GasEye

Probe

User Manual

AIROPTIC™

GasEye Probe

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Product Information:	Gas analyzer
Application:	In-situ analyzer
Brand name:	**GasEye Probe**

Contents

1. Introduction

1.1. General information

This manual relates to an instrument that was manufactured with high attention to detail in controlled conditions. By following the description provided in this document our product will work safely and perform the intended measurements properly.

1.2. Warranty conditions

Our company guarantees a 12-month warranty period for the GasEye Probe instrument. This period becomes valid upon delivery of the instrument and will be granted only if the product is installed, operated and maintained according to the information provided in this manual.

1.3. Delivery information

The respective scope of delivery is listed on the shipping documents – enclosed with the delivery – in accordance with the valid sales contract. When opening the packaging, please observe the corresponding information on the packaging material. Check the delivery for completeness and overall condition. In particular, you should compare the Order No. on the rating plates with the ordering data. If possible, please retain the packaging material, since you can use it again in case of return deliveries.

1.4. Calibration information

The GasEye Probe system is factory calibrated using certified gas mixtures. The instrument utilizes an internal in-line reference gas cell for real time verification of the calibration status or a process gas normally present in the process gas stream. Thus, we can assure long term stability and accuracy of the system and there is no need for calibration of the system in field as long as the system status is operational.

2. General information about the analyzer

2.1. Introduction

The laser based GasEye Probe spectrometer is a versatile analyzing tool for industrial process applications. It can be configured to operate in the near-infrared (NIR), mid-infrared (MIR) and infrared (IR) wavelength range thereby covering the majority of all gases of interest in the industrial process monitoring.

2.2. Types of applications

GasEye Probe SG instrument was designed and is used in many specified applications, in industries such as:

- Power industry – monitoring of the combustion process
- Wood board production – operator safety, emission
- Chemical industry
- Cement industry
- Steel industry

2.3. Analyzer arrangement

2.3.1. GasEye Probe SG mechanical assembly

The GasEye Probe SG (Single Gas) analyzer consists of a central unit and a probe. The central unit emits laser beam through the probe. The active part of the probe is exposed to the process environment, therefore to the analytes of interest. The laser reflects off the end of the probe and returns to the central unit detector. GasEye Probe utilizes an internal in-line reference gas cell or a process gas (e.g. H2O) for real time verification of the calibration status.

Figure 1 shows the GasEye Probe assembly with external mechanical parts description.

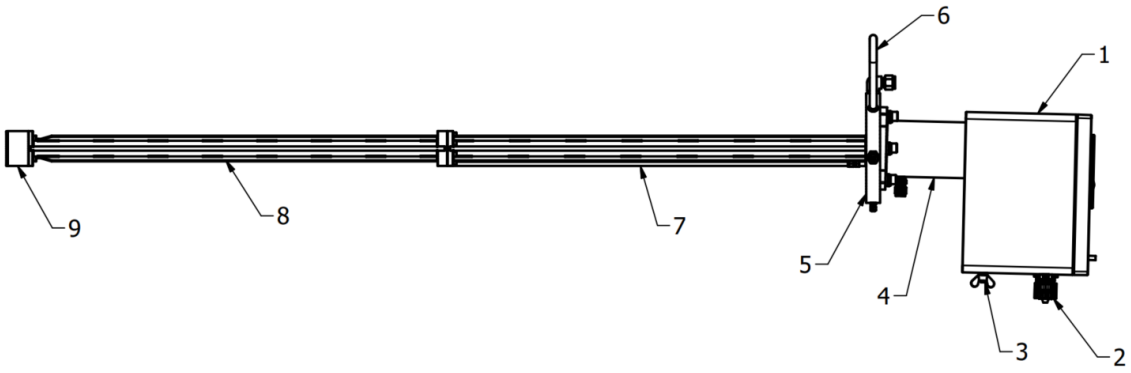


Figure 1. GasEye Probe SG instrument assembly.

ID	Name
1	Probe housing
2	Cable glands/ purging connectors
3	PE connector
4	Probe tube
5	Flange
6	Holder
7	Passive part of the Probe
8	Active part of the Probe
9	Mirror holder

Table 1. Descriptions of GasEye Probe instrument assembly.

In Figure 2 the details of unit housing are highlighted.

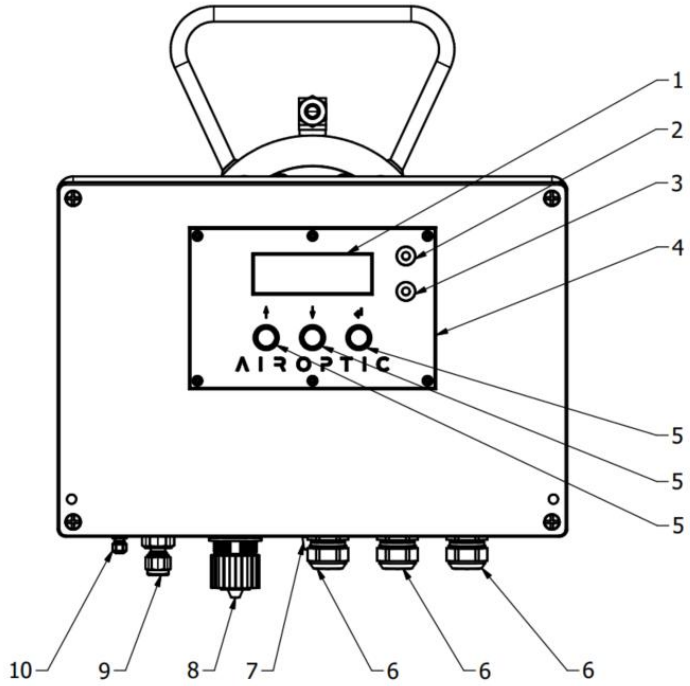


Figure 2. Central unit drawing.

ID	Name
1	HMI window
2	HMI red LED
3	HMI green LED
4	HMI front panel
5	HMI button
6	Cable gland M20
7	PE connector
8	Ethernet connector
9	Purging connector
10	Thermocouple connector

Table 2. Description of central unit.

2.4. Functional description

2.4.1. Principle of operation

GasEye Probe is a laser analyzer that utilizes tunable diode laser (TDL) absorption spectroscopy. The central unit sends a laser light through the passive and active part of the probe and is reflected by the retroreflector mounted on the end of probe. The reflected light travels back to the central unit where it is detected. The laser beam interacts with the process environment only in the active part of the probe. When a gas of interest is present in this process, it will absorb the laser light. The optical power detected in the central unit will depend on the concentration of the gas, temperature, pressure and optical pathlength (optical pathlength determined by the probe length) according to Lambert's Beer law. Thus, in order to determine the gas concentration, the analyzer requires information regarding temperature, pressure and optical pathlength (pathlength is a fixed value equal to the length of the active part of the probe). Pressure signal can be provided by analog inputs, via industrial communication protocols or as manual values via Webserver or HMI. GasEye Probe is equipped with a temperature sensor, thus there is no need to provide it by the customer.

In the GasEye Probe analyzer, the laser wavelength is specifically chosen to match the fingerprint region of the particular gas of interest and is being continuously scanned over the absorption line(s). Since full spectral information is recovered with very high spectral resolution the analyzer remains immune to foreign gas broadening and is immune to cross-interferences from dust and any other gas constituents in the process.
GasEye Probe by design can operate in several wavelength regions from near infrared to Mid-Infrared.

3. Technical data

3.1. Design, enclosure

Degree of protection: In accordance with IP66

Process windows: Leak tested and certified in accordance to EN1779 standard.

Instrument dimensions:

SINGLE GAS

Central unit:	Width x height: 330 mm x 230 mm Length: 323 mm
Probe:	Width x height: ø 50mm Active optical path length: 2 x 578 mm Total length: 1232 mm

Weight:

Central unit: 12 kg
Probe: 6 kg

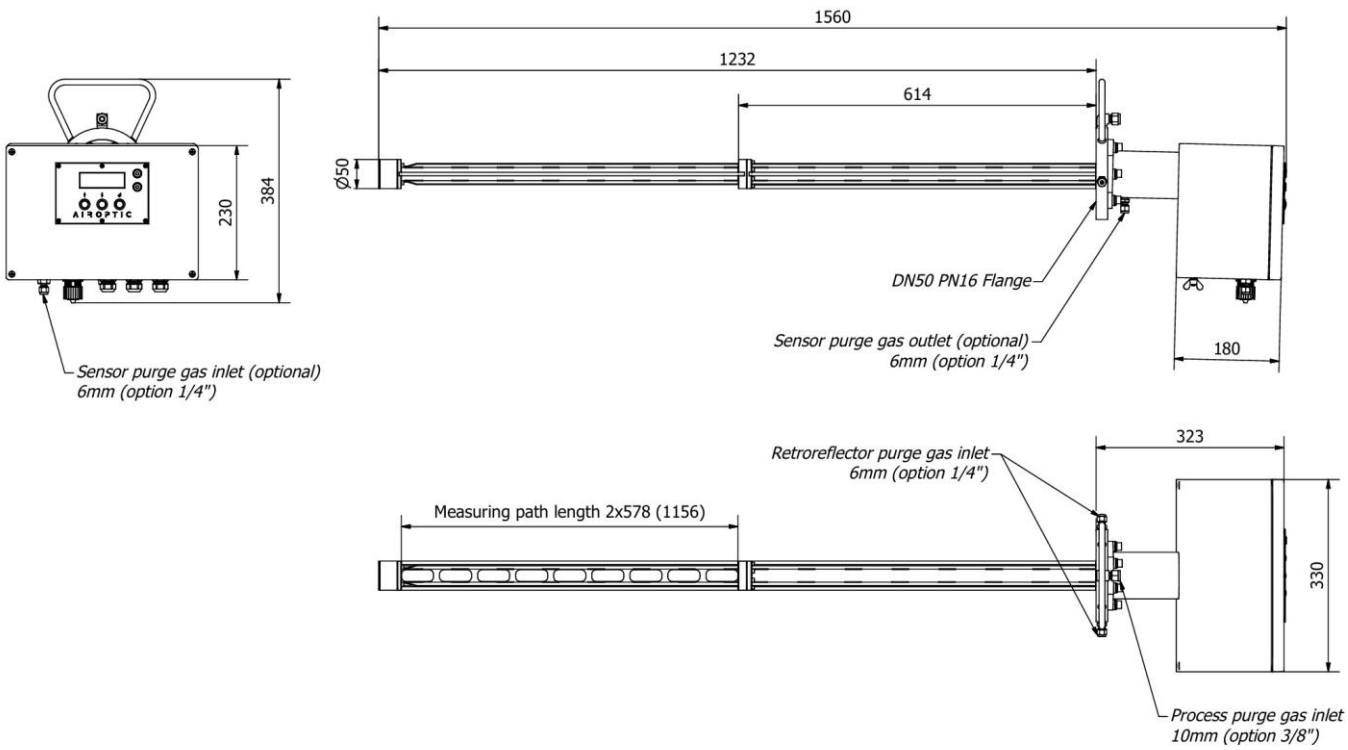


Figure 3. GasEye Probe Single Gas overview.

3.2. Electrical characteristics

Power input: 24 VDC nominal (19-30 VDC)

Power consumption: < 15VA

EMC immunity: In accordance with EN 61326-1

Electric safety: In accordance with 61010-1

3.3. Dynamic performance

Warm-up time: approx. 5 minutes. It takes approximately 60 minutes for the system to be fully operational.

3.4. Electric inputs and outputs

Inputs:
4 x analog input (4 – 20 mA)
8 x digital input (isolated)

Outputs:
4 x analog output (4 – 20 mA, isolated)
8 x digital output (isolated)

WARNING
Analog outputs
*GasEye Probe may have **active** or **passive** analog outputs, depending on the customer requirement. Please ensure that the outputs are handled according to their type. For details, please refer to Chapter 5 of this manual.*

3.5. Customer interface

Ethernet (RJ-45);
WebServer based software for real-time logging of the gas concentration and optical transmission
Windows - based Logger application

3.6. Climatic conditions

Ambient temperature: -30ºC to +60ºC
Ambient pressure: 800 - 1200 hPa
Ambient humidity: RH < 99%, non-condensing

3.7. Purging

Sensor purging flow rate: 0.2 – 7 l/min
Process purging flow rate: 5 - 50 l/min
Retroreflector purging flow rate: 5 - 50 l/min

3.8. Packaging

Each analyzer is shipped in an appropriate box. A stretch foil is used to secure the interior of the box from moisture. There are identification labels on each box which are doubled on the stretch foil. On the outside of the box there are also shipping documents and delivery note.

The interior of the box contains the following items

Analyzer:

Central unit
Probe
Graphite gasket
Purging connectors
Flange screws, nuts and washers
Ethernet cable (used for analyzer-to-computer connection)

Documents:

Packing list
EC Declaration of Conformity
Calibration certificate
Inputs/outputs test report
Sight glass leak test report

Tools:

Wrench size 24
Hex 14 mm
Screwdriver PH3 150mm
Flat-head screwdriver (for electrical connections)

3.9. Calibration and calibration certificate

The analyzer is calibrated using certified gas sample in the factory. One of the key parameters of the analyzer is its limit of detection (LOD) which determines the lowest measurable concentration. This quantity is estimated for each application and is determined for each device before shipping to our customers. For every GasEYE analyzer we determine the limit of detection during a 12-hour cycle in a climate chamber. The analyzer is placed on a test gas cell and a zero sample is introduced. A zero sample is either nitrogen or dry air to purge out the constituent of interest. The climate chamber temperature is then varied between -20°C to +55°C and the concentration signal is logged, as well as other important analyzer parameters. Based on the concentration reading during the temperature cycle the limit of detection is calculated using the following equation:

$$LOD = 2 * standard\ deviation(gas\ concentration)$$

Limit of detection is usually quantified in ppm x meter units. This allows to easily recalculate the limit of detection for arbitrary path length. For example: Limit of detection for standard carbon monoxide application at room temperature is LOD 0.2 ppm x m. If the process path length is 1.156 meters the actual limit of detection at this distance will be:

$$LOD\ (@\ 1.156\ meters) = \frac{LOD}{Process\ path\ length} = \frac{0.2\ ppm\ x\ m}{1.156\ m} = 0.17\ ppm$$

Before shipment, each analyzer is accompanied with individual calibration certificate, where all calibration and performance information are given.

4. Installation

4.1. Safety information

GasEye Probe is classified as a Class 1 laser product. The emitted laser radiation is invisible (near infrared) and not hazardous to an unprotected eye. GasEye Probe has warning labels placed at positions specified in the EN 60825-1:2014-11 norm.

NOTICE

Internal invisible IR laser is a **Class I** product.

WARNING

Heat safety

Some metal parts and piping placed near the sensors might be at elevated temperatures due to high temperature purging - either from steam or from air. To avoid severe burns these parts must either be isolated or equipped with protective metal sheets. Always use protective gloves in the vicinity of such hot parts.

WARNING

Pressure safety

It is possible to mount the GasEye Probe to processes with elevated pressure. Although the window of the process interface is burst-tested up to 4 MPa (40 bar), the customer should define a safety factor appropriate to his application.

WARNING

Electrical safety

*Mounting or unmounting of the instrument must be performed with the power cord **DISCONNECTED.** The power supply must be connected only when the instrument is fully adjusted and secured.*

4.2. Mounting

4.2.1. Mounting conditions

During the operation, the ambient temperature cannot exceed the values stated in the specification. If the unit is exposed to direct solar radiation, ensure that the total temperature will not exceed the maximum permitted temperature. If these conditions cannot be fulfilled the GasEye Probe must be installed in a cabinet with a controlled environment.

CAUTION
Avoid condensation
As condensation is normally a problem when moving the device from outdoor to the inside of a building, the device should be adapted to the new ambient conditions for a couple of hours before starting it.

4.2.2. Preparations

Prior to the installation of GasEye Probe, the process flange must be welded in at the measurement point and must be compatible with DN50/PN10-40 with the minimum inner diameter of 52 mm. The flange must protrude at least 150 mm (maximally 600 mm) from the wall.

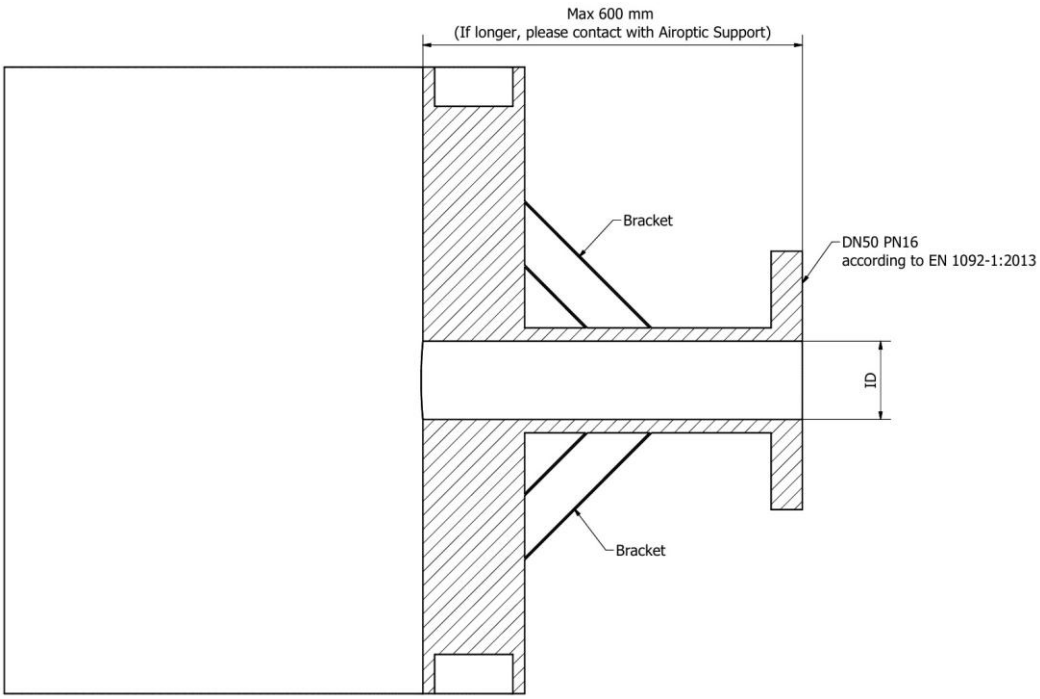


Figure 4. Schematic drawing of the process flange installation.

4.3. Sensor mounting

After completing the flange welding, user may proceed to sensor mounting.

1. Prior to installation ensure that the ring gasket is present on the flange and mount the central on the flange.

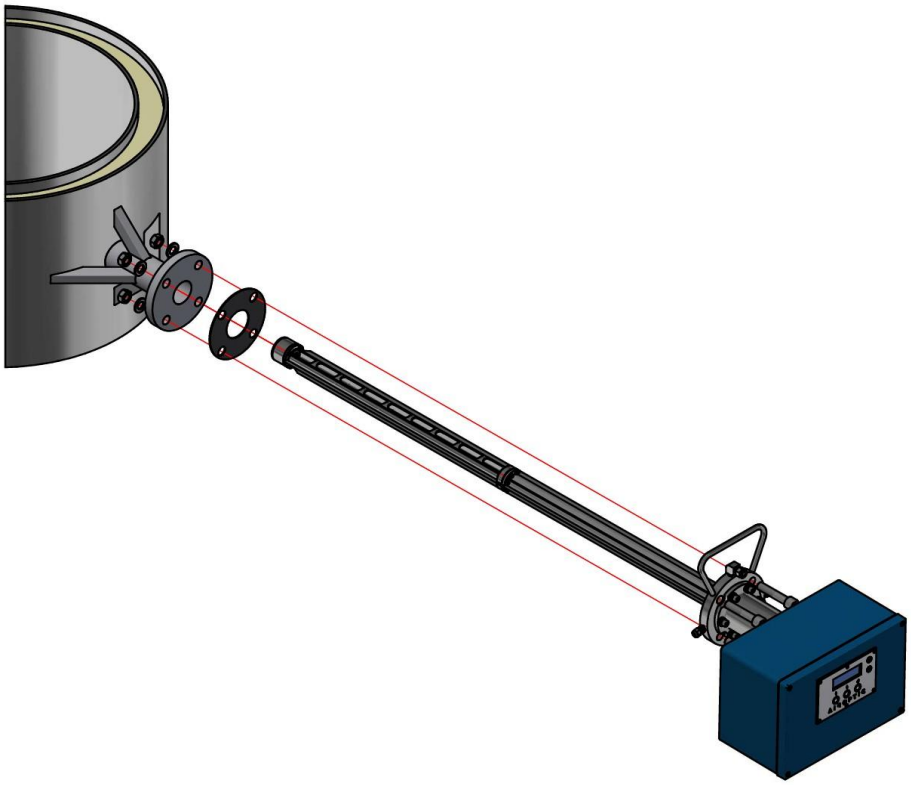


Figure 5. Mounting the central unit on the flange.

2. Make sure the central unit is connected properly so the front surface of the central unit flange is aligned to the process flange surface. The connection can be tightened now.

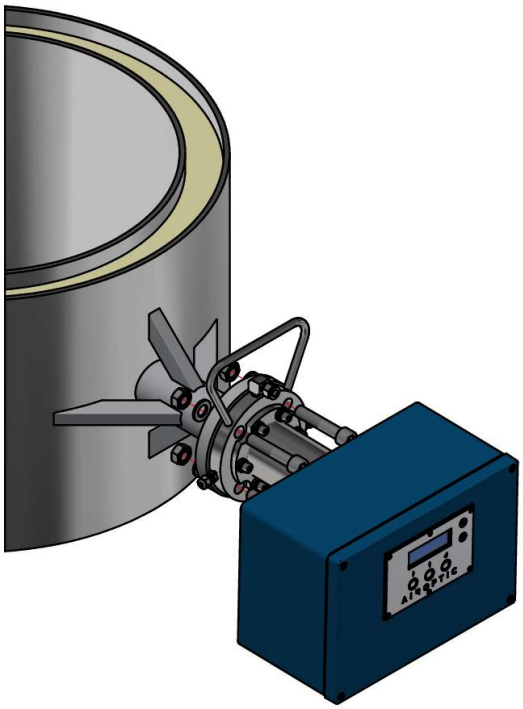


Figure 6. The flange connection.

3. Tighten the connection with M16x80 screws. The system is now prepared for electrical connections.

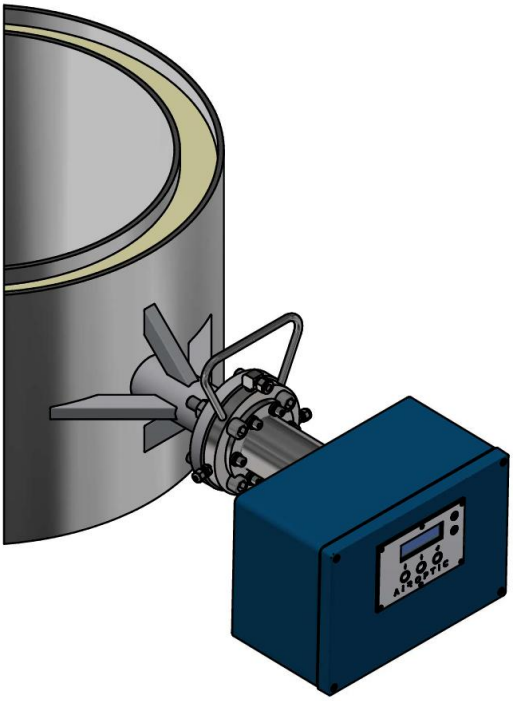


Figure 7. Tightening the connection.

4.4. Housing lid opening

Central unit

1. Dismount housing lid of central unit by unscrewing each of the four bolts. Please do it carefully since the lid has connection to boards inside the housing.

2. Separate the lid out of the housing, until the end of wire hinges. Keep horizontal direction (perpendicularly to front side).

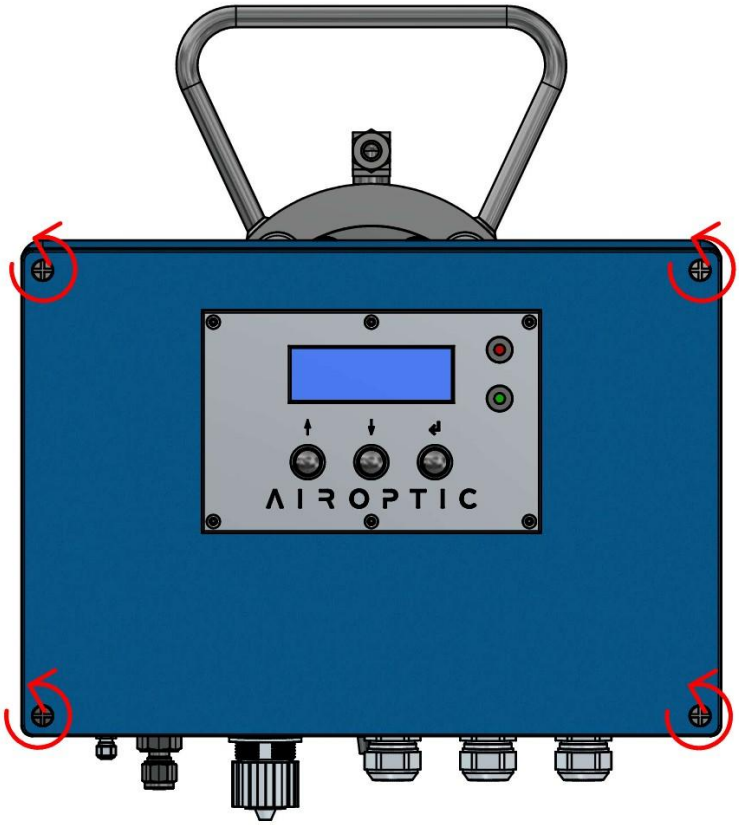


Figure 8. Central unit housing lid bolts

3. Tilt the lid at an angle (maximally 110°) to allow easy access to the components inside the housing. Tilt the lid carefully, do not use too much strength.

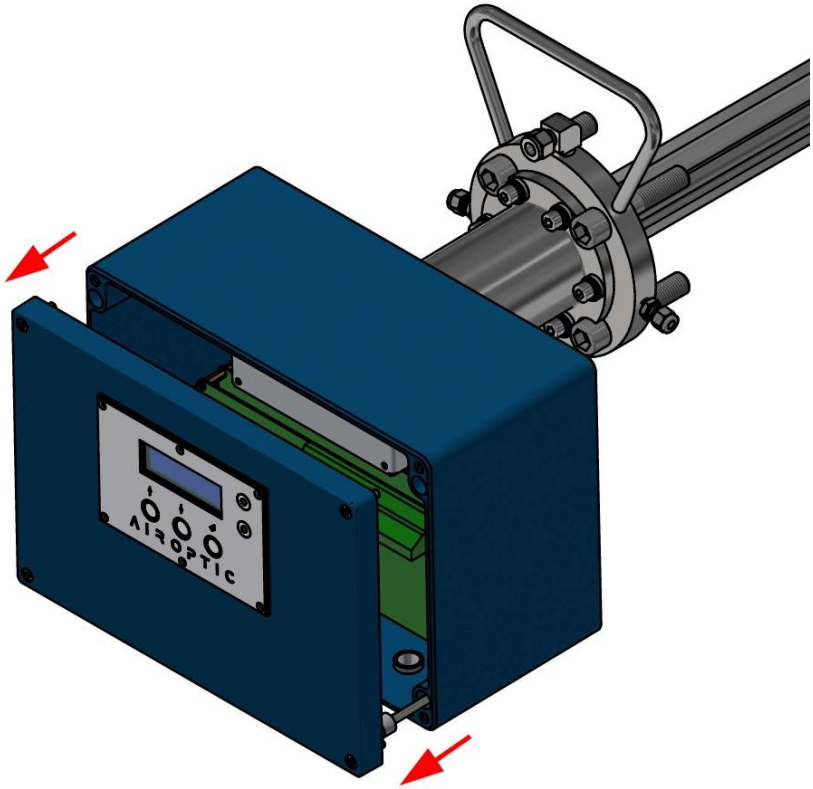


Figure 9. Central unit lid opening.

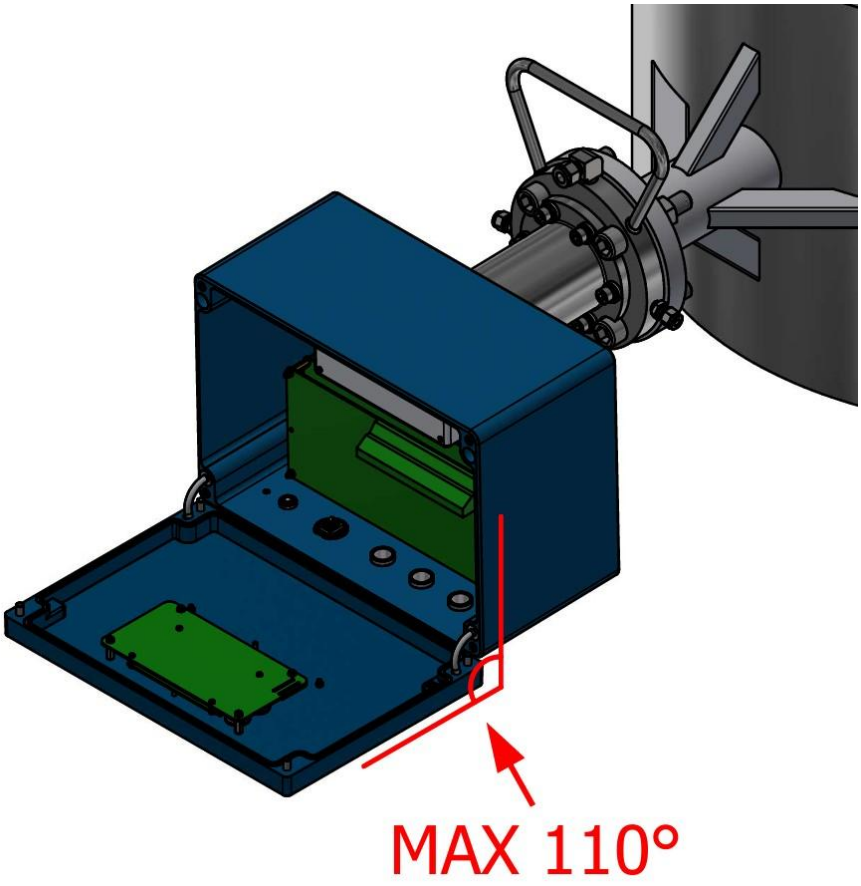


Figure 10. Maximum angle of central unit lid opening.

5. Electrical installation

5.1. Electrical connections

The GasEye Probe gas analyzer consists of a central unit and a process probe.

Standard connections (included) needed for analyzer commissioning are as follows:

- *Ethernet cable* – used for connection of the analyzer with a computer via WebServer. Standard length is 10 meter (other lengths on request).

The connections are shown in Figure 11.

Additional connections for analog or digital signals, as well as Modbus RTU, Modbus TCP/IP, Profinet, Profibus or Add-on module functionality are available depending on the customer requirement.

Electrical characteristics:

- 24 VDC nominal (19 – 30 VDC)
- max. 15W

Available interfaces:

- 4 x analog output 4 – 20 mA (isolated, easy user selection via DIP switch between active/passive mode)
- 4 x analog input 4 – 20 mA (easy user selection via DIP switch between active/passive mode)
- 8 x digital output (isolated)
- 8 x digital input (isolated)
- Human Machine Interface (HMI) – LCD backlight display located on the central unit housing lid
- Ethernet port:
  a) WebServer – system configuration and data acquisition via web browser,
  b) Windows based program – GasEye logger for real time data acquisition,
  c) remote service and diagnostics
- d) USB port – service and diagnostics port
- Optional: Modbus (TCP/IP), Modbus RTU, Profinet, Profibus

Additional build-in features:

- Automatic gain control (AGC): ensures correct gas measurement even at high dust loads resulting in loss of optical transmission down to 0.5%. AGC operates fully automatic with no need for manual adjustment of the signal gain under any process conditions
- Self-calibration features: Internal reference gas compartment is used for closed loop control of the zero and span drift

Ethernet cable is provided for commissioning/service/diagnostic purposes (standard length 10m). System can be fully parametrized and tested via WebServer. Additional cables for industrial protocols must be provided by the customer.

5.1.1. GasEye Probe Single Gas

GasEye Probe Single Gas consists of central unit and receiver unit. See figure below.

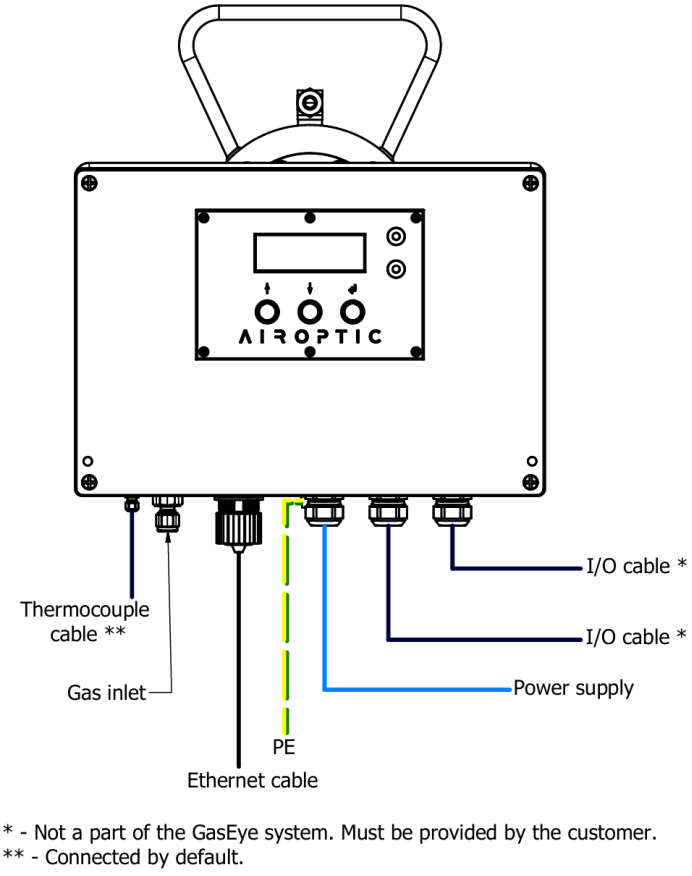


Figure 11. Probe Single Gas electrical connection diagram.

5.2. Central unit – electrical terminals

The description of the central unit electrical terminals with its functionalities is presented in this chapter.

1. Pressure sensor
2. Electrical terminals
3. USB port
4. Ethernet port for WebServer connection
5. Add-on module interface (optional)
6. Front panel display connection

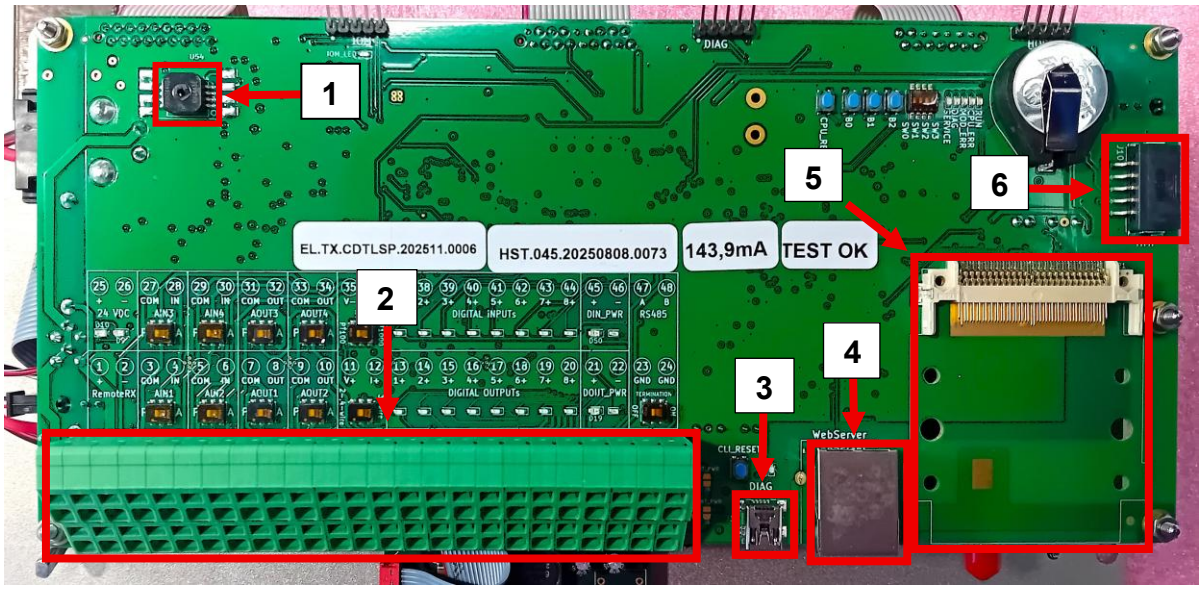


Figure 12. Top view of the HOST board

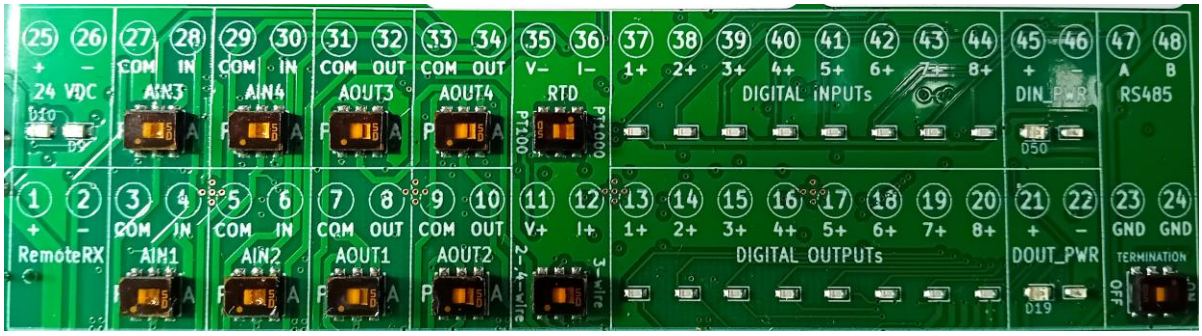


Figure 13. Electrical terminals numbering.

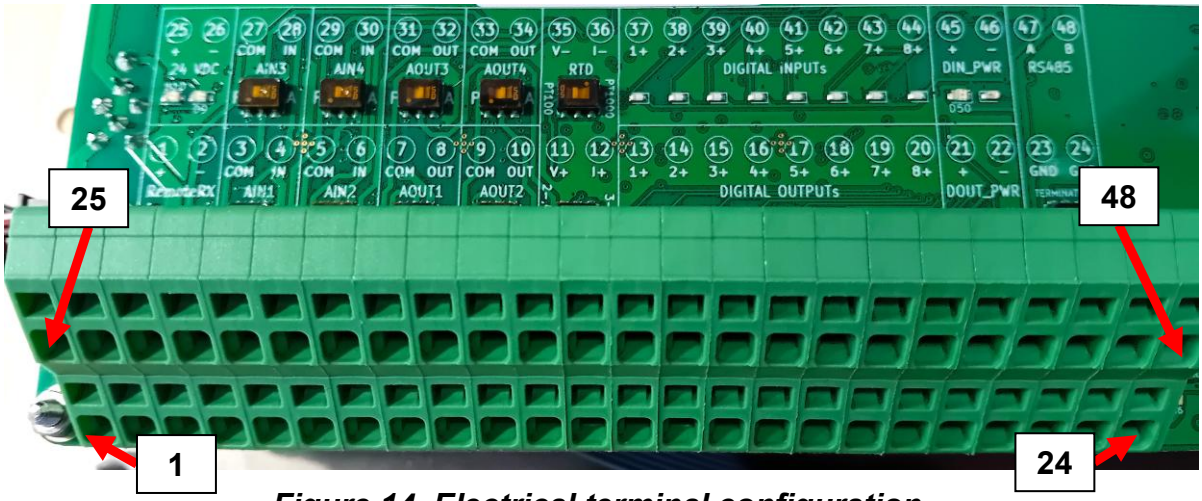


Figure 14. Electrical terminal configuration.

No.	Row	Function	Symbol		Characteristic
1	I	Supply voltage for receiver side (not used in GasEye Probe)	RemoteRX	+	19÷30 VDC (output)
2	I			-	
25	II	Supply voltage	24 VDC	+	19÷30 VDC (input)
26	II			-	
3	I	Analog input 1 (4÷20 mA)	AIN1	COM	19÷30 VDC, 24mA Active/Passive
4	I			IN	
5	I	Analog input 2 (4÷20 mA)	AIN2	COM	19÷30 VDC, 24mA Active/Passive
6	I			IN	
27	II	Analog input 3 (4÷20 mA)	AIN3	COM	19÷30 VDC, 24mA Active/Passive
28	II			IN	
29	II	Analog input 4 (4÷20 mA)	AIN4	COM	19÷30 VDC, 24mA Active/Passive
30	II			IN	
7	I	Analog output 1 (4÷20 mA)	AOUT1	COM	19÷30 VDC, 24mA Active/Passive
8	I			OUT	
9	I	Analog output 2 (4÷20 mA)	AOUT2	COM	19÷30 VDC, 24mA Active/Passive
10	I			OUT	
31	II	Analog output 3 (4÷20 mA)	AOUT3	COM	19÷30 VDC, 24mA Active/Passive
32	II			OUT	
33	II	Analog output 4 (4÷20 mA)	AOUT4	COM	19÷30 VDC, 24mA Active/Passive
34	II			OUT	
11	I	Resistance thermometer input	RTD	V+	PT100/PT1000 2-,3-,4-wire
12	I			I+	
35	II			V-	
36	II			I-	
13	I	Digital outputs 1÷8	DIGITAL OUTPUTs	1+	30VDC, 0.5A Isolated
14	I			2+	
15	I			3+	
16	I			4+	
17	I			5+	
18	I			6+	
19	I			7+	
20	I			8+	
21	I	Digital outputs supply voltage	DOUT_PWR	+	
22	I			-	
37	II	Digital inputs 1÷8	DIGITAL INPUTs	1+	30VDC, 0.1A Isolated
38	II			2+	
39	II			3+	
40	II			4+	
41	II			5+	
42	II			6+	
43	II			7+	
44	II			8+	
45	II	Digital inputs supply voltage	DIN_PWR	+	
46	II			-	
23	I	MODBUS RTU	RS485	GND	Isolated
24	I			GND	
47	II			A	
48	II			B	

Table 3. Description of the electrical terminals

5.2.1. Power supply

Specification

Device requirements:

- voltage range: 19÷30 VDC, typ. 24 VDC,
- power consumption: max. 15W

For proper operation of the device secure adequate power supply.

Connection

Connect the power supply to HOST board P3 terminal. Use the customer cable provided with the device or use a standard cable (shielded cable is preferred) with a maximum wire diameter of 2.5 mm^2 (14AWG). Connect the positive pole of the power supply to the pin 25 and negative pole to the pin 26. Power supply connection diagram is presented at Figure 15.

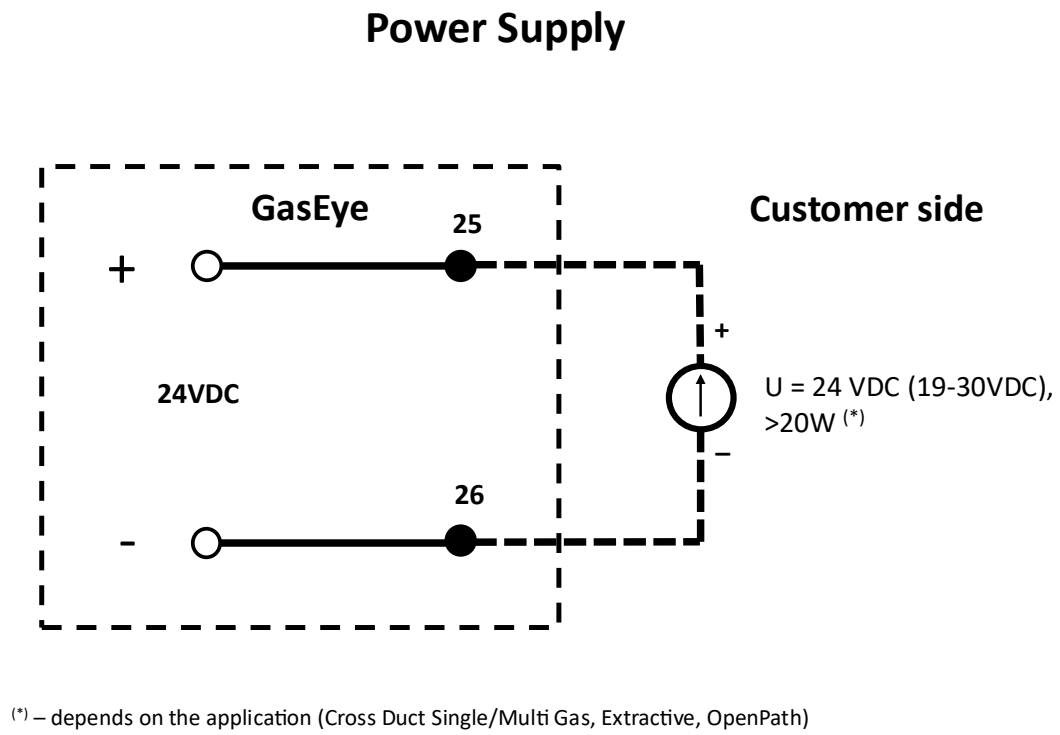


Figure 15. Power supply connection diagram.

Protection

The device is protected by eFuse with integrated reverse-input polarity protection. The device can withstand positive and negative supply voltages up to ±60 VDC. In case of overvoltage, undervoltage, overcurrent or reverse-input polarity the device is switched off and the red diode on the HOST board (at the 24VDC section) is illuminated.

WARNING

Power supply

The device does not have a power switch!

- *Provide a protected circuit breaker in the vicinity of the device at the place of installation.*
- *The circuit breaker must be a switch or power switch, and must be labelled as the circuit breaker for the device.*
- *At the supply point, the power supply must be isolated from dangerous live cables by double or reinforced insulation in the case of devices with a 24 V supply voltage.*
- *To be supplied by approved class 2 power supply*

5.2.2. Battery supply

Battery supply is used to protect RTC (real time calendar) chip (RV-8523) against registers clear after main power will be lost.

Battery Specification

Lithium battery 3V - CR2032 (non-rechargeable)

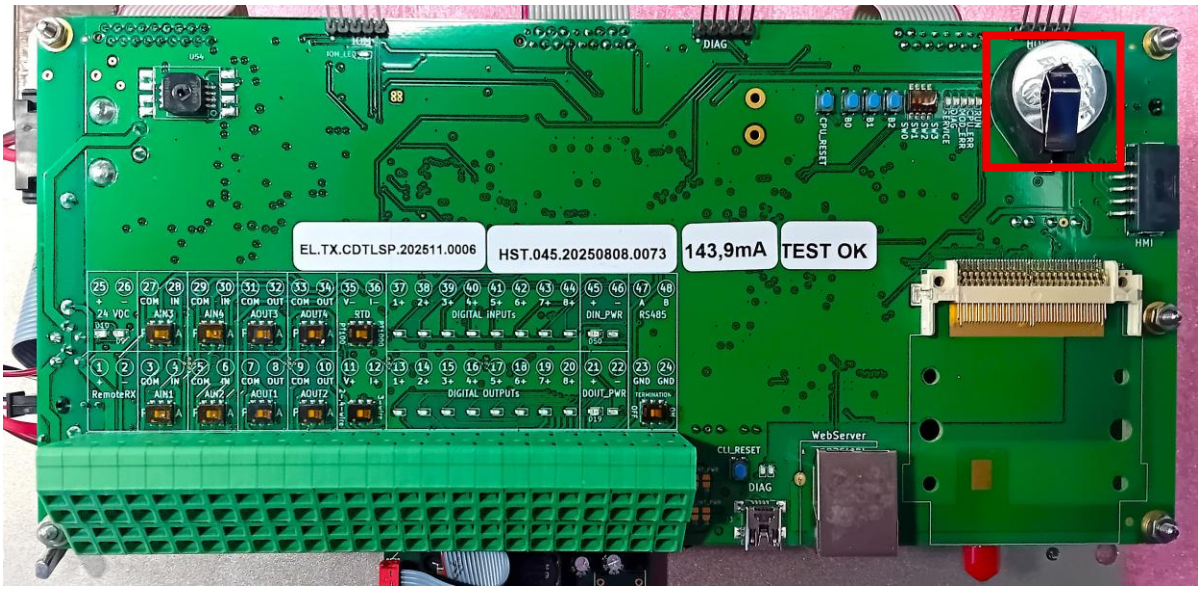


Figure 16. Battery socket location of the Host board

5.2.3. Analog outputs and inputs

According to the customer preference the analog outputs and inputs can be set as active or passive. Please follow the instructions regarding analog outputs and inputs to avoid faulty operation or damage to the system. Figure 17 presents an overview of the analog input/output dip switches which are found on the electrical panel. Dip switches are used to switch between passive and active. To set analog input or analog output signal to passive, change assigned switch position on position P (Passive). To set analog input or analog output signal to active change assigned switch position on position A (Active).

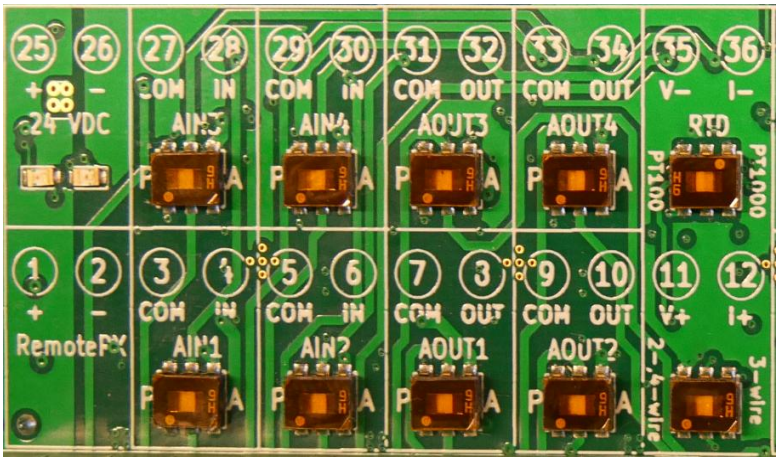


Figure 17. Analog input/output dip switches.

Analog outputs can operate in two modes according to NAMUR NE43 and EN 15267-3:2008. The operation mode can be selected via WebServer in Parameters/AOUT tab. GasEYE device generates the failure signal at the level of 3.3 mA.

NAMUR NE43 is an international association of process instrumentation user companies that have worked on improving the diagnostic coverage in 4 to 20-mA analog output transmitters to address associated safety issues (Figure 18). NAMUR NE43 provides the guideline for signaling-failure information to the safety-interlock systems over a 4- to 20-mA loop. NAMUR NE43 recommends using 3.8 mA to 20.5 mA as an extended measurement information range. NAMUR NE43 recommends using loop current below 3.6 mA or above 21 mA is in the diagnostic failure information range.

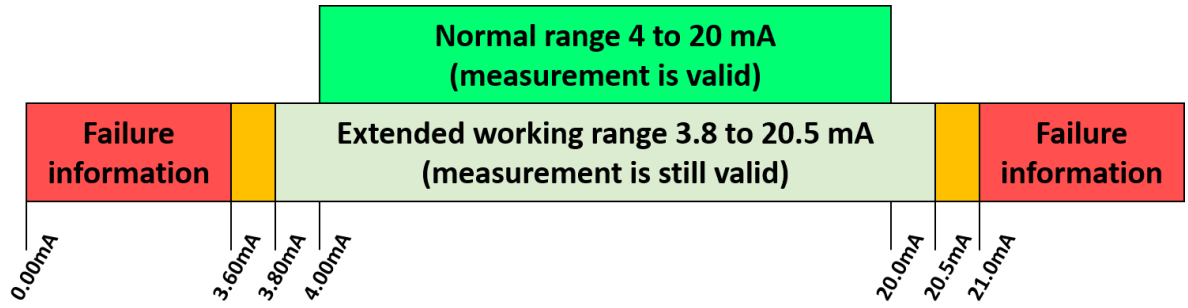


Figure 18. NAMUR NE43 Recommendation.

EN 15267-3:2008 is a European Standard that specifies the performance criteria and test procedures for automated measuring systems that measure gases and particulate matter in, and flow of, the waste gas from stationary sources. This European Standard supports the requirements of particular EU Directives. It provides the detailed procedures covering the QAL1 requirements of EN 14181 and, where required, input data used in QAL3. EN 15267-3:2008 provides the guideline for signaling-failure information to the safety-interlock systems over a 4- to 20-mA loop (Figure 19).

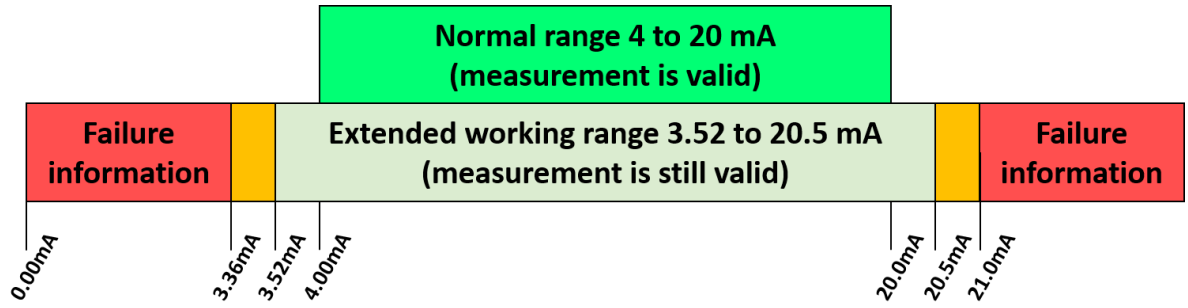


Figure 19. EN 15267-3:2008 Recommendation.

Each analog input and output is individually tested for each GasEYE device using PLC station before shipment. The report from the tests is generated automatically and is attached to the package.

5.2.4. Active analog outputs

Active analog outputs need no external powering of the output terminal. Please refer to Figure 20 for output signal connection.

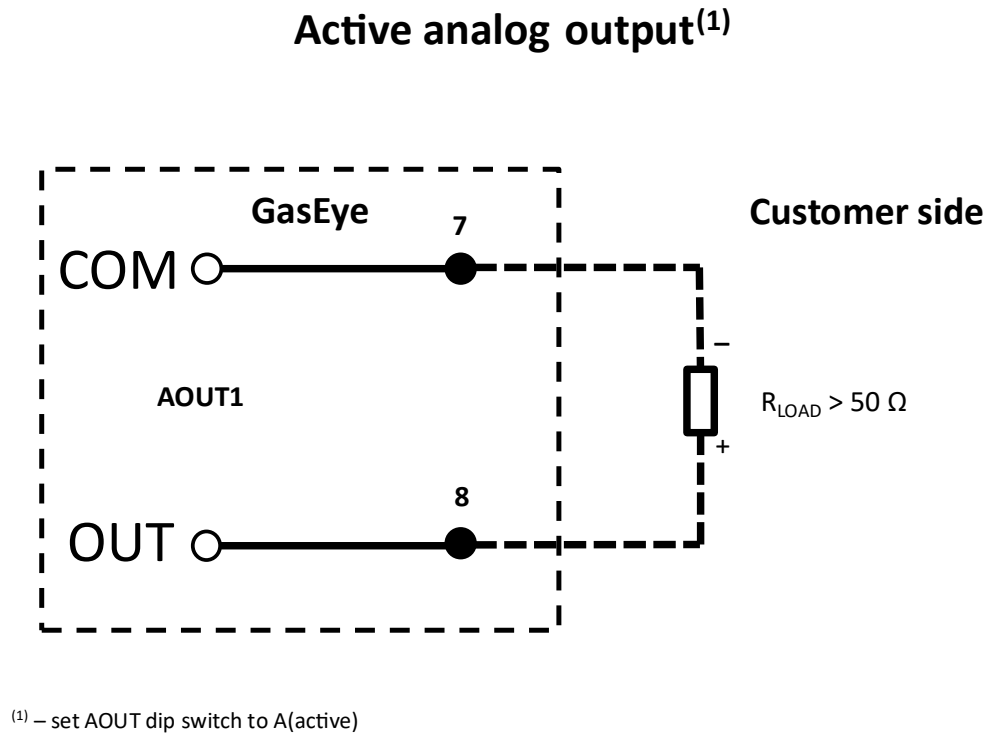


Figure 20. Exemplary usage of active analog output.

R_{LOAD} should be at least **50Ω**

WARNING
Active analog outputs
*GasEye Probe provides supply voltage for the active analog outputs and thus analog outputs **MUST NOT BE** powered externally. Please set the dip switch to Active (A) before powering up the system.*

5.2.5. Passive analog outputs

Passive analog outputs require external powering for operation. Please refer to Figure 21 for output signal connection.

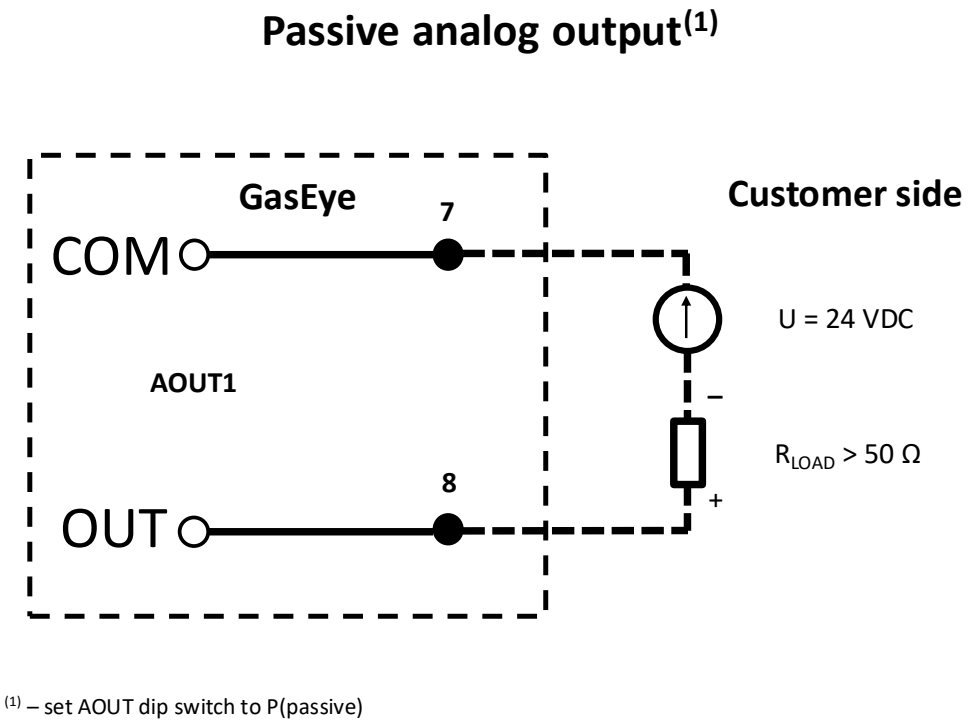


Figure 21. Exemplary usage of passive analog output.

R_{LOAD} should be at least **50Ω**

WARNING
Passive analog outputs
*GasEye Probe does not provide supply voltage for the passive analog outputs, thus they **MUST BE** powered externally. Please set the dip switch to Passive (P) before powering up the system.*

5.2.6. Active analog inputs

Active analog inputs need no external powering of the input terminal. Please refer to Figure 22 for input signal connection.

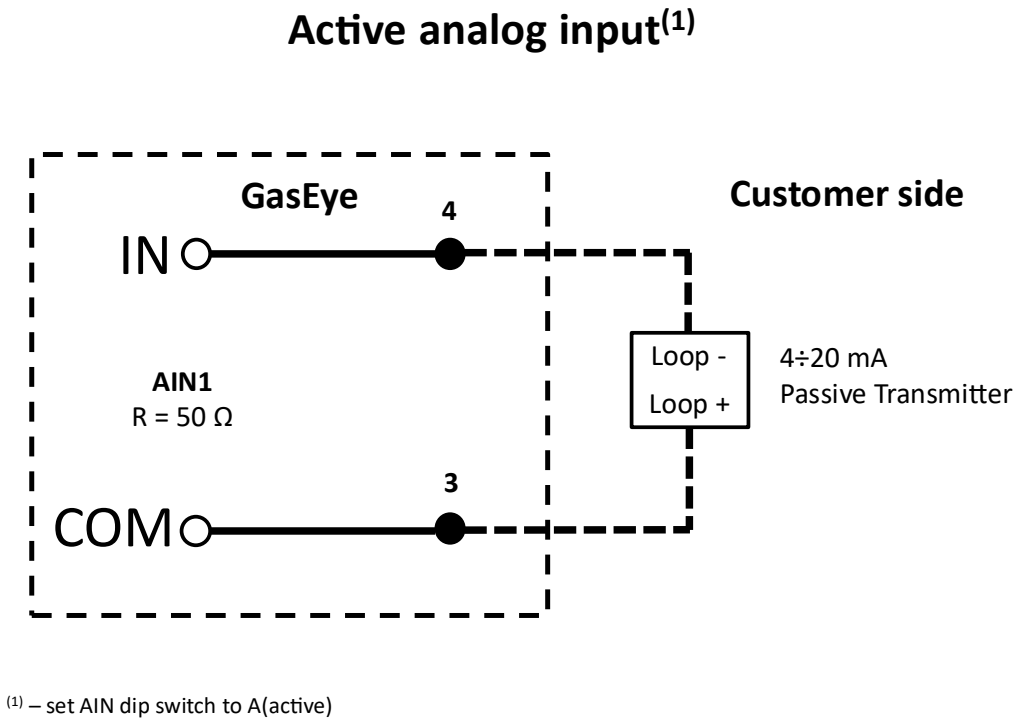
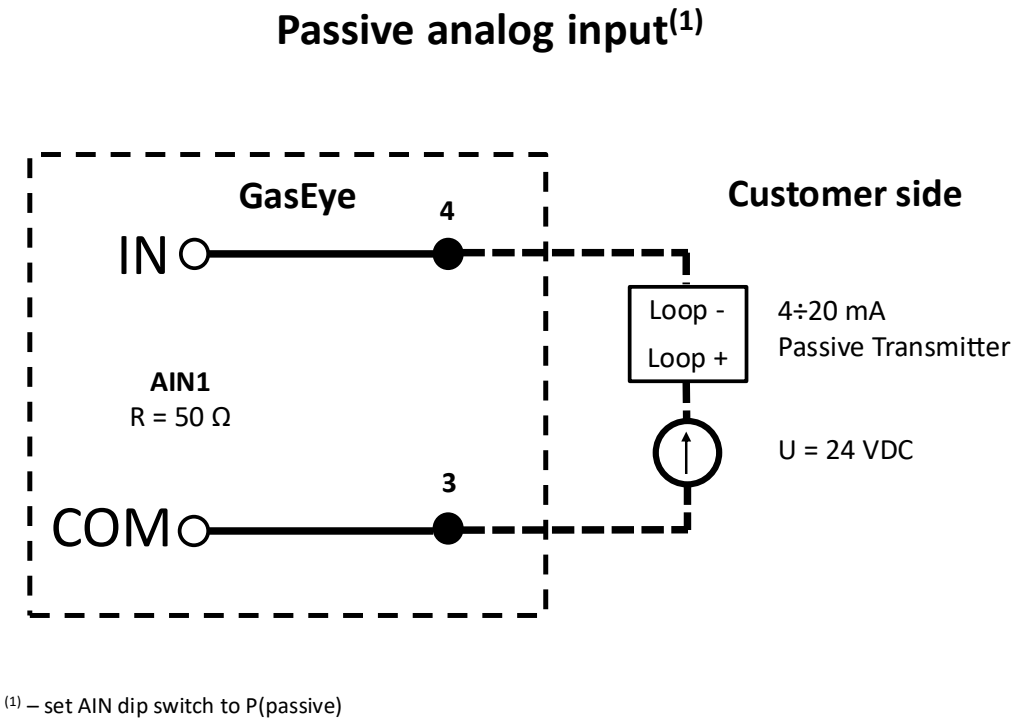


Figure 22. Exemplary usage of active analog input.

WARNING
Active analog inputs
*GasEye Probe provides supply voltage for the active analog inputs and thus analog inputs **MUST NOT BE** powered externally. Please set the dip switch to Active (A) before powering up the system.*

5.2.7. Passive analog inputs

Passive analog inputs require external powering for operation. Please refer to Figure 23 for input signal connection.



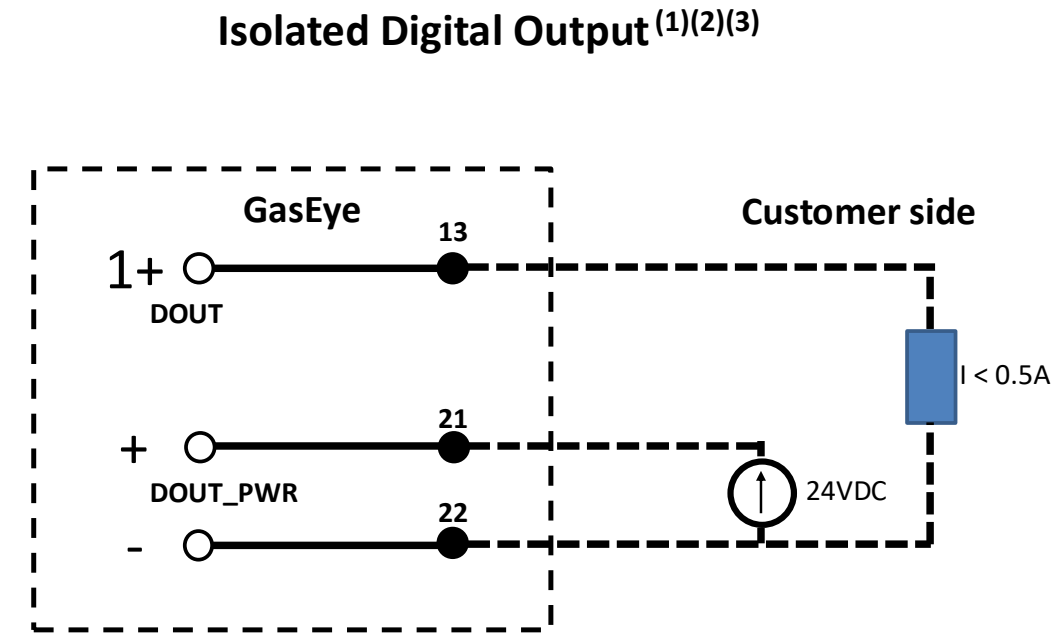
(1) – set AIN dip switch to P(passive)

Figure 23. Exemplary usage of passive analog input.

WARNING
Passive analog inputs
*GasEye Probe does not provide supply voltage for the passive analog inputs, thus they **MUST BE** powered externally. Please set the dip switch to Passive (P) before powering up the system.*

5.2.8. DOUT

GasEye system provides 8 high side power switch (MOSFET) based digital outputs. Digital outputs are galvanically isolated from HOST board thus the digital outputs block must be powered externally (pin 21 and 22, 19-30 VDC). Each output can handle current up to 0.5 A. The status of each output is displayed on the HOST board with the blue LED in DOUT section. In the DOUT_PWR section the status of the power supply (green LED -> Power OK, red LED -> Power NOT OK) can be found.



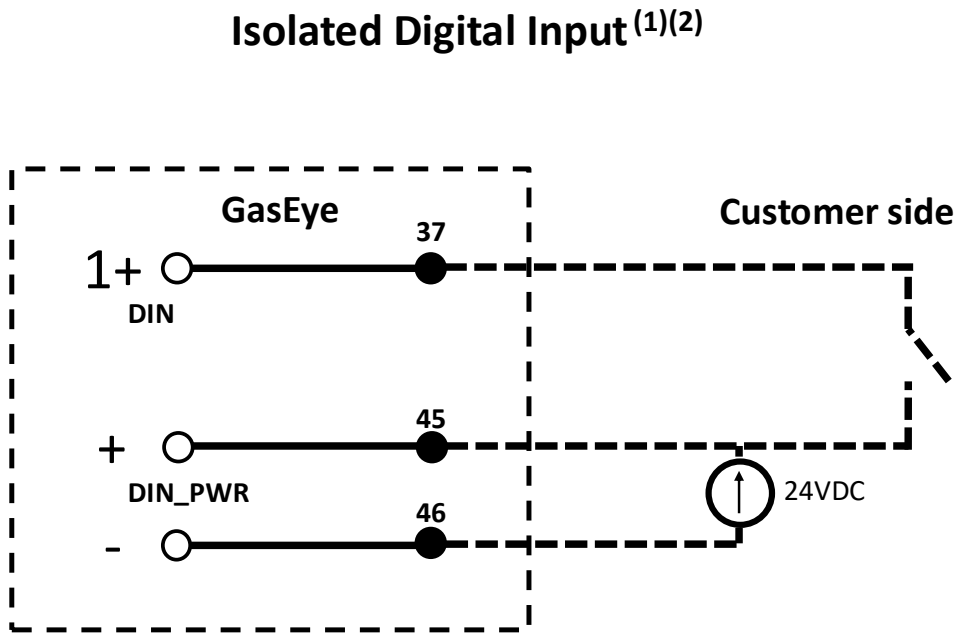
(1) – high side power switch (MOSFET) based
(2) – digital outputs are electrically isolated from HOST board
(3) – additional 24VDC power supply required

Figure 24. Exemplary usage of digital output.

WARNING
Digital outputs
*GasEye Probe does not provide supply voltage for the digital outputs, thus they **MUST BE** powered externally.*

5.2.9. DIN

GasEye system provides 8 digital inputs. Digital inputs are galvanically isolated from HOST board thus the digital inputs block must be powered externally (pin 45 and 46, 19-30 VDC). The status of each input is displayed on the HOST board with the blue LED in DIN section. In the DIN_PWR section the status of the power supply (green LED -> Power OK, red LED -> Power NOT OK) can be found.



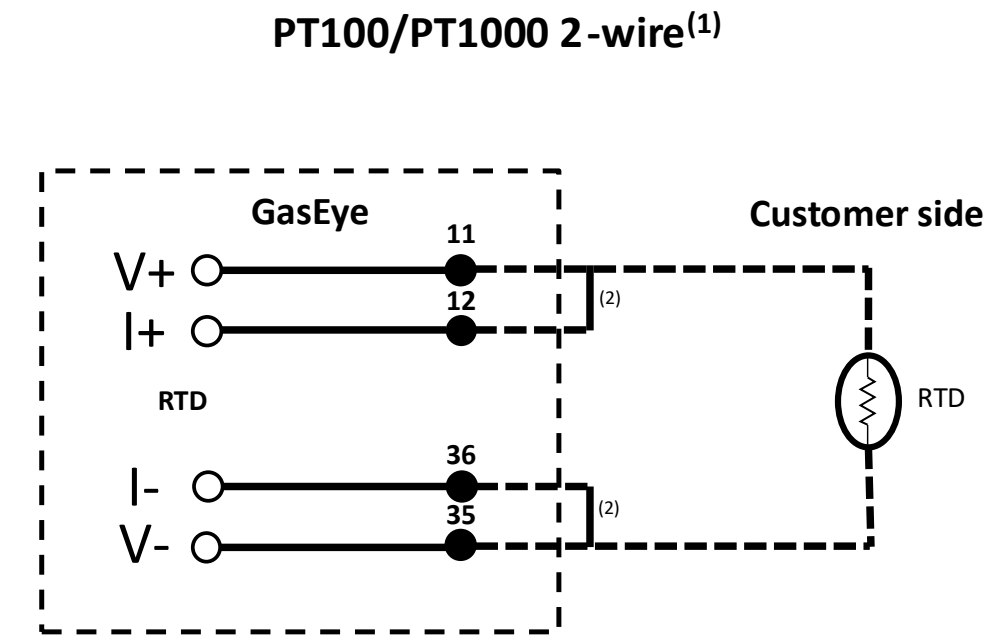
(1) – digital inputs are electrically isolated from HOST board
(2) – additional 24VDC power supply required

Figure 25. Exemplary usage of digital input.

WARNING
Digital inputs
*GasEye Probe does not provide supply voltage for the digital inputs, thus they **MUST BE** powered externally.*

5.2.10. RTD

GasEye system provides the resistance temperature detectors (RTDs) input for measuring the process temperature. The system can be configured with two dip switches to operate with PT100/PT1000 and 2-,3-,4-wire connection. Please refer Figure 26 to Figure 28 for signal connection.

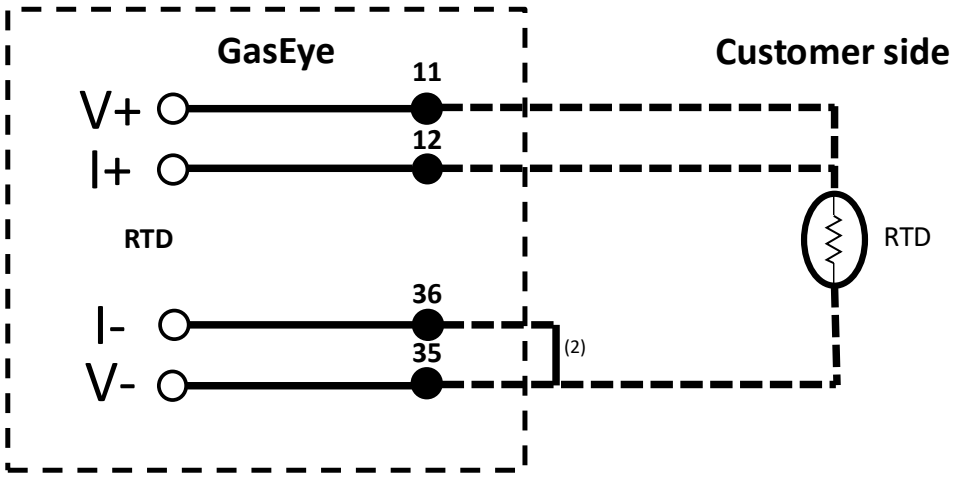


(1) – set 2-,4-wire dip switch, set PT100/PT1000 dip switch as required
(2) – external jumper required

Figure 26. Exemplary usage of 2-wire RTD.

WARNING
RTD
2-wire RTD requires additional terminal connection, please make the external jumper for 11 and 12 as well for 36 and 35.

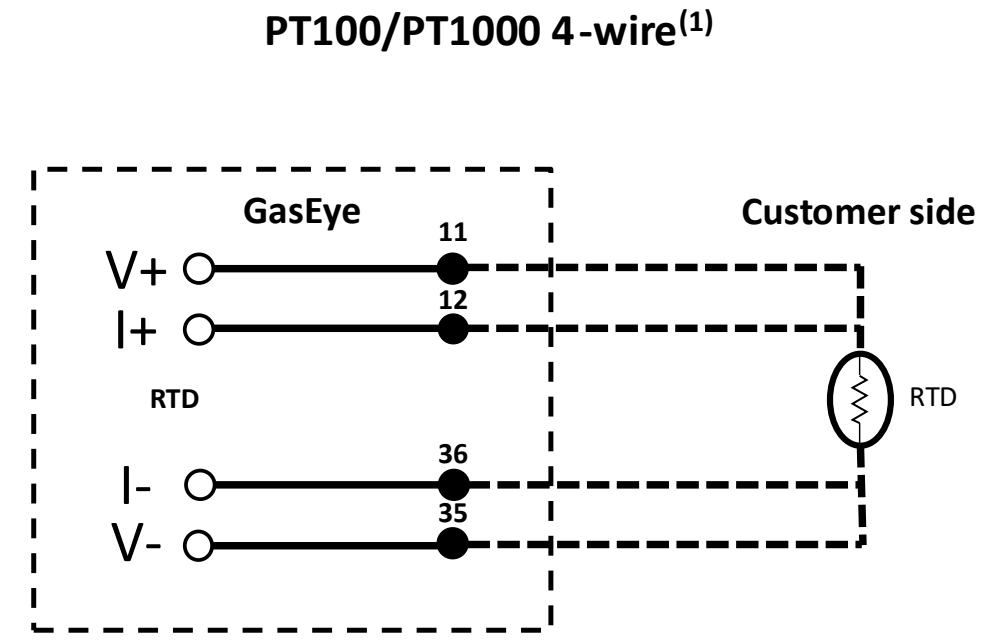
PT100/PT1000 3-wire(1)



(1) – set 3-wire dip switch, set PT100/PT1000 dip switch as required
(2) – external jumper required

Figure 27. Exemplary usage of 3-wire RTD.

WARNING
RTD
3-wire RTD requires additional terminal connection, please make the external jumper for 36 and 35.



(1) – set 2-,4-wire dip switch, set PT100/PT1000 dip switch as required

Figure 28. Exemplary usage of 4-wire RTD.

5.3. Customer cable connection (optional)

A separate electrical cable is connected via Power supply and I/O cable gland for communication with the customer' DCS. Please use the cable with minimum 12 x 0.5mm^2 wires and external diameter between 7-12 mm to fit into the gland. Cable supplied by Airoptic is preferred.

Figure 29. Customer cable.

5.4. Ethernet connection

A separate ethernet cable is connected via special gland for communication with the analyzer via webserver. To ensure IP66, use only the ethernet cable supplied by Airoptic. Please follow the step-by-step instruction for correct installation.

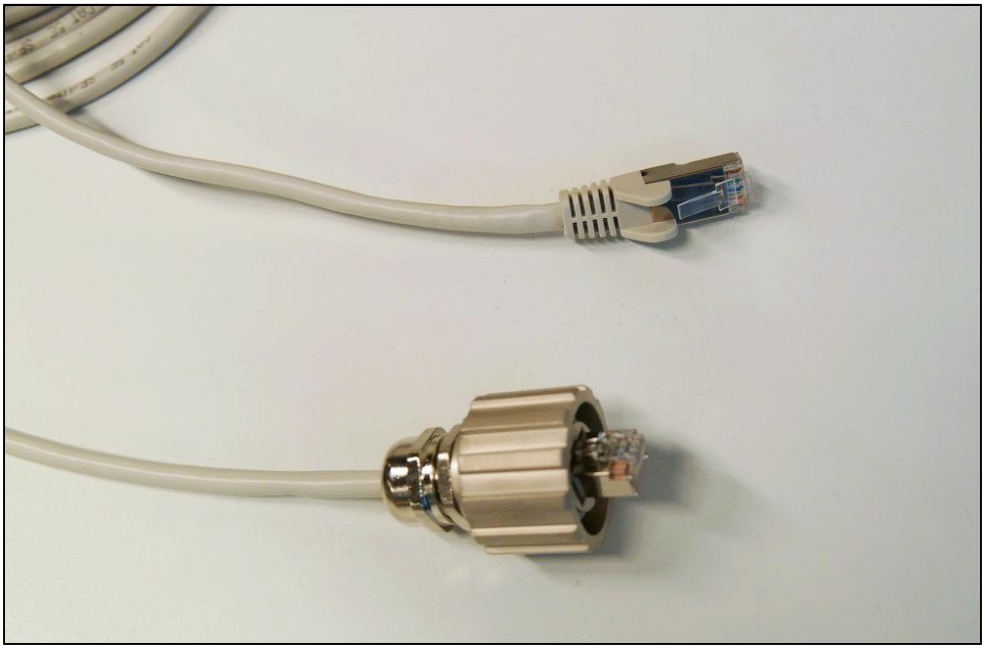


Figure 30. Ethernet cable.

5.4.1. Ethernet cable installation instruction:

1. Unscrew ethernet gland cap.
2. Put ethernet cable in the gland and twist the nut.
3. If the ethernet cable is not used either permanently or temporarily, make sure the gland cap is twisted on, so the ethernet socket and whole central unit housing are sealed.

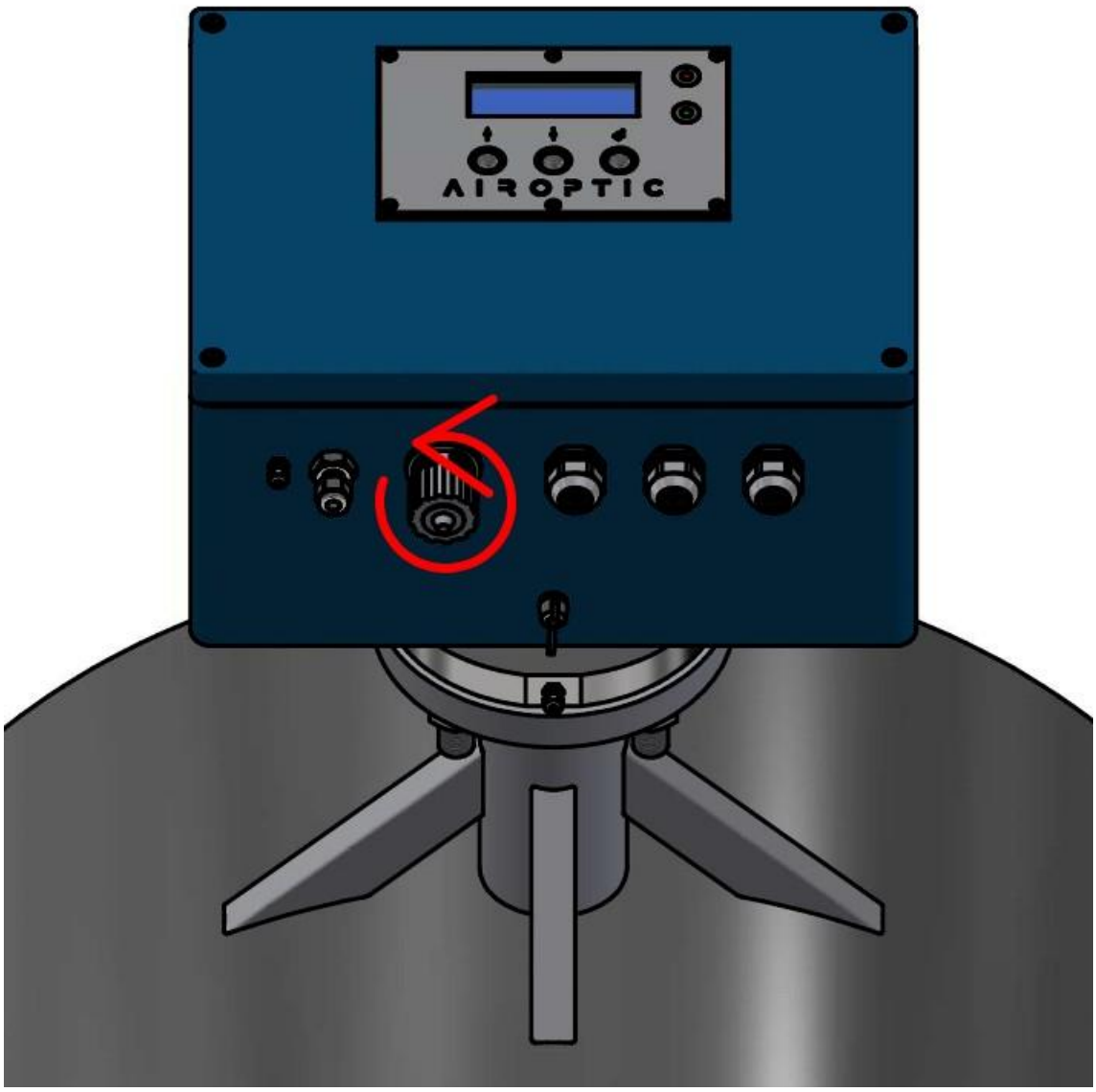


Figure 31. Ethernet gland.

5.5. Industrial protocols connection

The GasEye Probe gas analyzer has implemented MODBUS RTU, MODBUS TCP and PROFINET industrial communication protocols. On plant can work only one protocol and it is declared by customer during ordering. Thanks to integrated analyzer software and electronic board with Anybus CompactCom communication module device is very flexible and for special customer requirement additional communication protocols can be quickly implemented.

5.5.1. Modbus RTU (RS485)

Modbus RTU is fully implemented by Airoptic and does not need additional communication module. Device can work in slave mode. Communication parameters are configured by Analyzer web server tool.

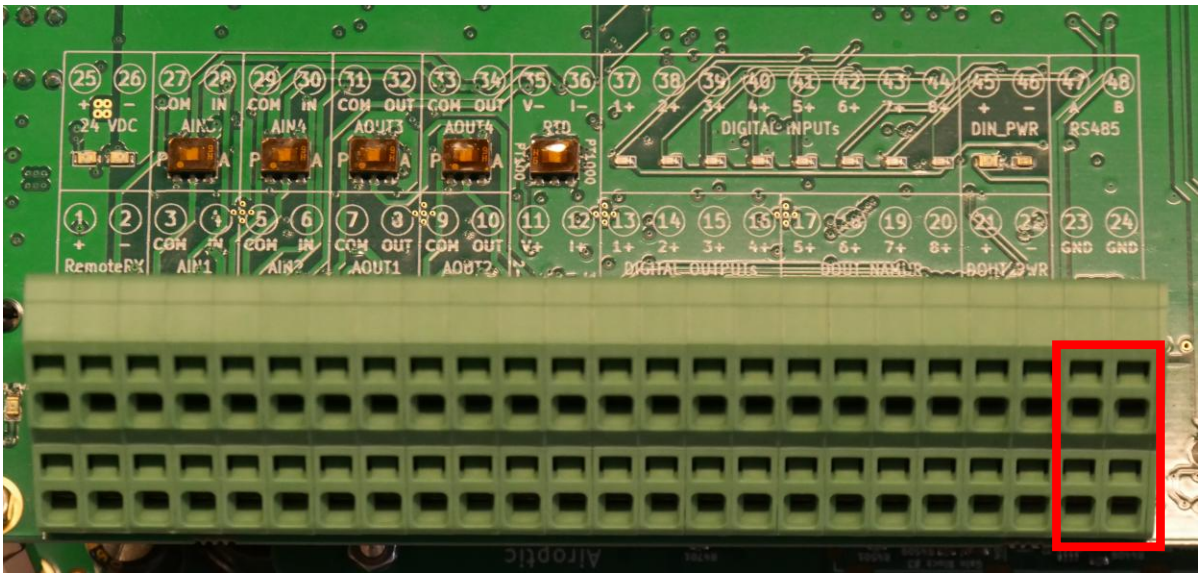


Figure 32. Location RS-485 socket on Analyzer PCB Host 4.X.

1. RS-485 transmission settings

Baud rate: 9600/19200
Stop bits: STOP_BIT_1/ STOP_BIT_2
Parity: NO_PARITY_8_BIT/ EVEN_PARITY_8_BIT/ ODD_PARITY_8_BIT/ NO_PARITY_9_BIT
Flow control: none

2. Modbus byte transmission method

Byte Order: LSB/MSB
Swap: ON/OFF

3. Device Address

Modbus slave device addresses from 1 to 247 are shown in the Table 4 below.

Table 4. Modbus Input register map (function 0x4).

Register Name	Register address (hex)	Register address (dec)	Comments
	0x00	0	16 -bits of floating point value (first part) Process temperature
PROCESS.TEMPERATURE	0x01	1	16 -bits of floating point value (second part) Process temperature
	0x02	2	16 -bits of floating point value (first part) Process pressure
PROCESS.PRESSURE	0x03	3	16 -bits of floating point value (second part) Process pressure
	0x04	4	16 -bits of floating point value (first part) Temperature calculate available only in specific configuration
TEMP.CALCULATED	0x05	5	16 -bits of floating point value (second part) Temperature calculate available only in specific configuration
	0x06	6	16 -bits of floating point value (first part) Gas concentration
GAS101.CONCENTRATION	0x07	7	16 -bits of floating point value (second part) Gas concentration
	0x08	8	16 -bits of floating point value (first part) Gas concentration
GAS102.CONCENTRATION	0x09	9	16 -bits of floating point value (second part) Gas concentration
	0x0A	10	16 -bits of floating point value (first part) Gas concentration
GAS103.CONCENTRATION	0x0B	11	16 -bits of floating point value (second part) Gas concentration
	0x0C	12	16 -bits of floating point value (first part) Gas concentration
GAS104.CONCENTRATION	0x0D	13	16 -bits of floating point value (second part)

			Gas concentration
	0x0E	14	16 -bits of floating point value (first part) Gas concentration
GAS105.CONCENTRATION	0x0F	15	16 -bits of floating point value (second part) Gas concentration
	0x10	16	16 -bits of floating point value (first part) Gas concentration
GAS106.CONCENTRATION	0x11	17	16 -bits of floating point value (second part) Gas concentration
	0x12	18	16 -bits of floating point value (first part) Gas concentration
GAS107.CONCENTRATION	0x13	19	16 -bits of floating point value (second part) Gas concentration
	0x14	20	16 -bits of floating point value (first part) Gas concentration
GAS108.CONCENTRATION	0x15	21	16 -bits of floating point value (second part) Gas concentration
GAS101.CONSIM	0x16	22	Scaling to integer value (0 - 27648) Gas concentration
GAS102.CONSIM	0x17	23	Scaling to integer value (0 - 27648) Gas concentration
GAS103.CONSIM	0x18	24	Scaling to integer value (0 - 27648) Gas concentration
GAS104.CONSIM	0x19	25	Scaling to integer value (0 - 27648) Gas concentration
GAS105.CONSIM	0x1A	26	Scaling to integer value (0 - 27648) Gas concentration
GAS106.CONSIM	0x1B	27	Scaling to integer value (0 - 27648) Gas concentration
GAS107.CONSIM	0x1C	28	Scaling to integer value (0 - 27648) Gas concentration
GAS108.CONSIM	0x1D	29	Scaling to integer value (0 - 27648)

			Gas concentration
	0x1E	30	16 -bits of floating point value (first part) Laser transmission
LASER11.TRANSMISSION	0x1F	31	16 -bits of floating point value (second part) Laser transmission
	0x20	32	16 -bits of floating point value (first part) Laser transmission
LASER12.TRANSMISSION	0x21	33	16 -bits of floating point value (second part) Laser transmission
	0x22	34	16 -bits of floating point value (first part) Laser transmission
LASER13.TRANSMISSION	0x23	35	16 -bits of floating point value (second part) Laser transmission
	0x24	36	16 -bits of floating point value (first part) Laser transmission
LASER14.TRANSMISSION	0x25	37	16 -bits of floating point value (second part) Laser transmission
LASER11.TRANSMISSION_SIM	0x26	38	Scaling to integer value (0 - 27648) Laser transmission
LASER12.TRANSMISSION_SIM	0x27	39	Scaling to integer value (0 - 27648) Laser transmission
LASER13.TRANSMISSION_SIM	0x28	40	Scaling to integer value (0 - 27648) Laser transmission
LASER14.TRANSMISSION_SIM	0x29	41	Scaling to integer value (0 - 27648) Laser transmission
	0x2A	42	16 -bits of floating point value (first part) Fiber transmission
FIBER1.TRANSMISSION	0x2B	43	16 -bits of floating point value (second part) Fiber transmission
	0x2C	44	16 -bits of floating point value (first part) Fiber transmission
FIBER2.TRANSMISSION	0x2D	45	16 -bits of floating point value (second part) Fiber transmission
REMOTERX1.GAIN	0x2E	46	16 -bits of floating point value (first part)

			Detector gain
	0x2F	47	16 -bits of floating point value (second part) Detector gain
	0x30	48	16 -bits of floating point value (first part) Detector gain
REMOTERX2.GAIN	0x31	49	16 -bits of floating point value (second part) Detector gain
	0x32	50	16 -bits of floating point value (first part) Laser gain
LASER1.GAIN_TIA	0x33	51	16 -bits of floating point value (second part) Laser gain
	0x34	52	16 -bits of floating point value (first part) Laser gain
LASER2.GAIN_TIA	0x35	53	16 -bits of floating point value (second part) Laser gain
	0x36	54	16 -bits of floating point value (first part) Laser gain
LASER3.GAIN_TIA	0x37	55	16 -bits of floating point value (second part) Laser gain
	0x38	56	16 -bits of floating point value (first part) Laser gain
LASER4.GAIN_TIA	0x39	57	16 -bits of floating point value (second part) Laser gain
	0x3A	58	16 -bits of floating point value (first part) Laser amplitude reference
TEC0.THL_REF_AMP	0x3B	59	16 -bits of floating point value (second part) Laser amplitude reference
	0x3C	60	16 -bits of floating point value (first part) Laser temperature conditions
TEC0.AMB_TEMPERATURE	0x3D	61	16 -bits of floating point value (second part) Laser temperature conditions

	0x3E	62	16 -bits of floating point value (first part) Laser amplitude reference
TEC1.THL_REF_AMP	0x3F	63	16 -bits of floating point value (second part) Laser amplitude reference
	0x40	64	16 -bits of floating point value (first part) Laser temperature conditions
TEC1.AMB_TEMPERATURE	0x41	65	16 -bits of floating point value (second part) Laser temperature conditions
	0x42	66	16 -bits of floating point value (first part) Laser amplitude reference
TEC2.THL_REF_AMP	0x43	67	16 -bits of floating point value (second part) Laser amplitude reference
	0x44	68	16 -bits of floating point value (first part) Laser temperature conditions
TEC2.AMB_TEMPERATURE	0x45	69	16 -bits of floating point value (second part) Laser temperature conditions
	0x46	70	16 -bits of floating point value (first part) Laser amplitude reference
TEC3.THL_REF_AMP	0x47	71	16 -bits of floating point value (second part) Laser amplitude reference
	0x48	72	16 -bits of floating point value (first part) Laser temperature conditions
TEC3.AMB_TEMPERATURE	0x49	73	16 -bits of floating point value (second part) Laser temperature conditions
SYSTEM.STATUS	0x4A	74	System status value 6 system ok
SYSTEM.STARTUP_PROCEDURE	0x4B	75	System startup procedure 0 - Low level platform is not working 1 - Device initialization and memory test 2 - Internal communication check 3 - Automatic gain control calibration procedure 4 - Device parameters check and set 5 - Lasers temperature stabilization (lasers are off)

			6 - Lasers temperature stabilization (lasers are on) 7 - Lasers transmission check 8 - Self-calibration procedure 9 - Concentration measurement check 10 - Normal operation of the device (startup procedure is finished)
SYSTEM.TRANS_MP1_STATUS	0x4C	76	Value 1 ok Value 0 warning
SYSTEM.ERR_CODE	0x4D	77	Reserved - future use
SYSTEM.AIO_ERROR	0x4E	78	Reserved - future use
SYSTEM.DIO_ERROR	0x4F	79	Reserved - future use
SYSTEM.RTD_PRESS_ERROR	0x50	80	Reserved - future use
SYSTEM.ALARM1	0x51	81	Alarm 1
SYSTEM.ALARM2	0x52	82	Alarm 2
SYSTEM.ALARM3	0x53	83	Alarm 3
SYSTEM.ALARM4	0x54	84	Alarm 4
SYSTEM.ALARM5	0x55	85	Alarm 5
SYSTEM.ALARM6	0x56	86	Alarm 6
SYSTEM.ALARM7	0x57	87	Alarm 7
SYSTEM.ALARM8	0x58	88	Alarm 8
SYSTEM.ALARM9	0x59	89	Alarm 9
SYSTEM.ALARM10	0x5A	90	Alarm 10
SYSTEM.CALIB_MODE	0x5B	91	Run in system calibrated mode
	0x5C	92	16 -bits of floating point value (first part) Analog output value
AOUT1	0x5D	93	16 -bits of floating point value (second part) Analog output value
	0x5E	94	16 -bits of floating point value (first part) Analog output value
AOUT2	0x5F	95	16 -bits of floating point value (second part) Analog output value
	0x60	96	16 -bits of floating point value (first part) Analog output value
AOUT3	0x61	97	16 -bits of floating point value (second part) Analog output value
AOUT4	0x62	98	16 -bits of floating point value (first part) Analog output value

	0x63	99	16 -bits of floating point value (second part) Analog output value
	0x64	100	16 -bits of floating point value (first part) Analog scaling input value
AIN1	0x65	101	16 -bits of floating point value (second part) Analog input value
	0x66	102	16 -bits of floating point value (first part) Analog input scaling value
AIN1.VAL	0x67	103	16 -bits of floating point value (second part) Analog input scaling value
AIN1.VALSIM	0x68	104	Scaling to integer value (0 - 27648) Analog input scaling value
	0x69	105	16 -bits of floating point value (first part) Analog input value
AIN2	0x6A	106	16 -bits of floating point value (second part) Analog input value
	0x6B	107	16 -bits of floating point value (first part) Analog input scaling value
AIN2.VAL	0x6C	108	16 -bits of floating point value (second part) Analog input scaling value
AIN2.VALSIM	0x6D	109	Scaling to integer value (0 - 27648) Analog input scaling value
	0x6E	110	16 -bits of floating point value (first part) Analog input value
AIN3	0x6F	111	16 -bits of floating point value (second part) Analog input value
	0x70	112	16 -bits of floating point value (first part) Analog input scaling value
AIN3.VAL	0x71	113	16 -bits of floating point value (second part) Analog input scaling value
AIN3.VALSIM	0x72	114	Scaling to integer value (0 - 27648) Analog input scaling value
AIN4	0x73	115	16 -bits of floating point value (first part)

			Analog input value
	0x74	116	16 -bits of floating point value (second part) Analog input value
	0x75	117	16 -bits of floating point value (first part) Analog input scaling value
AIN4.VAL	0x76	118	16 -bits of floating point value (second part) Analog input scaling value
AIN4.VALSIM	0x77	119	Scaling to integer value (0 - 27648) Analog input scaling value
	0x78	120	16 -bits of floating point value (first part) Temperature sensor value
RTD	0x79	121	16 -bits of floating point value (second part) Temperature sensor value
	0x7A	122	16 -bits of floating point value (first part) Pressure sensor value
AMB_PRESSURE	0x7B	123	16 -bits of floating point value (second part) Pressure sensor value
DOUT	0x7C	124	DOUT & 0x01 – first digital output DOUT & 0x02 – second digital output DOUT & 0x04 – third digital output DOUT & 0x08 – fourth digital output
DIN	0x7D	125	DIN & 0x01 – first digital input DIN & 0x02 – second digital input DIN & 0x04 – third digital input DIN & 0x08 – fourth digital input
PROCESS.TEMP_IS	0x7E	126	Process temperature input signal selection
PROCESS.TEMP_MANUAL_VALUE	0x7F	127	16 -bits of floating point value (first part) Process temperature manual value
	0x80	128	16 -bits of floating point value (second part) Process temperature manual value
PROCESS.PRESS_IS	0x81	129	Process pressure input signal selection
PROCESS.PRESS_SENSOR_TYPE	0x82	130	Pressure sensor type selection (absolute/ gauge)
PROCESS.PRESS_MANUAL_VALUE	0x83	131	16 -bits of floating point value (first part)

			Process pressure manual value in
	0x84	132	16 -bits of floating point value (second part) Process pressure manual value in
MEAS.PATH_LENGTH_CH1	0x85	133	16 -bits of floating point value (first part) Measuring path length channel 1
	0x86	134	16 -bits of floating point value (second part) Measuring path length channel 1
MEAS.PATH_LENGTH_CH2	0x87	135	16 -bits of floating point value (first part) Measuring path length channel 2
	0x88	136	16 -bits of floating point value (second part) Measuring path length channel 2
MEAS.RESPONSE_TIME_T90	0x89	137	16 -bits of floating point value (first part) Response time (T90) – const for IIR filter
	0x8A	138	16 -bits of floating point value (second part) Response time (T90) – const for IIR filter
GAS101.SPAN_CALIBRATION	0x8B	139	16 -bits of floating point value (first part) Span calibration factor
	0x8C	140	16 -bits of floating point value (second part) Span calibration factor
GAS101.OFFSET	0x8D	141	16 -bits of floating point value (first part) Span offset value
	0x8E	142	16 -bits of floating point value (second part) Span offset value
GAS102.SPAN_CALIBRATION	0x8F	143	16 -bits of floating point value (first part) Span calibration factor
	0x90	144	16 -bits of floating point value (second part) Span calibration factor
GAS102.OFFSET	0x91	145	16 -bits of floating point value (first part) Span offset value
	0x92	146	16 -bits of floating point value (second part)

			Span offset value
GAS103.SPAN_CALIBRATION	0x93	147	16 -bits of floating point value (first part) Span calibration factor
	0x94	148	16 -bits of floating point value (second part) Span calibration factor
GAS103.OFFSET	0x95	149	16 -bits of floating point value (first part) Span offset value
	0x96	150	16 -bits of floating point value (second part) Span offset value
GAS104.SPAN_CALIBRATION	0x97	151	16 -bits of floating point value (first part) Span calibration factor
	0x98	152	16 -bits of floating point value (second part) Span calibration factor
GAS104.OFFSET	0x99	153	16 -bits of floating point value (first part) Span offset value
	0x9A	154	16 -bits of floating point value (second part) Span offset value
GAS105.SPAN_CALIBRATION	0x9B	155	16 -bits of floating point value (first part) Span calibration factor
	0x9C	156	16 -bits of floating point value (second part) Span calibration factor
GAS105.OFFSET	0x9D	157	16 -bits of floating point value (first part) Span offset value
	0x9E	158	16 -bits of floating point value (second part) Span offset value
GAS106.SPAN_CALIBRATION	0x9F	159	16 -bits of floating point value (first part) Span calibration factor
	0xA0	160	16 -bits of floating point value (second part) Span calibration factor
GAS106.OFFSET	0xA1	161	16 -bits of floating point value (first part) Span offset value

	0xA2	162	16 -bits of floating point value (second part) Span offset value
GAS107.SPAN_CALIBRATION	0xA3	163	16 -bits of floating point value (first part) Span calibration factor
	0xA4	164	16 -bits of floating point value (second part) Span calibration factor
GAS107.OFFSET	0xA5	165	16 -bits of floating point value (first part) Span offset value
	0xA6	166	16 -bits of floating point value (second part) Span offset value
GAS108.SPAN_CALIBRATION	0xA7	167	16 -bits of floating point value (first part) Span calibration factor
	0xA8	168	16 -bits of floating point value (second part) Span calibration factor
GAS108.OFFSET	0xA9	169	16 -bits of floating point value (first part) Span offset value
	0xAA	170	16 -bits of floating point value (second part) Span offset value
TEMP.SPAN_CALIBRATION	0xAB	171	16 -bits of floating point value (first part) Span calibration factor
	0xAC	172	16 -bits of floating point value (second part) Span calibration factor
TEMP.OFFSET	0xAD	173	16 -bits of floating point value (first part) Span offset value
	0xAE	174	16 -bits of floating point value (second part) Span offset value
DOUT.DO1	0xAF	175	Signal selection for digital output
DOUT.DO2	0xB0	176	Signal selection for digital output
DOUT.DO3	0xB1	177	Signal selection for digital output
DOUT.DO4	0xB2	178	Signal selection for digital output
AOUT.FORCE_MANUAL_MODE ENABLE	0xB3	179	Force manual mode for all analog outputs
AOUT.SCALE_ENALE	0xB4	180	Enable scaling range for all analog outputs

AOUT.CALIBRATED	0xB5	181	Reserved - future use
AOUT1.SELECT_SIGNAL	0xB6	182	Measurement signal selection for the output
AOUT1.MANUAL_VALUE	0xB7	183	16 -bits of floating point value (first part) Manual mode value in scaling range
	0xB8	184	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT1.SCALE_MIN	0xB9	185	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0xBA	186	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT1.SCALE_MAX	0xBB	187	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xBC	188	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT1.A	0xBD	189	16 -bits of floating point value (first part) Reserved - future use
	0xBE	190	16 -bits of floating point value (second part) Reserved - future use
AOUT1.B	0xBF	191	16 -bits of floating point value (first part) Reserved - future use
	0xC0	192	16 -bits of floating point value (second part) Reserved - future use
AOUT2.SELECT_SIGNAL	0xC1	193	Measurement signal selection for the output
AOUT2.MANUAL_VALUE	0xC2	194	16 -bits of floating point value (first part) Manual mode value in scaling range
	0xC3	195	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT2.SCALE_MIN	0xC4	196	16 -bits of floating point value (first part)

			Scaling range value corresponds to 4 mA
	0xC5	197	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT2.SCALE_MAX	0xC6	198	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xC7	199	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT2.A	0xC8	200	16 -bits of floating point value (first part) Reserved - future use
	0xC9	201	16 -bits of floating point value (second part) Reserved - future use
AOUT2.B	0xCA	202	16 -bits of floating point value (first part) Reserved - future use
	0xCB	203	16 -bits of floating point value (second part) Reserved - future use
AOUT3.SELECT_SIGNAL	0xCC	204	Measurement signal selection for the output
AOUT3.MANUAL_VALUE	0xCD	205	16 -bits of floating point value (first part) Manual mode value in scaling range
	0xCE	206	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT3.SCALE_MIN	0xCF	207	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0xD0	208	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT3.SCALE_MAX	0xD1	209	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA

	0xD2	210	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT3.A	0xD3	211	16 -bits of floating point value (first part) Reserved - future use
	0xD4	212	16 -bits of floating point value (second part) Reserved - future use
AOUT3.B	0xD5	213	16 -bits of floating point value (first part) Reserved - future use
	0xD6	214	16 -bits of floating point value (second part) Reserved - future use
AOUT4.SELECT_SIGNAL	0xD7	215	Measurement signal selection for the output
AOUT4.MANUAL_VALUE	0xD8	216	16 -bits of floating point value (first part) Manual mode value in scaling range
	0xD9	217	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT4.SCALE_MIN	0xDA	218	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0xDB	219	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT4.SCALE_MAX	0xDC	220	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xDD	221	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT4.A	0xDE	222	16 -bits of floating point value (first part) Reserved - future use
	0xDF	223	16 -bits of floating point value (second part) Reserved - future use

AOUT4.B	0xE0	224	16 -bits of floating point value (first part) Reserved - future use
	0xE1	225	16 -bits of floating point value (second part) Reserved - future use
AIN.SCALE_ENABLE	0xE2	226	Enable scaling range for all analog inputs
AIN.CALIBRATED	0xE3	227	Reserved - future use
AIN.MEDIAN	0xE4	228	Number of samples put to median filter
AIN.IIR	0xE5	229	16 -bits of floating point value (first part) Const time value put to IIR filter
	0xE6	230	16 -bits of floating point value (second part) Const time value put to IIR filter
AIN1.SCALE_MIN	0xE7	231	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0xE8	232	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN1.SCALE_MAX	0xE9	233	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xEA	234	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN1.A	0xEB	235	16 -bits of floating point value (first part) Reserved - future use
	0xEC	236	16 -bits of floating point value (second part) Reserved - future use
AIN1.B	0xED	237	16 -bits of floating point value (first part) Reserved - future use
	0xEE	238	16 -bits of floating point value (second part) Reserved - future use
AIN2.SCALE_MIN	0xEF	239	16 -bits of floating point value (first part)

			Scaling range value corresponds to 4 mA
	0xF0	240	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN2.SCALE_MAX	0xF1	241	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xF2	242	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN2.A	0xF3	243	16 -bits of floating point value (first part) Reserved - future use
	0xF4	244	16 -bits of floating point value (second part) Reserved - future use
AIN2.B	0xF5	245	16 -bits of floating point value (first part) Reserved - future use
	0xF6	246	16 -bits of floating point value (second part) Reserved - future use
AIN3.SCALE_MIN	0xF7	247	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0xF8	248	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN3.SCALE_MAX	0xF9	249	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0xFA	250	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN3.A	0xFB	251	16 -bits of floating point value (first part) Reserved - future use
	0xFC	252	16 -bits of floating point value (second part)

			Reserved - future use
AIN3.B	0xFD	253	16 -bits of floating point value (first part) Reserved - future use
	0xFE	254	16 -bits of floating point value (second part) Reserved - future use
AIN4.SCALE_MIN	0xFF	255	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x100	256	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN4.SCALE_MAX	0x101	257	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x102	258	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN4.A	0x103	259	16 -bits of floating point value (first part) Reserved - future use
	0x104	260	16 -bits of floating point value (second part) Reserved - future use
AIN4.B	0x105	261	16 -bits of floating point value (first part) Reserved - future use
	0x106	262	16 -bits of floating point value (second part) Reserved - future use
RTD.MEDIAN	0x107	263	Number of samples put to median filter
RTD.IIR	0x108	264	16 -bits of floating point value (first part) Const time value put to IIR filter
	0x109	265	16 -bits of floating point value (second part) Const time value put to IIR filter
AMB_PRESS.MEDIAN	0x10A	266	Number of samples put to median filter
AMB_PRESS.IIR	0x10B	267	16 -bits of floating point value (first part)

			Const time value put to IIR filter
	0x10C	268	16 -bits of floating point value (second part) Const time value put to IIR filter
SYSTEM.CALIB_MODE_ENABLE	0x10D	269	Set system to calibrated mode
ALARM1.ENABLE	0x10E	270	Alarm enable/disable
ALARM1.AUTORESET_ENABLE	0x10F	271	Alarm autoreset enable/disable
ALARM1.RESET	0x110	272	Alarm manual reset
ALARM1.NORMAL_STATE	0x111	273	Alarm normal state value
ALARM1.SIGNAL	0x112	274	Alarm signal selection
ALARM1.OPERATOR	0x113	275	Alarm mathematical operator
ALARM1.THRESHOLD	0x114	276	16 -bits of floating point value (first part) Alarm threshold value
	0x115	277	16 -bits of floating point value (second part) Alarm threshold value
ALARM1.HYSTERESIS	0x116	278	16 -bits of floating point value (first part) Alarm hysteresis value
	0x117	279	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM2.ENABLE	0x118	280	Alarm enable/disable
ALARM2.AUTORESET_ENABLE	0x119	281	Alarm autoreset enable/disable
ALARM2.RESET	0x11A	282	Alarm manual reset
ALARM2.NORMAL_STATE	0x11B	283	Alarm normal state value
ALARM2.SIGNAL	0x11C	284	Alarm signal selection
ALARM2.OPERATOR	0x11D	285	Alarm mathematical operator
ALARM2.THRESHOLD	0x11E	286	16 -bits of floating point value (first part) Alarm threshold value
	0x11F	287	16 -bits of floating point value (second part) Alarm threshold value
ALARM2.HYSTERESIS	0x120	288	16 -bits of floating point value (first part) Alarm hysteresis value
	0x121	289	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM3.ENABLE	0x122	290	Alarm enable/disable
ALARM3.AUTORESET_ENABLE	0x123	291	Alarm autoreset enable/disable
ALARM3.RESET	0x124	292	Alarm manual reset
ALARM3.NORMAL_STATE	0x125	293	Alarm normal state value
ALARM3.SIGNAL	0x126	294	Alarm signal selection
ALARM3.OPERATOR	0x127	295	Alarm mathematical operator

ALARM3.THRESHOLD	0x128	296	16 -bits of floating point value (first part) Alarm threshold value
	0x129	297	16 -bits of floating point value (second part) Alarm threshold value
ALARM3.HYSTERESIS	0x12A	298	16 -bits of floating point value (first part) Alarm hysteresis value
	0x12B	299	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM4.ENABLE	0x12C	300	Alarm enable/disable
ALARM4.AUTORESET_ENABLE	0x12D	301	Alarm autoreset enable/disable
ALARM4.RESET	0x12E	302	Alarm manual reset
ALARM4.NORMAL_STATE	0x12F	303	Alarm normal state value
ALARM4.SIGNAL	0x130	304	Alarm signal selection
ALARM4.OPERATOR	0x131	305	Alarm mathematical operator
ALARM4.THRESHOLD	0x132	306	16 -bits of floating point value (first part) Alarm threshold value
	0x133	307	16 -bits of floating point value (second part) Alarm threshold value
ALARM4.HYSTERESIS	0x134	308	16 -bits of floating point value (first part) Alarm hysteresis value
	0x135	309	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM5.ENABLE	0x136	310	Alarm enable/disable
ALARM5.AUTORESET_ENABLE	0x137	311	Alarm autoreset enable/disable
ALARM5.RESET	0x138	312	Alarm manual reset
ALARM5.NORMAL_STATE	0x139	313	Alarm normal state value
ALARM5.SIGNAL	0x13A	314	Alarm signal selection
ALARM5.OPERATOR	0x13B	315	Alarm mathematical operator
ALARM5.THRESHOLD	0x13C	316	16 -bits of floating point value (first part) Alarm threshold value
	0x13D	317	16 -bits of floating point value (second part) Alarm threshold value
ALARM5.HYSTERESIS	0x13E	318	16 -bits of floating point value (first part) Alarm hysteresis value
	0x13F	319	16 -bits of floating point value (second part)

			Alarm hysteresis value
ALARM6.ENABLE	0x140	320	Alarm enable/disable
ALARM6.AUTORESET_ENABLE	0x141	321	Alarm autoreset enable/disable
ALARM6.RESET	0x142	322	Alarm manual reset
ALARM6.NORMAL_STATE	0x143	323	Alarm normal state value
ALARM6.SIGNAL	0x144	324	Alarm signal selection
ALARM6.OPERATOR	0x145	325	Alarm mathematical operator
ALARM6.THRESHOLD	0x146	326	16 -bits of floating point value (first part) Alarm threshold value
	0x147	327	16 -bits of floating point value (second part) Alarm threshold value
ALARM6.HYSTERESIS	0x148	328	16 -bits of floating point value (first part) Alarm hysteresis value
	0x149	329	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM7.ENABLE	0x14A	330	Alarm enable/disable
ALARM7.AUTORESET_ENABLE	0x14B	331	Alarm autoreset enable/disable
ALARM7.RESET	0x14C	332	Alarm manual reset
ALARM7.NORMAL_STATE	0x14D	333	Alarm normal state value
ALARM7.SIGNAL	0x14E	334	Alarm signal selection
ALARM7.OPERATOR	0x14F	335	Alarm mathematical operator
ALARM7.THRESHOLD	0x150	336	16 -bits of floating point value (first part) Alarm threshold value
	0x151	337	16 -bits of floating point value (second part) Alarm threshold value
ALARM7.HYSTERESIS	0x152	338	16 -bits of floating point value (first part) Alarm hysteresis value
	0x153	339	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM8.ENABLE	0x154	340	Alarm enable/disable
ALARM8.AUTORESET_ENABLE	0x155	341	Alarm autoreset enable/disable
ALARM8.RESET	0x156	342	Alarm manual reset
ALARM8.NORMAL_STATE	0x157	343	Alarm normal state value
ALARM8.SIGNAL	0x158	344	Alarm signal selection
ALARM8.OPERATOR	0x159	345	Alarm mathematical operator
ALARM8.THRESHOLD	0x15A	346	16 -bits of floating point value (first part) Alarm threshold value

	0x15B	347	16 -bits of floating point value (second part) Alarm threshold value
ALARM8.HYSTERESIS	0x15C	348	16 -bits of floating point value (first part) Alarm hysteresis value
	0x15D	349	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM9.ENABLE	0x15E	350	Alarm enable/disable
ALARM9.AUTORESET_ENABLE	0x15F	351	Alarm autoreset enable/disable
ALARM9.RESET	0x160	352	Alarm manual reset
ALARM9.NORMAL_STATE	0x161	353	Alarm normal state value
ALARM9.SIGNAL	0x162	354	Alarm signal selection
ALARM9.OPERATOR	0x163	355	Alarm mathematical operator
ALARM9.THRESHOLD	0x164	356	16 -bits of floating point value (first part) Alarm threshold value
	0x165	357	16 -bits of floating point value (second part) Alarm threshold value
ALARM9.HYSTERESIS	0x166	358	16 -bits of floating point value (first part) Alarm hysteresis value
	0x167	359	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM10.ENABLE	0x168	360	Alarm enable/disable
ALARM10.AUTORESET_ENABLE	0x169	361	Alarm autoreset enable/disable
ALARM10.RESET	0x16A	362	Alarm manual reset
ALARM10.NORMAL_STATE	0x16B	363	Alarm normal state value
ALARM10.SIGNAL	0x16C	364	Alarm signal selection
ALARM10.OPERATOR	0x16D	365	Alarm mathematical operator
ALARM10.THRESHOLD	0x16E	366	16 -bits of floating point value (first part) Alarm threshold value
	0x16F	367	16 -bits of floating point value (second part) Alarm threshold value
ALARM10.HYSTERESIS	0x170	368	16 -bits of floating point value (first part) Alarm hysteresis value
	0x171	369	16 -bits of floating point value (second part) Alarm hysteresis value

HMI.PASSWORD	0x172	370	HMI pin needs to change parameters from HMI panel (value range 0-9999)

Table 5. Scaling to integer value example (0-27648).

System		Gas Concentration	Transmission	AI	AO	Description
Integer	Hexadecimal	0 ppm to 10 ppm	0% to 100%	4mA to 20mA	4mA to 20mA	
32767	7FFF	11.851 ppm	118.51 %	22.96 mA	22.96 mA	Overflow
32512	7F00					
32511	7EFF	11.759 ppm	117.59 %	22.81 mA	22.81 mA	Overshoot range
27649	6C01					
27648	6C00	10 ppm	100 %	20 mA	20 mA	Nominal range
20736	5100	7.5 ppm	75 %	16 mA	16 mA	
1	0001	0.00036 ppm	0.0036 %	4 mA + 578.7 nA	4 mA + 578.7 nA	
0	0000	0 ppm	0 %	4 mA	4 mA	
-1	FFFF					Undershoot range
-4864	ED00	-1.759 ppm		1.185 mA	1.185 mA	
-4865	ECFF					Underflow
-32768	8000					

Table 6. Holding Registers (Function 0x3 0x6 0x10).

Register Name	Register address (hex)	Register address (dec)	Comments
PROCESS.TEMP_IS	0x00	0	Process temperature input signal selection
PROCESS.TEMP_MANUAL_VALUE	0x01	1	16 -bits of floating point value (first part) Process temperature manual value
	0x02	2	16 -bits of floating point value (second part) Process temperature manual value
PROCESS.PRESS_IS	0x03	3	Process pressure input signal selection
PROCESS.PRESS_SENSOR_TYPE	0x04	4	Pressure sensor type selection (absolute/ gauge)
PROCESS.PRESS_MANUAL_VALUE	0x05	5	16 -bits of floating point value (first part) Process pressure manual value in
	0x06	6	16 -bits of floating point value (second part) Process pressure manual value in

MEAS.PATH_LENGTH_CH1	0x07	7	16 -bits of floating point value (first part) Measuring path length channel 1
	0x08	8	16 -bits of floating point value (second part) Measuring path length channel 1
MEAS.PATH_LENGTH_CH2	0x09	9	16 -bits of floating point value (first part) Measuring path length channel 2
	0x0A	10	16 -bits of floating point value (second part) Measuring path length channel 2
MEAS.RESPONSE_TIME_T90	0x0B	11	16 -bits of floating point value (first part) Response time (T90) – const for IIR filter
	0x0C	12	16 -bits of floating point value (second part) Response time (T90) – const for IIR filter
GAS101.SPAN_CALIBRATION	0x0D	13	16 -bits of floating point value (first part) Span calibration factor
	0x0E	14	16 -bits of floating point value (second part) Span calibration factor
GAS101.OFFSET	0x0F	15	16 -bits of floating point value (first part) Span offset value
	0x10	16	16 -bits of floating point value (second part) Span offset value
GAS102.SPAN_CALIBRATION	0x11	17	16 -bits of floating point value (first part) Span calibration factor
	0x12	18	16 -bits of floating point value (second part) Span calibration factor
GAS102.OFFSET	0x13	19	16 -bits of floating point value (first part) Span offset value
	0x14	20	16 -bits of floating point value (second part) Span offset value
GAS103.SPAN_CALIBRATION	0x15	21	16 -bits of floating point value (first part) Span calibration factor

	0x16	22	16 -bits of floating point value (second part) Span calibration factor
GAS103.OFFSET	0x17	23	16 -bits of floating point value (first part) Span offset value
	0x18	24	16 -bits of floating point value (second part) Span offset value
GAS104.SPAN_CALIBRATION	0x19	25	16 -bits of floating point value (first part) Span calibration factor
	0x1A	26	16 -bits of floating point value (second part) Span calibration factor
GAS104.OFFSET	0x1B	27	16 -bits of floating point value (first part) Span offset value
	0x1C	28	16 -bits of floating point value (second part) Span offset value
GAS105.SPAN_CALIBRATION	0x1D	29	16 -bits of floating point value (first part) Span calibration factor
	0x1E	30	16 -bits of floating point value (second part) Span calibration factor
GAS105.OFFSET	0x1F	31	16 -bits of floating point value (first part) Span offset value
	0x20	32	16 -bits of floating point value (second part) Span offset value
GAS106.SPAN_CALIBRATION	0x21	33	16 -bits of floating point value (first part) Span calibration factor
	0x22	34	16 -bits of floating point value (second part) Span calibration factor
GAS106.OFFSET	0x23	35	16 -bits of floating point value (first part) Span offset value
	0x24	36	16 -bits of floating point value (second part) Span offset value
GAS107.SPAN_CALIBRATION	0x25	37	16 -bits of floating point value (first part)

			Span calibration factor
	0x26	38	16 -bits of floating point value (second part) Span calibration factor
GAS107.OFFSET	0x27	39	16 -bits of floating point value (first part) Span offset value
	0x28	40	16 -bits of floating point value (second part) Span offset value
GAS108.SPAN_CALIBRATION	0x29	41	16 -bits of floating point value (first part) Span calibration factor
	0x2A	42	16 -bits of floating point value (second part) Span calibration factor
GAS108.OFFSET	0x2B	43	16 -bits of floating point value (first part) Span offset value
	0x2C	44	16 -bits of floating point value (second part) Span offset value
TEMP.SPAN_CALIBRATION	0x2D	45	16 -bits of floating point value (first part) Span calibration factor
	0x2E	46	16 -bits of floating point value (second part) Span calibration factor
TEMP.OFFSET	0x2F	47	16 -bits of floating point value (first part) Span offset value
	0x30	48	16 -bits of floating point value (second part) Span offset value
DOUT.DO1	0x31	49	Signal selection for digital output
DOUT.DO2	0x32	50	Signal selection for digital output
DOUT.DO3	0x33	51	Signal selection for digital output
DOUT.DO4	0x34	52	Signal selection for digital output
AOUT.FORCE_MANUAL_MODE ENABLE	0x35	53	Force manual mode for all analog outputs
AOUT.SCALE_ENALE	0x36	54	Enable scaling range for all analog outputs
AOUT.CALIBRATED	0x37	55	Reserved - future use
AOUT1.SELECT_SIGNAL	0x38	56	Measurement signal selection for the output
AOUT1.MANUAL_VALUE	0x39	57	16 -bits of floating point value (first part)

			Manual mode value in scaling range
	0x3A	58	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT1.SCALE_MIN	0x3B	59	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x3C	60	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT1.SCALE_MAX	0x3D	61	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x3E	62	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT1.A	0x3F	63	16 -bits of floating point value (first part) Reserved - future use
	0x40	64	16 -bits of floating point value (second part) Reserved - future use
AOUT1.B	0x41	65	16 -bits of floating point value (first part) Reserved - future use
	0x42	66	16 -bits of floating point value (second part) Reserved - future use
AOUT2.SELECT_SIGNAL	0x43	67	Measurement signal selection for the output
AOUT2.MANUAL_VALUE	0x44	68	16 -bits of floating point value (first part) Manual mode value in scaling range
	0x45	69	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT2.SCALE_MIN	0x46	70	16 -bits of floating point value (first part)

			Scaling range value corresponds to 4 mA
	0x47	71	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT2.SCALE_MAX	0x48	72	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x49	73	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT2.A	0x4A	74	16 -bits of floating point value (first part) Reserved - future use
	0x4B	75	16 -bits of floating point value (second part) Reserved - future use
AOUT2.B	0x4C	76	16 -bits of floating point value (first part) Reserved - future use
	0x4D	77	16 -bits of floating point value (second part) Reserved - future use
AOUT3.SELECT_SIGNAL	0x4E	78	Measurement signal selection for the output
AOUT3.MANUAL_VALUE	0x4F	79	16 -bits of floating point value (first part) Manual mode value in scaling range
	0x50	80	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT3.SCALE_MIN	0x51	81	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x52	82	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT3.SCALE_MAX	0x53	83	16 -bits of floating point value (first part)

			Scaling range value corresponds to 20 mA
	0x54	84	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT3.A	0x55	85	16 -bits of floating point value (first part) Reserved - future use
	0x56	86	16 -bits of floating point value (second part) Reserved - future use
AOUT3.B	0x57	87	16 -bits of floating point value (first part) Reserved - future use
	0x58	88	16 -bits of floating point value (second part) Reserved - future use
AOUT4.SELECT_SIGNAL	0x59	89	Measurement signal selection for the output
AOUT4.MANUAL_VALUE	0x5A	90	16 -bits of floating point value (first part) Manual mode value in scaling range
	0x5B	91	16 -bits of floating point value (second part) Manual mode value in scaling range
AOUT4.SCALE_MIN	0x5C	92	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x5D	93	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AOUT4.SCALE_MAX	0x5E	94	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x5F	95	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AOUT4.A	0x60	96	16 -bits of floating point value (first part) Reserved - future use

	0x61	97	16 -bits of floating point value (second part) Reserved - future use
AOUT4.B	0x62	98	16 -bits of floating point value (first part) Reserved - future use
	0x63	99	16 -bits of floating point value (second part) Reserved - future use
AIN.SCALE_ENABLE	0x64	100	Enable scaling range for all analog inputs
AIN.CALIBRATED	0x65	101	Reserved - future use
AIN.MEDIAN	0x66	102	Number of samples put to median filter
AIN.IIR	0x67	103	16 -bits of floating point value (first part) Const time value put to IIR filter
	0x68	104	16 -bits of floating point value (second part) Const time value put to IIR filter
AIN1.SCALE_MIN	0x69	105	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x6A	106	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN1.SCALE_MAX	0x6B	107	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x6C	108	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN1.A	0x6D	109	16 -bits of floating point value (first part) Reserved - future use
	0x6E	110	16 -bits of floating point value (second part) Reserved - future use
AIN1.B	0x6F	111	16 -bits of floating point value (first part) Reserved - future use
	0x70	112	16 -bits of floating point value (second part)

			Reserved - future use
AIN2.SCALE_MIN	0x71	113	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x72	114	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN2.SCALE_MAX	0x73	115	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x74	116	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN2.A	0x75	117	16 -bits of floating point value (first part) Reserved - future use
	0x76	118	16 -bits of floating point value (second part) Reserved - future use
AIN2.B	0x77	119	16 -bits of floating point value (first part) Reserved - future use
	0x78	120	16 -bits of floating point value (second part) Reserved - future use
AIN3.SCALE_MIN	0x79	121	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x7A	122	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN3.SCALE_MAX	0x7B	123	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x7C	124	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN3.A	0x7D	125	16 -bits of floating point value (first part)

			Reserved - future use
	0x7E	126	16 -bits of floating point value (second part) Reserved - future use
AIN3.B	0x7F	127	16 -bits of floating point value (first part) Reserved - future use
	0x80	128	16 -bits of floating point value (second part) Reserved - future use
AIN4.SCALE_MIN	0x81	129	16 -bits of floating point value (first part) Scaling range value corresponds to 4 mA
	0x82	130	16 -bits of floating point value (second part) Scaling range value corresponds to 4 mA
AIN4.SCALE_MAX	0x83	131	16 -bits of floating point value (first part) Scaling range value corresponds to 20 mA
	0x84	132	16 -bits of floating point value (second part) Scaling range value corresponds to 20 mA
AIN4.A	0x85	133	16 -bits of floating point value (first part) Reserved - future use
	0x86	134	16 -bits of floating point value (second part) Reserved - future use
AIN4.B	0x87	135	16 -bits of floating point value (first part) Reserved - future use
	0x88	136	16 -bits of floating point value (second part) Reserved - future use
RTD.MEDIAN	0x89	137	Number of samples put to median filter
RTD.IIR	0x8A	138	16 -bits of floating point value (first part) Const time value put to IIR filter
	0x8B	139	16 -bits of floating point value (second part) Const time value put to IIR filter

AMB_PRESS.MEDIAN	0x8C	140	Number of samples put to median filter
AMB_PRESS.IIR	0x8D	141	16 -bits of floating point value (first part) Const time value put to IIR filter
	0x8E	142	16 -bits of floating point value (second part) Const time value put to IIR filter
SYSTEM.CALIB_MODE_ENABLE	0x8F	143	Set system to calibrated mode
ALARM1.ENABLE	0x90	144	Alarm enable/disable
ALARM1.AUTORESET_ENABLE	0x91	145	Alarm autoreset enable/disable
ALARM1.RESET	0x92	146	Alarm manual reset
ALARM1.NORMAL_STATE	0x93	147	Alarm normal state value
ALARM1.SIGNAL	0x94	148	Alarm signal selection
ALARM1.OPERATOR	0x95	149	Alarm mathematical operator
ALARM1.THRESHOLD	0x96	150	16 -bits of floating point value (first part) Alarm threshold value
	0x97	151	16 -bits of floating point value (second part) Alarm threshold value
ALARM1.HYSTERESIS	0x98	152	16 -bits of floating point value (first part) Alarm hysteresis value
	0x99	153	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM2.ENABLE	0x9A	154	Alarm enable/disable
ALARM2.AUTORESET_ENABLE	0x9B	155	Alarm autoreset enable/disable
ALARM2.RESET	0x9C	156	Alarm manual reset
ALARM2.NORMAL_STATE	0x9D	157	Alarm normal state value
ALARM2.SIGNAL	0x9E	158	Alarm signal selection
ALARM2.OPERATOR	0x9F	159	Alarm mathematical operator
ALARM2.THRESHOLD	0xA0	160	16 -bits of floating point value (first part) Alarm threshold value
	0xA1	161	16 -bits of floating point value (second part) Alarm threshold value
ALARM2.HYSTERESIS	0xA2	162	16 -bits of floating point value (first part) Alarm hysteresis value
	0xA3	163	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM3.ENABLE	0xA4	164	Alarm enable/disable
ALARM3.AUTORESET_ENABLE	0xA5	165	Alarm autoreset enable/disable

ALARM3.RESET	0xA6	166	Alarm manual reset
ALARM3.NORMAL_STATE	0xA7	167	Alarm normal state value
ALARM3.SIGNAL	0xA8	168	Alarm signal selection
ALARM3.OPERATOR	0xA9	169	Alarm mathematical operator
ALARM3.THRESHOLD	0xAA	170	16 -bits of floating point value (first part) Alarm threshold value
	0xAB	171	16 -bits of floating point value (second part) Alarm threshold value
ALARM3.HYSTERESIS	0xAC	172	16 -bits of floating point value (first part) Alarm hysteresis value
	0xAD	173	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM4.ENABLE	0xAE	174	Alarm enable/disable
ALARM4.AUTORESET_ENABLE	0xAF	175	Alarm autoreset enable/disable
ALARM4.RESET	0xB0	176	Alarm manual reset
ALARM4.NORMAL_STATE	0xB1	177	Alarm normal state value
ALARM4.SIGNAL	0xB2	178	Alarm signal selection
ALARM4.OPERATOR	0xB3	179	Alarm mathematical operator
ALARM4.THRESHOLD	0xB4	180	16 -bits of floating point value (first part) Alarm threshold value
	0xB5	181	16 -bits of floating point value (second part) Alarm threshold value
ALARM4.HYSTERESIS	0xB6	182	16 -bits of floating point value (first part) Alarm hysteresis value
	0xB7	183	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM5.ENABLE	0xB8	184	Alarm enable/disable
ALARM5.AUTORESET_ENABLE	0xB9	185	Alarm autoreset enable/disable
ALARM5.RESET	0xBA	186	Alarm manual reset
ALARM5.NORMAL_STATE	0xBB	187	Alarm normal state value
ALARM5.SIGNAL	0xBC	188	Alarm signal selection
ALARM5.OPERATOR	0xBD	189	Alarm mathematical operator
ALARM5.THRESHOLD	0xBE	190	16 -bits of floating point value (first part) Alarm threshold value
	0xBF	191	16 -bits of floating point value (second part) Alarm threshold value

ALARM5.HYSTERESIS	0xC0	192	16 -bits of floating point value (first part) Alarm hysteresis value
	0xC1	193	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM6.ENABLE	0xC2	194	Alarm enable/disable
ALARM6.AUTORESET_ENABLE	0xC3	195	Alarm autoreset enable/disable
ALARM6.RESET	0xC4	196	Alarm manual reset
ALARM6.NORMAL_STATE	0xC5	197	Alarm normal state value
ALARM6.SIGNAL	0xC6	198	Alarm signal selection
ALARM6.OPERATOR	0xC7	199	Alarm mathematical operator
ALARM6.THRESHOLD	0xC8	200	16 -bits of floating point value (first part) Alarm threshold value
	0xC9	201	16 -bits of floating point value (second part) Alarm threshold value
ALARM6.HYSTERESIS	0xCA	202	16 -bits of floating point value (first part) Alarm hysteresis value
	0xCB	203	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM7.ENABLE	0xCC	204	Alarm enable/disable
ALARM7.AUTORESET_ENABLE	0xCD	205	Alarm autoreset enable/disable
ALARM7.RESET	0xCE	206	Alarm manual reset
ALARM7.NORMAL_STATE	0xCF	207	Alarm normal state value
ALARM7.SIGNAL	0xD0	208	Alarm signal selection
ALARM7.OPERATOR	0xD1	209	Alarm mathematical operator
ALARM7.THRESHOLD	0xD2	210	16 -bits of floating point value (first part) Alarm threshold value
	0xD3	211	16 -bits of floating point value (second part) Alarm threshold value
ALARM7.HYSTERESIS	0xD4	212	16 -bits of floating point value (first part) Alarm hysteresis value
	0xD5	213	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM8.ENABLE	0xD6	214	Alarm enable/disable
ALARM8.AUTORESET_ENABLE	0xD7	215	Alarm autoreset enable/disable
ALARM8.RESET	0xD8	216	Alarm manual reset
ALARM8.NORMAL_STATE	0xD9	217	Alarm normal state value
ALARM8.SIGNAL	0xDA	218	Alarm signal selection

ALARM8.OPERATOR	0xDB	219	Alarm mathematical operator
ALARM8.THRESHOLD	0xDC	220	16 -bits of floating point value (first part) Alarm threshold value
	0xDD	221	16 -bits of floating point value (second part) Alarm threshold value
ALARM8.HYSTERESIS	0xDE	222	16 -bits of floating point value (first part) Alarm hysteresis value
	0xDF	223	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM9.ENABLE	0xE0	224	Alarm enable/disable
ALARM9.AUTORESET_ENABLE	0xE1	225	Alarm autoreset enable/disable
ALARM9.RESET	0xE2	226	Alarm manual reset
ALARM9.NORMAL_STATE	0xE3	227	Alarm normal state value
ALARM9.SIGNAL	0xE4	228	Alarm signal selection
ALARM9.OPERATOR	0xE5	229	Alarm mathematical operator
ALARM9.THRESHOLD	0xE6	230	16 -bits of floating point value (first part) Alarm threshold value
	0xE7	231	16 -bits of floating point value (second part) Alarm threshold value
ALARM9.HYSTERESIS	0xE8	232	16 -bits of floating point value (first part) Alarm hysteresis value
	0xE9	233	16 -bits of floating point value (second part) Alarm hysteresis value
ALARM10.ENABLE	0xEA	234	Alarm enable/disable
ALARM10.AUTORESET_ENABLE	0xEB	235	Alarm autoreset enable/disable
ALARM10.RESET	0xEC	236	Alarm manual reset
ALARM10.NORMAL_STATE	0xED	237	Alarm normal state value
ALARM10.SIGNAL	0xEE	238	Alarm signal selection
ALARM10.OPERATOR	0xEF	239	Alarm mathematical operator
ALARM10.THRESHOLD	0xF0	240	16 -bits of floating point value (first part) Alarm threshold value
	0xF1	241	16 -bits of floating point value (second part) Alarm threshold value
ALARM10.HYSTERESIS	0xF2	242	16 -bits of floating point value (first part) Alarm hysteresis value

	0xF3	243	16 -bits of floating point value (second part) Alarm hysteresis value
HMI.PASSWORD	0xF4	244	HMI pin needs to change parameters from HMI panel (value range 0-9999)

5.5.2. Modbus TCP

Modbus TCP is an Anybus CompactCom module integrated with Analyzer. Communication parameters are configured by Analyzer web server tool (only TCP PORT number is static).
TCP port number: 502

Modbus register map is common for RTU/TCP and is described in previous chapter.

5.5.3. Profinet

Profinet is Anybus CompactCom module integrated with Analyzer. Communication parameters are configured by Analyzer web server tool.
Data transmitted by protocol are described in Modbus RTU chapter and can be found in GSDML configuration file deliver with device.

5.5.4. Add-on module

Mechanical connection of the ABCC-M40 module to the PCB board GasEye Host ver. 4.X.

Elements of the ABCC-M40 module:

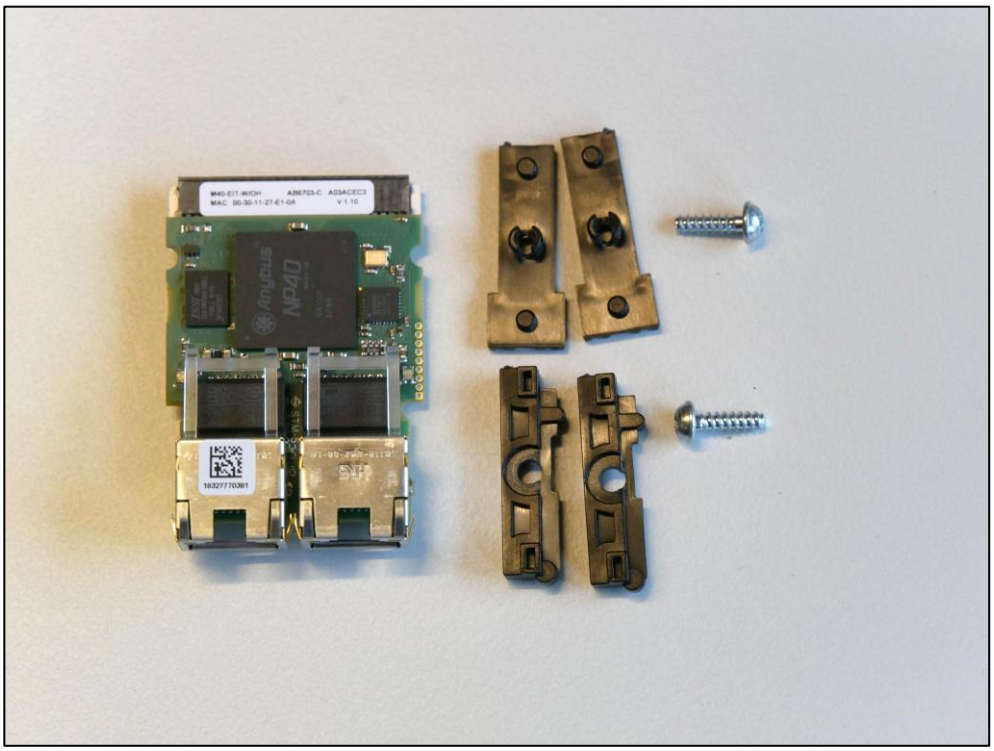


Figure 33. Elements of the ABCC-M40 module.

Steps to plug the ABCC-M40 module into the PCB GasEye Host board are presented in the pictures below:

1. Locate the slot reserved for ABCC-M40 on the GasEye Host PCB board.

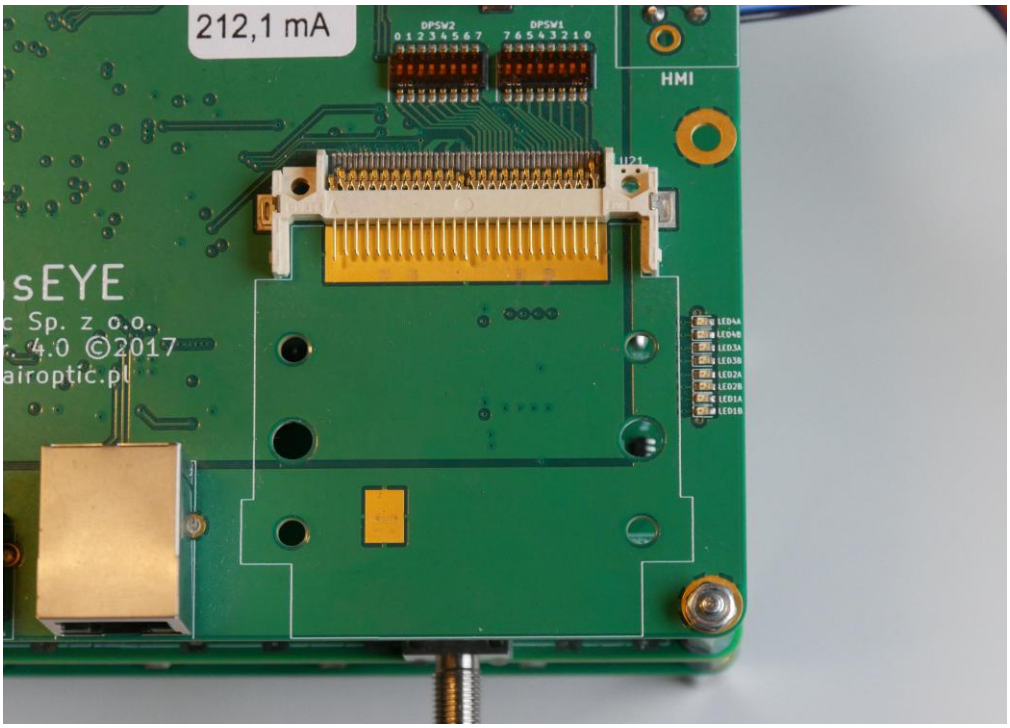


Figure 34. ABCC-M40 slot.

2. Insert two supports as presented on the picture below.

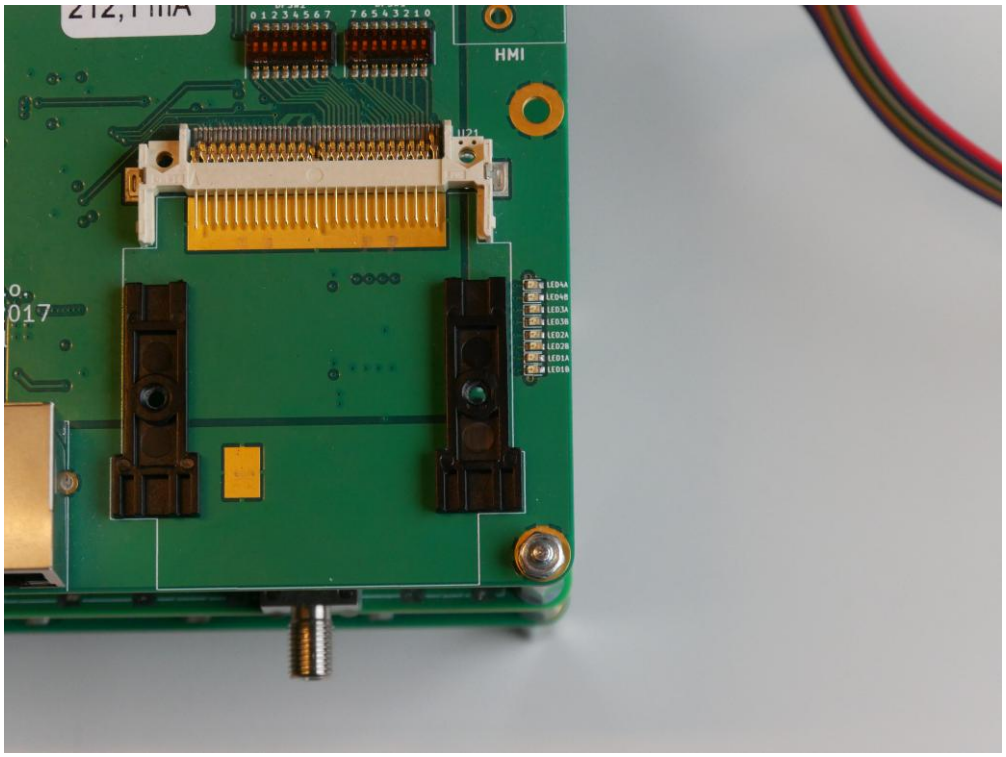


Figure 35. Supports inserting.

3. Plug the ABCC-M40 module to the socket.

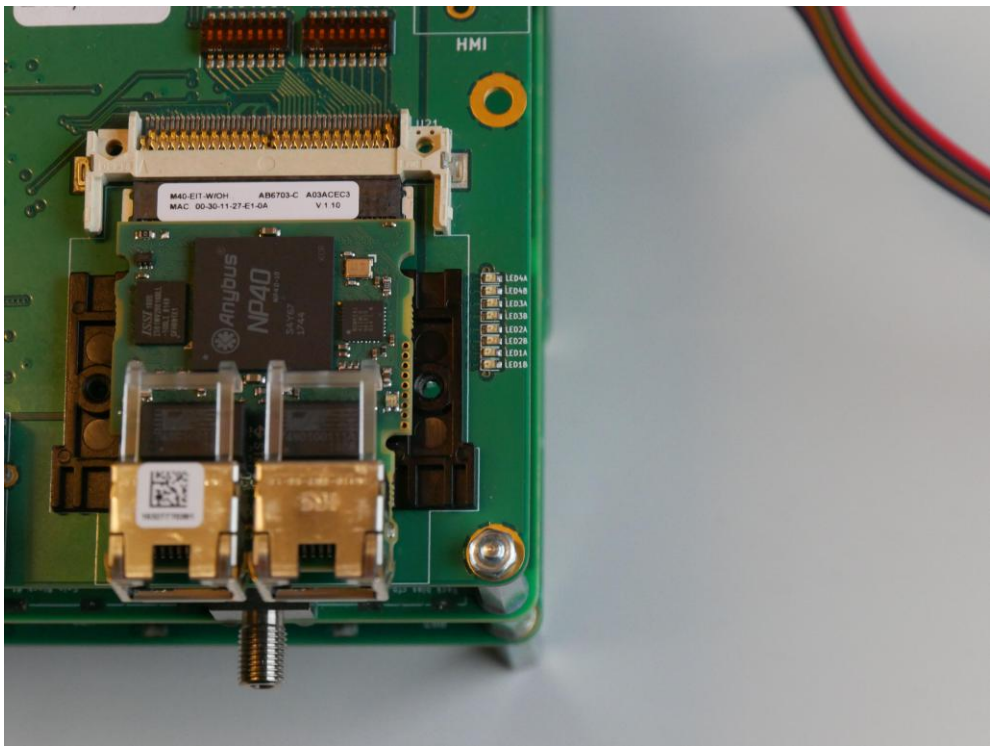


Figure 36. Plugging the ABCC-M40 module.

4. Put the overlay and screw it with the support using two screws

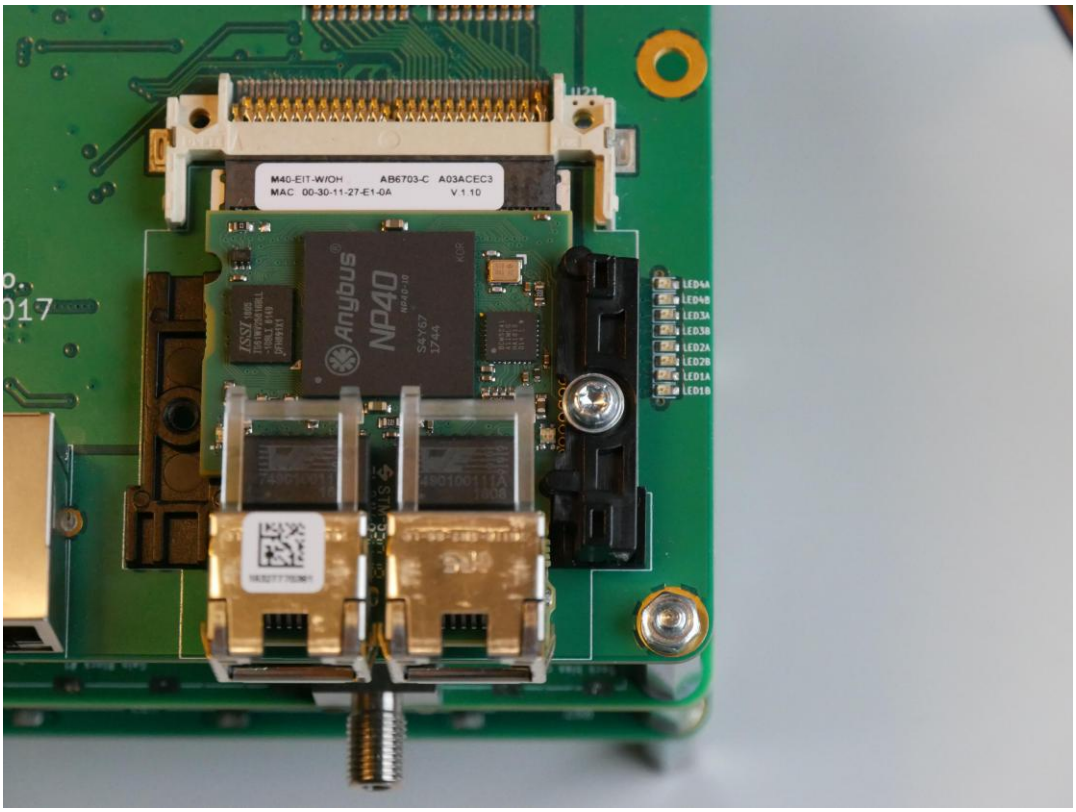


Figure 37. Putting the overlay 1/2.

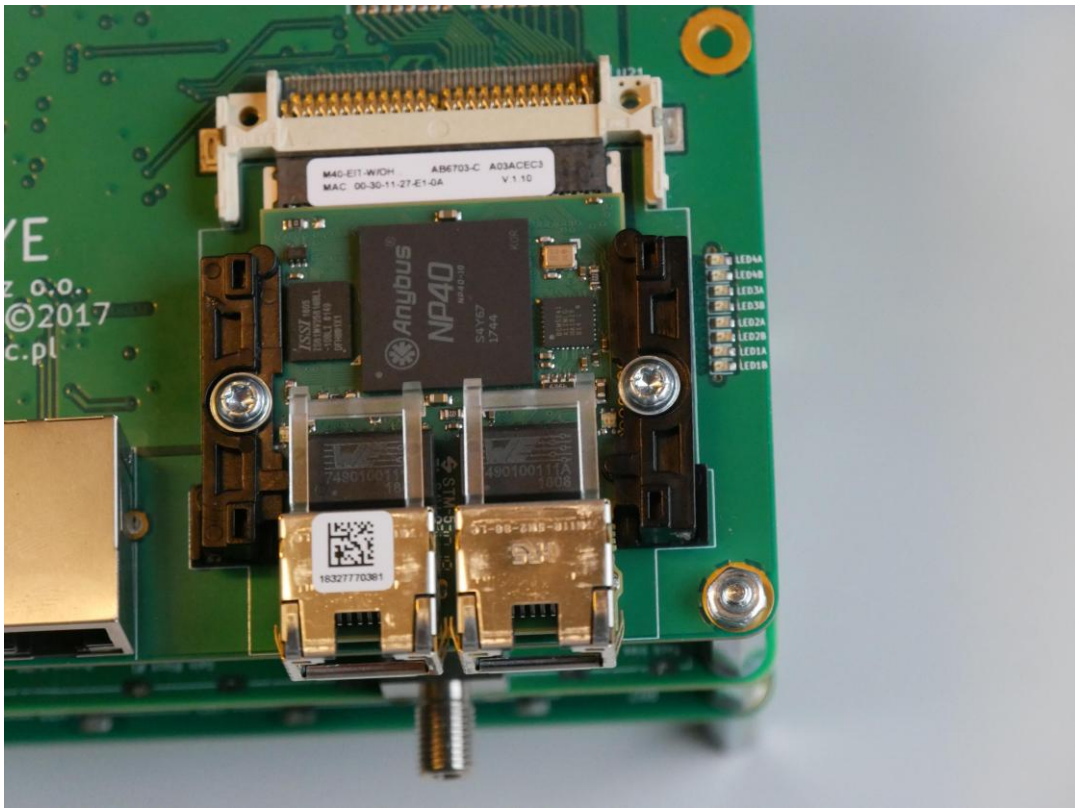


Figure 38. Putting the overlay 2/2.

6. Startup procedure

The startup procedure (SUP) is started each time the device is powered on or restarted via WebServer or by the reset button. During startup procedure the device is performing the internal diagnostics and checking the laser optical transmission. Startup procedure steps are shown in Table 7. The startup procedure takes about 3 to 5 minutes. Actual start-up procedure number can be checked on the HMI (as SUP) or via WebServer (Measurements/System/SYSTEM.STARTUP_PROCEDURE).

Startup Procedure Number (SUP)	Information
0	Low level platform is not working
1	Device initialization and memory test
2	Internal communication check
3	Automatic gain control calibration procedure
4	Device parameters check and set
5	Lasers temperature stabilization (lasers are off)
6	Lasers temperature stabilization (lasers are on)
7	Lasers transmission check
8	Self-calibration procedure
9	Concentration measurement check
10	Normal operation of the device (startup procedure is finished)

Table 7. Startup procedure (SUP) steps.

If the startup procedure (SUP) stopped at the step below 10 for more than 5 minutes, please refer to the SUP troubleshooting steps table below.

Startup Procedure Number (SUP)	Troubleshooting
0 to 6	Internal error occurred. Please contact Airoptic.
7	No/Low optical transmission. Please check the cleanliness of the process windows and/or the flange alignment.
8 to 9	Self-calibration procedure error. Please check the device specification (device is used out of the specification and/or the process gas is required for reference purposes).
10	Normal operation of the device.

Table 8. Startup procedure (SUP) troubleshooting steps.

7. HMI – front panel display

On the lid of the transmitter unit there is an LCD display, which allows monitoring of pre-defined measurements and editing essential parameters. The user can access and toggle between the menu positions using the buttons that are placed beneath the display.

7.1. Overview

Front panel of device has an alphanumerical display 4x20 (4 rows 20 columns), three buttons and two LEDs (Figure 39).

Figure 39. Front panel display.

Upon connection of the power supply the display will light up and show a welcome message with host version which is followed by the Main Menu page. During the start-up procedure the red LED will flash until the procedure is completed. It takes approximately 6 minutes to complete the initialization.

Figure 40. Welcome message with Host software version.

7.2. Menu

The user has access to the menu from the HMI level. The user can display measurements, parameters and IOs (Inputs/Outputs). The menu structure looks as follows.

Main Menu

- Settings
  - Network Settings
    - IP address
    - Mask
    - Gateway
  - Parameters
    - Optical path length 1 (Path1)
    - Optical path length 2 (Path2)
    - T90
    - TeIS
    - PrIS
- About
  - HMI version
  - Host version
  - SN
- Measurements
  - Gas 101
  - Gas 102
  - Gas 103
  - Gas 104
  - Gas 105
  - Gas 106
  - Gas 107
  - Gas 108
  - G101N
  - G102N
  - G103N
  - G104N
  - G105N
  - G106N
  - G107N
  - G108N
  - Sum of Gases (GASSUM)
  - Dew Point (DEWPT)
  - Temperature calculated (TEMCAL)
  - Fiber 1 transmission (F1TR)
  - Fiber 2 transmission (F2TR)
  - Remote RX1 gain (RX1G)
  - Remote RX2 gain (RX2G)
  - Process temperature (PrTemp)
  - Process pressure (PrPres)
  - Process H20 (PrH2O)
  - Process O2 (PrO2)
  - Laser1 transmission (Trans1)
  - Laser2 transmission (Trans2)
  - Laser3 transmission (Trans3)
  - Laser4 transmission (Trans4)
  - System startup procedure (SUP)
  - Reference 1 (REF1)
  - Reference 2 (REF2)
  - Reference 3 (REF3)
  - Reference 4 (REF4)

- Analog input
  - Analog input 1
  - Analog input 2
  - Analog input 3
  - Analog input 4
- Analog output
  - Analog output 1
  - Analog output 2
  - Analog output 3
  - Analog output 4
- Monitoring
  - Failure
    - Transmisssion
    - TempSensor
    - PressSensor
    - LoopCable
    - RecvDetect
    - RecvNotSat
    - LaserOverheat
    - LaserTemp
    - LaserAmbTemp
    - LaserParam
    - Magistrals
    - Voltage
    - Current
  - Out of range
    - ProcessPress
    - GasConc
    - DevAmbTemp
    - PathLength
  - Maintenance
    - TransLow
    - RefGasLow
  - Startup
    - LowLevel
    - DevInitMemIni
    - InternalComm
    - CalibProced
    - ParamCheck
    - LaserTempOff
    - LaserTempOn
    - LaserTrans
    - SelfCalib
    - ConcMeas
    - NormalOper

Figure 41. Main menu overview.

7.2.1. SETTINGS

Subcategories “Network settings” and “Parameters” can be selected.

Figure 42. Front panel display – subcategories.

NETWORK SETTINGS

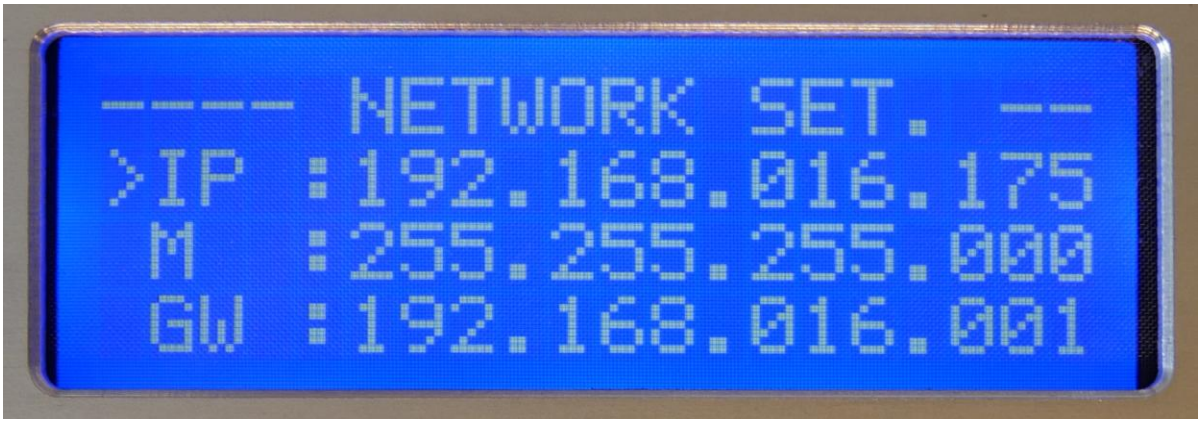


Figure 43. Front panel display - network settings.

Items in this category can be edited.

IP	IP address of the device
M	Subnet mask
GW	IP address of the gateway

PARAMETERS

Figure 44. Front panel display - parameters.

Figure 45. Front panel display - parameters.

Items in this category can be edited.

PATH1	The path 1 length value (unit: meter)
PATH2	The path 2 length value (unit: meter)
T90	Averaging time for concentration measurement (unit: second)
TeIS	A drop-down list with a selection of temperature sources
PrIS	A drop-down list with a selection of pressure sources

7.2.1. ABOUT

In this category we can read the HMI and HOST version and Serial number of the device.

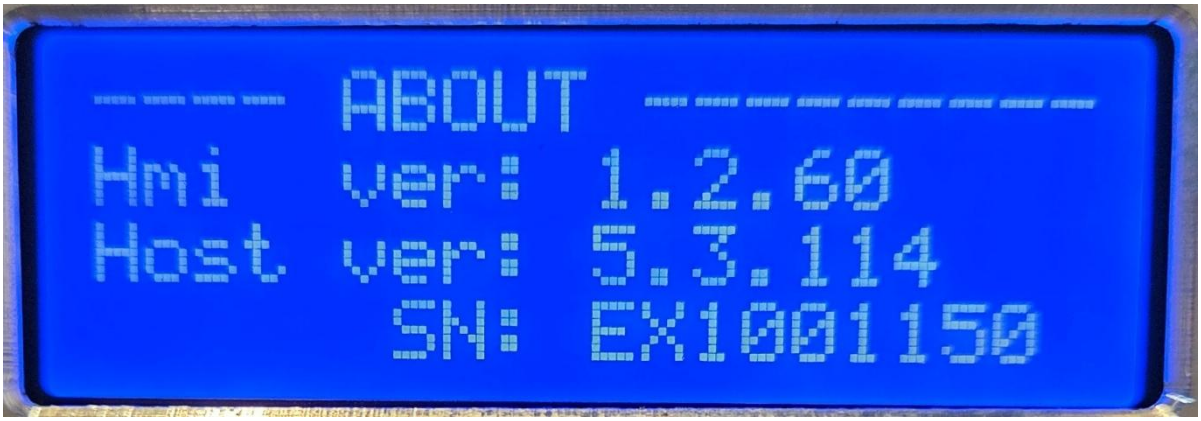


Figure 46. Front panel display - diagnostic.

Items in this category are read-only.

HMI ver	HMI version
Host ver	Host version
SN	Serial number of the device

7.2.2. MEASUREMENTS

Items in this category are read-only.

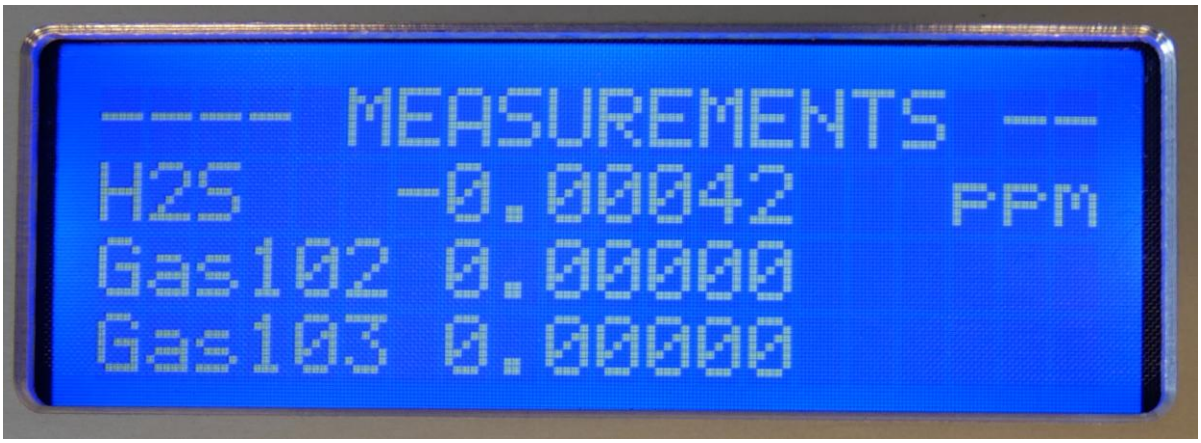


Figure 47. Front panel display – measurements GAS 1-3.

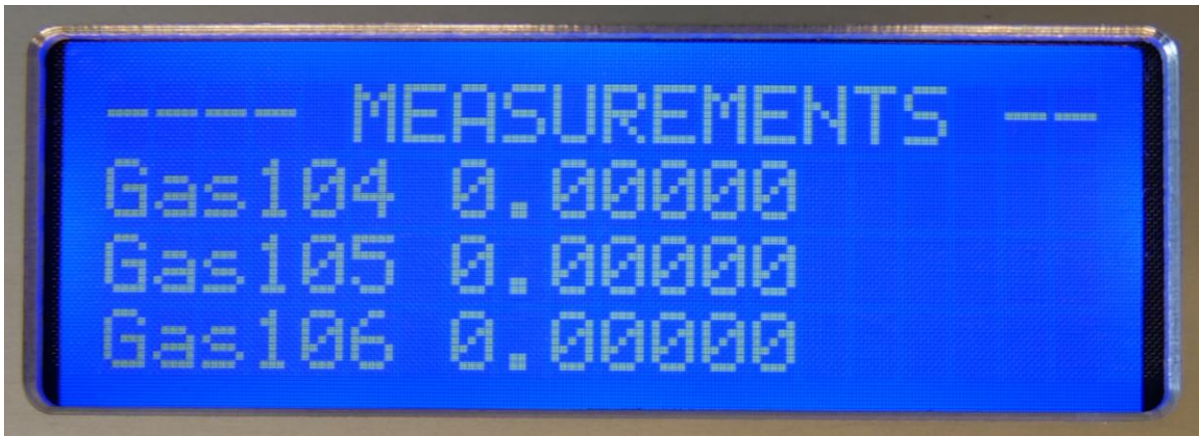


Figure 48. Front panel display – measurements GAS 4-6.

Figure 49. Front panel display – measurements GAS 7-8, TEMCAL.

GAS1-8 (e.g. O2, HCL, HCHO)	Displays the concentration value for up to eight gases
TEMCAL	Calculated process temperature (unit: degree Celsius)

Figure 50. Front panel display – measurements GASSUM,Dewpoint, and Temcal.

GASSUM	Gas Sum
DEWPT	Dew Point
TEMCAL	Temp. Calculated

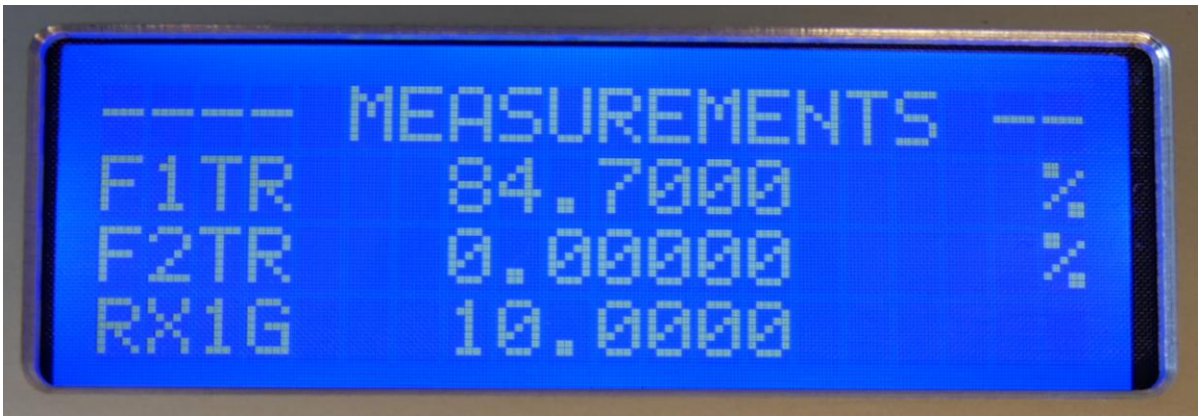


Figure 51. Front panel display – measurements F1TR, F2TR, RX1G.

F1TR	Displays transmission of fiber 1 (always 0 in GasEye Probe)
F2TR	Displays transmission of fiber 2 (always 0 in GasEye Probe)
RX1G	Fiber 1 remote RX gain

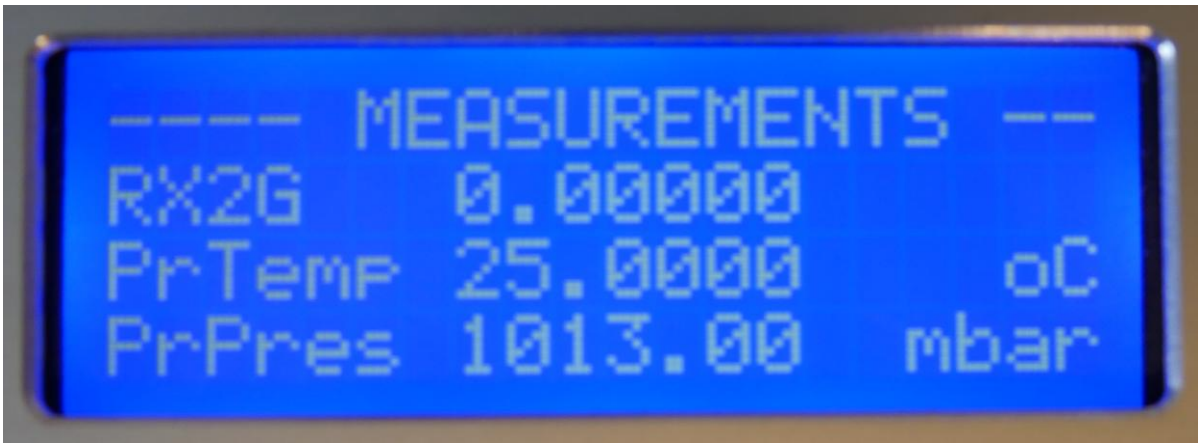


Figure 52. Front panel display – measurements RX2G, PrTemp, PrPres.

RX2G	Fiber 2 remote RX gain
PrTemp	Process temperature (unit: degree Celsius)
PrPres	Process pressure (unit: mbar)

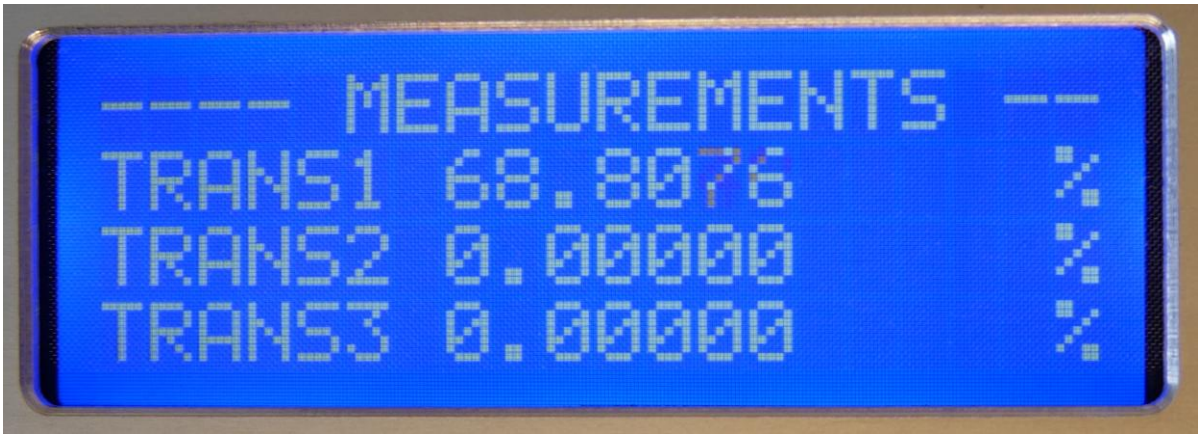


Figure 53. Front panel display – measurements TRANS1-3.

TRANS1	Transmission of Laser 1
TRANS2	Transmission of Laser 2
TRANS3	Transmission of Laser 3

Figure 54. Front panel display – measurements TRANS4, SUP, REF1.

TRANS4	Transmission of Laser 4
SUP	Startup Procedure Number
REF1	Displays the reference signal 1 value

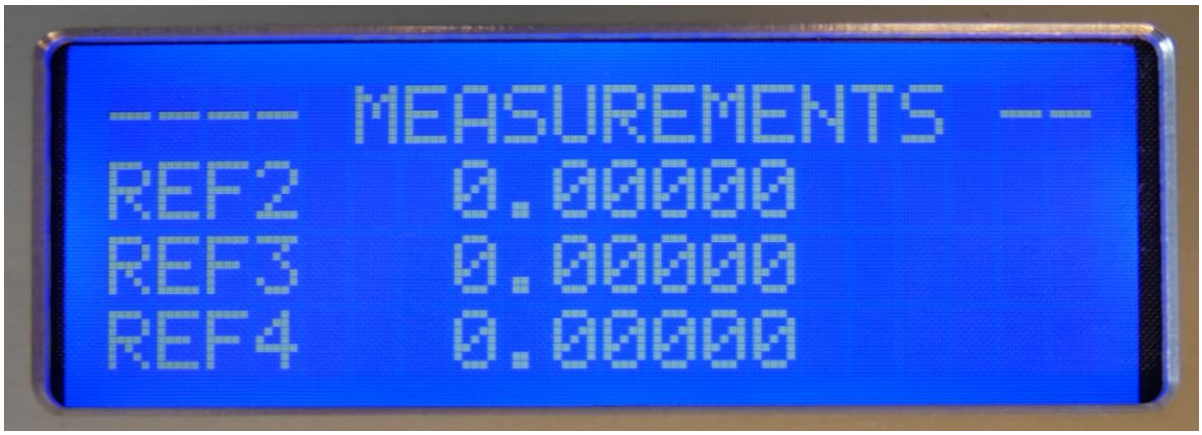


Figure 55. Front panel display – measurements REF2-4.

REF2	Displays the reference signal 2 value
REF3	Displays the reference signal 3 value
REF4	Displays the reference signal 4 value

7.2.3. ANALOG INPUT

Items in this category can be edited.

Figure 56. Front panel display – analog input AIN1-3.

Figure 57. Front panel display – analog input AIN4.

AIN1	Scaled value from Analog Input 1
AIN2	Scaled value from Analog Input 2
AIN3	Scaled value from Analog Input 3
AIN4	Scaled value from Analog Input 4

7.2.4. ANALOG OUTPUT

Items in this category can be edited.

Figure 58. Front panel display – analog output AOUT1-3.

Figure 59. Front panel display - analog output AOUT4.

AOUT1	Scaled value from Analog Output 1
AOUT2	Scaled value from Analog Output 2
AOUT3	Scaled value from Analog Output 3
AOUT4	Scaled value from Analog Output 4

7.2.1. Monitoring

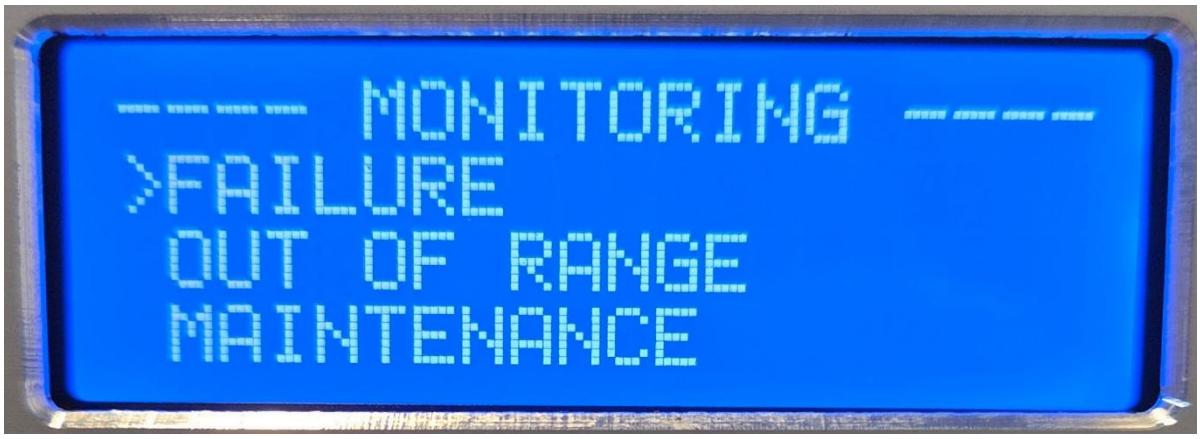


Figure 60. Front panel display – monitoring.

Failure	Refer to Self-Monitoring Tab checks
Out of Range	
Maintenance	
Startup	

7.2.2. Failure

Figure 61. Front panel display – failure Transmission, TempSensor, PressSensor

Figure 62. Front panel display – failure LoopCable, RecvDetect, RecvNotSat

Figure 63. Front panel display – failure LaserOverheat, LaserTemp,LaserAmbTemp

Figure 64. Front panel display – failure LaserParam, Magistrals, Voltage

Figure 65. Front panel display – failure Voltage, Current, Transmission

Transmission	The flag signaling too low transmission to measure concentration.
TempSensor	The flag signaling fault from analog / rtd input configured as temperature source sensor.
PressSensor	The flag signaling fault from analog input configured as pressure source sensor.
LoopCable	The flag signaling damage blue/white cable (cable connect receiver with transmitter part). Minimum value 10%.
RecvDetect	Central unit detects receiver part (communication is established by loop cable).
RecvNotSat	Detector saturation control status.
LaserOverheat	Overheated laser flag. Cut off power to the laser (Not analyzer itself).
LaserTemp	Laser temperature sensor fault.
LaserAmpTemp	Laser ambient temperature sensor fault.
LaserParam	Laser characteristic change.
Magistrals	The flag signaling lost communication with internal modules (Lost communication with HMI and other modules not responsible for measured gas concentration don’t set the whole analyzer into fault stage).
Voltage	The flag signaling internal voltages out of specification.
Current	The flag signaling internal currents out of specification.

9.2.8 Out of range

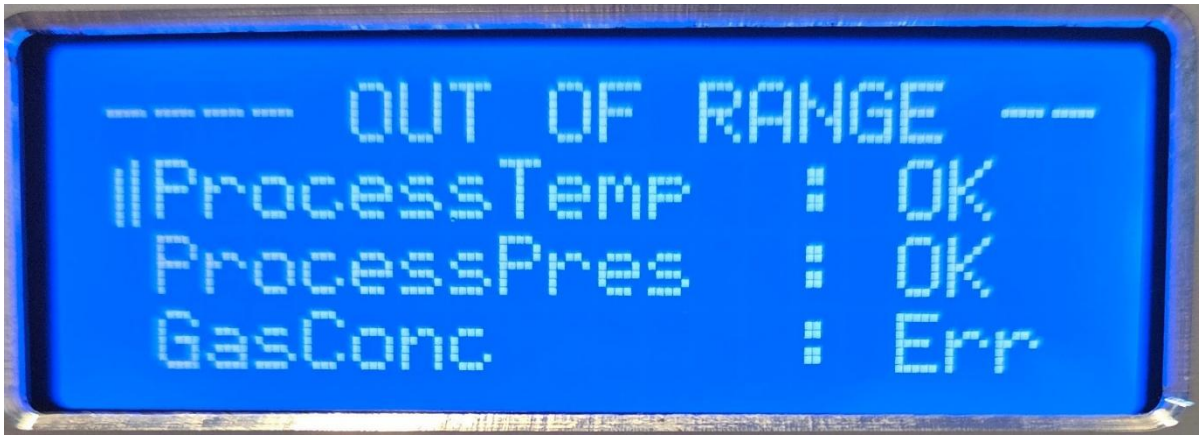


Figure 66. Front panel display – out of range ProcessTemp, ProcessPres, GasConc

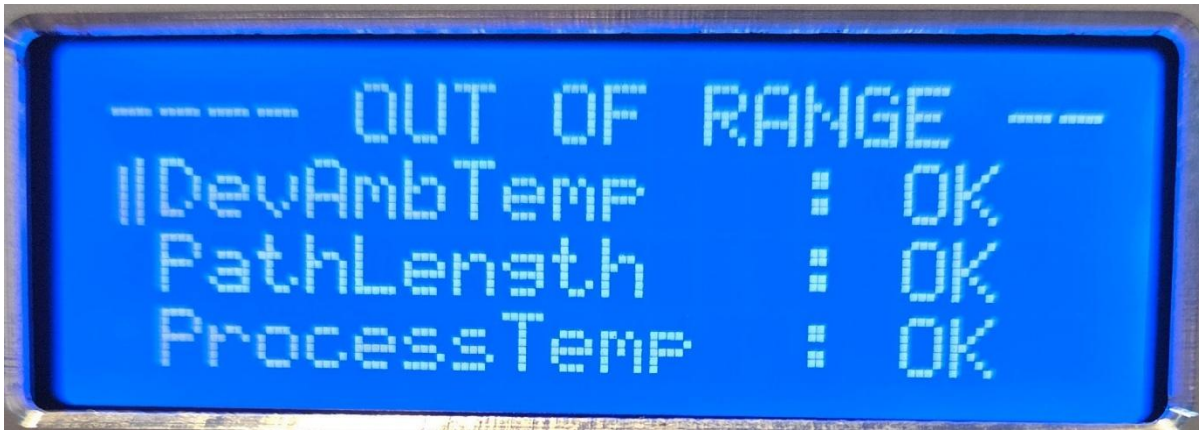


Figure 67. Front panel display – out of DevAmbTemp, Pathlenght

Process temperature	Correct range of process temperature can be read from parameters APP.TEMPERATURE_MIN, APP.TEMPERATURE_MAX
Process pressure	Correct range of process temperature can be read from parameters APP.PRESSURE_MIN, APP.PRESSURE_MAX
Gas concentration	Correct range of process temperature can be read from parameters APP.GAS101_CONCENTRATION_MIN, APP.GAS101_CONCENTRATION_MAX
Device ambient temperature	Correct range of process temperature can be read from parameters APP.AMB_TEMPERATURE_MIN, APP.AMB_TEMPERATURE_MAX
Path length	Correct range of process temperature can be read from parameters APP.PATH_LENGTH_MIN, APP.PATH_LENGTH_MAX

9.2.9 Maintenance

Figure 68. Front panel display – maintenance TranLow, RefGasLow

Laser transmission low	Flag indicating low transmission level.
Reference gas level	Refer to Self-Monitoring Tab checks

9.2.10 Startup

Figure 69. Front panel display – startup LowLevel,DevInitMemIni, InternalComm

Figure 70. Front panel display – startup CalibProced, ParamCheck,LaserTempOff

Figure 71. Front panel display – startup LaserTempOn, LaserTrans, SelfCalib

Figure 72. Front panel display – startup ConcMeas, NormalOper

LowLevel	Low level platform is not working
DevIniMemIni	Device initialization and memory test
InternalComm	Internal communication check
CalibProced	Automatic gain control calibration procedure
ParamCheck	Device parameters check and settings
LaserTempOff	Lasers temperature stabilization (lasers are off)
LaserTempOn	Lasers temperature stabilization (lasers are on)
LaserTrans	Lasers transmission check
SelfCalib	Self-calibration procedure
ConcMeas	Concentration measurement check
NormalOper	Normal operation of the device

7.3. Signals

GREEN LED	RED LED	Description
ON	OFF	System OK
ON (FLASHING)	OFF	Low transmission OR/AND low reference signal
OFF	ON	System error
OFF	ON (FLASHING)	Start-up procedure

Table 9. Front panel display - signals.

7.4. Buttons

Buttons provide signals from user to the HMI. Buttons function depends on which mode currently is

Button \ Mode		NORMAL	EDIT	PASSWORD
↑	Up	Move up	Increment blinking digit	Increment blinking digit
↓	Down	Move down	Decrement blinking digit	Decrement blinking digit
↵	Enter	Select item	Go to next field	Go to next digit field
↵	Enter (hold)	Return to higher menu level	Confirm changes	Confirm the typed in password

Table 10. Front panel display - buttons.

7.5. Editing parameters

1. Go to parameters menu and select the desired item with Enter button.

Figure 73. Front panel display – Parameter selection.

2. Password request should appear. Standard password is: **2552**

Figure 74. Front panel display – Password request.

3. Type password and hold Enter button to confirm or just press Enter button when the cursor is on the last digit – then password validation status shall appear. Press Enter to return to the Parameters category.

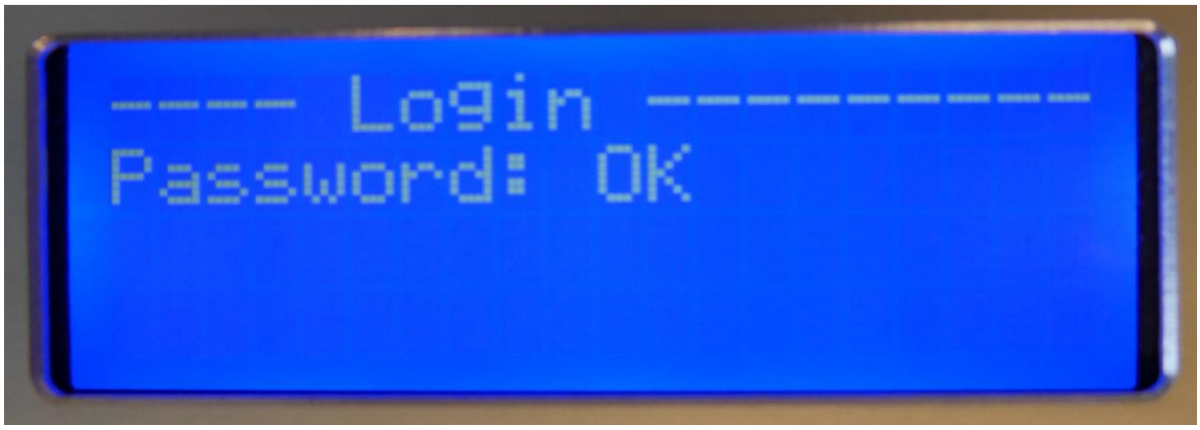


Figure 75. Front panel display – Password confirmation.

4. If password was correct, select the desired item again, and press Enter. Now, the selected parameter is in edition mode. With using UP/DOWN change value at certain position and with pressing ENTER button change input position. Set parameter holding ENTER button.

Figure 76. Front panel display – Editing parameters.

5. There will show asking for confirmation of changing parameter. Select “Yes”, “No” or “repeat config” and press ENTER button.

Figure 77. Front panel display – Confirmation of new parameters.

6. Parameter was changed successfully.

7.6. Editing network settings

Network settings can be changed in the NETWORK SETTINGS category.

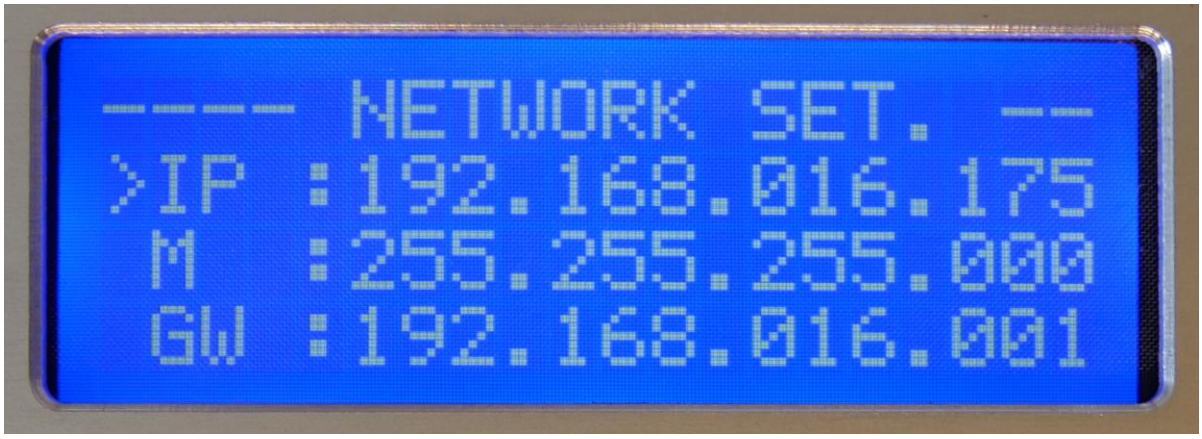


Figure 78. Front panel display - Editing network settings.

IP, subnet mask, and gateway address configuration are similar to usual parameter editing but holding Enter button quits editing mode without saving. To confirm the changes, press Enter when the cursor is on the last digit, and select “Yes”, “No”, or “repeat config”.

Figure 79. Front panel display – Editing IP address

Figure 80. Front panel display – IP address confirmation

7.7. Editing AIN/AOUT scaling

When is needed to change scale of AINx/AOUTx select in Analog Input/Output menu item to edit and enter password if prompted.

Figure 81. Front panel display - AIN/AOUT editing.

After item selection, a dialog with min and max values opens.

Figure 82. Front panel display – Editing analog input parameters.

Holding the Enter button for the first time moves the cursor from Min value to the Max value. After holding the Enter button for the second time a confirmation dialog appears. Select “Yes”, “No”, or “repeat config”.

Figure 83. Front panel display – Confirmation of analog input parameters.

After confirmation, the new value of parameter is set.

8. WebServer application

The WebServer application allows to monitor the GasEye Probe measurements i.e. transmission value which is necessary to properly adjust the instrument.

8.1. Establishing communication with the instrument

In order to establish the communication of the instrument with the computer the user have to properly setup IP configuration. Please follow the steps below (based on Microsoft Windows 10 operating system):

1. Open Network and Internet settings.

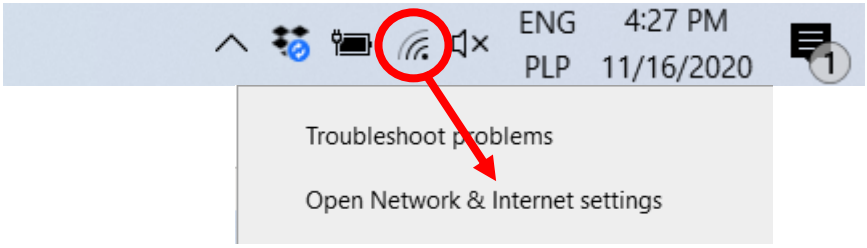


Figure 84. Network settings icon

2. Access the Adapter settings by clicking on the “Ethernet” connection.

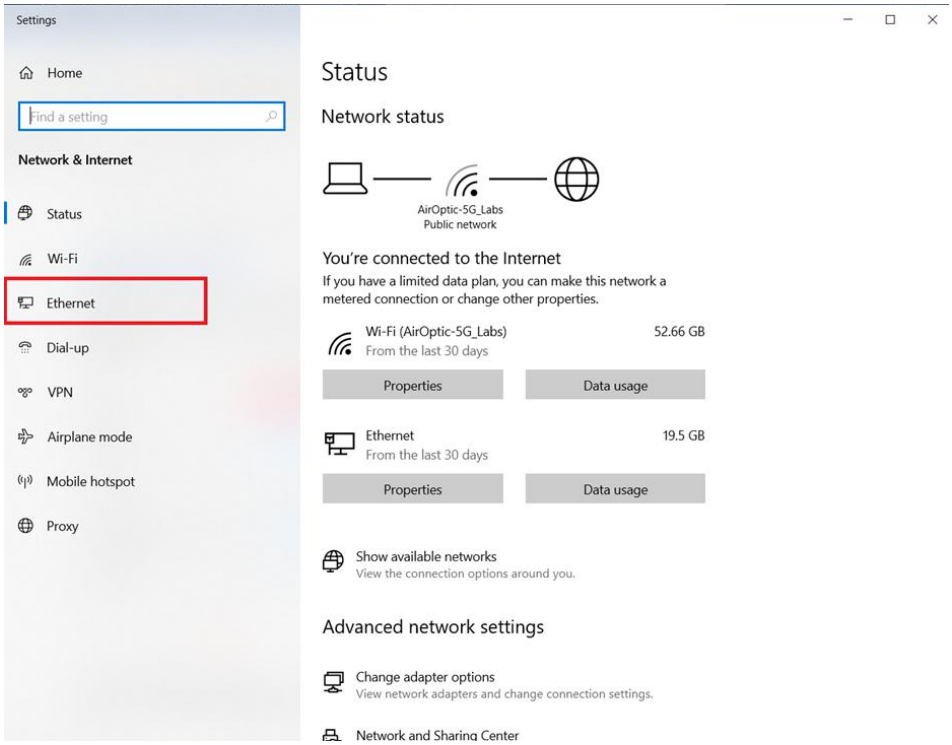


Figure 85. Network status window.

3. Open the Adapter options by clicking “Change adapter options”.

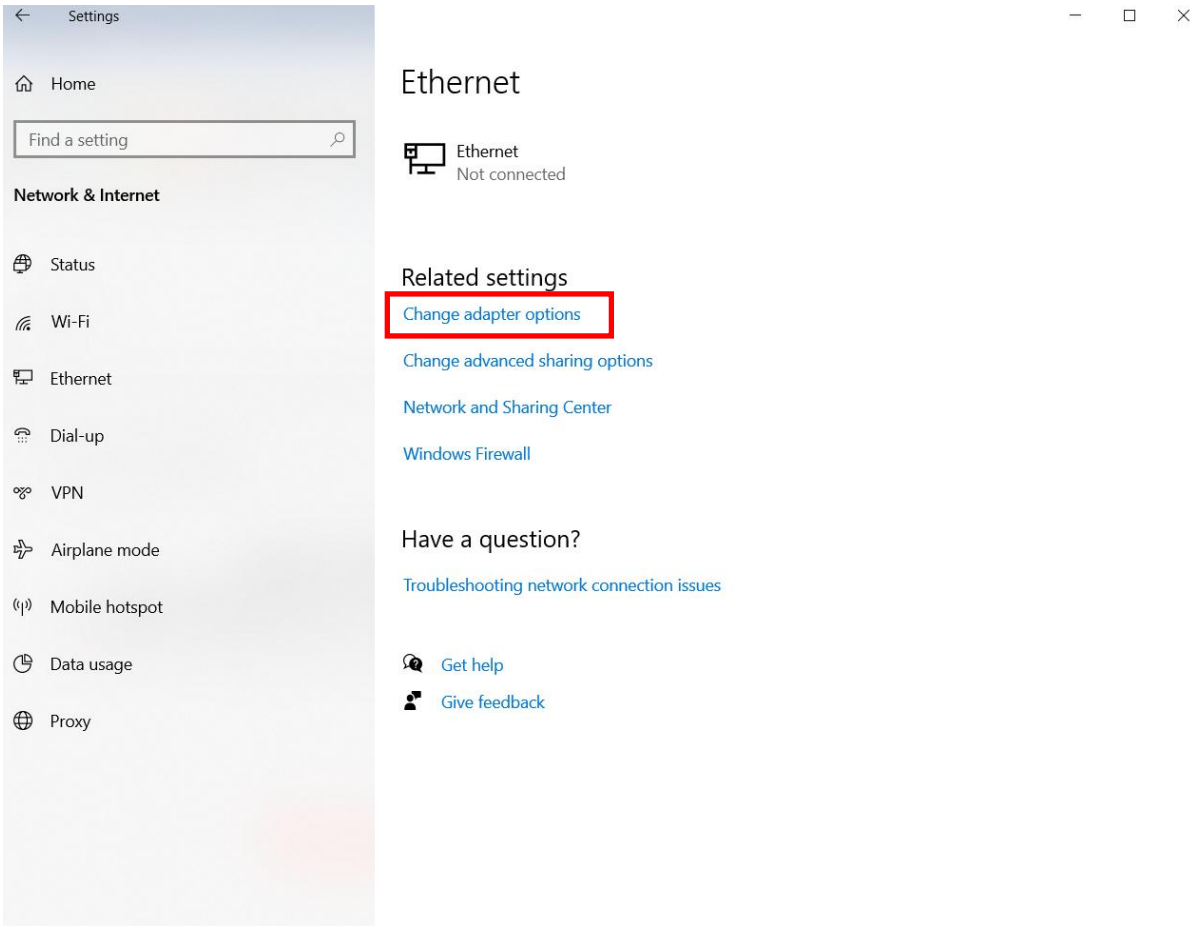


Figure 86. Ethernet settings window.

4. Open the Ethernet status window.

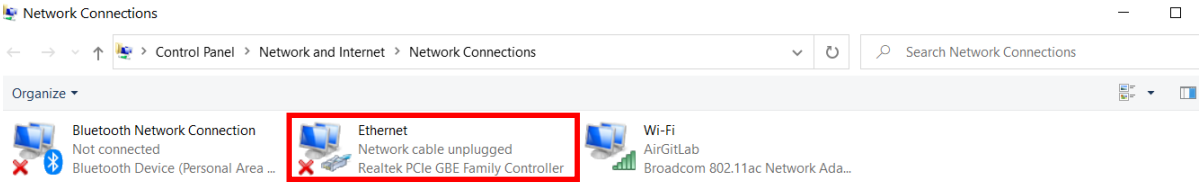


Figure 87. Network connections window.

5. Open Properties of a Ethernet Connection.

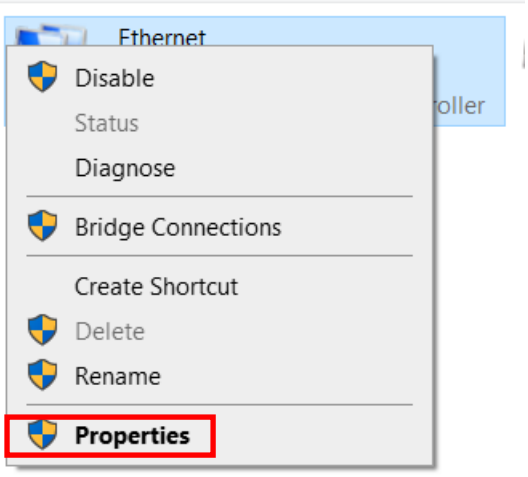


Figure 88. Ethernet connection properties.

6. Select IPv4 Internet Protocol and click on the Properties.

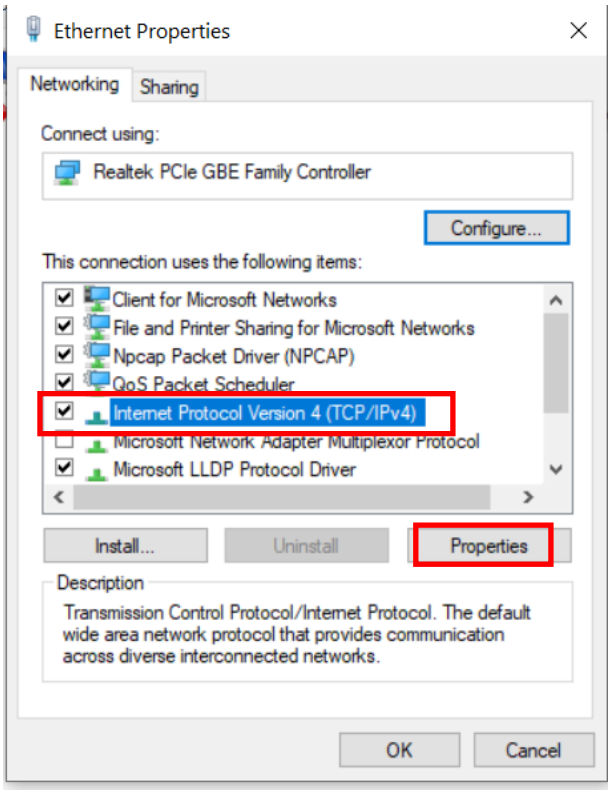


Figure 89. IPv4 Internet Protocol selection.

7. Select “Use the following IP address:”

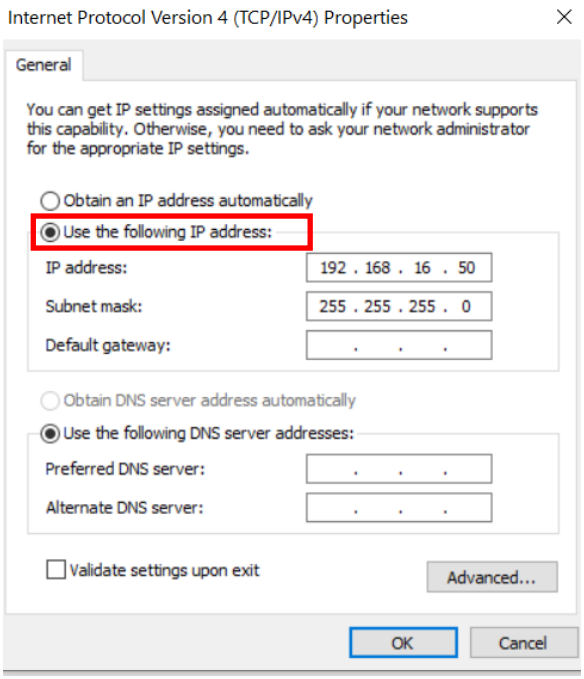


Figure 90. IP address selection.

8. Type in:
   IP address: 192.168.16.100;
   Subnet mask: 255.255.255.0
   and apply changes.

9. Open an internet browser (preferably Mozilla Firefox).
10. Type in 192.168.16.xx (IP depends on the specific instrument model).
11. If the Ethernet connection is established the WebServer application shall open.

8.2. User access level

User access level to the WebServer is the most basic access type.

If the connection is established successfully, it is possible to log in to the WebServer application.

We can find the IP address of the device in front panel display (more information in point 7.2.1). We can also check the device number on the sticker on the central unit (Figure 91).

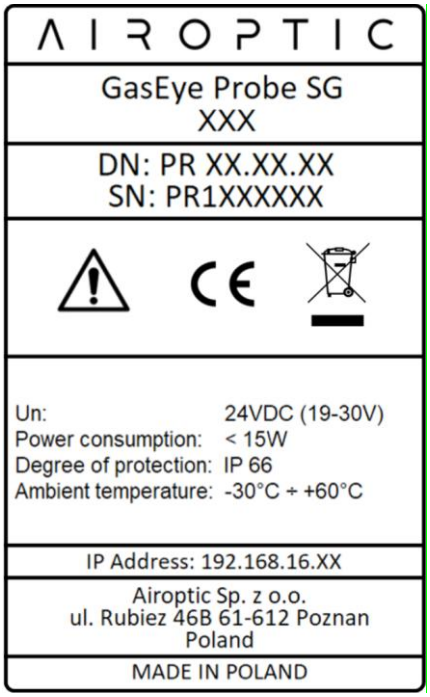


Figure 91. The sticker on the central unit.

After typing in the IP address in the web browser a Login panel shall appear (Figure 92). To log in provide the following information (**case sensitive!**):

Account: GasEYE
Password: #pi3.14

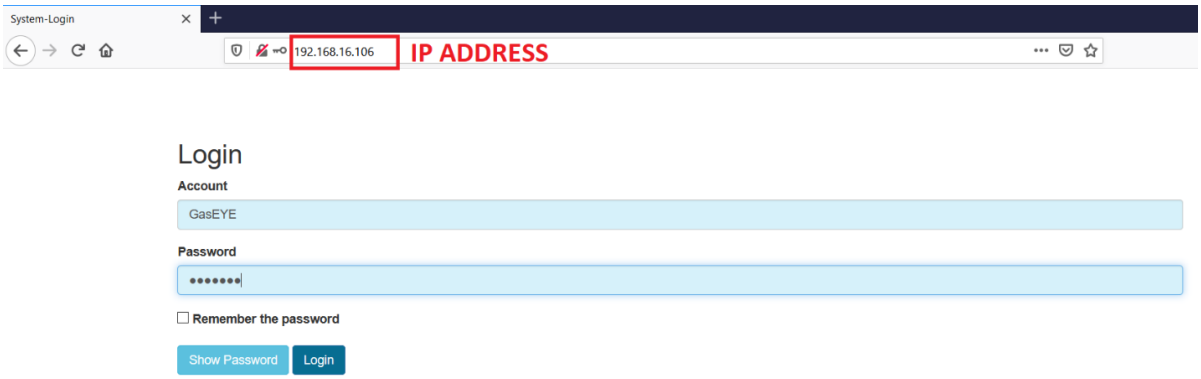


Figure 92. WebServer login page.

There are seven tabs from the left on main bar possible for User access type:

- **Self-Monitoring**
- **Measurements**
- **Parameters**
- **Settings**
- **Factory config**
- **Eventlog**
- **About**

Figure 93. User access level – main bar 1/2.

In the upper right corner of the window logout button can be found:

- **Reboot**
- **Logout (User)**

Figure 94. User access level – main bar 2/2.

8.3. Self-Monitoring

There are 4 columns: Failure, Out of Range, Maintenance, Startup Procedure:

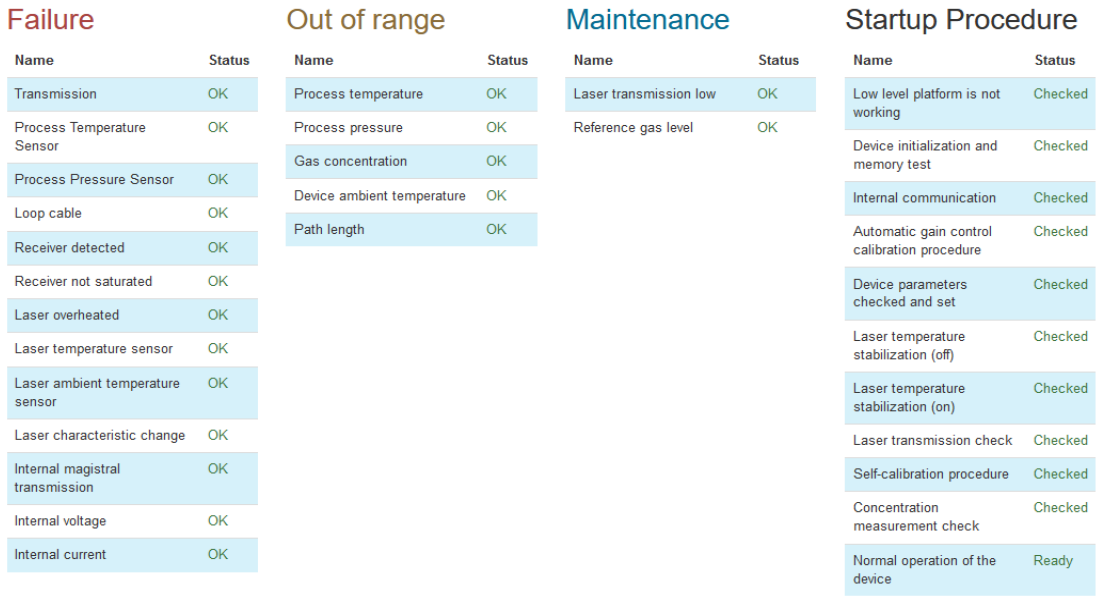


Figure 95. Self-monitoring functionalities

Failure	
Transmission	Transmission level OK/FAIL
Process Temperature Sensor	Process Temperature Sensor OK/FAIL
Process Pressure Sensor	Process Pressure Sensor OK/FAIL
Loop Cable	Loop Cable OK/FAIL
Receiver detected	Receiver detected OK/FAIL
Receiver not saturated	Receiver not saturated OK/FAIL
Laser overheated	Laser overheated OK/FAIL
Laser temperature sensor	Laser temperature sensor OK/FAIL
Laser ambient temperature sensor	Laser ambient temperature sensor OK/FAIL
Laser characteristic change	Laser characteristic change OK/FAIL
Internal magistral transmission	Internal magistral transmission OK/FAIL
Internal voltage	Internal voltage OK/FAIL
Internal current	Internal current OK/FAIL
Out of range	
Process temperature	Checks if Process temperature is in range of application
Process pressure	Checks if Process pressure is in range of application
Gas concentration	Checks if Gas concentration is in range of application
Device ambient temperature	Checks if Device ambient temperature is in range of application
Path length	Checks if Path length is in range of application
Maintenance	
Laser transmission low	Transmission level OK/FAIL
Reference gas level	Reference gas level OK/FAIL
Startup Procedure	
Low level platform is not working	**Internal error occurred. Please contact Airoptic.**
Device initialization and memory test	
Internal communication	
Automatic gain control calibration procedure	
Device parameters chcked and set	
Laser temperature stabilization (off)	
Laser temperature stabilization (on)	
Laser transmission check	No/Low optical transmission. Please check the cleanliness of the process windows.

Self-calibration procedure	Self-calibration procedure error. Please check the device specification (device is used out of the specification and/or the process gas is required for reference purposes).
Concentration measurement check	
Normal operation of the device	Normal operation of the device.

Table 11. Self-monitoring functionalities - description

8.4. Measurement tab

Drop-down menu will appear when clicking on the **Measurements.**

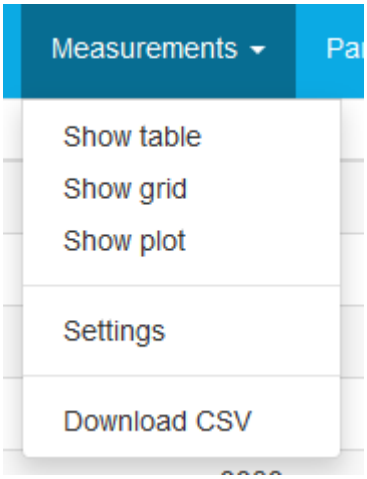


Figure 96. Webserver application - Measurement tab.

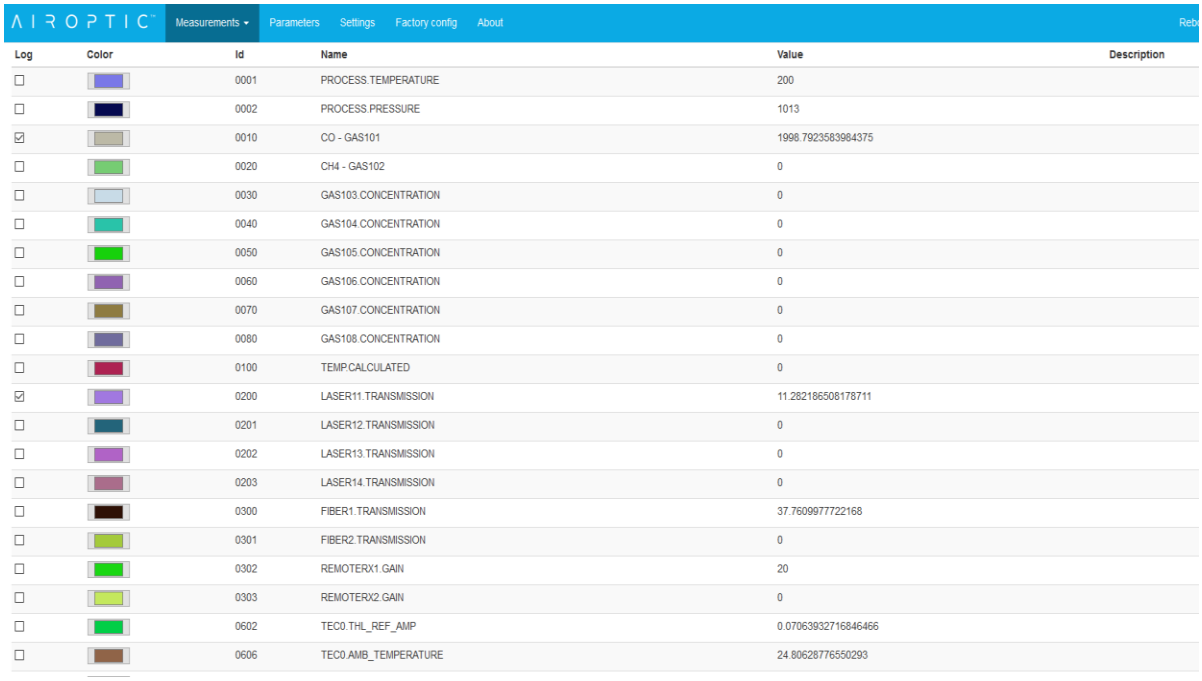
In the Measurement tab there are five functionalities that are accessible by clicking the respective field.

Table 12. Measurement window functionalities.

Show table	Shows table with the variables acquired from the instrument. User can choose which one are plotted by ticking a box next to the demanded variable description.
Show grid	Shows grid with the measurements. Their visibility is not affected by user choice in the table.
Show plot	Activates plot of the variables chosen from the table.
Settings	Opens measurement settings menu.
Download CSV	User may download measurements chosen in the table and save it in a comma-separated (*.csv) format.

8.4.1. Show Table

When Show table is active all analyzer measurements are presented by table view and the user may choose which variables are plotted (when switch to Show plot view) by ticking/unticking the ***Log*** box (See ***Figure 97***). The user may also change the ***Colour*** of the plotted line by clicking on the color box associated with variable.



Log	Color	Id	Name	Value	Description
☐		0001	PROCESS.TEMPERATURE	200	
☐		0002	PROCESS.PRESSURE	1013	
☑		0010	CO - GAS101	1998.7923583984375	
☐		0020	CH4 - GAS102	0	
☐		0030	GAS103.CONCENTRATION	0	
☐		0040	GAS104.CONCENTRATION	0	
☐		0050	GAS105.CONCENTRATION	0	
☐		0060	GAS106.CONCENTRATION	0	
☐		0070	GAS107.CONCENTRATION	0	
☐		0080	GAS108.CONCENTRATION	0	
☐		0100	TEMP.CALCULATED	0	
☑		0200	LASER11.TRANSMISSION	11.282186508178711	
☐		0201	LASER12.TRANSMISSION	0	
☐		0202	LASER13.TRANSMISSION	0	
☐		0203	LASER14.TRANSMISSION	0	
☐		0300	FIBER1.TRANSMISSION	37.7609977722168	
☐		0301	FIBER2.TRANSMISSION	0	
☐		0302	REMOTERX1.GAIN	20	
☐		0303	REMOTERX2.GAIN	0	
☐		0602	TEC0.THL_REF_AMP	0.07063932716846466	
☐		0606	TEC0.AMB_TEMPERATURE	24.80628776550293	

Figure 97. Measurements Show table view.

Log	Color	Id	Name	Value	Description
☑		0001	PROCESS.TEMPERATURE	200	
☐		0002	PROCESS.PRESSURE	1013	
☑		0010	CO - GAS101	0	
☐		0020	CH4 - GAS102	0.0569089129567146 3	
☐		0030	GAS103.CONCENTRATION	0	
☐		0040	GAS104.CONCENTRATION	0	
☐		0050	GAS105.CONCENTRATION	0	

Figure 98. Excerpt from Measurement Table.

8.4.2. Show Grid

The measurements may be presented in a grid view. In this view mode measurements are group into groups and subgroups and additional left menu appears to choose subgroups to present. (Subgroups can by hide/show by clicking on the group name – black font).

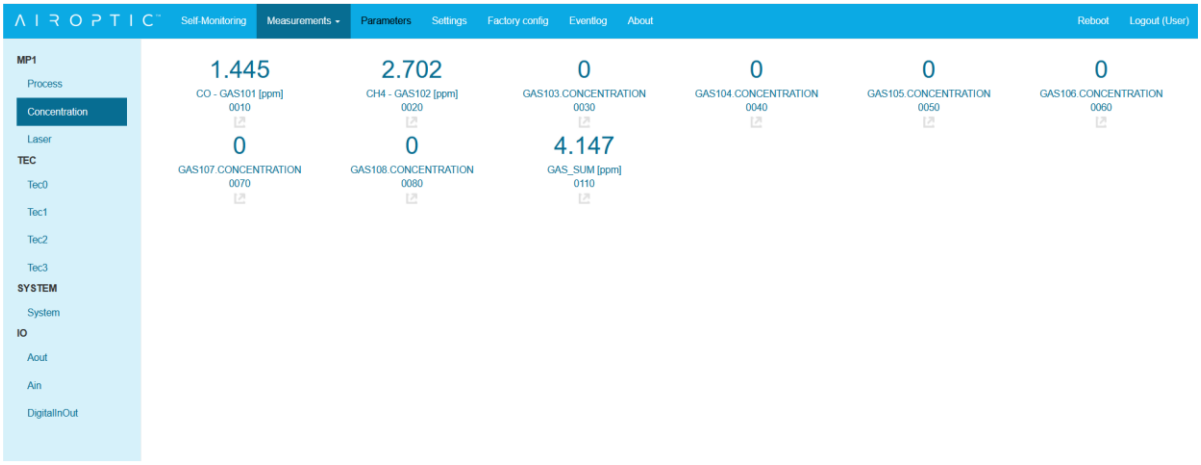


Figure 99. Measurements Show grid view.

In grid mode everyone measurement can by presented in new screen by “clicking” icon .

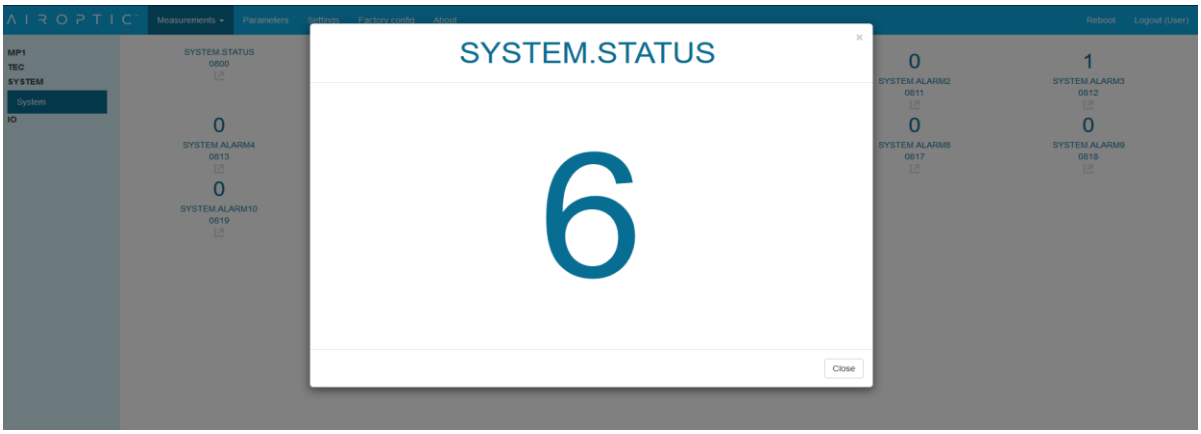


Figure 100. Present measurement value in separate screen.

In grid view some measurements can be marked by NC or Err flag. NC flag means that measurement is not connected or not used in configuration. Err flag means that error is detected on measurement.

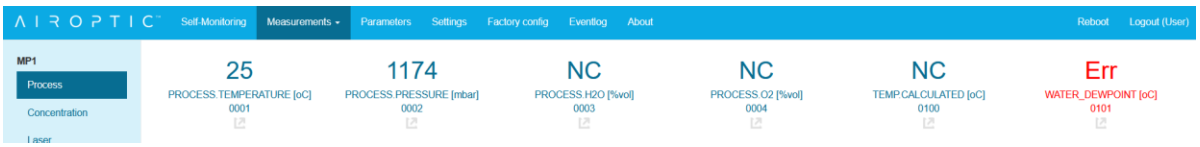


Figure 101. Presented data with additional flag detected.

8.4.1. Show Plot

With variables chosen in the table view the user may visually present the measurements in a form of a plot.

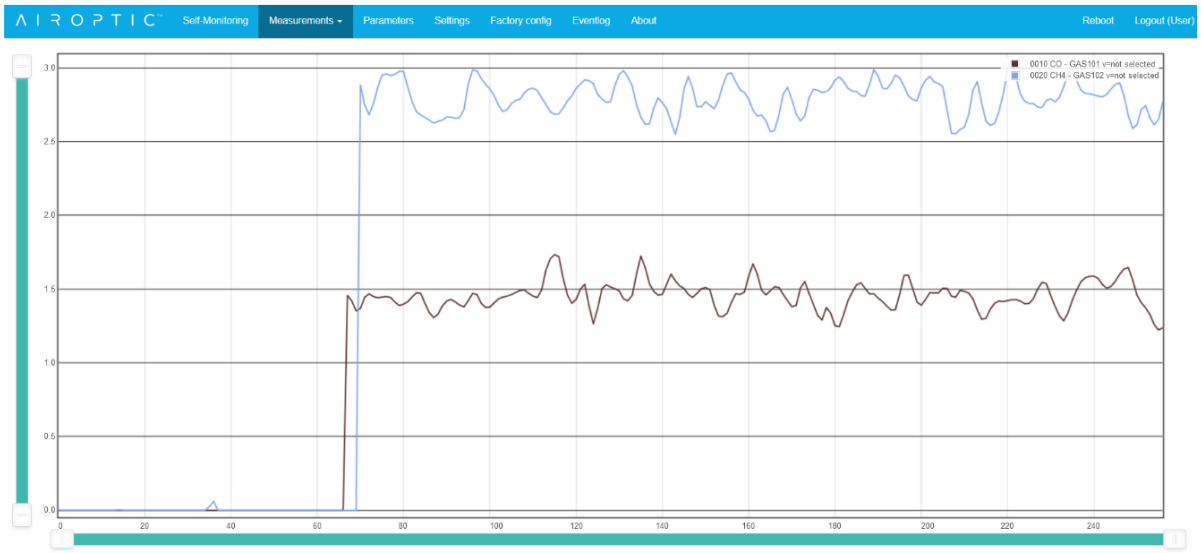


Figure 102. Plot Window.

In the Table 13 below the functionalities of the Plot Window are described.

	Toggle between start/stop of the measurement. By clicking stop the acquiring is paused and the data is preserved. Upon resuming, by clicking Start, the measurement logging continues from the last recorded data point.
	Clears the memory and deletes all of the recorded data. Prior to clicking this button, it is advised to save your measurements! Data loss is irreversible!
	User can define sample time in milliseconds. This parameter dictates how often the data will be acquired from the instrument.

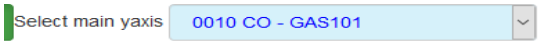
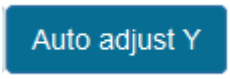
	User can define how many samples will be stored in the hardware during the session. When the sample limit is reached the oldest logged data points will be overwritten and the log will continue.
	Toggle between single yaxis/Multi yaxes. This option applies when more than one measurement is chosen from the table to be plotted.
	For Multi yaxes mode user can choose which y-axis is main for the plot drawing.
	Automatically adjusts the y-axis limits to fit the plot inside the plot window. The action is instantaneous and is not recurring.
	Manual y-axis minimum value.
	Manual y-axis maximum value.

Table 13. Plot Window functionalities.

8.4.2. Settings

In the Settings window, the user can choose the sample time (in milliseconds) and limit of the sample points to be plotted (log points). It is not recommended to exceed the limit of 100,000 points

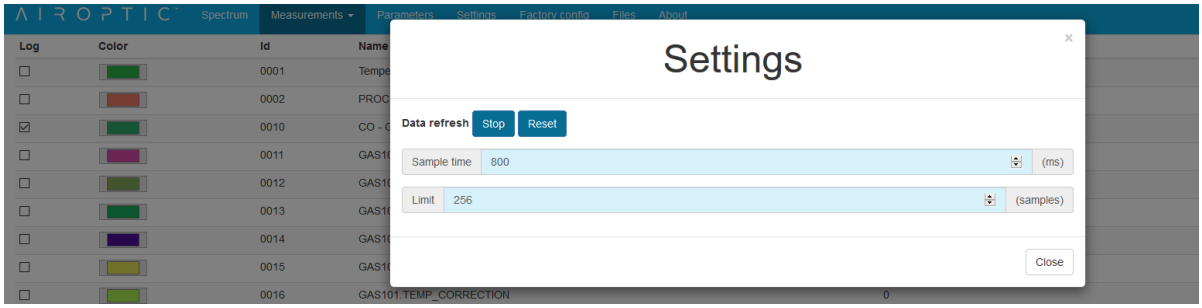


Figure 103. Modal window Settings.

8.4.3. Measurement Groups

There are four groups on the left side panel:

- MP1
- TEC
- SYSTEM
- IO

8.4.3.1. MP1 -> Process

Submodule displays basic process environment measurements.

Process measurements	
Name	**Description**
PROCESS.TEMPERATURE	Process temperature set by Parameters->MP1->Process
PROCESS.PRESSURE	Process temperature set by Parameters->MP1->Process
TEMP.CALCULATED	Only applicable in oxygen analyzers on special request
PROCESS.H2O	Process temperature set by Parameters->MP1->Process
PROCESS.O2	Process temperature set by Parameters->MP1->Process
WATER_DEWPOINT	Water dewpoint based on pressure provided by user

Table 14. Process measurement list.

Figure 104. Process measurements window.

8.4.3.2. MP1 -> Concentration

Submodule displays gases concentration.

Concentration measurements	
Name	**Description**
GAS101.CONCENTRATION	Gas concentration
GAS102.CONCENTRATION	Gas concentration
GAS103.CONCENTRATION	Gas concentration
GAS104.CONCENTRATION	Gas concentration
GAS105.CONCENTRATION	Gas concentration
GAS106.CONCENTRATION	Gas concentration
GAS107.CONCENTRATION	Gas concentration
GAS108.CONCENTRATION	Gas concentration

Table 15. Concentration measurement list.

Figure 105. Concentration measurements window.

8.4.3.3. MP1 -> Laser

Submodule displays transmission quality (power) between Transmitter and Receiver.

Laser measurements	
Name	**Description**
LASER11.TRANSMISSION	Laser transmission quality
LASER12.TRANSMISSION	Laser transmission quality
LASER13.TRANSMISSION	Laser transmission quality
LASER14.TRANSMISSION	Laser transmission quality
FIBER1. TRANSMISSION	Loop cable transmission
FIBER2. TRANSMISSION	Loop cable transmission
REMOTERX1.GAIN	Remote receiver gain 1
REMOTERX2.GAIN	Remote receiver gain 2

Table 16. Laser measurement list.

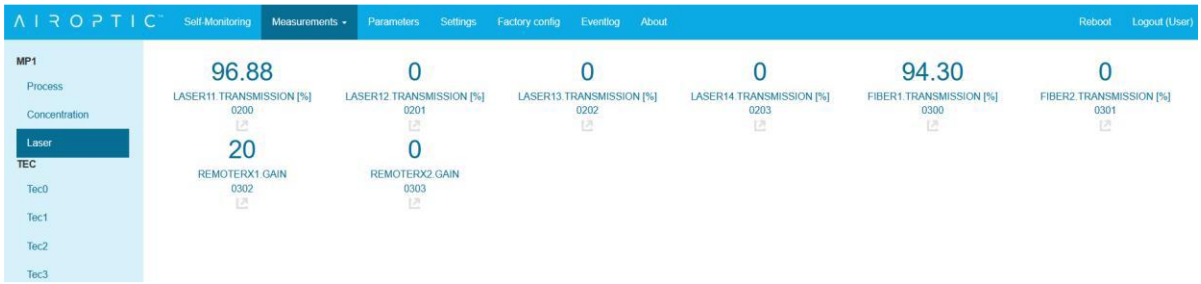


Figure 106. Laser measurements window.

8.4.3.4. TEC -> Tec0

Submodule displays measurement from first laser temperature control module.

Laser measurements	
Name	**Description**
TEC0.THL_REF_AMP	Reference gas amplitude
TEC0.AMB_TEMPERATURE	Laser ambient temperature

Table 17. Laser measurement list – Laser1 temperature control module.

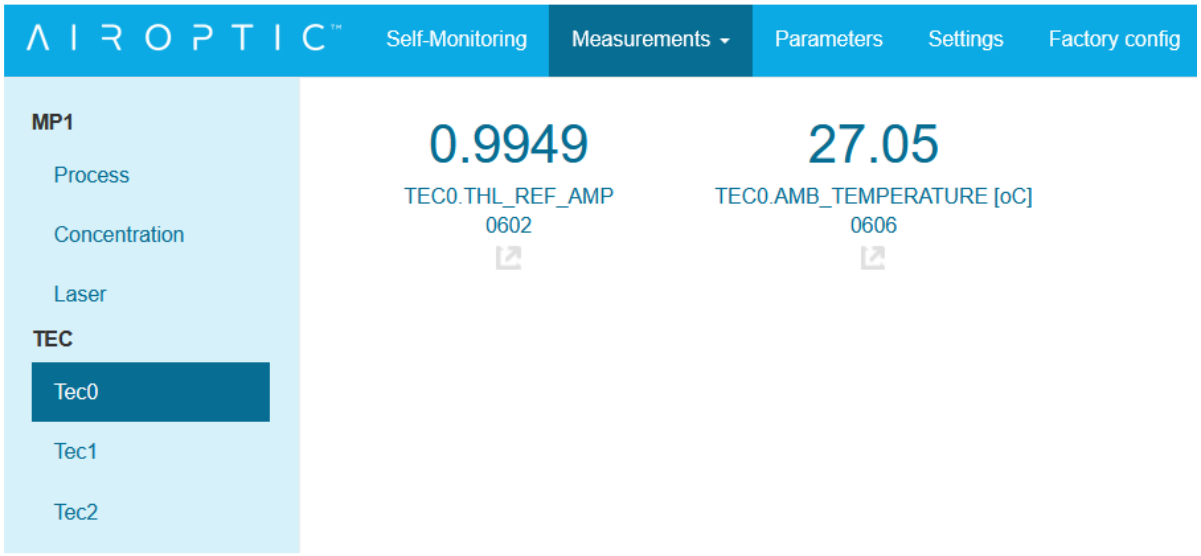


Figure 107. Laser temperature control module measurements window – Laser1.

8.4.3.5. TEC -> Tec1

Submodule displays measurement from second laser temperature control module.

Laser measurements	
Name	**Description**
TEC1.THL_REF_AMP	Reference gas amplitude
TEC1.AMB_TEMPERATURE	Laser ambient temperature

Table 18. Laser measurement list – Laser2 temperature control module.

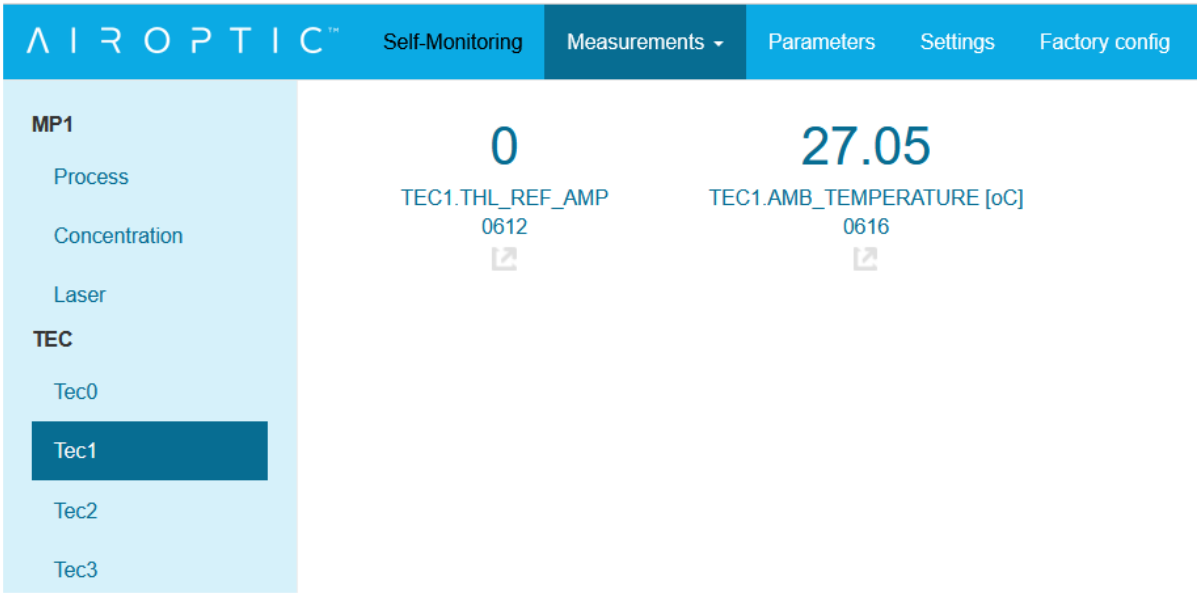


Figure 108. Laser temperature control module measurements window – Laser2.

8.4.3.6. TEC -> Tec2

Submodule displays measurement from third laser temperature control module.

Laser measurements	
Name	**Description**
TEC2.THL_REF_AMP	Reference gas amplitude
TEC2.AMB_TEMPERATURE	Laser ambient temperature

Table 19. Laser measurement list – Laser3 temperature control module.

Figure 109. Laser temperature control module measurements window - Laser3.

8.4.3.7. TEC -> Tec3

Submodule displays measurement from fourth laser temperature control module.

Laser measurements	
Name	**Description**
TEC3.THL_REF_AMP	Reference gas amplitude
TEC3.AMB_TEMPERATURE	Laser ambient temperature

Table 20. Laser measurement list – Laser4 temperature control module.

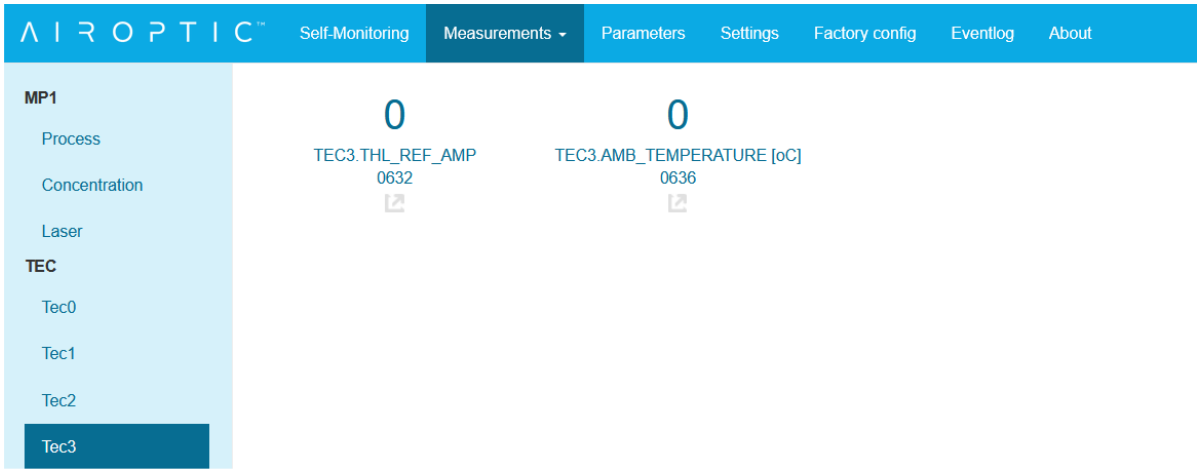


Figure 110. Laser temperature control module measurements window - Laser4.

8.4.3.8. System -> System

Submenu displays system health.

System measurements	
Name	**Description**
SYSTEM.STATUS	6 – system ready
SYSTEM.STARTUP_PROCEDURE	Values described in page **Błąd! Nie zdefiniowano zakładki.**
SYSTEM.TRANS_MP1_STATUS	1 - laser is working properly 0 – warning
SYSTEM.ALARM 1	Status value for alarm 1
SYSTEM.ALARM 2	Status value for alarm 2
SYSTEM.ALARM 3	Status value for alarm 3
SYSTEM.ALARM 4	Status value for alarm 4
SYSTEM.ALARM 5	Status value for alarm 5
SYSTEM.ALARM 6	Status value for alarm 6
SYSTEM.ALARM 7	Status value for alarm 7
SYSTEM.ALARM 8	Status value for alarm 8
SYSTEM.ALARM 9	Status value for alarm 9
SYSTEM.ALARM 10	Status value for alarm 10

Table 21. System measurement list.

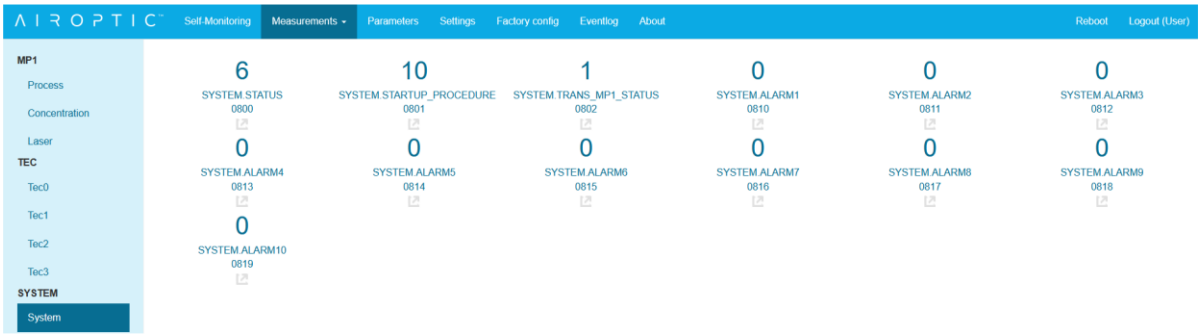


Figure 111. System measurements window.

8.4.3.9. IO -> Aout (Analog output measurement)

Submenu displays 4 analog output channels set values

Analog outputs measurements	
Name	**Description**
AOUT1	Output value for analog output 1
AOUT2	Output value for analog output 2
AOUT3	Output value for analog output 3
AOUT4	Output value for analog output 4

Table 22. Analog outputs measurements list.

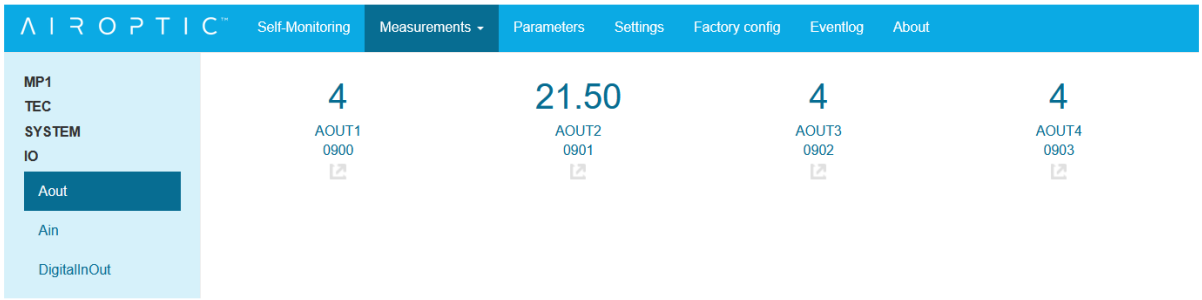


Figure 112. Analog output measurements window.

8.4.3.10. IO -> Ain (Analog input measurement)

Submenu displays 4 analog input channels.

Analog inputs measurements	
Name	**Description**
AIN1	Raw analog input value measured in mA
AIN1.VAL	Scaled value according to configuration set in Parameters->Ain
AIN2	Raw analog input value measured in mA
AIN2.VAL	Scaled value according to configuration set in Parameters->Ain
AIN3	Raw analog input value measured in mA
AIN3.VAL	Scaled value according to configuration set in Parameters->Ain
AIN4	Raw analog input value measured in mA
AIN4.VAL	Scaled value according to configuration set in Parameters->Ain
RTD	Temperature read from resistance sensor (PT100/PT1000)
AMB_PRESSURE	Ambient pressure read from sensor put on host board

Table 23. Analog inputs measurements list.

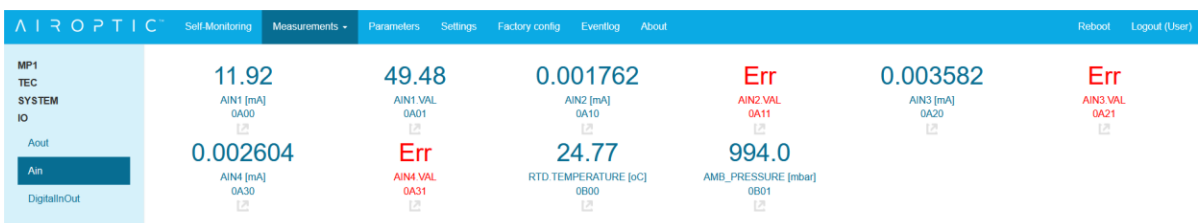


Figure 113. Analog input measurements window

8.4.3.11. IO -> DigitalInOut

Submenu displays 8 digital inputs and 8 digital outputs values.

Digital inputs/outputs measurements	
Name	**Description**
DOUT1	Output value for digital output pin 1
DOUT2	Output value for digital output pin 2
DOUT3	Output value for digital output pin 3
DOUT4	Output value for digital output pin 4
DOUT5	Output value for digital output pin 5
DOUT6	Output value for digital output pin 6
DOUT7	Output value for digital output pin 7
DOUT8	Output value for digital output pin 8
DIN1	Input value for digital input pin 1
DIN2	Input value for digital input pin 2
DIN3	Input value for digital input pin 3
DIN4	Input value for digital input pin 4
DIN5	Input value for digital input pin 5
DIN6	Input value for digital input pin 6
DIN7	Input value for digital input pin 7
DIN8	Input value for digital input pin 8

Table 24. Digital inputs/outputs measurements list.

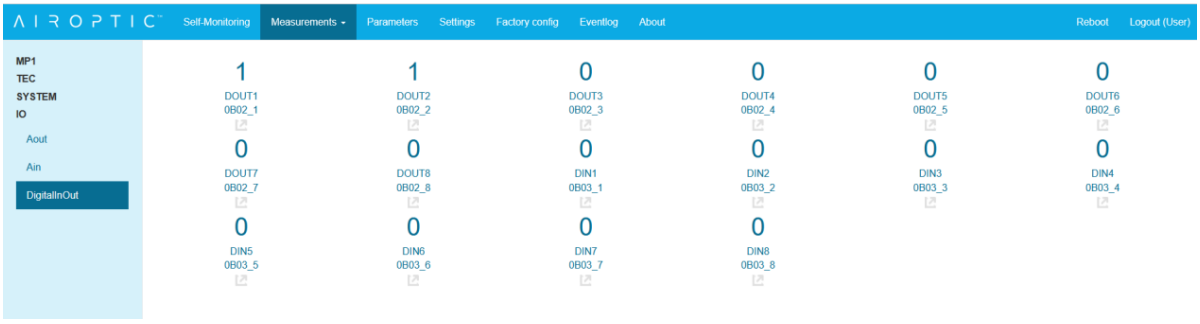


Figure 114. Digital input and output measurements window.

8.5. Parameters tab

In the User access mode it is possible to access and edit various parameters, see Figure 115.

If external temperature or pressure signals are fed into the analog ports they need to be configured in this tab. Analog output signals can also be extracted from the instrument and shall be configured in the Parameters tab. By default, there are signals assigned to the analog inputs/outputs.

If other configuration than the default is needed, please use the respective fields to define the required signal. **For detailed information about each of the parameters please refer to the full list in the Appendix 1.**

Please note that for the proper measurement of the concentration the user must provide the actual path length determined at the installation site (in meters).

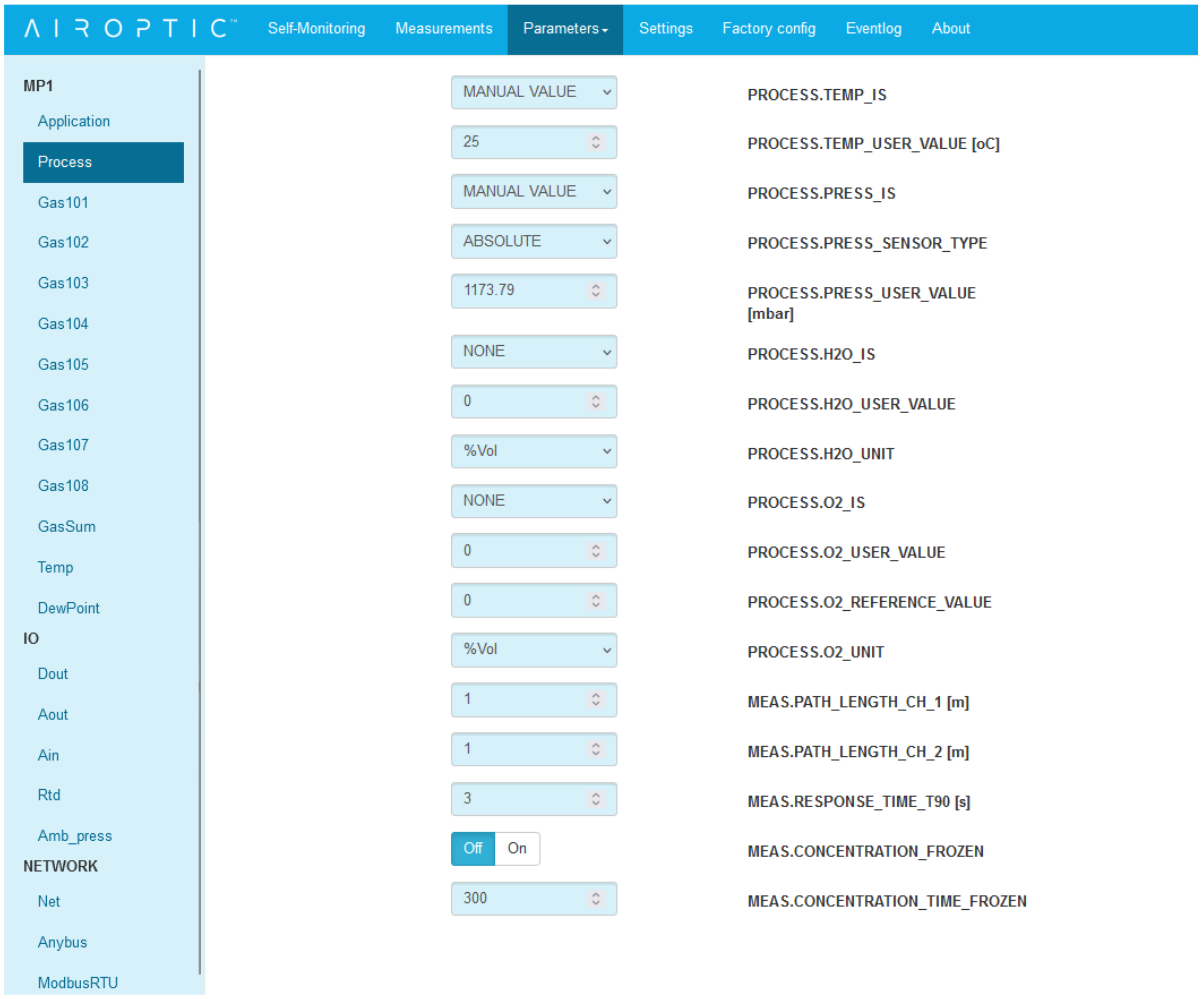


Figure 115. Process parameters window

In order to change the value or setting of chosen parameter the user shall click on the field that intends to change i.e. optical path length. By clicking on the light blue box, the edition mode is activated. The value is changed by typing in the new value.

To apply changes, click on the **Send** button that will appear next to the edited field. The same method applies to a drop-down menu changes. Dark blue background indicates that the value has been changed but has not been applied yet.

If changes where made the **Send&Save** button becomes active. By clicking it the changes are permanently stored in the analyzer firmware.

Drop-down menu will appear when clicking on the **Parameters.**

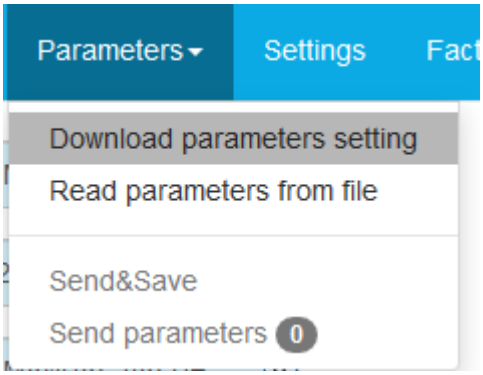


Figure 116. Webserver application - parameters Window.

Download parameters setting	Current parameter list can be downloaded to a *.txt file.
Read parameters from file	Previously saved parameter list can be read from a *.txt file.
Send & Save	Current parameter list is saved and sent to the instrument.
Send parameters	All parameters that have been changed are sent at once. Number in oval indicates the number of parameters that will be applied.

Table 25. Parameter Window functionalities.

8.5.1. Parameter groups

There are four main groups visible on the left panel:

- MP1
- IO
- NETWORK
- SYSTEM

8.5.1.1. MP1 -> Process (Process environment configuration)

Process parameters	
Name	**Description**
PROCESS.TEMP_IS	Select temperature sensor source. (Table)
PROCESS.TEMP_USER_VALUE	Temperature value in manual mode
PROCESS.PRESS_IS	Select pressure sensor source (Table)
PROCESS.PRESS_SENSOR_TYPE	Select sensor pressure type (Table)
PROCESS.PRESS_USER_VALUE	Pressure value in manual mode
MEAS.PATH_LENGTH_CH_1	Length between transmitter and receiver
MEAS.PATH_LENGTH_CH_2	Length between transmitter and receiver
MEAS.RESPONSE_TIME_T90	Time response for infinite impulse filter

Temperature sensor source	
Name	**Description**
MANUAL VALUE	Value is set manually by user from WebServer interface.
AIN1 AIN2 AIN3 AIN4	Temperature sensor is connected to analog input socket
AIN-RTD	Resistance temperature sensor
INDUSTRY_PROTOCOL	Temperature is sent by industry protocol
TEMP.CALCULATED	Only applicable in oxygen analyzers on special request

TCU1.P1_TEMPERATURE TCU1.P2_TEMPERATURE TCU1.P3_TEMPERATURE TCU1.P4_TEMPERATURE TCU1.P5_TEMPERATURE TCU1.P6_TEMPERATURE TCU1.P7_TEMPERATURE TCU1.P8_TEMPERATURE TCU2.P1_TEMPERATURE TCU2.P2_TEMPERATURE TCU2.P3_TEMPERATURE TCU2.P4_TEMPERATURE TCU2.P5_TEMPERATURE TCU2.P6_TEMPERATURE TCU2.P7_TEMPERATURE TCU2.P8_TEMPERATURE	Extractive devices only (not applicable in Probe)

Table 26. Temperature sensor source list.

Pressure sensor source	
Name	**Description**
MANUAL VALUE	Value is set manually by user from WebServer interface.
AIN1 AIN2 AIN3 AIN4	Pressure sensor is connected to analog input socket
AMBIENT-PRESSURE	Pressure is gotten from build-in sensor
INDUSTRY_PROTOCOL	Pressure is sent by industry protocol
PCU1 PCU2 PCU3 PCU4	Extractive devices only (not applicable in Probe)

Table 27. Pressure sensor source list.

Pressure sensor type	
Name	**Description**
ABSOLUTE	Absolute pressure sensor
GAUGE	Gauge pressure sensor

Table 28. Pressure sensor type list.

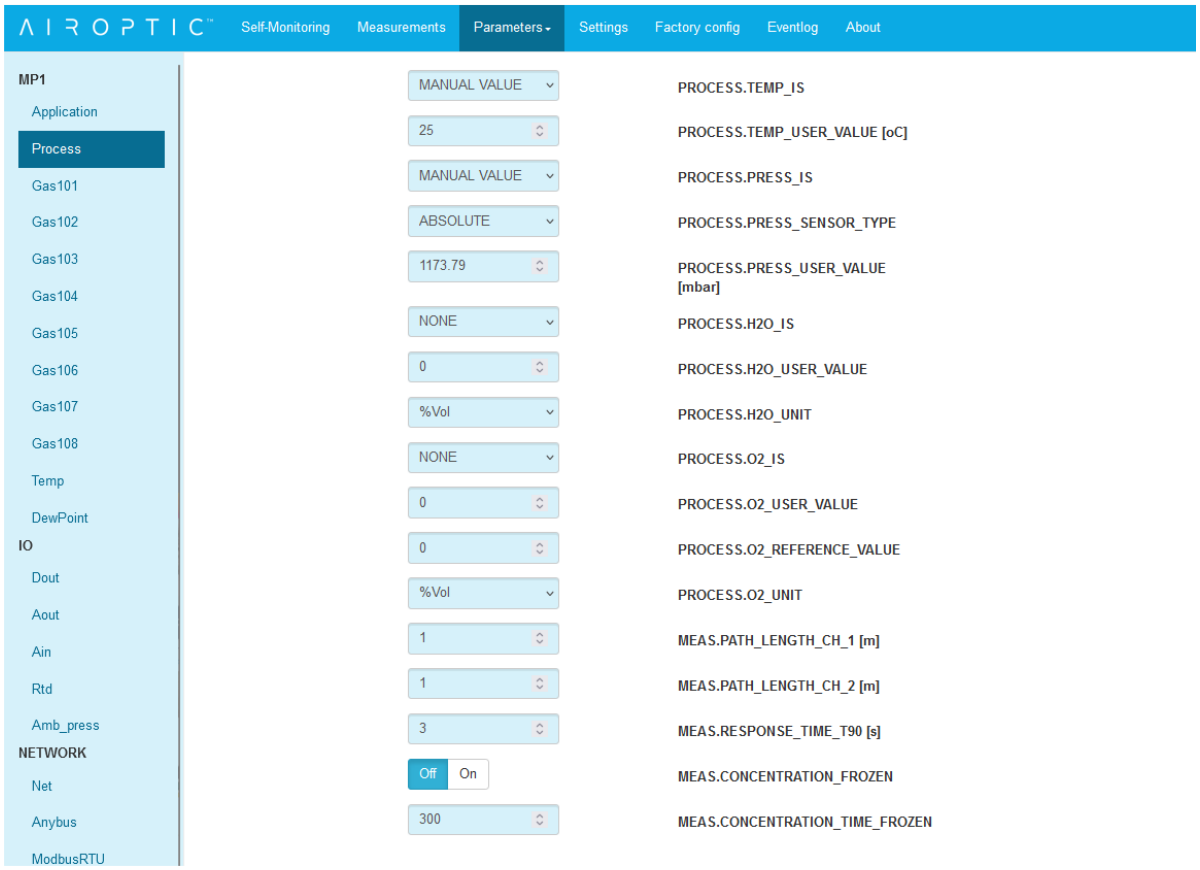


Figure 117. Process parameters window

8.5.1.2. MP1 -> Gas101

Gas parameters	
Name	**Description**
GAS101.SPAN_CALIBRATION	Multiplier of the measured concentration GAS101. 1 – factory value of multiplier
GAS101.OFFSET	Offset from measured concentration GAS101

Table 29. GAS101 parameters list.

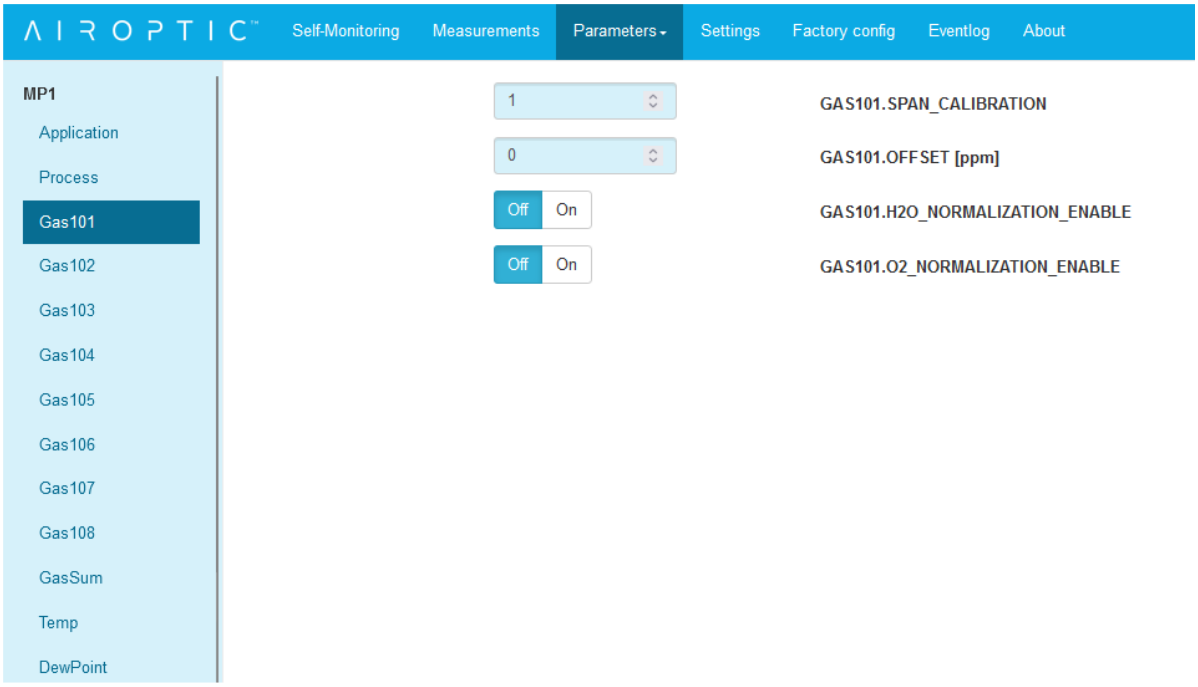


Figure 118. GAS101 parameters window

8.5.1.3. MP1 -> Gas102

Gas parameters	
Name	**Description**
GAS102.SPAN_CALIBRATION	Multiplier of the measured concentration GAS102. 1 – factory value of multiplier
GAS102.OFFSET	Offset from measured concentration GAS102 value

Table 30. GAS102 parameters list.

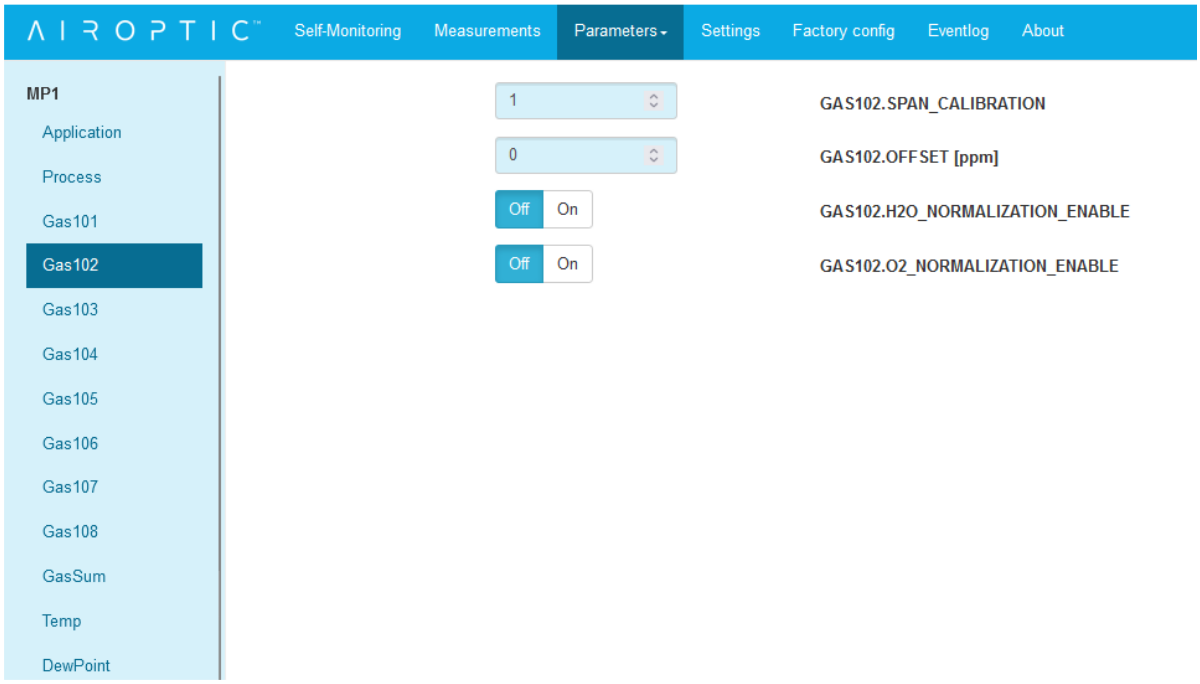


Figure 119. GAS102 parameters window.

8.5.1.4. MP1 -> Gas103

Gas parameters	
Name	**Description**
GAS103.SPAN_CALIBRATION	Multiplier of the measured concentration GAS103. 1 – factory value of multiplier
GAS103.OFFSET	Offset from measured concentration GAS103 value

Table 31. GAS103 parameters list.

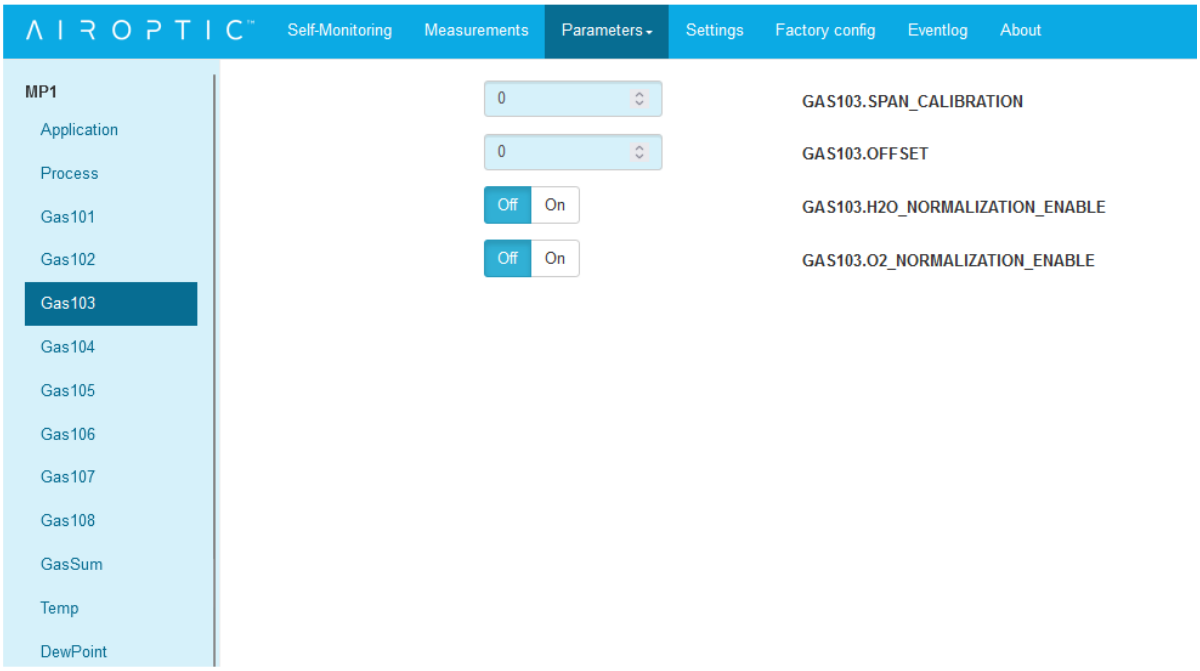


Figure 120. GAS103 parameters window

8.5.1.5. MP1 -> Gas104

Gas parameters	
Name	**Description**
GAS104.SPAN_CALIBRATION	Multiplier of the measured concentration GAS104. 1 – factory value of multiplier
GAS104.OFFSET	Offset from measured concentration GAS104 value

Table 32. GAS104 parameters list.

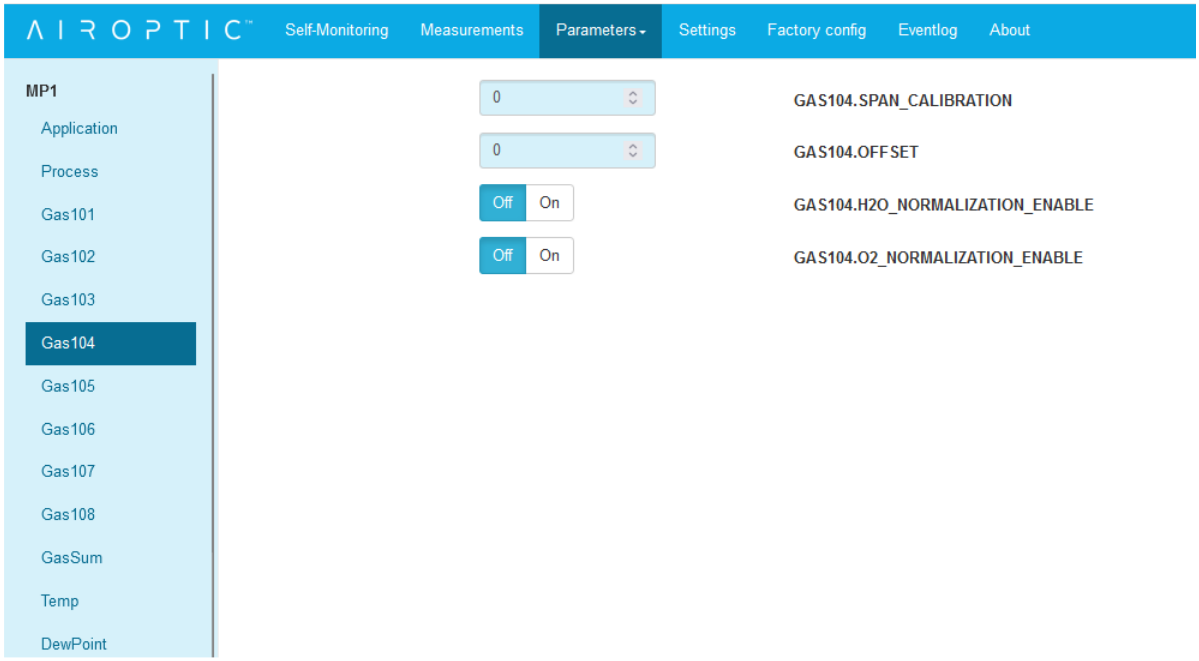


Figure 121. GAS104 parameters window

8.5.1.6. MP1 -> Gas105

Gas parameters	
Name	**Description**
GAS105.SPAN_CALIBRATION	Multiplier of the measured concentration GAS105. 1 – factory value of multiplier
GAS105.OFFSET	Offset from measured concentration GAS105 value

Table 33. GAS105 parameters list.

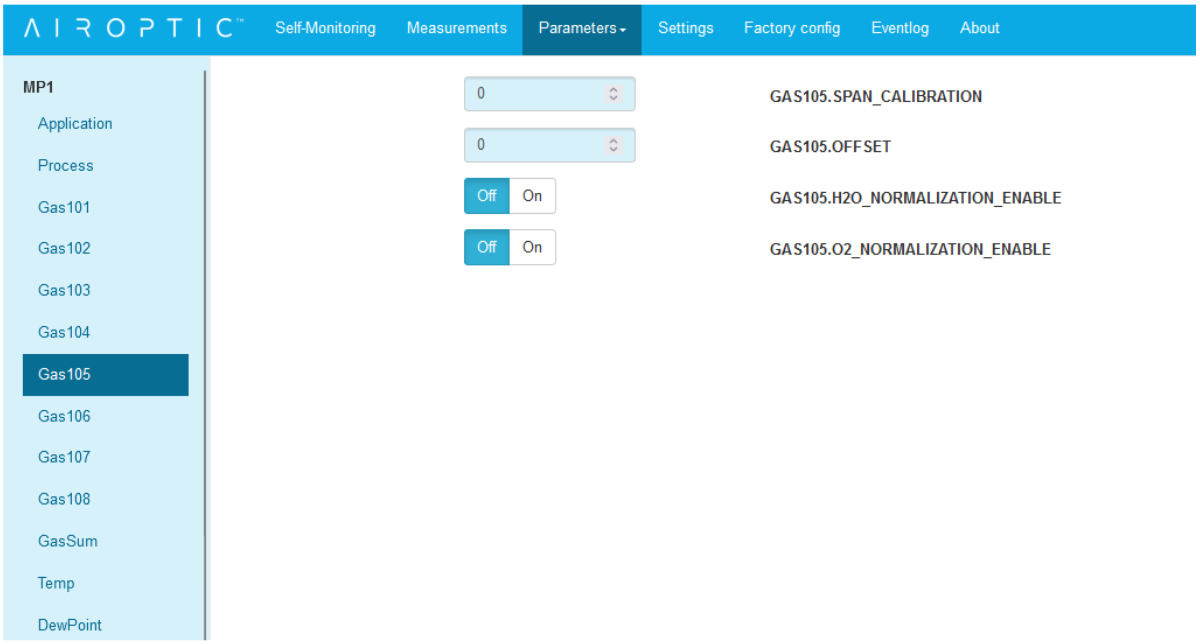


Figure 122. GAS105 parameters window.

8.5.1.7. MP1 -> Gas106

Gas parameters	
Name	**Description**
GAS106.SPAN_CALIBRATION	Multiplier of the measured concentration GAS106. 1 – factory value of multiplier
GAS106.OFFSET	Offset from measured concentration GAS106 value

Table 34. GAS106 parameters list.

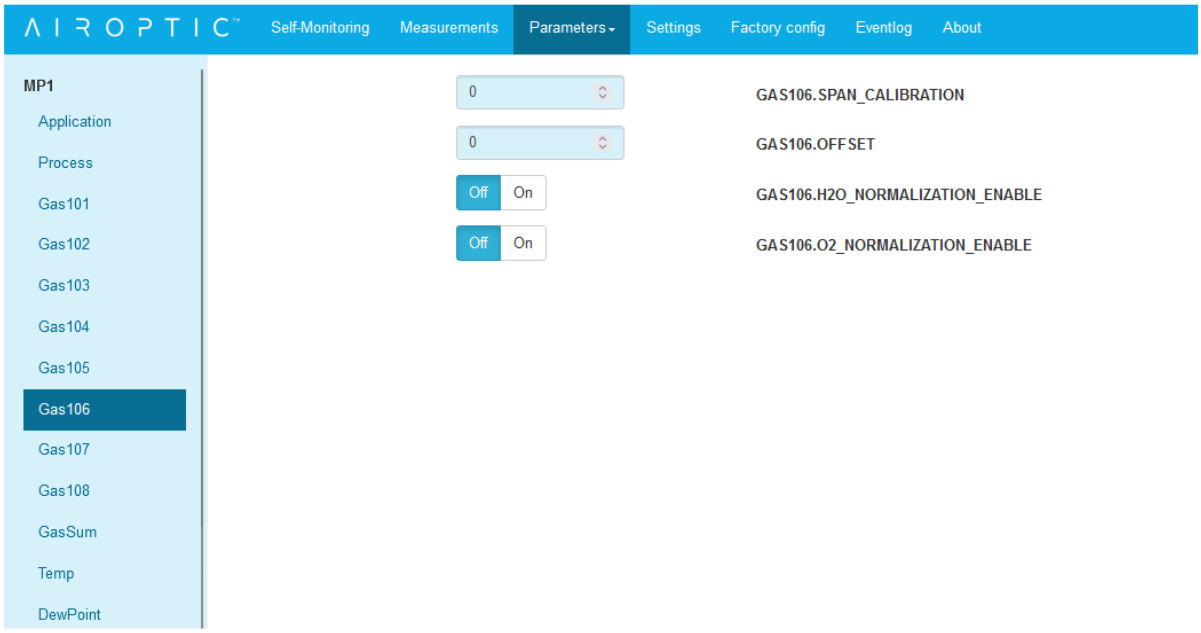


Figure 123. GAS106 parameters window

8.5.1.8. MP1 -> Gas107

Gas parameters	
Name	**Description**
GAS107.SPAN_CALIBRATION	Multiplier of the measured concentration GAS107. 1 – factory value of multiplier
GAS107.OFFSET	Offset from measured concentration GAS107 value

Table 35. GAS107 parameters list.

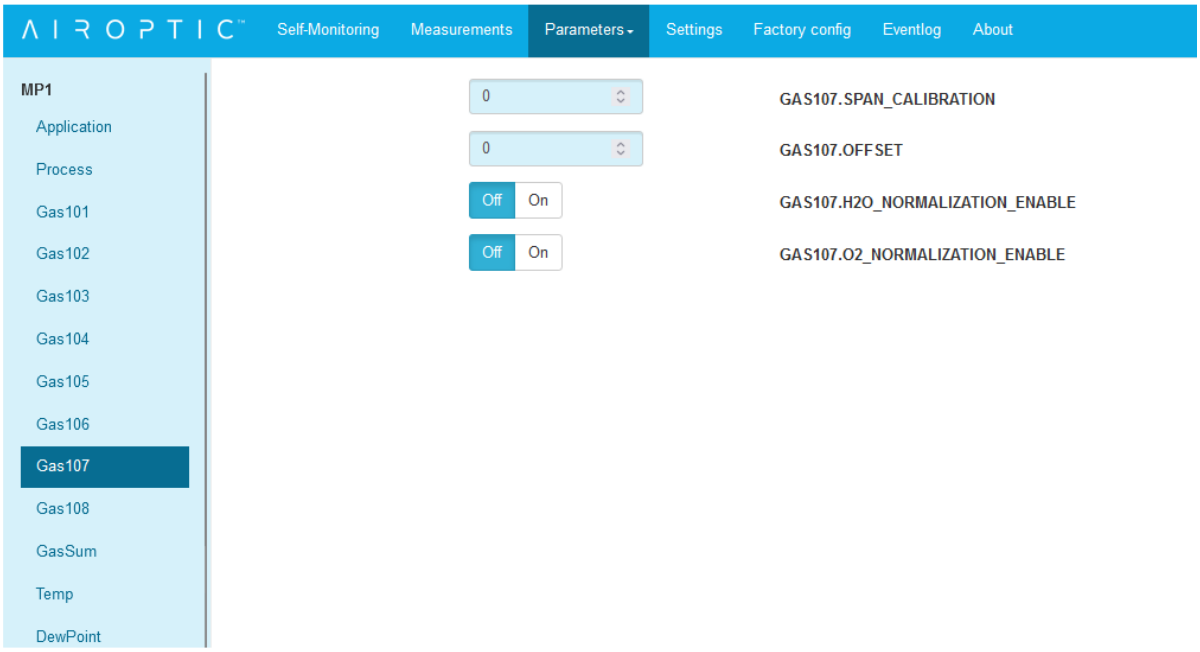


Figure 124. GAS107 parameters window.

8.5.1.9. MP1 -> Gas108

Gas parameters	
Name	**Description**
GAS108.SPAN_CALIBRATION	Multiplier of the measured concentration GAS108. 1 – factory value of multiplier
GAS108.OFFSET	Offset from measured concentration GAS108 value

Table 36. GAS108 parameters list.

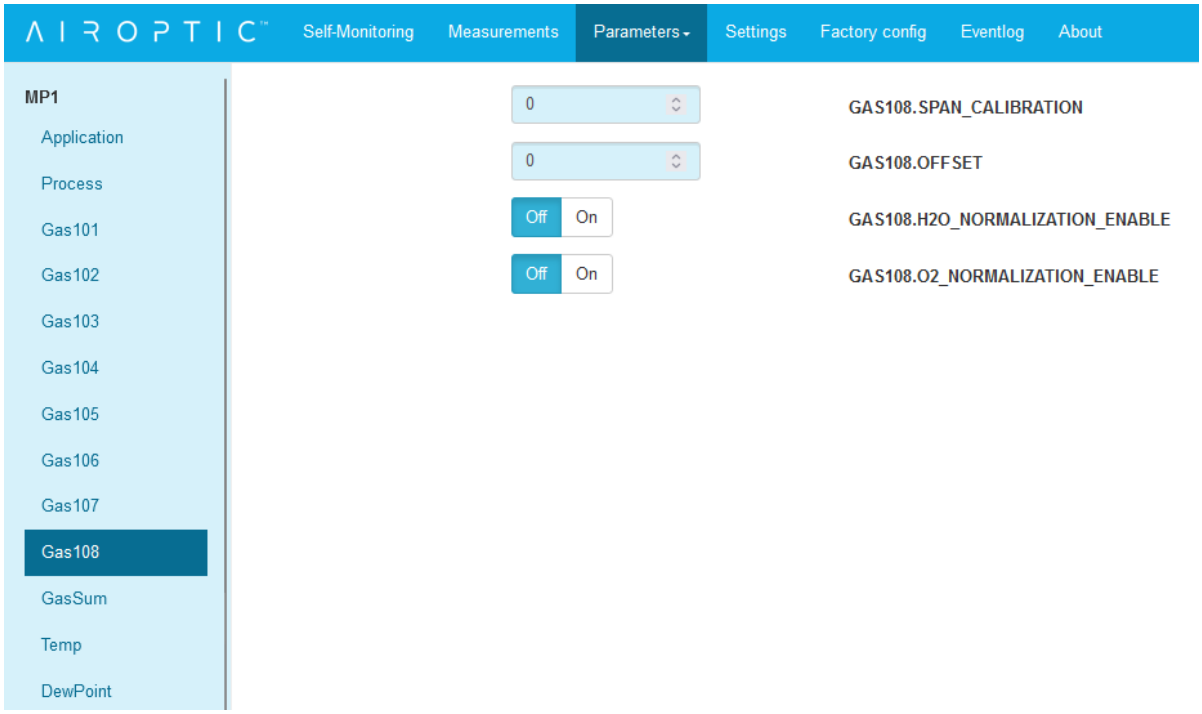


Figure 125. GAS108 parameters window.

8.5.1. MP1 -> Gas_Sum (on application request)

Gas_Sum	
Name	**Description**
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS101
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS102
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS103
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS104
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS105
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS106
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS107
GAS_SUM.GAS101_ENABLE	On/Off GAS_SUM.GAS108

Table 37. Gas_Sum parameters window.

8.5.1.1. MP1 -> Temp

Temperature parameters	
Name	**Description**
TEMP.SPAN_CALIBRATION	Multiplier of the measured temperature. 1 – factory value of multiplier
TEMP.OFFSET	Offset from measured temperature

Table 38. Temperature parameters list.

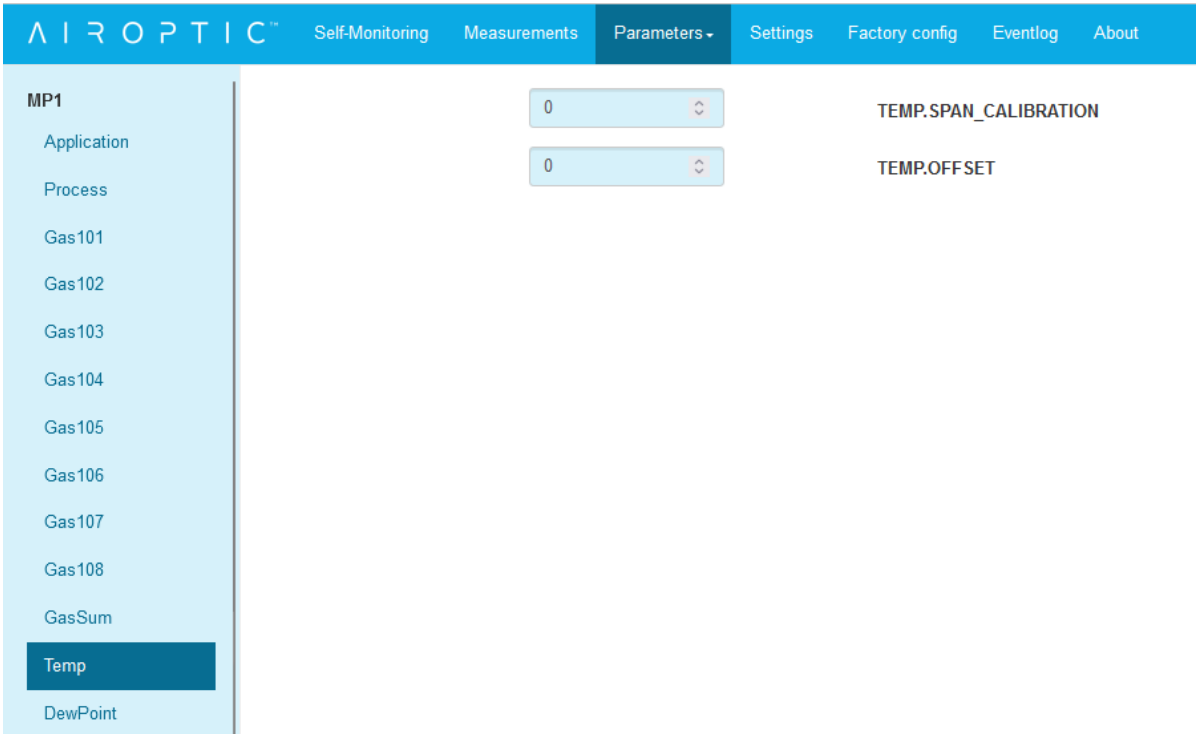


Figure 126. Temperature parameters window.

8.5.1.2. IO -> Dout (Digital output operating mode configuration)

Digital outputs parameters	
Name	**Description**
DOUT.DO1	Configuration of first digital output (Available operating mode see Table)
DOUT.DO2	Configuration of second digital output (Available operating mode see Table)
DOUT.DO3	Configuration of third digital output (Available operating mode see Table)

DOUT.DO4	Configuration of fourth digital output (Available operating mode see Table)
DOUT.DO5	Configuration of fifth digital output (Available operating mode see Table)
DOUT.DO6	Configuration of sixth digital output (Available operating mode see Table)
DOUT.DO7	Configuration of seventh digital output (Available operating mode see Table)
DOUT.DO8	Configuration of eight digital output (Available operating mode see Table)

Table 39. Digital outputs list.

Select digital output operating mode	
Name	**Description**
ON	Set the digital output to high.
OFF	Set the digital output to low.
SYSTEM STATUS	Set the digital output to high when system status is 6. Signals the correct operation of the system.
TRANSMISSION STATUS	Set the digital output to high when transmission status is 1. Signals correct laser transmission.
SYSTEM_ALARM1 SYSTEM_ALARM2 SYSTEM_ALARM3 SYSTEM_ALARM4 SYSTEM_ALARM5 SYSTEM_ALARM6 SYSTEM_ALARM7 SYSTEM_ALARM8 SYSTEM_ALARM9 SYSTEM_ALARM10	Set the digital output to opposite when condition from specific alarm occurs
ALARM_PUMP1 ALARM_PUMP2 ALARM_PUMP3 ALARM_PUMP4	Extractive devices only (not applicable in Probe) Set the digital output to high when is a pump error
RED_LASER_ON	Open path devices only

Table 40. Digital output operating mode list.

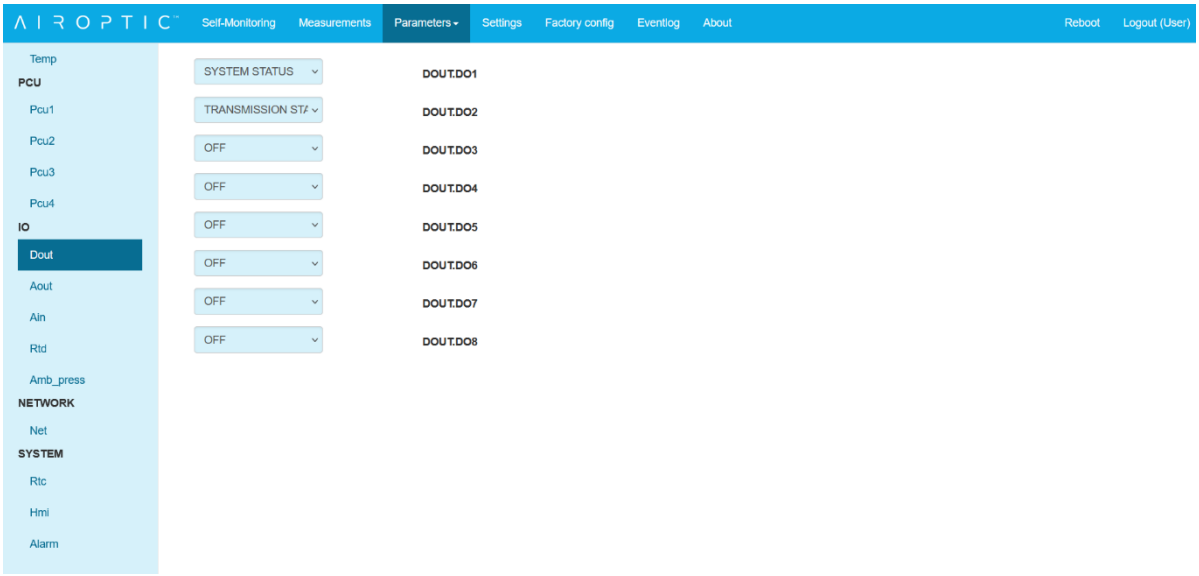


Figure 127. Dout parameters window.

8.5.1.3. IO -> Aout (Analog output configuration)

Analog value is scaled to a defined range and set to the specific output.
Formula used to calculate output value:

$$Aout = 4 + \frac{MANUAL\_VALUE\ -\ SCALE\_MIN}{SCALE\_MAX\ -SCALE\_MIN} * 16$$

Analog outputs parameters	
Name	**Description**
AOUT.FORCE_MANUAL_ MODE_ENABLE	Switch all analog output channels to manual mode ignoring SELECT_SIGNAL value
AOUT.SCALE_ENABLE	Enable/disable calculation of scaling value from range SCALE_MIN, SCALE_MAX (formula above)
AOUT.CALIBRATED	Enable/disable calibration factors
AOUT.MIN_OUT_RANGE	Signaling out of available range on analog output
AOUT1.SELECT_SIGNAL	Measurement converts to analog output value. Available measurements are presented in Table 42

AOUT1.MANUAL_VALUE	Analog value set by user (available when SELECT_SIGNAL is selected or when FORCE_MANUAL_MODE_ENABLE is set)
AOUT1.SCALE_MIN	Set scale minimum on first output (equivalent 4mA on output)
AOUT1.SCALE_MAX	Set scale maximum on first output (equivalent 20mA on output)
AOUT1.A	Calibration factor A on first output (y=Ax+B)
AOUT1.B	Calibration factor B on first output (y=Ax+B)
AOUT2.SELECT_SIGNAL	Measurement converts to analog output value. Available measurements are presented in Table 42
AOUT2.MANUAL_VALUE	Analog value set by user (available when SELECT_SIGNAL is selected or when FORCE_MANUAL_MODE_ENABLE is set)
AOUT2.SCALE_MIN	Set scale minimum on second output (equivalent 4mA on output)
AOUT2.SCALE_MAX	Set scale maximum on second output (equivalent 20mA on output)
AOUT2.A	Calibration factor A on second output (y=Ax+B)
AOUT2.B	Calibration factor B on second output (y=Ax+B)
AOUT3.SELECT_SIGNAL	Measurement converts to analog output value. Available measurements are presented in Table 42
AOUT3.MANUAL_VALUE	Analog value set by user (available when SELECT_SIGNAL is selected or when FORCE_MANUAL_MODE_ENABLE is set)
AOUT3.SCALE_MIN	Set scale minimum on third output (equivalent 4mA on output)

AOUT3.SCALE_MAX	Set scale maximum on third output (equivalent 20mA on output)
AOUT3.A	Calibration factor A on third output (y=Ax+B)
AOUT3.B	Calibration factor B on third output (y=Ax+B)
AOUT4.SELECT_SIGNAL	Measurement converts to analog output value. Available measurements are presented in Table 42
AOUT4.MANUAL_VALUE	Analog value set by user (available when SELECT_SIGNAL is selected or when FORCE_MANUAL_MODE_ENABLE is set)
AOUT4.SCALE_MIN	Set scale minimum on fourth output (equivalent 4mA on output)
AOUT4.SCALE_MAX	Set scale maximum on fourth output (equivalent 20mA on output)
AOUT4.A	Calibration factor A on fourth output (y=Ax+B)
AOUT4.B	Calibration factor B on fourth output (y=Ax+B)

Table 41. Analog outputs list.

Analog output select signals	
Name	**Description**
MANUAL MODE	Value is set by user
GAS101.CONCENTRATION GAS102.CONCENTRATION GAS103.CONCENTRATION GAS104.CONCENTRATION GAS105.CONCENTRATION GAS106.CONCENTRATION GAS107.CONCENTRATION GAS108.CONCENTRATION	Gas concentration (Measurement id: 0010) Gas concentration (Measurement id: 0020) Gas concentration (Measurement id: 0030) Gas concentration (Measurement id: 0040) Gas concentration (Measurement id: 0050) Gas concentration (Measurement id: 0060) Gas concentration (Measurement id: 0070) Gas concentration (Measurement id: 0080)
LASER11.TRANSMISSION LASER12.TRANSMISSION LASER13.TRANSMISSION LASER14.TRANSMISSION	Laser transmission (Measurement id: 0200) Laser transmission (Measurement id: 0201) Laser transmission (Measurement id: 0202) Laser transmission (Measurement id: 0203)
TEMP.CALCULATED	Temperature calculated – only applicable in oxygen analyzers on special request (Measurement id 0100)
PROCESS.TEMP	Process temperature (Measurement id: 0001)
PROCESS.PRESSURE	Process pressure (Measurement id: 0002)

Table 42. Analog output select signals list.

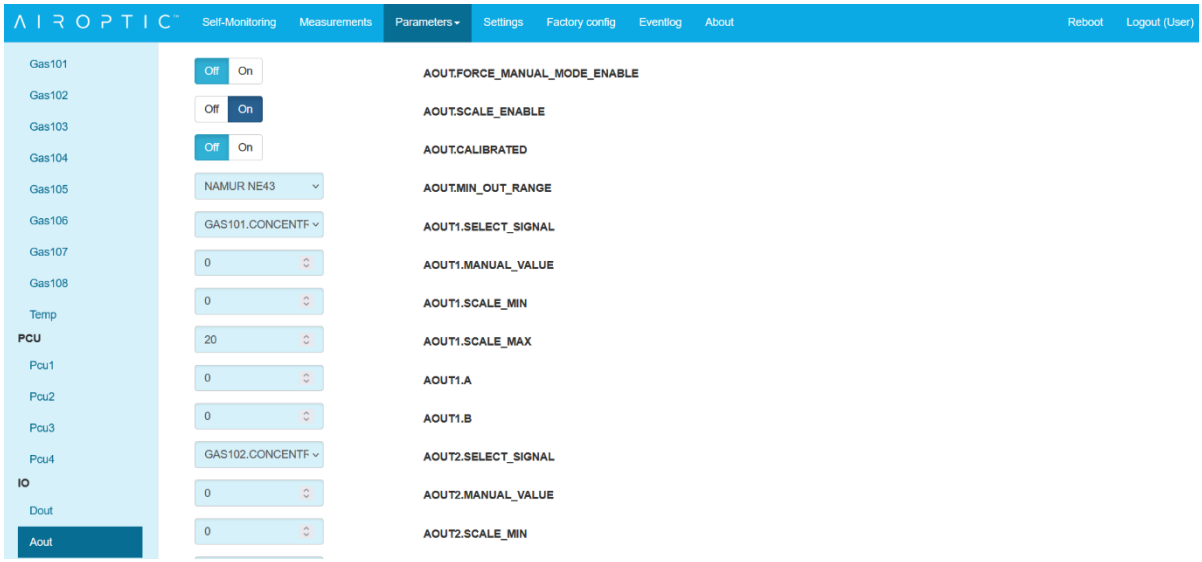


Figure 128. Aout parameters window.

8.5.1.4. IO -> Ain (Analog input configuration)

Analog inputs parameters	
Name	**Description**
AIN.SCALE_ENABLE	Enable/disable calculation of scaling value from range SCALE_MIN, SCALE_MAX
AIN.CALIBRATED	Enable/disable calibration factors
AIN.IIR	Time response for infinite impulse filter
AIN1.SCALE_MIN	Set scale minimum on first input (equivalent 4mA on input)
AIN1.SCALE_MAX	Set scale maximum on first input (equivalent 20mA on input)
AIN1.A	Calibration factor A on first input (y=Ax+B)
AIN1.B	Calibration factor B on first input (y=Ax+B)
AIN2.SCALE_MIN	Set scale minimum on second input (equivalent 4mA on input)
AIN2.SCALE_MAX	Set scale maximum on second input (equivalent 20mA on input)
AIN2.A	Calibration factor A on second input (y=Ax+B)
AIN2.B	Calibration factor B on second input (y=Ax+B)
AIN3.SCALE_MIN	Set scale minimum on third input (equivalent 4mA on input)
AIN3.SCALE_MAX	Set scale maximum on third input (equivalent 20mA on input)
AIN3.A	Calibration factor A on third input (y=Ax+B)

AIN3.B	Calibration factor B on third input (y=Ax+B)
AIN4.SCALE_MIN	Set scale minimum on third input (equivalent 4mA on input)
AIN4.SCALE_MAX	Set scale maximum on third input (equivalent 20mA on input)
AIN4.A	Calibration factor A on third input (y=Ax+B)
AIN4.B	Calibration factor B on third input (y=Ax+B)

Table 43. Analog inputs parameters list.

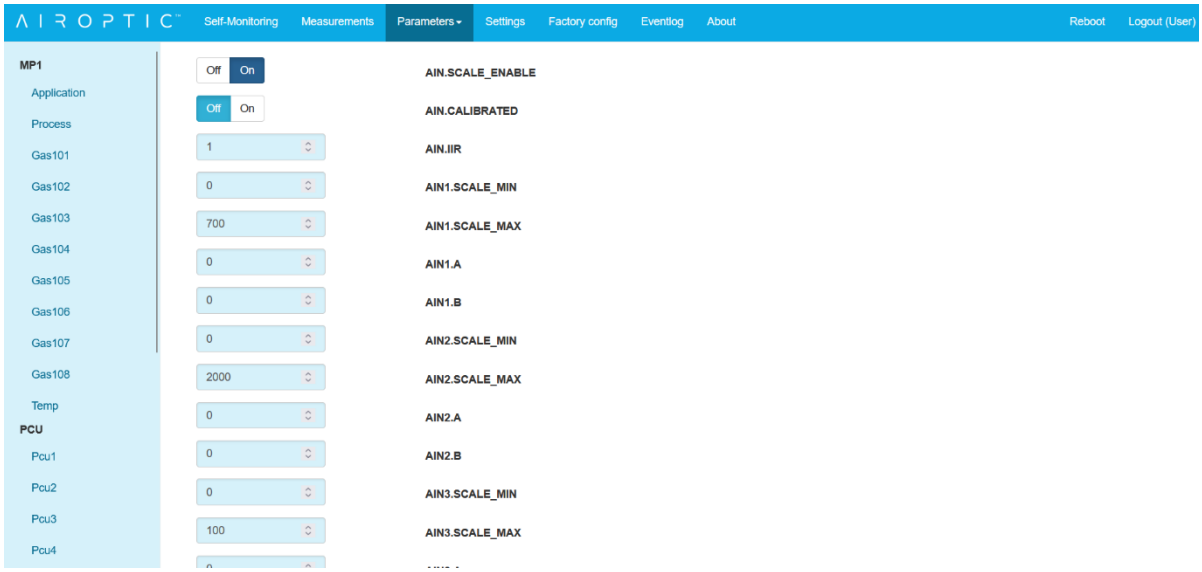


Figure 129. Ain parameters window.

8.5.1.5. IO -> Rtd (Resistance temperature sensor configuration)

Resistance temperature sensor parameters	
Name	**Description**
RTD.IIR	Time response for infinite impulse filter

Table 44. Resistance temperature sensor parameters list.

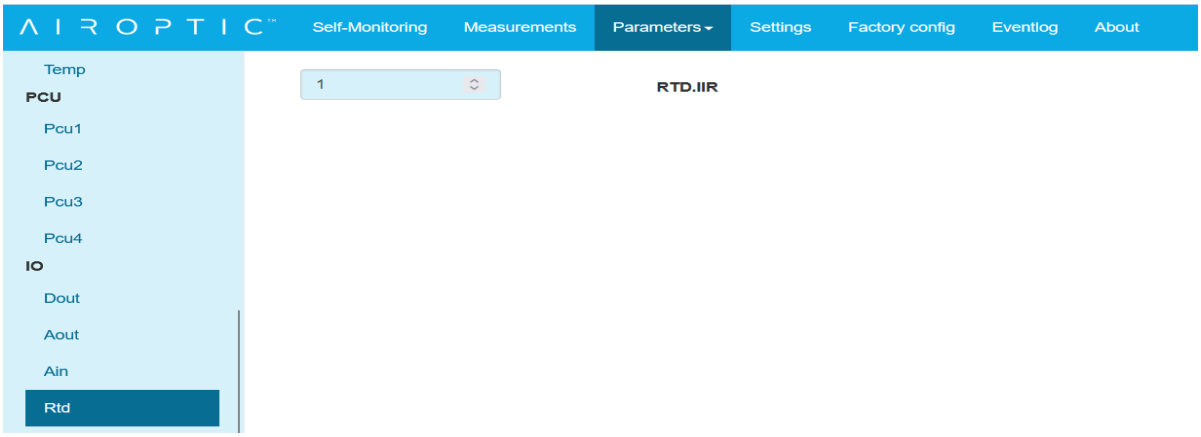


Figure 130. Resistance temperature detector window.

8.5.1.6. IO -> Amb_press (Ambient pressure sensor configuration)

Ambient pressure sensor parameters	
Name	**Description**
AMB_PRESS.IIR	Time response for infinite impulse filter

Table 45. Ambient pressure sensor parameters list.

Figure 131. Ambient pressure sensor window.

8.5.1.7. NETWORK -> Net (Service ethernet port configuration)

Service ethernet port parameters	
Name	**Description**
NET.SYSTEM_IP_ADDRESS	Service address IP of device
NET.SYSTEM_IP_MASK	Network IP mask
NET.GATEWAY_IP_ADDR	Address of gateway
NET.STREAM_ENABLE	Enable UDP stream to log data by PC GasEYE logger application
NET.STREAM_IP_ADDR	IP address of UDP stream (PC GasEYE logger address)
NET.STREAM_UDP_PORT	UDP stream port (PC GasEYE logger)
NET.STREAM_INTERVAL	Stream frames interval
NET.BROADCAST_STATUS	GasEYE identification broadcast frame
NET.STREAM_BRODCAST_UDP_PORT	Identification broadcast UDP port

Table 46. Service ethernet port parameters list.

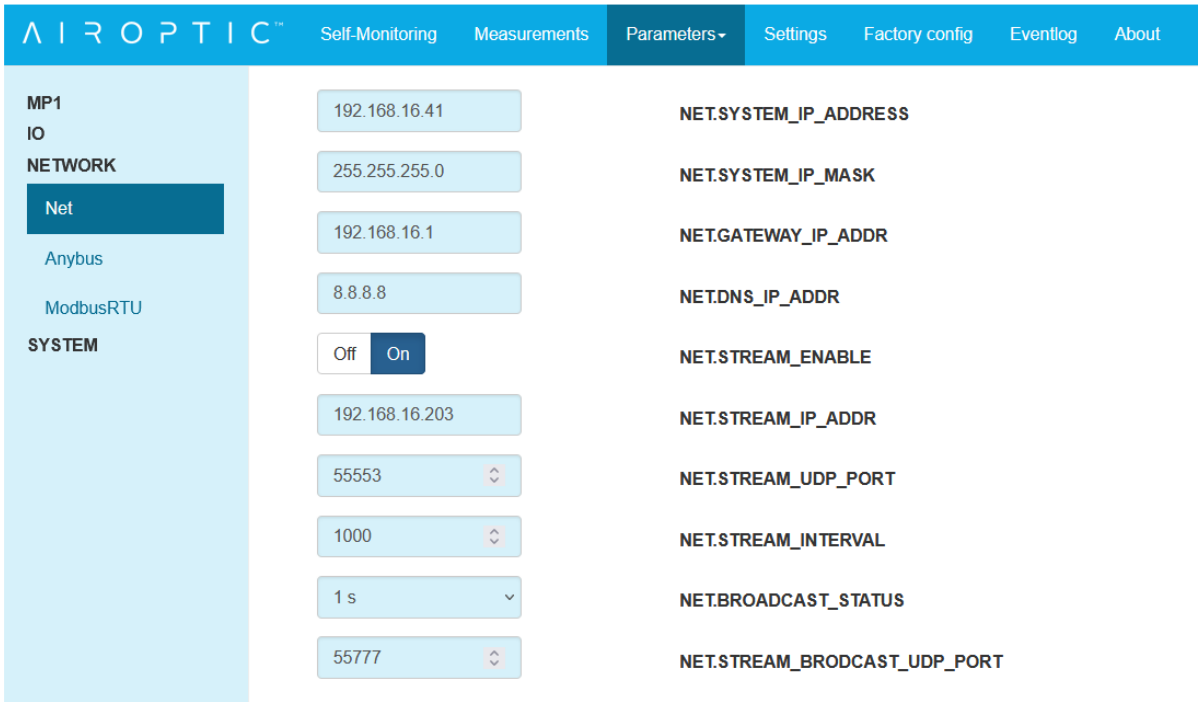


Figure 132. Service ethernet port configuration window.

8.5.1.8. NETWORK -> ModbusRTU (Modbus slave transmission configuration)

Modbus RTU parameters	
Name	**Description**
MBUS.BAUD_RATE	Baud rate 9600/19200
MBUS.STOP_BITS	Stop bits STOP_BIT_1/ STOP_BIT_2
MBUS.PARITY	NO_PARITY_8_BIT/EVEN_PARITY_8_BIT/ ODD_PARITY_8_BIT/NO_PARITY_9_BIT
MBUS.ADDR	Modbus device address
MBUS.BORDER	Byte order
MBUS.SWAP	Swap register
MBUS.MAP	Show device Modbus register map

Table 47. Service ethernet port parameters list.

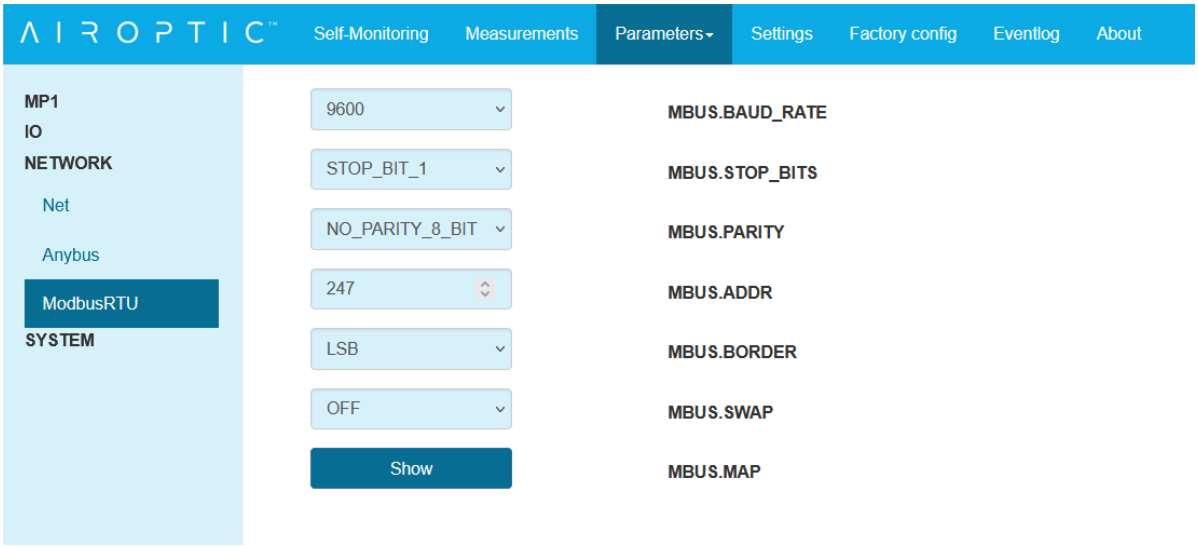


Figure 133. Modbus RTU configuration window.

8.5.1.1. NETWORK -> Anybus module

Anybus parameters	
Name	**Description**
ANB.IP_ADDRESS	Anybus IP address
ANB.IP_MASK	Anybus IP mask
ANB.GATEWAY_IP_ADDR	Anybus Gateway IP Adress
ANB.DHCP	ON/OFF Dynamic Host Configuration Protocol
ANB.MODBUS_MAP	Anybus Map
ANB.STAT_CFG	Anybus Module Status and Configuration
ANB.RESET	Reset Anybus Module

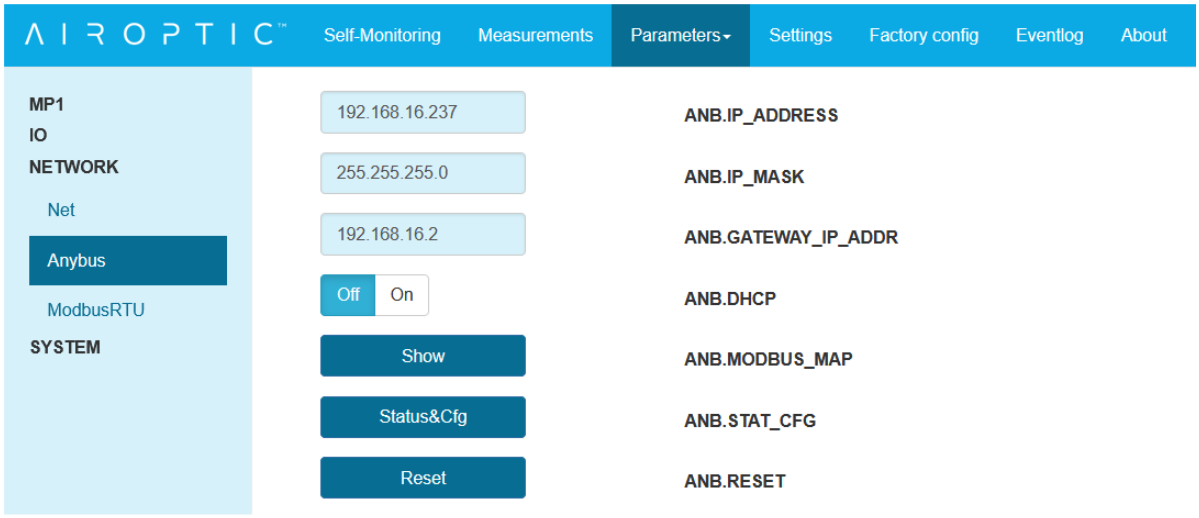


Figure 134. Anybus configuration window.

8.5.1.2. SYSTEM -> Rtc (Real time clock configuration)

Real time clock parameters	
Name	**Description**
RTC.YEAR	Actual year
RTC.MONTH	Actual month
RTC.DAY	Actual day
RTC.HOUR	Hour of the day
RTC.MINUTE	Minute of the day
RTC.SECOND	Second of the day
RTC.SET	Set new date and time to analyzer

Table 48. Real time clock parameters list.

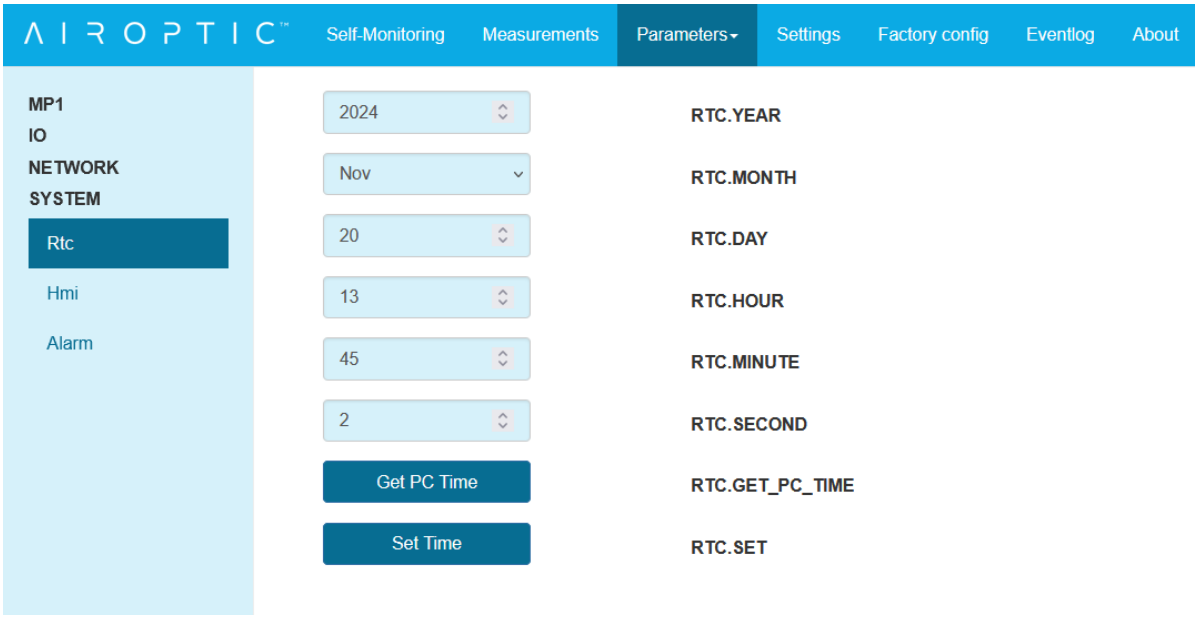


Figure 135. Rtc parameters window.

8.5.1.3. SYSTEM -> HMI (Human-Machine Interface configuration)

HMI parameters	
Name	**Description**
HMI.PASSWORD	Set pin (4-digits) to protect device against unauthorized change parameters by HMI

Table 49. HMI parameters list.

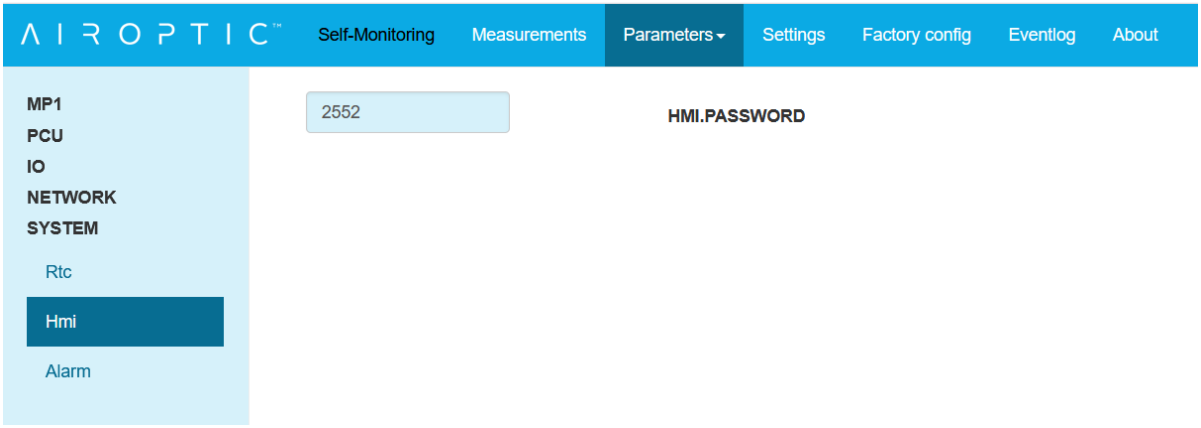


Figure 136. HMI parameter window.

8.5.1.4. SYSTEM -> Alarm

Alarm configuration window allow user to configure up to 10 self-defined alarms

Alarm parameters	
Name	**Description**
ALARM1.ENABLE	On – alarm on Off – alarm off
ALARM1.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM1.RESET	On – reset alarm manually
ALARM1.NORMAL_STATE	Low or high normal state selectable
ALARM1.SIGNAL	Selection of the signal that will be checked
ALARM1.OPERATOR	Determining condition (>;<;>=;<=)
ALARM1.THRESHOLD	Value for condition
ALARM1.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM2.ENABLE	On – alarm on Off – alarm off
ALARM2.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM2.RESET	On – reset alarm manually
ALARM2.NORMAL_STATE	Low or high normal state selectable
ALARM2.SIGNAL	Selection of the signal that will be checked
ALARM2.OPERATOR	Determining condition (>;<;>=;<=)
ALARM2.THRESHOLD	Value for condition
ALARM2.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM3.ENABLE	On – alarm on Off – alarm off
ALARM3.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM3.RESET	On – reset alarm manually
ALARM3.NORMAL_STATE	Low or high normal state selectable
ALARM3.SIGNAL	Selection of the signal that will be checked
ALARM3.OPERATOR	Determining condition (>;<;>=;<=)
ALARM3.THRESHOLD	Value for condition
ALARM3.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM4.ENABLE	On – alarm on Off – alarm off
ALARM4.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM4.RESET	On – reset alarm manually
ALARM4.NORMAL_STATE	Low or high normal state selectable

ALARM4.SIGNAL	Selection of the signal that will be checked
ALARM4.OPERATOR	Determining condition (>;<;>=;<=)
ALARM4.THRESHOLD	Value for condition
ALARM4.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM5.ENABLE	On – alarm on Off – alarm off
ALARM5.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM5.RESET	On – reset alarm manually
ALARM5.NORMAL_STATE	Low or high normal state selectable
ALARM5.SIGNAL	Selection of the signal that will be checked
ALARM5.OPERATOR	Determining condition (>;<;>=;<=)
ALARM5.THRESHOLD	Value for condition
ALARM5.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM6.ENABLE	On – alarm on Off – alarm off
ALARM6.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM6.RESET	On – reset alarm manually
ALARM6.NORMAL_STATE	Low or high normal state selectable
ALARM6.SIGNAL	Selection of the signal that will be checked
ALARM6.OPERATOR	Determining condition (>;<;>=;<=)
ALARM6.THRESHOLD	Value for condition
ALARM6.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM7.ENABLE	On – alarm on Off – alarm off
ALARM7.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM7.RESET	On – reset alarm manually
ALARM7.NORMAL_STATE	Low or high normal state selectable
ALARM7.SIGNAL	Selection of the signal that will be checked
ALARM7.OPERATOR	Determining condition (>;<;>=;<=)
ALARM7.THRESHOLD	Value for condition
ALARM7.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM8.ENABLE	On – alarm on Off – alarm off
ALARM8.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM8.RESET	On – reset alarm manually
ALARM8.NORMAL_STATE	Low or high normal state selectable

ALARM8.SIGNAL	Selection of the signal that will be checked
ALARM8.OPERATOR	Determining condition (>;<;>=;<=)
ALARM8.THRESHOLD	Value for condition
ALARM8.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM9.ENABLE	On – alarm on Off – alarm off
ALARM9.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM9.RESET	On – reset alarm manually
ALARM9.NORMAL_STATE	Low or high normal state selectable
ALARM9.SIGNAL	Selection of the signal that will be checked
ALARM9.OPERATOR	Determining condition (>;<;>=;<=)
ALARM9.THRESHOLD	Value for condition
ALARM9.HYSTERESIS	Moves the auto reset boundary by the given value
ALARM10.ENABLE	On – alarm on Off – alarm off
ALARM10.AUTORESET_ENABLE	The alarm will automatically reset when condition disappear
ALARM10.RESET	On – reset alarm manually
ALARM10.NORMAL_STATE	Low or high normal state selectable
ALARM10.SIGNAL	Selection of the signal that will be checked
ALARM10.OPERATOR	Determining condition (>;<;>=;<=)
ALARM10.THRESHOLD	Value for condition
ALARM10.HYSTERESIS	Moves the auto reset boundary by the given value

Table 50. Alarm parameters list.

Alarm signals list	
Name	**Description**
GAS101.CONCENTRATION	Gas concentration (Measurement id: 0010)
GAS102.CONCENTRATION	Gas concentration (Measurement id: 0020)
GAS103.CONCENTRATION	Gas concentration (Measurement id: 0030)
GAS104.CONCENTRATION	Gas concentration (Measurement id: 0040)
GAS105.CONCENTRATION	Gas concentration (Measurement id: 0050)
GAS106.CONCENTRATION	Gas concentration (Measurement id: 0060)
GAS107.CONCENTRATION	Gas concentration (Measurement id: 0070)
GAS108.CONCENTRATION	Gas concentration (Measurement id: 0080)

TEMP.CALCULATED		Temperature calculated – only applicable in oxygen analyzers on special request (Measurement id 0100)
LASER11.TRANSMISSION LASER12.TRANSMISSION LASER13.TRANSMISSION LASER14.TRANSMISSION		Laser transmission (Measurement id: 0200) Laser transmission (Measurement id: 0201) Laser transmission (Measurement id: 0202) Laser transmission (Measurement id: 0203)
FIBER1.TRANSMISSION FIBER2.TRANSMISSION		Transmission with RX module Transmission with RX module
PROCESS.TEMP		Process temperature (Measurement id: 0001)
PROCESS.PRESSURE		Process pressure (Measurement id: 0002)

Table 51. Alarm signals list.

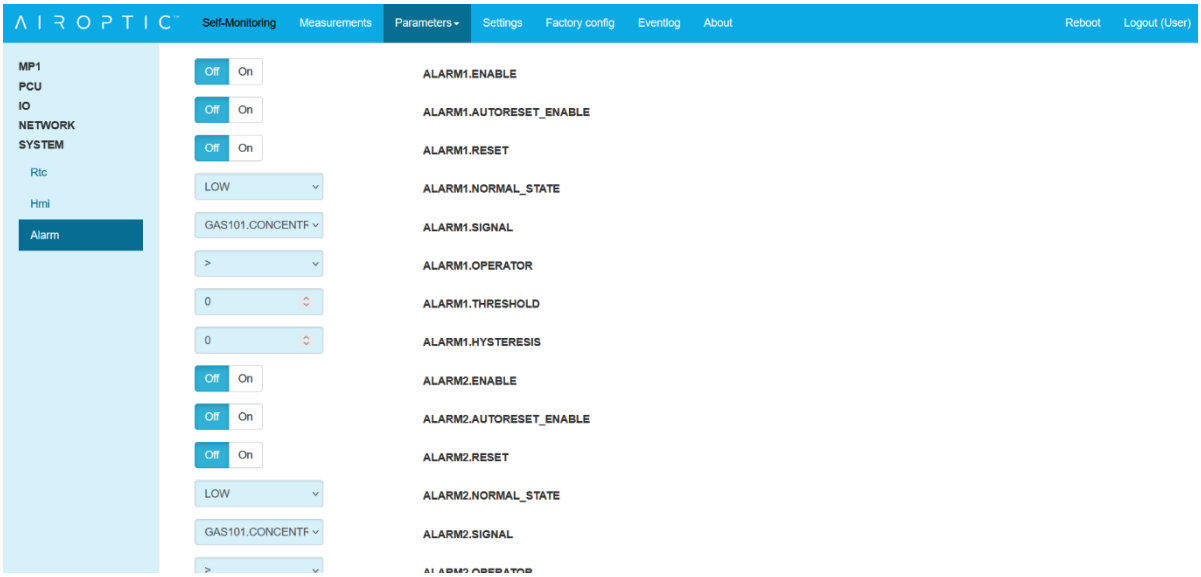


Figure 137. Alarm parameters window.

8.6. Settings tab

Drop-down menu will appear when clicking on the **Settings.**

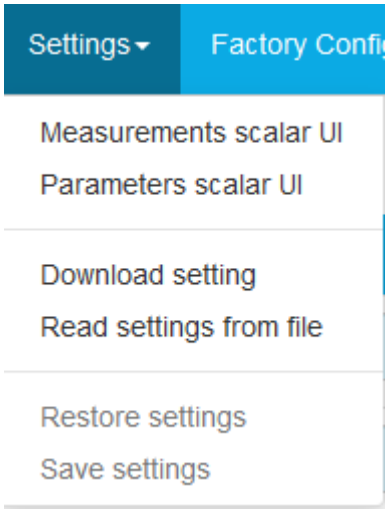


Figure 138. WebServer application - settings window.

Measurement scalar UI	View measurement aliases and units.
Parameters scalar UI	View parameters aliases and units.
Download settings	Download to PC txt file with measurement and parameters aliases and unit type.
Read settings from file	Read txt file with measurements and parameters aliases and unit type.
Restore settings	Restore settings from non volatile memory
Save settings	Send data to device and put dem in non volatile memory

Table 52. Settings window functionalities.

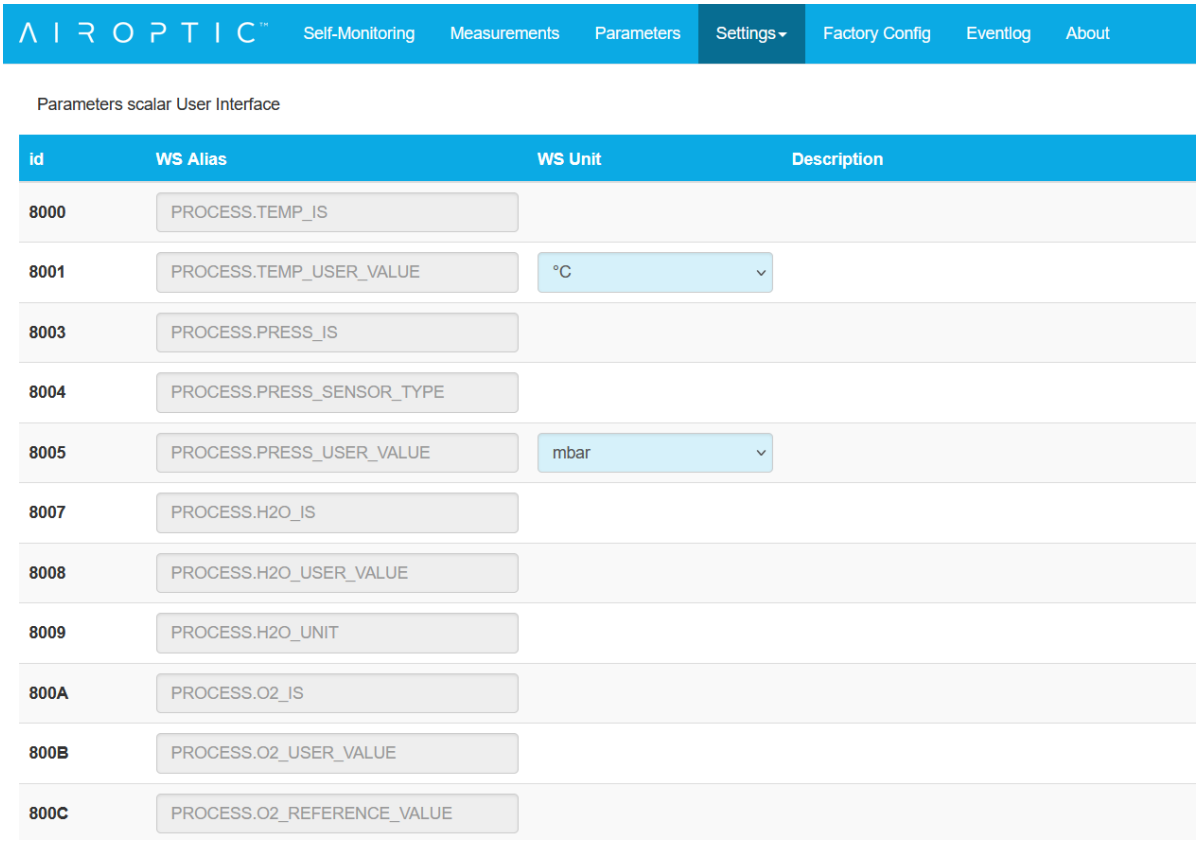


Figure 139. Settings window.

In order to change the unit of chosen parameter or measurement the user shall click on the field that intends to change i.e. optical path length. By select one of available unit type.

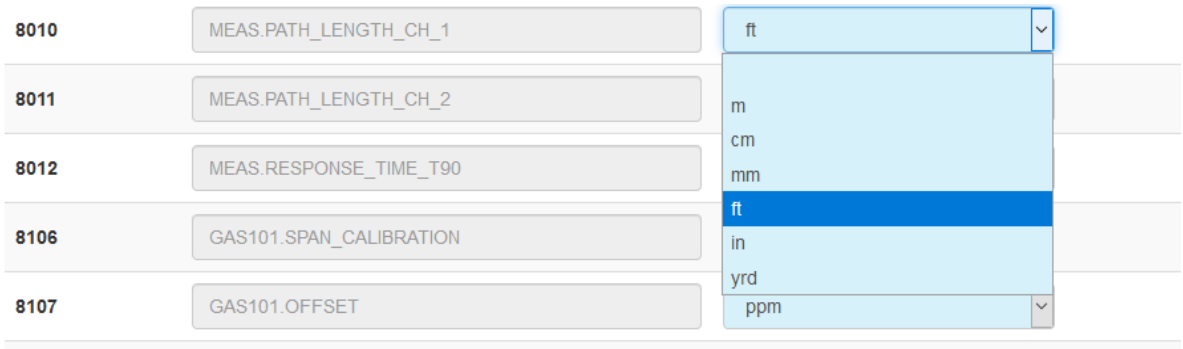


Figure 140. Settings window - making changes.

To apply changes, click on the **Send** button that will appear next to the edited field.

Figure 141. Settings window – applying changes.

8.7. Factory Config tab

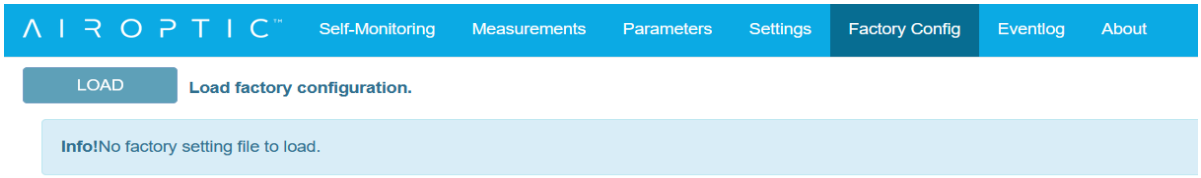
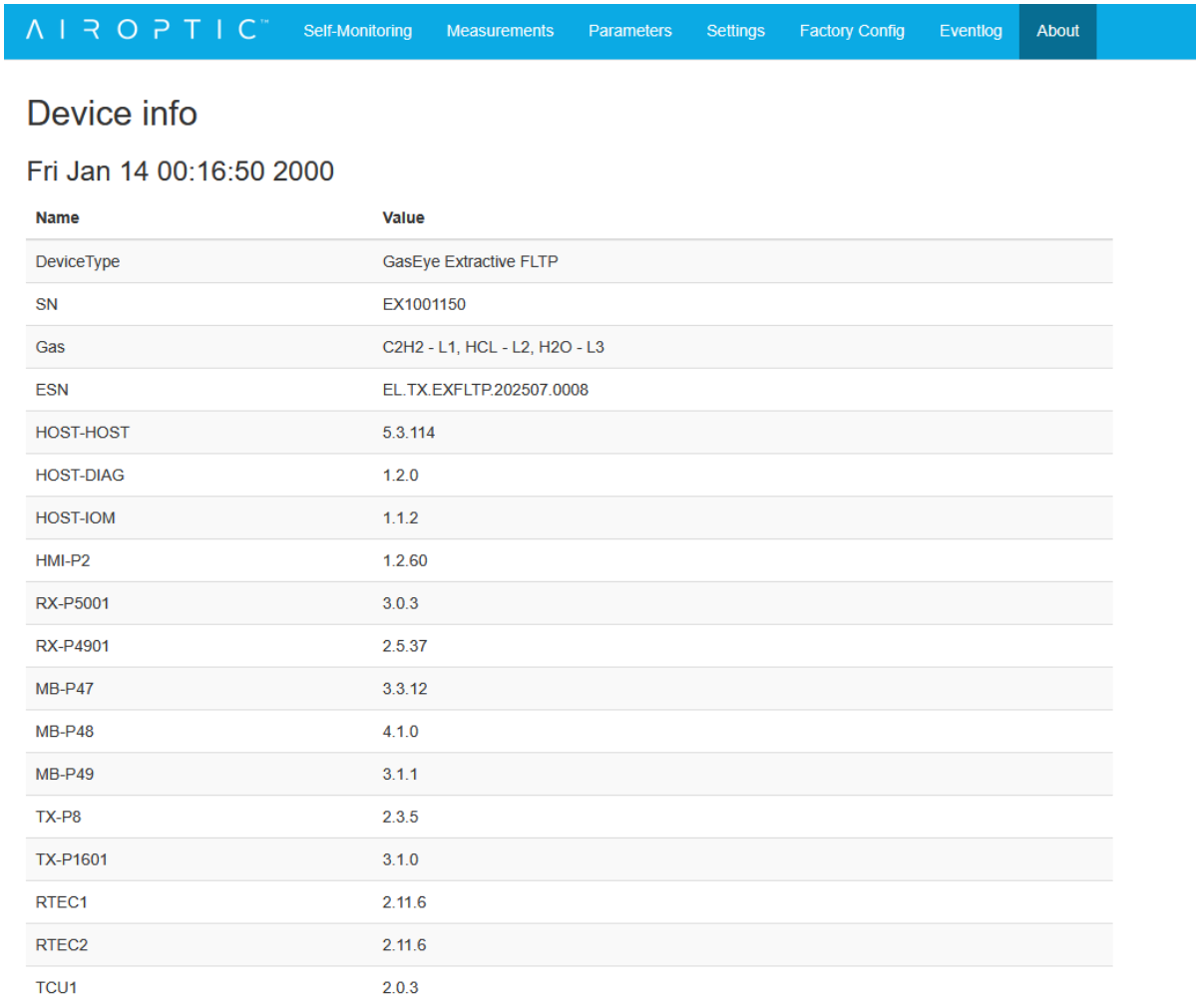


Figure 142. Factory config window.

Attention: Use LOAD button only if you are sure with you want to do. This option return device to factory settings. All user settings will be lost.

8.8. About tab

This page presents device firmware version.



Name	Value
DeviceType	GasEye Extractive FLTP
SN	EX1001150
Gas	C2H2 - L1, HCL - L2, H2O - L3
ESN	EL.TX.EXFLTP.202507.0008
HOST-HOST	5.3.114
HOST-DIAG	1.2.0
HOST-IOM	1.1.2
HMI-P2	1.2.60
RX-P5001	3.0.3
RX-P4901	2.5.37
MB-P47	3.3.12
MB-P48	4.1.0
MB-P49	3.1.1
TX-P8	2.3.5
TX-P1601	3.1.0
RTEC1	2.11.6
RTEC2	2.11.6
TCU1	2.0.3

Figure 143. Device information page.

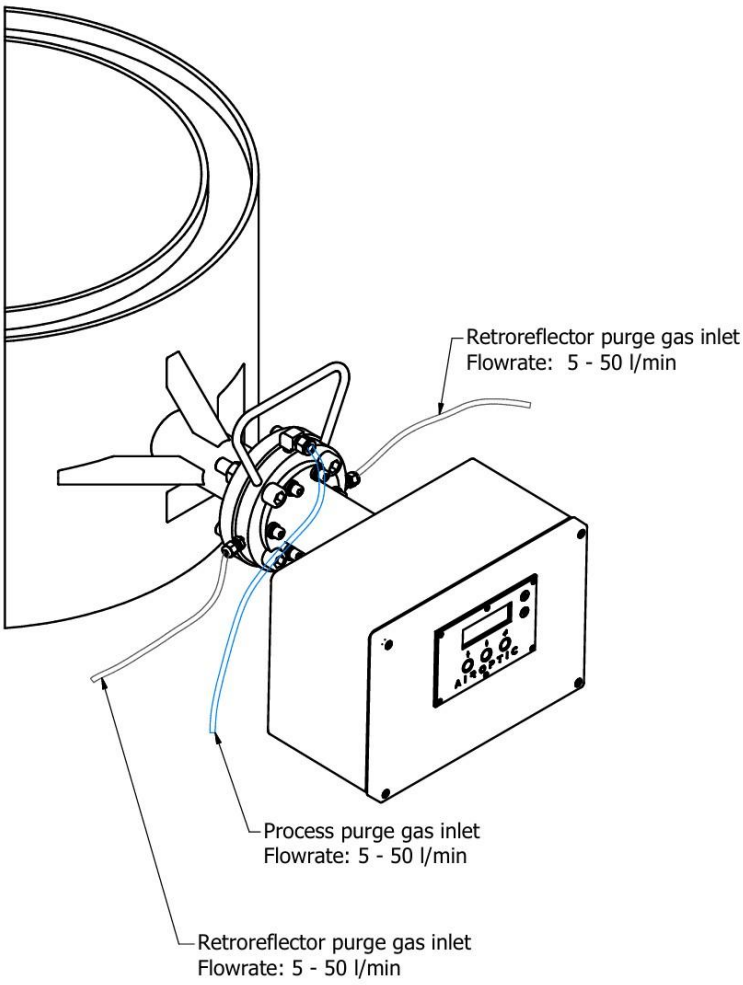
9. Purging (non-ATEX)

If there is need to remove any gas contaminants from inside of the instrument it may be purged using gases, such as air or nitrogen. Process purging and retrolefrector purging are recommended for every installation to prevent flange window and retrolefrector clogging.

Purge tubings diameter should be 6 mm or ¼" (according to the order).

Recommended process purging gas flow	5 – 50 l/min
Recommended retroleflector purging gas flow	5 – 50 l/min
Purging gas flow for sensor:	0.2 – 7 l/min

It is crucial to ensure that the purging gas does not contain any constituents of interest since it will affect the measurement and instrument stability. When using compressed air for purging please ensure that the air is dry and oil-free (according to ISO 8573-1, recommended Class 2 or 3). Bad quality of purging gas may affect the measurement or even damage the analyzer.



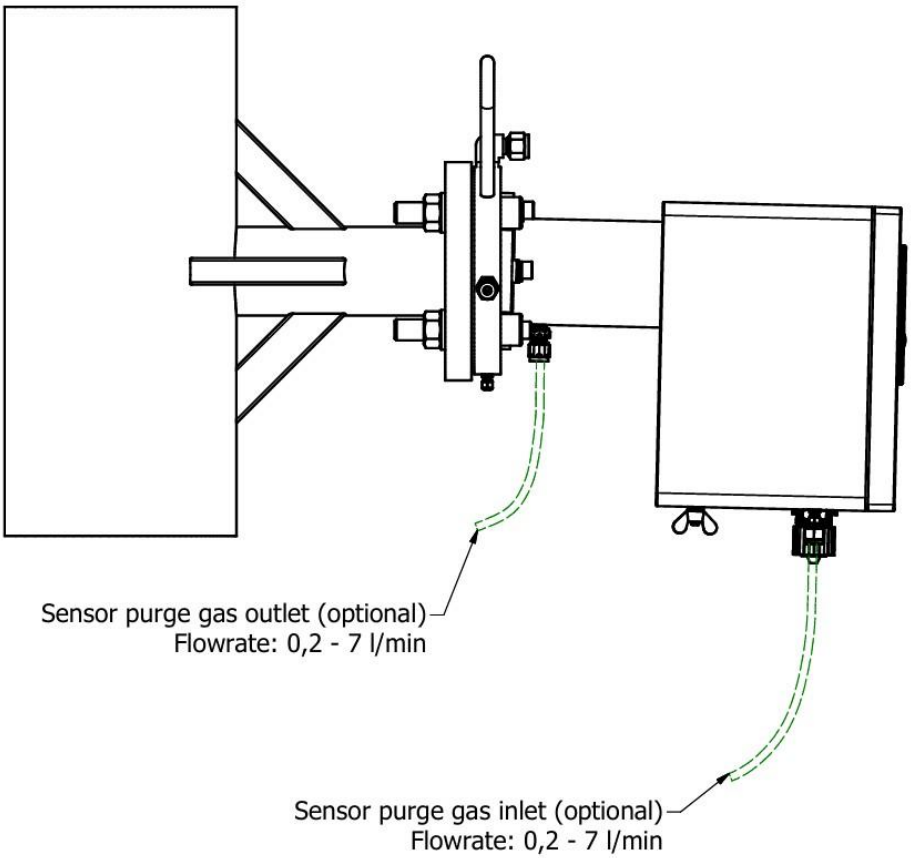


Figure 144. Overview of the purging areas – SG and MG version.

Outside thread/fitting type	Material
“Insert fitting” for ¼” tube	Nickel plated brass or SS316
“Insert fitting” for 6mm tube	Nickel plated brass or SS316
¼” double compression fitting	SS316
6mm double compression fitting	SS316

Table 53. Possible purge fittings versions for GasEye Probe.

10. Troubleshooting

As described in Chapter 3, the system status is indicated by two LEDs placed on the front panel of the transmitter unit, next to the display. In the table below the possible modes of operation are presented. Please note that during the start-up procedure the red LED will flash until the procedure is completed (approx. 5 minutes).

On Single Laser transmitter unit there is a white LED on the side that indicates the 24VDC power supply status.

Green - OFF **Red - OFF**	**System off**
Green - ON **Red - OFF**	**System operational**
Green - OFF **Red - ON**	**System operational** **Possible issue:** *low transmission* 1. Check the transmission value. 2. If transmission is below threshold value (depends on the application - typically 1% of transmission) please recheck the alignment 3. If realigning does not improve the transmission value, please remove the sensors and check visually the optical condition of windows. It may occur that dust or powder layer builds up on their surface and lowers the transmission. To remove the residuals, apply process side purging with sufficient pressure. 4. If purging is not sufficient to remove the contamination it is needed to clean the windows manually by dismounting them from the flange. For cleaning please use standard optics cleaning products. It is advised to contact Airoptic representative when window cleaning is needed. If the transmission value is above threshold value the red LED illumination indicates an internal analyzer error. Please restart the system and check whether the system restart resolves the issue. If not, contact Airoptic representative.
Green - OFF **Red - FLASHING**	**System not operational – startup procedure not completed** Red LED flashing (remaining for more than 10 minutes after power on) may indicate that an internal analyzer issue has occurred. Please restart the system and check whether the system restart resolves the issue. If not, contact Airoptic representative.

11. Contact Information

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Appendix 1. Parameters list.

Below the full list of parameters available through the WebServer is presented. For each parameter there is a brief description of its functionality.

ID	Name	Description
8000	PROCESS.TEMP_IS	Process temperature input signal selection
8001	PROCESS.TEMP_MANUAL_VALUE	Process temperature manual value in [°C]
8003	PROCESS.PRESS_IS	Process pressure input signal selection
8004	PROCESS.PRESS_SENSOR_TYPE	Pressure sensor type selection (absolute/ gauge)
8005	PROCESS.PRESS_MANUAL_VALUE	Process pressure manual value in [mbar]
8010	MEAS.PATH_LENGTH_CH_1	Measuring path length channel 1 in [m]
8011	MEAS.PATH_LENGTH_CH_2	Measuring path length channel 2 in [m]
8012	MEAS.RESPONSE_TIME_T90	Response time (T90) in [s]
8106	GAS101.SPAN_CALIBRATION	Span calibration factor
8107	GAS101.OFFSET	Span offset value
8126	GAS102.SPAN_CALIBRATION	Span calibration factor
8127	GAS102.OFFSET	Span offset value
8146	GAS103.SPAN_CALIBRATION	Span calibration factor
8147	GAS103.OFFSET	Span offset value
8166	GAS104.SPAN_CALIBRATION	Span calibration factor
8167	GAS104.OFFSET	Span offset value
8186	GAS105.SPAN_CALIBRATION	Span calibration factor
8187	GAS105.OFFSET	Span offset value
81A6	GAS106.SPAN_CALIBRATION	Span calibration factor
81A7	GAS106.OFFSET	Span offset value
81C6	GAS107.SPAN_CALIBRATION	Span calibration factor
81C7	GAS107.OFFSET	Span offset value
81E6	GAS108.SPAN_CALIBRATION	Span calibration factor
81E7	GAS108.OFFSET	Span offset value
8209	TEMP.SPAN_CALIBRATION	Span calibration factor
820A	TEMP.OFFSET	Span offset value
9300	DOUT.DO1	Signal selection for digital output
9301	DOUT.DO2	Signal selection for digital output
9302	DOUT.DO3	Signal selection for digital output
9303	DOUT.DO4	Signal selection for digital output
9500	AOUT.FORCE_MANUAL_MODE_ENABLE	Force manual mode for all analog outputs
9501	AOUT.SCALE_ENABLE	Enable scaling range for all analog outputs
9510	AOUT1.SELECT_SIGNAL	Measurement signal selection for the output
9511	AOUT1.MANUAL_VALUE	Manual mode value in scaling range
9512	AOUT1.SCALE_MIN	Scaling range value corresponds to 4 mA
9513	AOUT1.SCALE_MAX	Scaling range value corresponds to 20 mA
9520	AOUT2.SELECT_SIGNAL	Measurement signal selection for the output
9521	AOUT2.MANUAL_VALUE	Manual mode value in scaling range
9522	AOUT2.SCALE_MIN	Scaling range value corresponds to 4 mA
9523	AOUT2.SCALE_MAX	Scaling range value corresponds to 20 mA
9530	AOUT3.SELECT_SIGNAL	Measurement signal selection for the output
9531	AOUT3.MANUAL_VALUE	Manual mode value in scaling range
9532	AOUT3.SCALE_MIN	Scaling range value corresponds to 4 mA
9533	AOUT3.SCALE_MAX	Scaling range value corresponds to 20 mA
9540	AOUT4.SELECT_SIGNAL	Measurement signal selection for the output
9541	AOUT4.MANUAL_VALUE	Manual mode value in scaling range
9542	AOUT4.SCALE_MIN	Scaling range value corresponds to 4 mA
9543	AOUT4.SCALE_MAX	Scaling range value corresponds to 20 mA
9600	AIN.SCALE_ENABLE	Enable scaling range for all analog inputs
9610	AIN1.SCALE_MIN	Scaling range value corresponds to 4 mA

9611	AIN1.SCALE_MAX	Scaling range value corresponds to 20 mA
9620	AIN2.SCALE_MIN	Scaling range value corresponds to 4 mA
9621	AIN2.SCALE_MAX	Scaling range value corresponds to 20 mA
9630	AIN3.SCALE_MIN	Scaling range value corresponds to 4 mA
9631	AIN3.SCALE_MAX	Scaling range value corresponds to 20 mA
9640	AIN4.SCALE_MIN	Scaling range value corresponds to 4 mA
9641	AIN4.SCALE_MAX	Scaling range value corresponds to 20 mA
9901	NET.SYSTEM_IP_ADDRESS	System IP address (x.x.x.x, default: 192.168.16.13)
9902	NET.SYSTEM_IP_MASK	System IP mask (x.x.x.x, default: 255.255.255.0)
9903	NET.GATEWAY_IP_ADDR	Gateway IP address (x.x.x.x, default: 192.168.16.1)
9904	NET.DNS_IP_ADDR	DNS IP address (x.x.x.x, default: 8.8.8.8)
9905	NET.STREAM_ENABLE	Enable UDP streaming
9906	NET.STREAM_IP_ADDR	UDP IP address for streaming (for broadcast select x.x.x.255)
9907	NET.STREAM_UDP_PORT	UDP port number
9908	NET.STREAM_INTERVAL	Sampling time for the UDP streaming in [ms]
A100	ANB.IP_ADDRESS	Add-on module IP address (x.x.x.x)
A101	ANB.IP_MASK	Add-on module IP mask (x.x.x.x)
A102	ANB.GATEWAY_IP_ADDR	Add-on module gateway IP address (x.x.x.x)
A103	ANB.DHCP	Add-on module DHCP enable/disable
BTN	ANB.SHOW	Add-on module register map presentation
A200	RTC.SECOND	Second
A201	RTC.MINUTE	Minute
A202	RTC.HOUR	Hour
A203	RTC.DAY	Day
A204	RTC.MONTH	Month selection
A205	RTC.YEAR	Year
9A01	HMI.PASSWORD	Password for HMI
9C00	ALARM1.ENABLE	Alarm enable/disable
9C01	ALARM1.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C02	ALARM1.RESET	Alarm manual reset
9C03	ALARM1.NORMAL_STATE	Alarm normal state value
9C04	ALARM1.SIGNAL	Alarm signal selection
9C05	ALARM1.OPERATOR	Alarm mathematical operator
9C06	ALARM1.THRESHOLD	Alarm threshold value
9C07	ALARM1.HYSTERESIS	Alarm hysteresis value
9C10	ALARM2.ENABLE	Alarm enable/disable
9C11	ALARM2.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C12	ALARM2.RESET	Alarm manual reset
9C13	ALARM2.NORMAL_STATE	Alarm normal state value
9C14	ALARM2.SIGNAL	Alarm signal selection
9C15	ALARM2.OPERATOR	Alarm mathematical operator
9C16	ALARM2.THRESHOLD	Alarm threshold value
9C17	ALARM2.HYSTERESIS	Alarm hysteresis value
9C20	ALARM3.ENABLE	Alarm enable/disable
9C21	ALARM3.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C22	ALARM3.RESET	Alarm manual reset
9C23	ALARM3.NORMAL_STATE	Alarm normal state value
9C24	ALARM3.SIGNAL	Alarm signal selection
9C25	ALARM3.OPERATOR	Alarm mathematical operator
9C26	ALARM3.THRESHOLD	Alarm threshold value
9C27	ALARM3.HYSTERESIS	Alarm hysteresis value
9C30	ALARM4.ENABLE	Alarm enable/disable
9C31	ALARM4.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C32	ALARM4.RESET	Alarm manual reset
9C33	ALARM4.NORMAL_STATE	Alarm normal state value

9C34	ALARM4.SIGNAL	Alarm signal selection
9C35	ALARM4.OPERATOR	Alarm mathematical operator
9C36	ALARM4.THRESHOLD	Alarm threshold value
9C37	ALARM4.HYSTERESIS	Alarm hysteresis value
9C40	ALARM5.ENABLE	Alarm enable/disable
9C41	ALARM5.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C42	ALARM5.RESET	Alarm manual reset
9C43	ALARM5.NORMAL_STATE	Alarm normal state value
9C44	ALARM5.SIGNAL	Alarm signal selection
9C45	ALARM5.OPERATOR	Alarm mathematical operator
9C46	ALARM5.THRESHOLD	Alarm threshold value
9C47	ALARM5.HYSTERESIS	Alarm hysteresis value
9C50	ALARM6.ENABLE	Alarm enable/disable
9C51	ALARM6.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C52	ALARM6.RESET	Alarm manual reset
9C53	ALARM6.NORMAL_STATE	Alarm normal state value
9C54	ALARM6.SIGNAL	Alarm signal selection
9C55	ALARM6.OPERATOR	Alarm mathematical operator
9C56	ALARM6.THRESHOLD	Alarm threshold value
9C57	ALARM6.HYSTERESIS	Alarm hysteresis value
9C60	ALARM7.ENABLE	Alarm enable/disable
9C61	ALARM7.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C62	ALARM7.RESET	Alarm manual reset
9C63	ALARM7.NORMAL_STATE	Alarm normal state value
9C64	ALARM7.SIGNAL	Alarm signal selection
9C65	ALARM7.OPERATOR	Alarm mathematical operator
9C66	ALARM7.THRESHOLD	Alarm threshold value
9C67	ALARM7.HYSTERESIS	Alarm hysteresis value
9C70	ALARM8.ENABLE	Alarm enable/disable
9C71	ALARM8.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C72	ALARM8.RESET	Alarm manual reset
9C73	ALARM8.NORMAL_STATE	Alarm normal state value
9C74	ALARM8.SIGNAL	Alarm signal selection
9C75	ALARM8.OPERATOR	Alarm mathematical operator
9C76	ALARM8.THRESHOLD	Alarm threshold value
9C77	ALARM8.HYSTERESIS	Alarm hysteresis value
9C80	ALARM9.ENABLE	Alarm enable/disable
9C81	ALARM9.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C82	ALARM9.RESET	Alarm manual reset
9C83	ALARM9.NORMAL_STATE	Alarm normal state value
9C84	ALARM9.SIGNAL	Alarm signal selection
9C85	ALARM9.OPERATOR	Alarm mathematical operator
9C86	ALARM9.THRESHOLD	Alarm threshold value
9C87	ALARM9.HYSTERESIS	Alarm hysteresis value
9C90	ALARM10.ENABLE	Alarm enable/disable
9C91	ALARM10.AUTORESET_ENABLE	Alarm autoreset enable/disable
9C92	ALARM10.RESET	Alarm manual reset
9C93	ALARM10.NORMAL_STATE	Alarm normal state value
9C94	ALARM10.SIGNAL	Alarm signal selection
9C95	ALARM10.OPERATOR	Alarm mathematical operator
9C96	ALARM10.THRESHOLD	Alarm threshold value
9C97	ALARM10.HYSTERESIS	Alarm hysteresis value

Appendix 2. Measurements list

The full list of measurements available through the WebServer is presented below.

ID	Name	Description
0001	PROCESS.TEMPERATURE	Process temperature set by Parameters->MP1->Process
0002	PROCESS.PRESSURE	Process temperature set by Parameters->MP1->Process
0100	TEMP.CALCULATED	Only applicable in oxygen analysers on special request
0010	GAS101.CONCENTRATION	Gas101 concentration
0020	GAS102.CONCENTRATION	Gas102 concentration
0030	GAS103.CONCENTRATION	Gas103 concentration
0040	GAS104.CONCENTRATION	Gas104 concentration
0050	GAS105.CONCENTRATION	Gas105 concentration
0060	GAS106.CONCENTRATION	Gas106 concentration
0070	GAS107.CONCENTRATION	Gas107 concentration
0080	GAS108.CONCENTRATION	Gas108 concentration
0200	LASER11.TRANSMISSION	Laser11 transmission quality
0201	LASER12.TRANSMISSION	Laser12 transmission quality
0202	LASER13.TRANSMISSION	Laser13 transmission quality
0203	LASER14.TRANSMISSION	Laser14 transmission quality
0300	FIBER1.TRANSMISSION	Loop cable 1 transmission
0301	FIBER2.TRANSMISSION	Loop cable 2 transmission
0302	REMOTERX1.GAIN	Remote receiver gain 1
0303	REMOTERX2.GAIN	Remote receiver gain 2
0602	TEC0.THL_REF_AMP	TEC0 Reference amplitude
0606	TEC0.AMB_TEMPERATURE	TEC0 Ambient temperature
0612	TEC1.THL_REF_AMP	TEC1 Reference amplitude
0616	TEC1.AMB_TEMPERATURE	TEC1 Ambient temperature
0622	TEC2.THL_REF_AMP	TEC2 Reference amplitude
0626	TEC2.AMB_TEMPERATURE	TEC2 Ambient temperature
0632	TEC3.THL_REF_AMP	TEC3 Reference amplitude
0636	TEC3.AMB_TEMPERATURE	TEC3 Ambient temperature
0800	SYSTEM.STATUS	1- start-up procedure in progress 2- transmission lost at the end of the startup procedure 3- reservation (not used) 4- pump error (extraction systems only) 5- temperature or pressure sensor error detected 6- analyser is operating correctly
0801	SYSTEM.STARTUP_PROCEDURE	10 – start-up procedure complete, system is operational
0802	SYSTEM.TRANS_MP1_STATUS	1 - laser is working properly 0 – warning
0810	SYSTEM.ALARM1	Status value for alarm 1
0811	SYSTEM.ALARM2	Status value for alarm 2
0812	SYSTEM.ALARM3	Status value for alarm 3
0813	SYSTEM.ALARM4	Status value for alarm 4
0814	SYSTEM.ALARM5	Status value for alarm 5
0815	SYSTEM.ALARM6	Status value for alarm 6
0816	SYSTEM.ALARM7	Status value for alarm 7
0817	SYSTEM.ALARM8	Status value for alarm 8
0818	SYSTEM.ALARM9	Status value for alarm 9
0819	SYSTEM.ALARM10	Status value for alarm 10

0900	AOUT1	Analog output 1
0901	AOUT2	Analog output 2
0902	AOUT3	Analog output 3
0903	AOUT4	Analog output 4
0A00	AIN1	Analog input 1
0A01	AIN1.VAL	Analog 1 measured value
0A10	AIN2	Analog input 2
0A11	AIN2.VAL	Analog 2 measured value
0A20	AIN3	Analog input 3
0A21	AIN3.VAL	Analog 3 measured value
0A30	AIN4	Analog input 4
0A31	AIN4.VAL	Analog 4 measured value
0B00	RTD	RTD measured value
0B01	AMB_PRESSURE	Ambient pressure measured value
0B02	DOUT	Digital output
0B03	DIN	Digital input