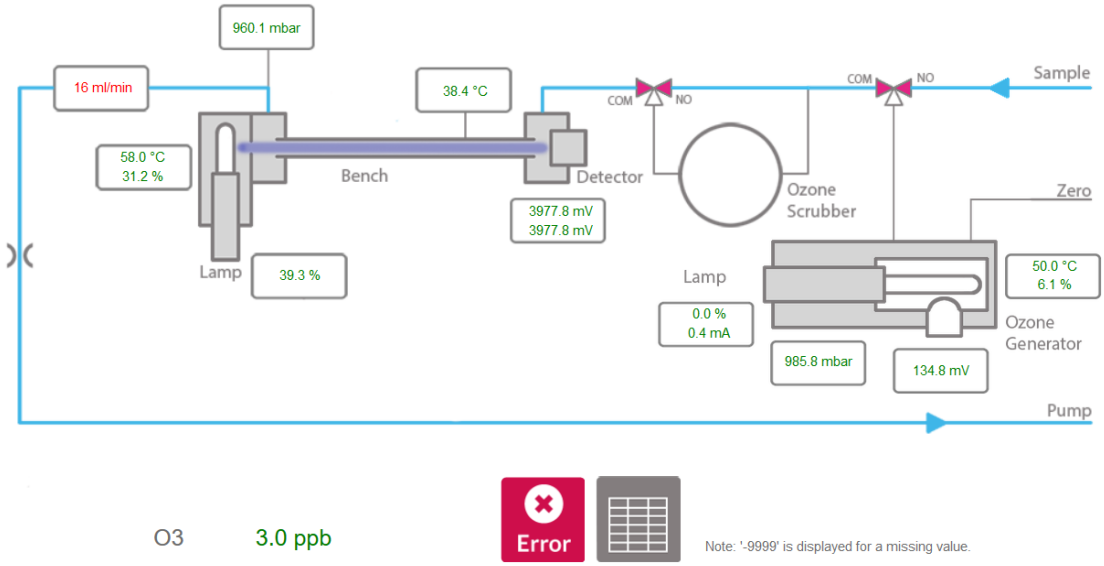

figure 7.2.: Linsens ozone module in error state

Clicking on the red “error” button opens a page guiding the user through a troubleshooting process (see figure 7.3.). This guide usually contains 1 to 3 steps to follow. At the end of the process, if the problem was not solved by the user, a text file summarizing the results of the troubleshooting can be downloaded and sent to the distributor for assistance.

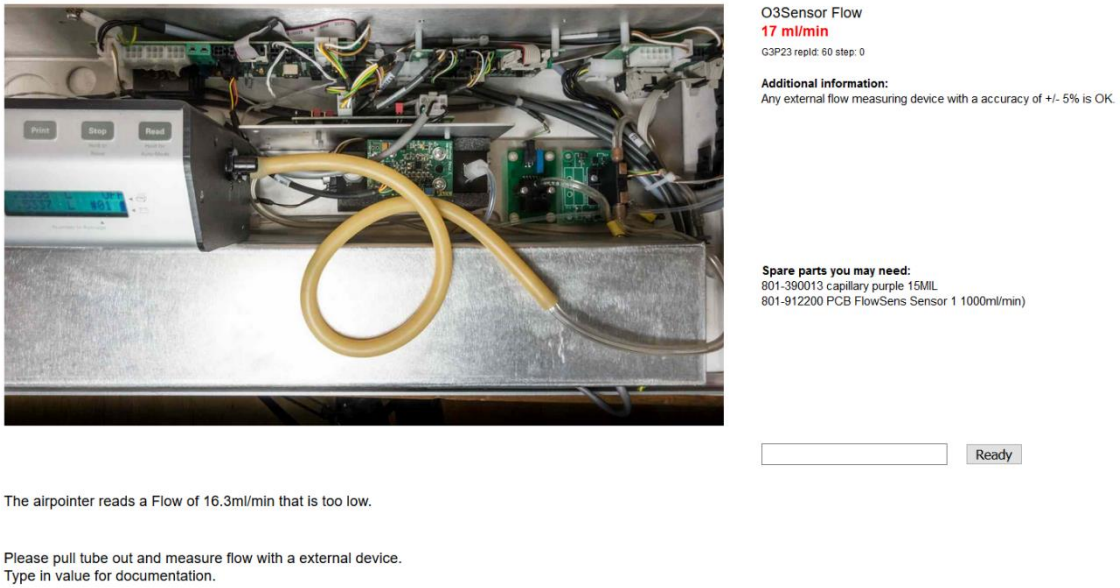

figure 7.3.: troubleshooting guide

CAUTION:

These steps may involve intervention on a running airpointer. In this case, it should only be attempted by trained personal because of the risks of burns, electric shocks, or exposure to harmful substances.