GasEye

Extractive

User Manual

AIROPTIC™

GasEye Extractive

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Product information:	Gas analyzer
Application:	Extractive analyzer
Brand name:	**GasEye Extractive** **GasEye Extractive Ex1** **GasEye Extractive Ex1 ET**

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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 Extractive 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. Analyzer description

The GasEye Extractive analyzer is a comprehensive gas analysis tool for industrial process applications. A gas sample from the process is continuously fed to the analyzer where it is analyzed in real time using laser absorption spectroscopy. The analyzer can be configured to operate in the near infrared (NIR), mid-infrared (MIR) and infrared (IR) wavelengths, thus enabling the measurement of most gases relevant to monitoring industrial processes. The GasEye Extraction Analyzer uses 1 to 8 lasers to analyze one or more gases of interest.

1.5. Calibration information

The GasEye Extractive 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. Thus, we can assure long term stability and accuracy of the system and there is no need for calibration of the system in the field as long as the system status is operational.

2. Operating principle

GasEye Extractive is a laser spectrometer that uses single line molecular absorption spectroscopy. A semiconductor laser emits a beam of infrared light which passes through the process and impinges the detector on the receiver side. When the target gas is present the light intensity changes, and this can be used to determine the concentration of the measured gas. The wavelength of the radiation emitted by the laser is chosen to match the specific absorption line wavelength of the gas. The laser continuously scans this single absorption line with a very high spectral resolution (Figure 1 - compare the width of the absorption line vs. the width of the laser line). The measurement is free of cross-interferences, since the laser light is absorbed very selectively by only one specific line in the scanned spectral range.

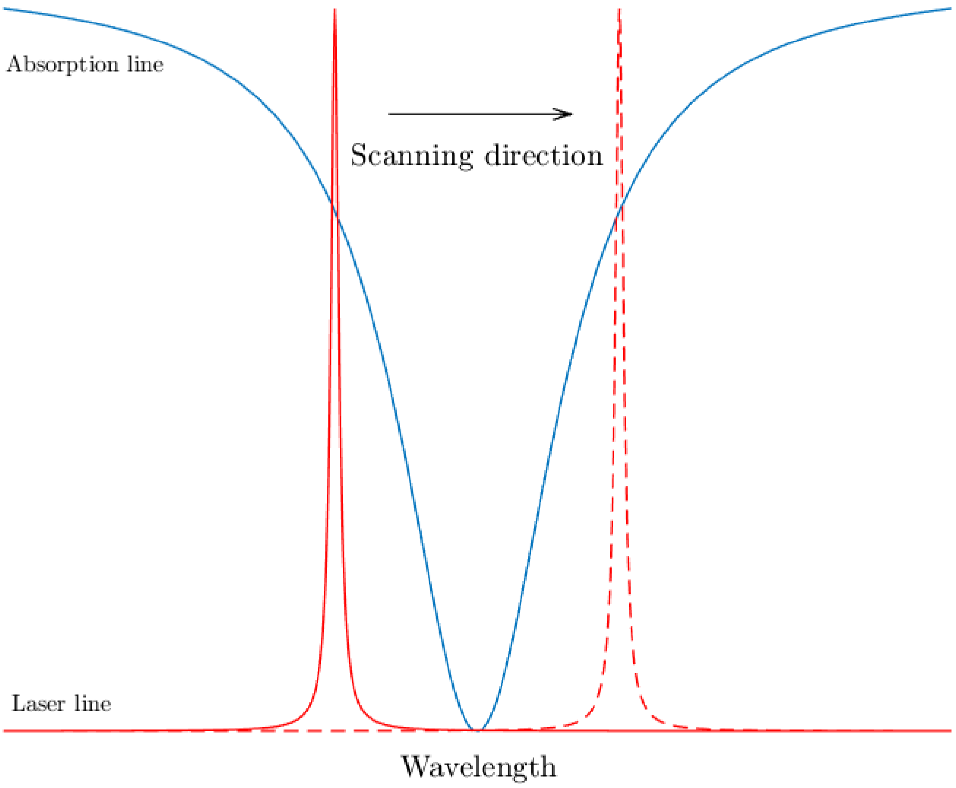


Figure 1 Schematic diagram of wavelength scanning process

2.1. Influences on the measurement

Temperature

The influence of temperature on the measured absorption line is compensated by internal algorithms. The temperature measurement is used to apply a correction of the temperature on the observed line strength. The temperature measurement is done with an internal sensor.

Pressure

The influence of pressure on the measured absorption line is compensated by internal algorithms. For known pressure values, the GasEye Extractive spectrometer adapts the line shape. The pressure measurement is done with an internal sensor to provide complete mathematical compensation of the pressure influence including the density effect (depending on specific application and target gas).

Interferences

The GasEye Extractive can measure the desired gas components very selectively. It may happen that the absorption line of the measured gas is influenced by the presence of other gases. This influence is compensated by the full shape of the detected signal curve analysis and applying algorithms that corrects the discrepancies accordingly.

3. GasEye Extractive – general purpose

The GasEye Extractive is a versatile gas analyzing tool for industrial process applications. A process gas sample is continuously fed into the analyzer where it is analyzed in real-time utilizing laser absorption spectroscopy.

Technical parameters:

- Power input Un: 230VAC (100~240VAC)
- Power consumption: < 300W
- Degree of protection: IP66
- Ambient temperature: -30°C ÷ +60°C

3.1. Basic requirements and safe use

The **GasEye Extractive** can be operated only in a non-hazardous areas. Any other ways of using the **GasEye Extractive** are forbidden. The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitably functional condition, or use of the device other than for its intended purpose.

Installation should be carried out by qualified personnel having the necessary authorization to install electrical and pressure measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident. Installation of device should be performed with particular care, in accordance with the regulations and standards applicable to that type of installation.

WARNING
Never install **GasEye Extractive** system in the hazardous areas. Death, personal injury and/or damage to property may result if this is not complied.

WARNING
Observe the specifications of the examination certificate valid in your country. Observe the laws and regulations valid in your country for the electric installation in non-hazardous areas.

WARNING
Never repair the device on site! Any components not mentioned in the spare parts list must be replaced or repaired by certified field service technicians.

3.2. Technical specification

GasEye Extarcive namplate with description is shown in Figure 2Figure 6.

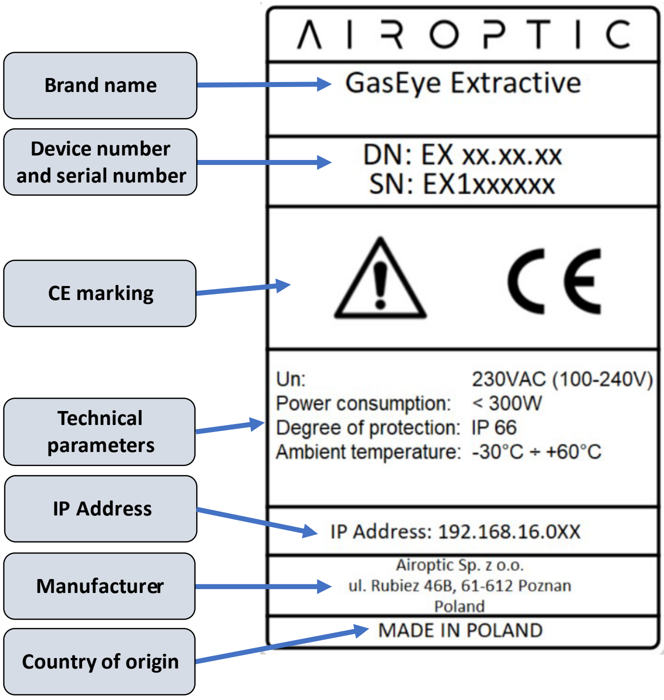


Figure 2 GasEye Extractive nameplate

Measurement conditions:

- **Precision:** +/- 1% of the measured value or LOD and response time 30 sec
- **Accuracy:** +/- 2% of the measured value or LOD and response time 30 sec
- **Conditioning of the sample:** dry, free from oils and particles
- **Calibration:** factory calibration using certified gas
- **Zero drift and span drift:** irrelevant
- **Sample pressure:** 0.05 – 0.3 barg
- **Sample temperature:** 0°C to 200°C (depends on application)

Climatic conditions:

- **Ambient temperature:** -30°C to 60°C
- **Ambient pressure:** 800 - 1200 hPa
- **Ambient humidity:** RH < 90%, non-condensing

Dynamic performance:

- **Ready for measurement:** 30 minutes after switching on
- **Response time (T90):** customizable 3-120 sec

Electrical inputs and outputs

- **Inputs:**
  - 4 x Analog inputs, (4-20 mA, process temperature and pressure, 2 x AUX) – easy user selection via DIP switch between active / passive mode.
  - 1 x RTD
  - 8 x Digital inputs

- **Outputs:**
  - 4 x Analog outputs, (4-20 mA, gas concentration, process transmission, 2 x AUX) active or passive - easy user selection via DIP switch between active / passive mode.
  - 8 x Digital outputs (NAMUR)

- **Optional:**
  - Modbus TCP/IP,
  - Modbus RTU

- ***Local user interface:***
  - Local user interface (LUI) – LCD display with backlight located on the housing cover
  - Ethernet:
    - WebServer application – system configuration and data acquisition via a web browser
    - Windows based program – GasEye recorder for real-time data acquisition

- ***Remote control:*** Ethernet for remote operation and diagnostics

Mechanical specification (Figure 3)**:**

- **Gas connection:** connector 6 mm Swagelok
- **Dimensions:** 650 x 460 x 230 mm
- **Weight:** < 60 kg
- **Material:** Housing: SS 1.4301 (AISI 304)
  Internal process cell: SS 1.4404 (AISI 316L)
  Cell window: sapphire

Security:

- **Low Voltage Directive (LVD) 2014/35/EU**
  - PN-EN 60825-1:2014-11 – Safety of laser devices - Part 1: Equipment classification and requirements
  - PN-EN 61010-1:2011 – Safety requirements for electrical equipment for measurement, control and use in the laboratory – Part 1: General requirements
- **EMC Directive 2014/30/EU**
  - EN 61326-1:2013-6 - Electrical apparatus for measurement, control, and laboratory use. EMC requirements - Part 1: General requirements
- **RoHS Directive 2011/65/EU**

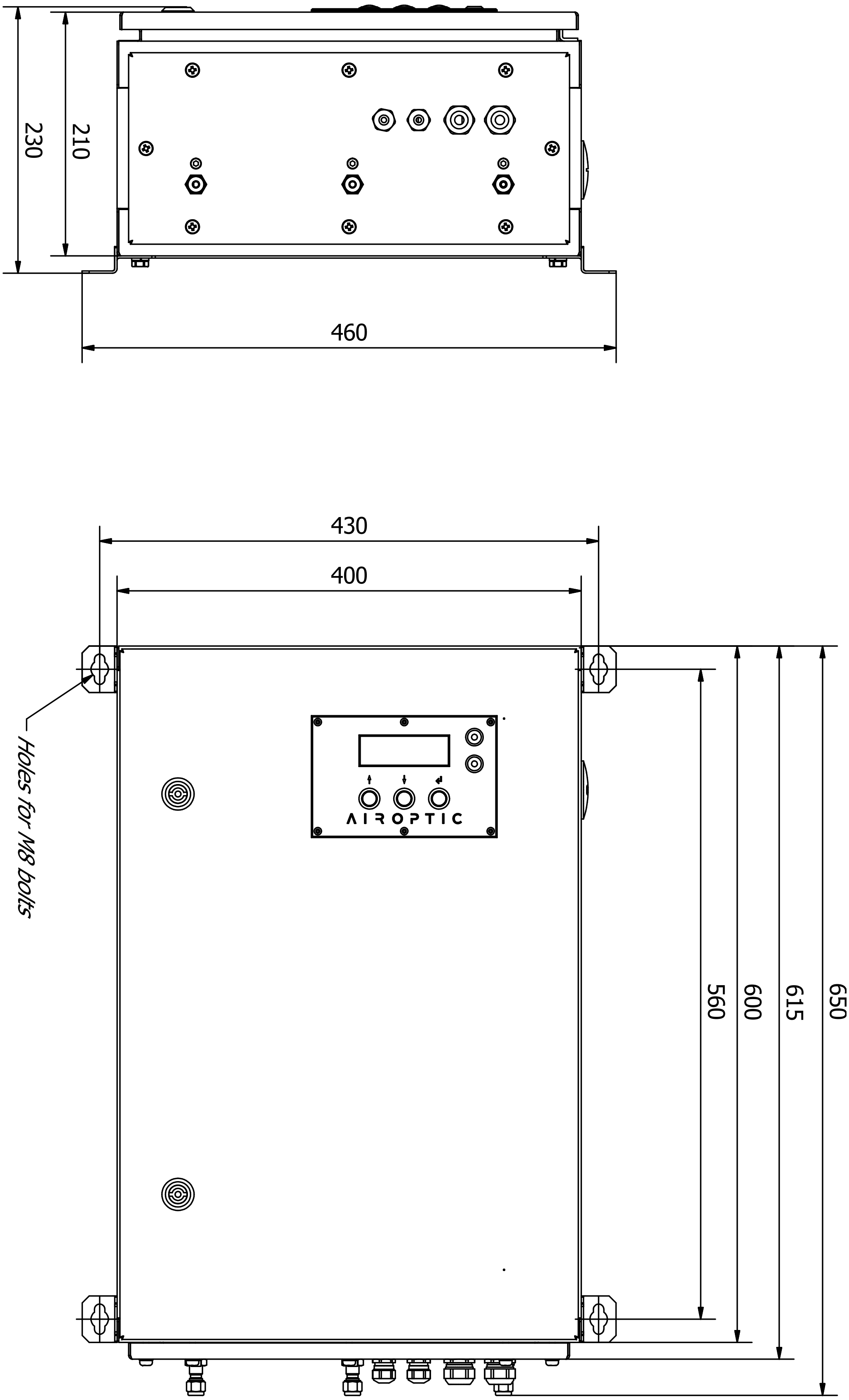


Figure 3 Diagram of GasEye Extractive analyzer with dimensions

3.3. Components specification and wiring diagram

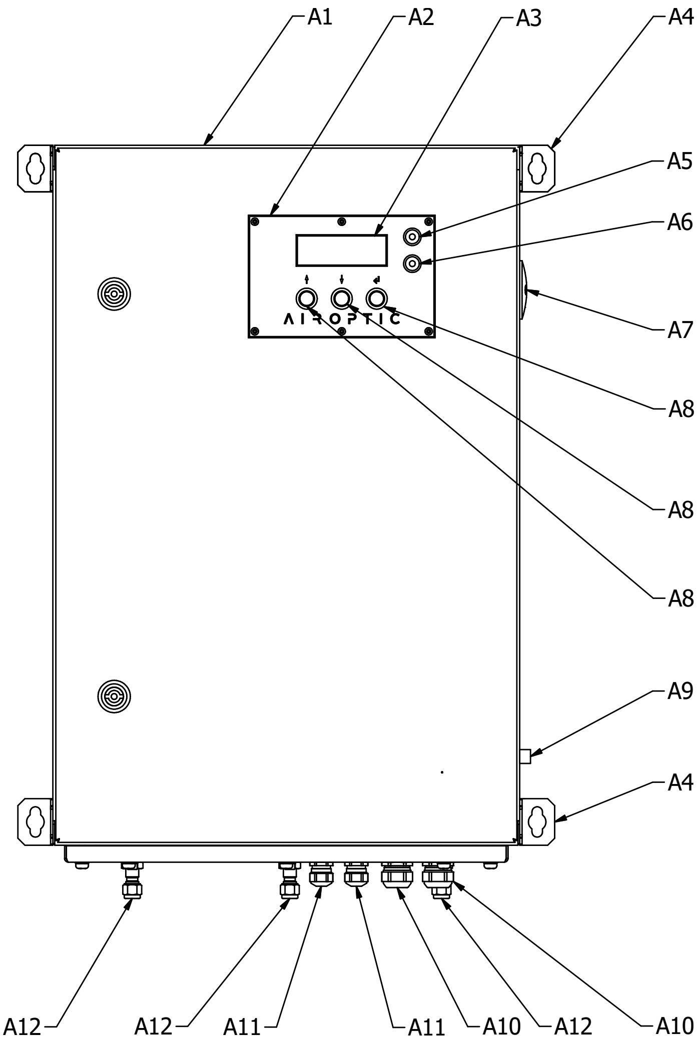


Figure 4 GasEye Extractive - outside view

Table 1 GasEye Extractive - components specification

ID	Name	Component specification
A1	Enclosure	IP66, -30°C ÷ +80°C, stainless steel AISI 304
A2	HMI front panel	Aluminum 5754
A3	HMI window	Acrylic with shielding mesh
A4	Mounting bracket	For M8 screws, stainless steel AISI 304
A5	HMI red LED	IP67, nickel-plated brass
A6	HMI green LED	IP67, nickel-plated brass
A7	Blanking plug/Breather drain	IP66, Stainless steel
A8	HMI button	IP66, stainless steel
A9	PE connector	For M8 screws, stainless steel AISI 304
A10	Cable gland M20	IP68, -60°C ÷ +105°C, 9÷14mm, nickel-plated brass
A11	Cable gland M16	IP68, -60°C ÷ +105°C, 5÷10mm, nickel-plated brass
A12	Gas connector	Ø6mm compression fitting, stainless steel AISI 316

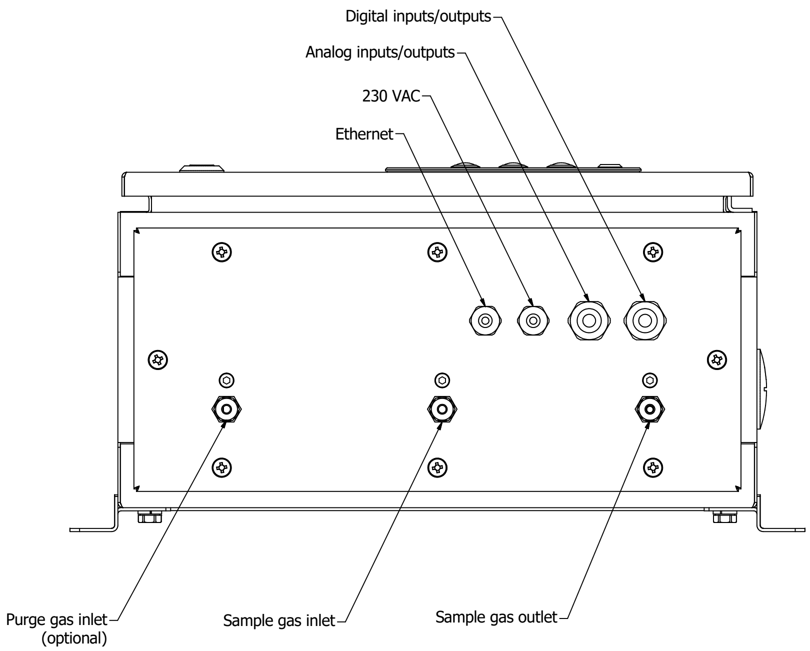


Figure 5 GasEye Extractive - bottom panel

4. GasEye Extractive Ex1 – hazardous areas

GasEye Extractive Ex1 is a certified version of the GasEye Extractive device for use in hazardous areas Zone 1/21 and can provide the optical radiation to Zone 0/20. GasEye Extarctive Ex1 provides Ex p (purge and pressurization) type of explosion protection. Ex p pressurized equipment is the technique of guarding against ingress of the external atmosphere into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere. The overpressure is maintained either with or without a continuous flow of the protective gas. Certified purge and pressurization system from Pepperl+Fuchs is used to meet the ATEX standards.

4.1. ATEX Marking

Certificate No. **KDB 20ATEX0056X**

GasEye Extractive Ex1

II 1/2G Ex op is pxb IIC T* Ga/Gb
II 1/2D Ex op is pxb IIIC T** Da/Db

Technical parameters:

- Power input Un: 230VAC (100~240VAC)
- Power consumption: < 300W
- Degree of protection: IP66
- Ambient temperature: -30°C ÷ +50°C Temperature class **T6**
  Maximum surface temperature **85°C**
  -30°C ÷ +60°C Temperature class **T5**
  Maximum surface temperature **100°C**
- Pre-purge time: ≥ 3 min.
- Inlet pressure: 2 bar
- Minimal pressure: not less than 1.4 mbar during continous system work after initial purging

Special conditions of use:

- The temperature class of the **GasEye Extractive Ex1** device (T* for gases) or the maximum surface temperature of the enclosure (T** for dust) depends on the process temperature of the tested medium. For the medium temperature above the declared maximum ambient temperature, the temperature class T* and the maximum surface temperature T** should be determined according to the manufacturer's instruction.
- External parts of the **GasEye Extractive Ex1** made of plastic should be cleaned with a damp cloth, with the addition of antistatic fluids.
- The **GasEye Extractive Ex1** device should be installed in a way that prevents electrostatic charging, in accordance with the instructions.

Determination of the temperature class T* and the maximum surface temperature T :**

Table 2 Temperature class and maximum surface temperature vs medium temperature

ID	Medium temperature	Ambient conditions	Temperature class	Maximum surface temperature
1	< 50°C	-30°C to 50°C	T6	85°C
2	< 100°C	-30°C to 60°C	T5	100°C
3	< 135°C	-30°C to 60°C	T4	135°C
4	< 200°C	-30°C to 60°C	T3	200°C

Additional equipment:

- Purging system controller:
  - Producer: Pepperl+Fuchs
  - Model: 6500-01-EXT1-PNO-LNO
  - ATEX certificate No.: UL/DEMKO 16ATEX1640X
  - Marking:

II 2G Ex eb q ib [ib pxb] IIC T4 Gb
II 2D Ex tb ib [ib pxb] IIIC T135°C Db (Ta: -20°C ÷ +70°C)
II 2G Ex eb q ib [ib pyb] IIC T4 Gb
II 2D Ex tb ib [ib pyb] IIIC T135°C Db

- Purging system vent:
  - Producer: Pepperl+Fuchs
  - Model: EPV-6500-07
  - ATEX certificate No.: DEMKO 15ATEX1622X
  - Marking:

II 2G Ex ib [pxb] IIC T4 Gb
II 2D Ex ib [pxb] IIIC T135°C Db (Ta: -20°C ÷ +70°C)
II 2G Ex ib [pyb] IIC T4 Gb
II 2D Ex ib [pyb] IIIC T135°C Db

- Solenoid operator
  - Producer: Nass magnet
  - Model: 1259 30 / 5146
  - ATEX certificate No.: PTB 02ATEX2154
  - Marking:

II 2G Ex ia IIC T6 Gb
Or (Ta: -40°C ÷ +50°C)
II 2G Ex ia IIB T6 Gb

Or

II 2G Ex ia IIC T4 Gb
Or (Ta: -40°C ÷ +85°C)
II 2G Ex ia IIB T4 Gb

  - Producer: Nass magnet
  - Model: 1262 50 / W5146
  - ATEX certificate No.: PTB 09ATEX2001
  - Marking:

II 2G Ex ia IIC/IIB T6 Ga
II 2D Ex t IIIC T80°C Db (Ta: -40°C ÷ +50°C)

Or

II 2G Ex ia IIC/IIB T4 Ga
II 2D Ex t IIIC T130°C Db (Ta: -40°C ÷ +85°C)

4.2. Basic requirements and safe use

The **GasEye Extractive Ex1** can be operated in Zone 1 and 21 and provide the optical radiation to Zone 0 and Zone 20. Any other ways of using the **GasEye Extractive Ex1** are forbidden. The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitably functional condition, or use of the device other than for its intended purpose.

Installation should be carried out by qualified personnel having the necessary authorization to install electrical and pressure measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident. Installation of device should be performed with particular care, in accordance with the regulations and standards applicable to that type of installation. The general rules for connecting and using pressurized enclosure should conform to the rules and standards for equipment with Ex p as specified in:

- **IEC 60079-14: Explosive atmospheres. Electrical installations design, selection and erection.**
- **IEC 60079-17: Explosive atmospheres. Electrical installations inspection and maintenance.**

The GasEye device is designed and manufactured in accordance with following standards:

- **EN IEC 60079-0:2018;**
- **EN 60079-2:2014;**
- **EN 60079-26:2015**
- **EN 60079-28:2015**

Information about possible use in hazardous areas can be found on a label located on the enclosure of the device.

WARNING
Never install **GasEye Extractive Ex1** system in the ATEX zone without permission of the plant manager (hot work permit). Death, personal injury and/or damage to property may result if this is not complied.

WARNING
Observe the specifications of the examination certificate valid in your country. Observe the laws and regulations valid in your country for the electric installation in hazardous areas with risk of explosion. Regulations for installation of electric equipment in hazardous areas: DIN EN 60079-14.

WARNING
Power shall not be restored after the enclosure has been opened until combustible gas/dust accumulations within the enclosure have been removed.

WARNING
Never switch on or operate an analyzer with lid open. Before opening the device wait at least two minutes after de-energizing. Make sure that externally powered signals are also be de-energized. For secure disconnection of all signals the device should be operated in hazardous areas only via a switch-off unit placed outside the hazardous area.

WARNING
Never repair the device on site! Any components not mentioned in the spare parts list must be replaced or repaired by certified field service technicians. Failure to do so will also result in loss of Ex approval.

WARNING
Customer is not allowed to change any other purging system settings nor replace any hardware element

WARNING
All non-intrinsically safe connections with GasEye analyzer that are powered other way than through the 6500 purge controller, must be cut-off when pressurization failure occurs to ensure safety.

4.3. Technical specification

GasEye Extarcive Ex1 namplate with description is shown in Figure 6.

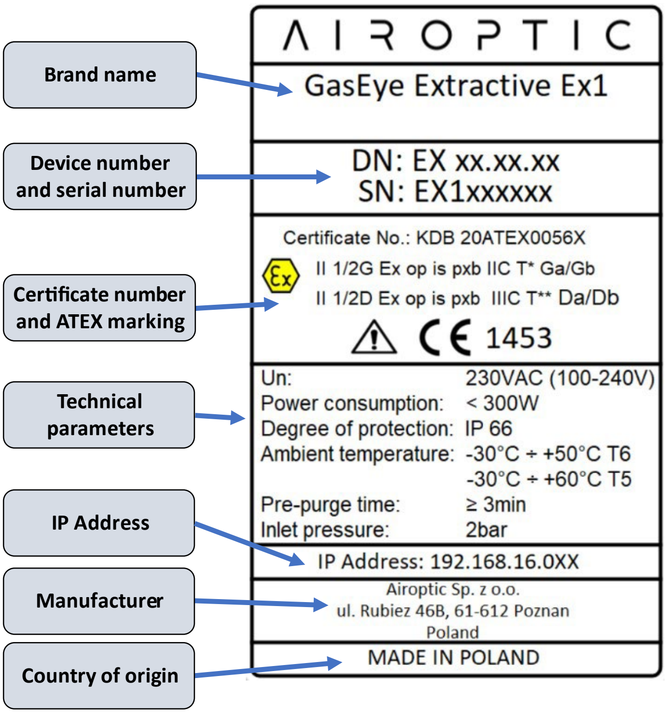


Figure 6 GasEye Extractive Ex1 nameplate

Measurement conditions:

- **Precision:** +/- 1% of the measured value or LOD and response time 30 sec
- **Accuracy:** +/- 2% of the measured value or LOD and response time 30 sec
- **Conditioning of the sample:** dry, free from oils and particles
- **Calibration:** factory calibration using certified gas
- **Zero drift and span drift:** irrelevant
- **Sample pressure:** 0.05 – 0.3 barg
- **Sample temperature:** 0°C to 200°C (depends on application)

Climatic conditions:

- **Ambient temperature:** -30°C to 60°C
- **Ambient pressure:** 800 - 1200 hPa
- **Ambient humidity:** RH < 90%, non-condensing

Dynamic performance:

- **Ready for measurement:** 30 minutes after switching on
- **Response time (T90):** customizable 3-120 sec

Electrical inputs and outputs

- **Inputs:**
  - 4 x Analog inputs, (4-20 mA, process temperature and pressure, 2 x AUX) – easy user selection via DIP switch between active / passive mode.
  - 1 x RTD
  - 8 x Digital inputs

- **Outputs:**
  - 4 x Analog outputs, (4-20 mA, gas concentration, process transmission, 2 x AUX) active or passive - easy user selection via DIP switch between active / passive mode.
  - 8 x Digital outputs (NAMUR)

- **Optional:**
  - Modbus TCP/IP,
  - Modbus RTU

- ***Local user interface:***
  - Local user interface (LUI) – LCD display with backlight located on the housing cover
  - Ethernet:
    - WebServer application – system configuration and data acquisition via a web browser
    - Windows based program – GasEye recorder for real-time data acquisition

- ***Remote control:*** Ethernet for remote operation and diagnostics

Mechanical specification (Figure 7**):**

- **Gas connection:** connector 6 mm Swagelok
- **Dimensions:** 650 x 488 x 230 mm
- **Weight:** < 60 kg
- **Material:** Housing: SS 1.4301 (AISI 304)
  Internal process cell: SS 1.4404 (AISI 316L)
  Cell window: sapphire

Security:

- **Low Voltage Directive (LVD) 2014/35/EU**
  - PN-EN 60825-1:2014-11 – Safety of laser devices - Part 1: Equipment classification and requirements
  - PN-EN 61010-1:2011 – Safety requirements for electrical equipment for measurement, control and use in the laboratory – Part 1: General requirements
- **EMC Directive 2014/30/EU**
  - EN 61326-1:2013-6 - Electrical apparatus for measurement, control, and laboratory use. EMC requirements - Part 1: General requirements
- **RoHS Directive 2011/65/EU**
- **ATEX Directive 2014/34/EU**
  - EN IEC 60079-0:2018;
  - EN 60079-2:2014;
  - EN 60079-26:2015;
  - EN 60079-28:2015

CLASS 1
LASER PRODUCT

CE

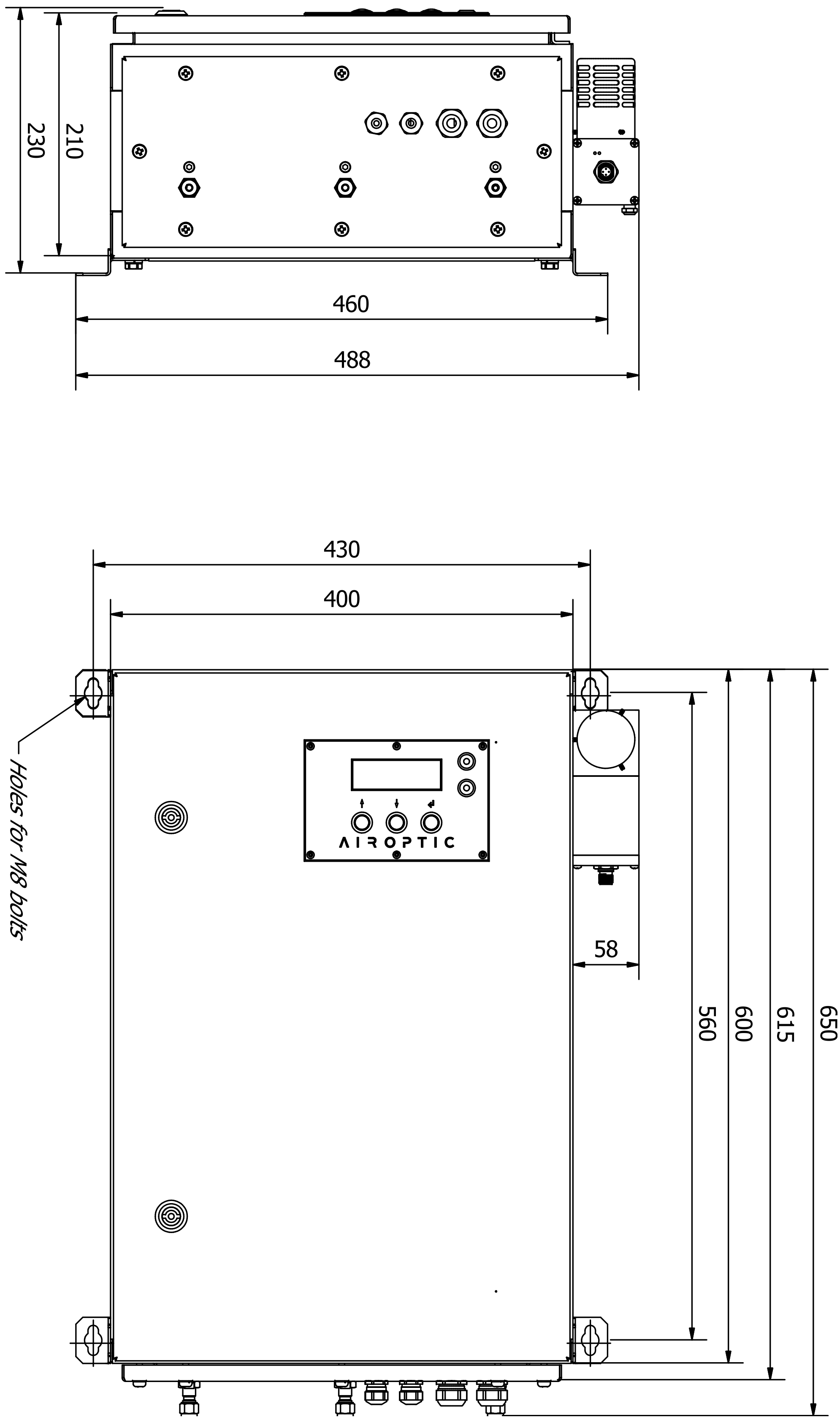


Figure 7. Diagram of GasEye Extractive Ex1 analyzer with dimensions

4.4. Components specification and wiring diagram

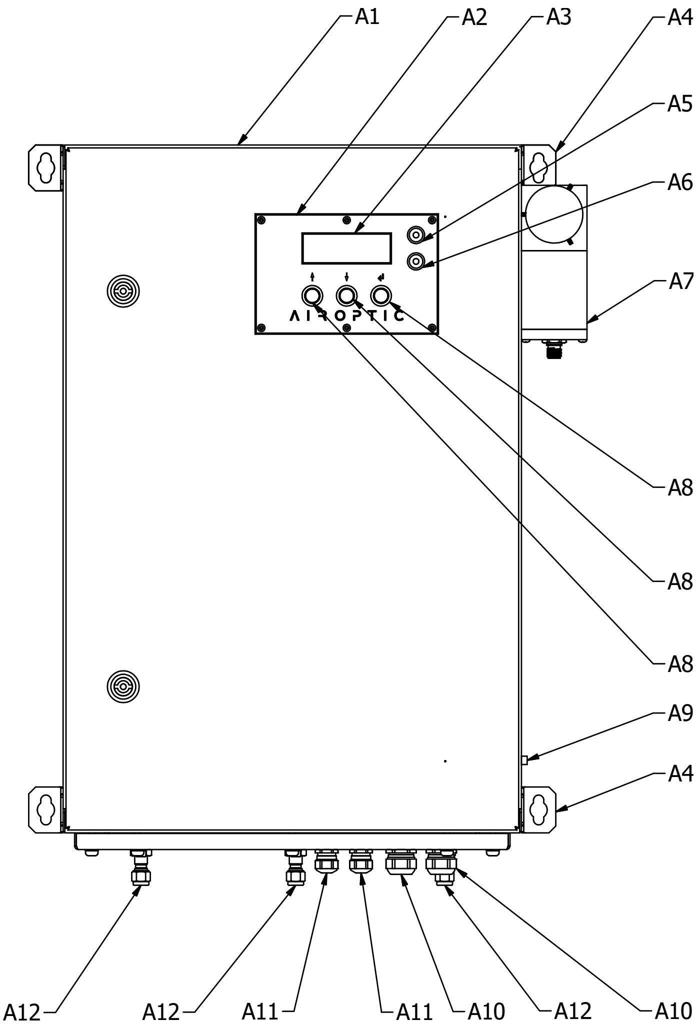


Figure 8 GasEye extractive Ex1 - outside view

Table 3 GasEye extractive Ex1 - components specification

ID	Name	Component specification
A1	Enclosure	IP66, -30°C ÷ +80°C, stainless steel AISI 304
A2	HMI front panel	Aluminum 5754
A3	HMI window	Acrylic with shielding mesh
A4	Mounting bracket	For M8 screws, stainless steel AISI 304
A5	HMI red LED	IP67, nickel-plated brass
A6	HMI green LED	IP67, nickel-plated brass
A7	Vent	IP66, -20°C ÷ +70°C, Aluminum anodized
A8	HMI button	IP66, stainless steel
A9	PE connector	For M8 screws, stainless steel AISI 304
A10	Cable gland M20	IP68, -60°C ÷ +105°C, 9÷14mm, nickel-plated brass
A11	Cable gland M16	IP68, -60°C ÷ +105°C, 5÷10mm, nickel-plated brass
A12	Gas connector	Ø6mm compression fitting, stainless steel AISI 316

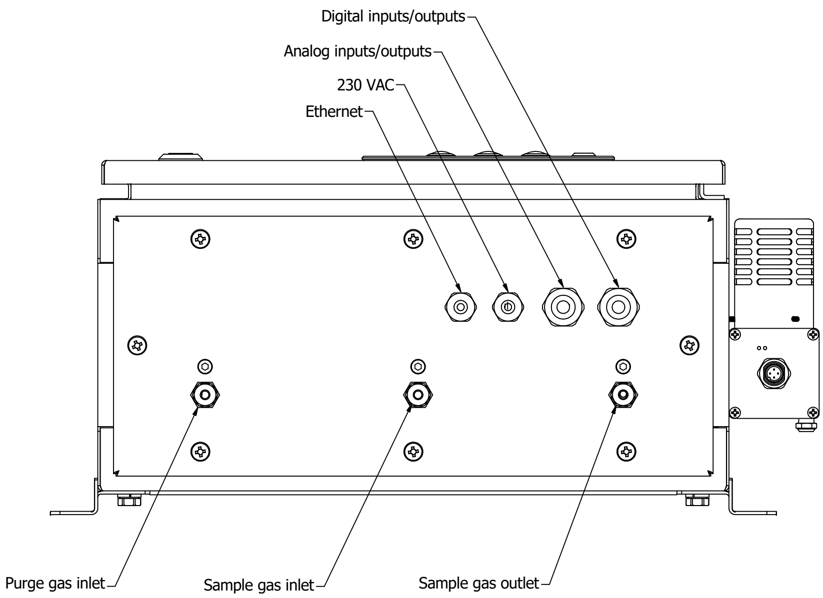


Figure 9 GasEye Extractive Ex1 - bottom panel

The ATEX Zone 1 version GasEye Extractive Ex1 analyzer wiring diagram is shown in Figure 10. A detailed description of the components of the installation is presented in the Table 4.

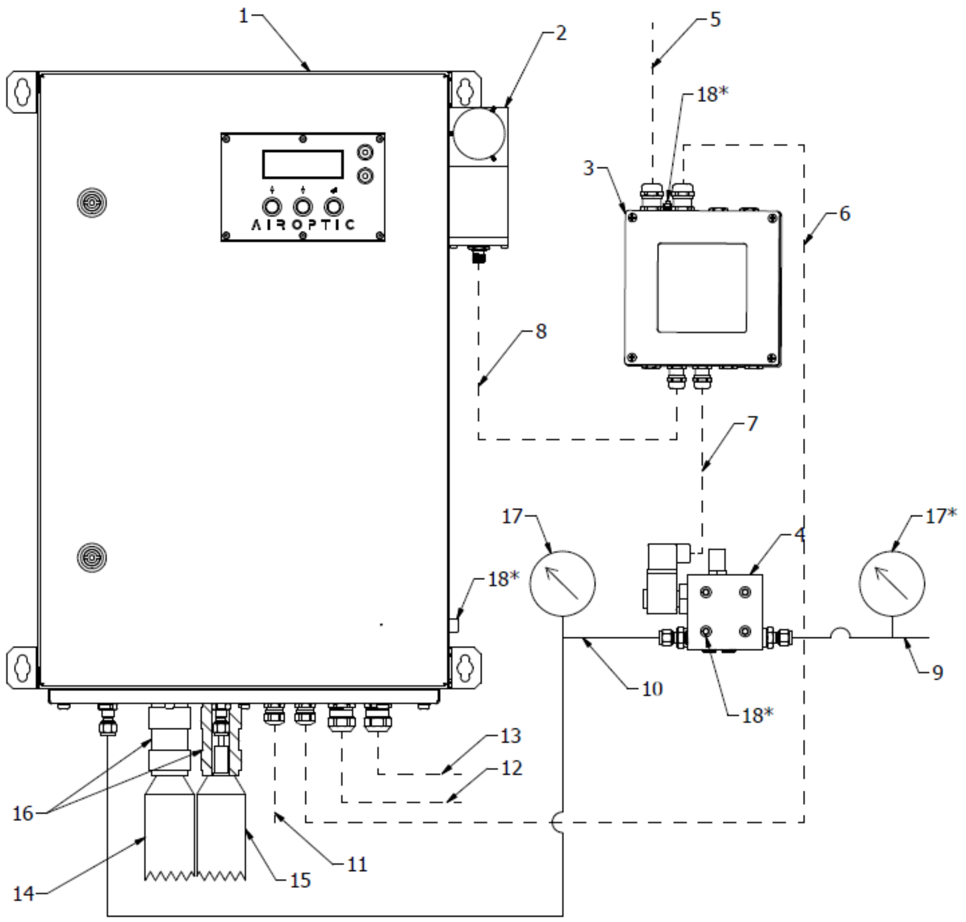


Figure 10 Schematic diagram of GasEye Extractive Ex1

Table 4 Description of the components of the GasEye Extractive Ex1.

ID	Component name	Comments
1	GasEye Extractive Ex1	Example: EX 15.01.01
2	Purging system vent	An integral part of the analyzer
3	Purging system controller	ATEX Zone 1
4	Solenoid operator (manifold)	ATEX Zone 1
5	Power input cable	Diameter: 6 - 7 mm Wires: 3x 1 mm^2
6	Analyzer power input cable	Diameter: 6 - 7 mm Wires: 3x 1 mm^2
7	Solenoid operator control signal cable	Diameter: 5,5 - 6 mm Wires: 3x 1 mm^2 Length: 50 m (max)
8	Purging system vent signal cable	Wires: 4x 0.5 mm^2 Length: 5m (max) Included
9	Purge gas inlet	Stainless steel tube 6mm Gas: nitrogen or instrument air (depends on application) Pre-purge - flow = 40-80 l/min Workflow <15 l/min Inlet pressure: 2,0 barg (1.8-2.5 barg) Pre-purge time ≥ 3 min
10	Purge gas pipe	Stainless steel tube 6mm
11	Diagnostic cable TCP/IP	Diameter: 4,5 - 6 mm SF/UTP CAT 5
12	Analog input and output cable	Diameter: 8 - 14,5 mm Wires: minimum 2 x 0,5 mm2
13	Digital input and output cable	Diameter: 8 - 14,5 mm Wires: minimum 2 x 0,5 mm2
14	Gas samlpe inlet	Through the hot line* (temp > 60°C) (*optional) Pressure range: 0,05 – 0,3 barg
15	Gas sample outlet	Through the hot line* (temp > 60°C) (*optional) Outlet pressure > 0,1 barg
16	Thermal insulation	Winkler WAZX1131 (or similar)
17	Manometer	*optional
18	PE	*optional

5. GasEye Extractive Ex1 ET – hazardous areas, extended temperature range

GasEye Extractive Ex1 ET (extended temperature) is a comprehensive tool for the analysis of gases in industrial processes, which uses the GasEye Extractive Ex1 extraction analyzer with additional accessories. All equipment was installed in an additional cover made of stainless steel. The housing is equipped with a convection type heater controlled by a thermostat. The thermostat keeps the temperature inside the enclosure above 15°C.

5.1. ATEX Marking

Certificate No. **KDB 20ATEX0056X**

GasEye Extractive Ex1 ET

II 1/2G Ex db eb h ia ib op is pxb q IIC T* Ga/Gb
II 1/2D Ex h ia ib op is tb pxb q IIIC T** Da/Db

Technical parameters:

- Power input Un: 230VAC (100~240VAC)
- Power consumption: < 400W
- Degree of protection: IP66
- Ambient temperature: -30°C ÷ +60°C Temperature class **T4**
  Maximum surface temperature **135°C**
- Pre-purge time: ≥ 3 min.
- Inlet pressure: 2 bar
- Minimal pressure: not less than 1.4 mbar during continous system work after initial purging

Special conditions of use:

- The temperature class of the **GasEye Extractive Ex1 ET** device (T* for gases) or the maximum surface temperature of the enclosure (T** for dust) depends on the process temperature of the tested medium. For the medium temperature above the declared maximum ambient temperature, the temperature class T* and the maximum surface temperature T** should be determined according to the manufacturer's instruction.
- **GasEye Extractive Ex1 ET** should be protected from direct sunlight.

Determination of the temperature class T* and the maximum surface temperature T :**

Table 5 Temperature class and maximum surface temperature vs medium temperature

ID	Medium temperature	Ambient conditions	Temperature class	Maximum surface temperature
1	< 135°C	-30°C to 60°C	T4	135°C
2	< 200°C	-30°C to 60°C	T3	200°C

GasEye Extractive Ex1 ET consists of certified devices for hazardous areas. List of explosion-proof equipment is shown in Table 6.

Table 6 List of explosion-proof equipment used in the GasEye Extractive Ex1 ET

ATEX specification of components				
ID	**Name**	**Type**	**Marking**	**ATEX certificate No.**
1	GasEye Extractive	Ex1	Ⓔx II 1/2G Ex op is pxb IIC T* Ga/Gb Ⓔx II 1/2D Ex op is pxb IIIC T** Da/Db	KDB 20ATEX0056X
2	Enclosure	RSA-ATEX-OH-116-060	Ⓔx II 2G Ex eb IIC Gb Ⓔx II 2D Ex tb IIIC Db	OBAC 15ATEX0203U
3	Purging system controller	6500-01-EXT1-PNO-LNO	Ⓔx II 2G Ex eb q ib [ib pxb] IIC T4 Gb Ⓔx II 2D Ex tb ib [ib pxb] IIIC T135°C Db Ⓔx II 2G Ex eb q ib [ib pyb] IIC T4 Gb Ⓔx II 2D Ex tb ib [ib pyb] IIIC T135°C Db	UL/DEMKO 16ATEX1640X
2	Purging system vent	EPV-6500-07	Ⓔx II 2G Ex ib [pxb] IIC T4 Gb Ⓔx II 2D Ex ib [pxb] IIIC T135°C Db Ⓔx II 2G Ex ib [pyb] IIC T4 Gb Ⓔx II 2D Ex ib [pyb] IIIC T135°C Db	DEMKO 15ATEX1622X
4	Solenoid operator	1259 30 / 5146	Ⓔx II 2G Ex ia IIC T6/T4 Gb Ⓔx II 2G Ex ia IIB T6/T4 Gb	PTB 02ATEX2154
		1262 50 / W5146	Ⓔx II 2G Ex ia IIC/IIB T6/T4 Ga Ⓔx II 2D Ex t IIIC T80°C/T130°C Db Ga	PTB 09ATEX2001
5	Junction box	CEP 252512	Ⓔx II 2G Ex e IIC T6/T5 Gb Ⓔx II 2D Ex tb IIIC T85°C/T100°C Db	SIRA 08ATEX3213
6	Manometer	232.30.063 + option ATEX	Ⓔx II 2G Ex h IIC T6 … T1 Gb Ⓔx II 2D Ex h IIIC T85°C … T450°C	-
7	Convection type heater 100W	CREx020 02052.0-10	Ⓔx II 2G Ex db IIC T5 Gb Ⓔx II 2D Ex tb IIIC T100°C Db	EPS 16ATEX1109X
8	Thermostat	REx 011	Ⓔx II 2G Ex db IIC T6 Gb Ⓔx II 2D Ex tb IIIC T85°C Db	EPS 16ATEX1118X
10	Cable glands	EX1126.20.140 - M20 EX1126.17.100 - M16	Ⓔx II 2G Ex e IIC Ⓔx II 2D Ex tD A21 IP68	PTB 10ATEX1034X
		HSK-M-Ex-d 1.622.2000.50 – M20 1.622.1600.50 – M16	Ⓔx II 2G Ex db IIC Gb Ⓔx II 1D Ex ta IIIC Da	KEMA 99ATEX6968X
11	Breath drain	DP-E-3-0-04-s2	Ⓔx II 2G Ex e IIC Gb Ⓔx II 2D Ex tb IIIC Db IP66	ITS 16ATEX101338X
		BDRVX-1MBNS.K01	Ⓔx II 2G Ex eb IIC Gb Ⓔx II 2D Ex tb IIIC Db	IMQ 13ATEX030X

5.2. Basic requirements and safe use

The **GasEye Extractive Ex1 ET** can be operated in Zone 1 and 21 and provide the optical radiation to Zone 0 and 20 per mark in 0. Any other ways of using the **GasEye Extractive Ex1 ET** are forbidden. The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitably functional condition, or use of the device other than for its intended purpose.

Installation should be carried out by qualified personnel having the necessary authorization to install electrical and pressure measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident. Installation of device should be performed with particular care, in accordance with the regulations and standards applicable to that type of installation. The general rules for connecting and using pressurized enclosure should conform to the rules and standards for equipment with Ex p as specified in:

- **IEC 60079-14: Explosive atmospheres. Electrical installations design, selection and erection.**
- **IEC 60079-17: Explosive atmospheres. Electrical installations inspection and maintenance.**

The GasEye device is designed and manufactured in accordance with following standards:

- **EN IEC 60079-0:2018;**
- **EN 60079-2:2014;**
- **EN 60079-26:2015**
- **EN 60079-28:2015**

Information about possible use in hazardous areas can be found on a label located on the enclosure of the device.

WARNING
Never install GasEye Extractive system in the ATEX zone without permission of the plant manager (hot work permit). Death, personal injury and/or damage to property may result if this is not complied.

WARNING
Observe the specifications of the examination certificate valid in your country. Observe the laws and regulations valid in your country for the electric installation in hazardous areas with risk of explosion. Regulations for installation of electric equipment in hazardous areas: DIN EN 60079-14.

WARNING
Power shall not be restored after the enclosure has been opened until combustible gas/dust accumulations within the enclosure have been removed.

WARNING
Never switch on or operate an analyzer with lid open. Before opening the device wait at least two minutes after de-energizing. Make sure that externally powered signals are also be de-energized. For secure disconnection of all signals the device should be operated in hazardous areas only via a switch-off unit placed outside the hazardous area.

WARNING
Never repair the device on site! Any components not mentioned in the spare parts list must be replaced or repaired by certified field service technicians. Failure to do so will also result in loss of Ex approval.

WARNING
Customer is not allowed to change any other purging system settings nor replace any hardware element

WARNING
All non-intrinsically safe connections with GasEye analyzer that are powered other way than through the 6500 purge controller, must be cut-off when pressurization failure occurs to ensure safety.

5.3. Technical specification

GasEye Extarcive Ex1 ET namplate with description is shown in Figure 11.

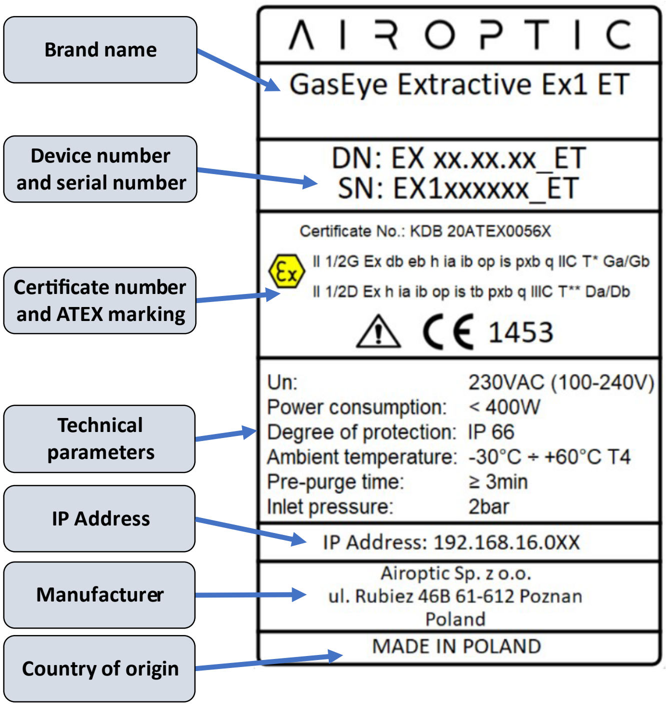


Figure 11 GasEye Extractive Ex1 ET nameplate

Measurement conditions:

- **Precision:** +/- 1% of the measured value or LOD and response time 30 sec
- **Accuracy:** +/- 2% of the measured value or LOD and response time 30 sec
- **Conditioning of the sample:** dry, free from oils and particles
- **Calibration:** factory calibration using certified gas
- **Zero drift and span drift:** irrelevant
- **Sample pressure:** 0.05 – 0.3 barg
- **Sample temperature:** 0°C to 200°C (depends on application)

Climatic conditions:

- **Ambient temperature:** -30°C to 60°C
- **Ambient pressure:** 800 - 1200 hPa
- **Ambient humidity:** RH < 90%, non-condensing

Dynamic performance:

- **Ready for measurement:** 30 minutes after switching on
- **Response time (T90):** customizable 3-120 sec

Electrical inputs and outputs

- **Inputs:**
  - 4 x Analog inputs, (4-20 mA, process temperature and pressure, 2 x AUX) – easy user selection via DIP switch between active / passive mode.
  - 1 x RTD
  - 8 x Digital inputs

- **Outputs:**
  - 4 x Analog outputs, (4-20 mA, gas concentration, process transmission, 2 x AUX) active or passive - easy user selection via DIP switch between active / passive mode.
  - 8 x Digital outputs (NAMUR)

- **Optional:**
  - Modbus TCP/IP,
  - Modbus RTU

- ***Local user interface:***
  - Local user interface (LUI) – LCD display with backlight located on the housing cover
  - Ethernet:
    - WebServer application – system configuration and data acquisition via a web browser
    - Windows based program – GasEye recorder for real-time data acquisition

- ***Remote control:*** Ethernet for remote operation and diagnostics

Mechanical specification (Figure 12**):**

- **Gas connection:** connector 6 mm Swagelok
- **Dimensions:** 1050 x 860 x 420 mm
- **Weight:** <80 kg
- **Material:** Housing: SS 1.4301 (AISI 304)

Security:

- **Low Voltage Directive (LVD) 2014/35/EU**
  - PN-EN 60825-1:2014-11 – Safety of laser devices - Part 1: Equipment classification and requirements
  - PN-EN 61010-1:2011 – Safety requirements for electrical equipment for measurement, control and use in the laboratory – Part 1: General requirements
- **EMC Directive 2014/30/EU**
  - EN 61326-1:2013-6 - Electrical apparatus for measurement, control, and laboratory use. EMC requirements - Part 1: General requirements
- **RoHS Directive 2011/65/EU**
- **ATEX Directive 2014/34/EU**
  - EN IEC 60079-0:2018;
  - EN 60079-2:2014;
  - EN 60079-26:2015;
  - EN 60079-28:2015

CLASS 1 LASER PRODUCT

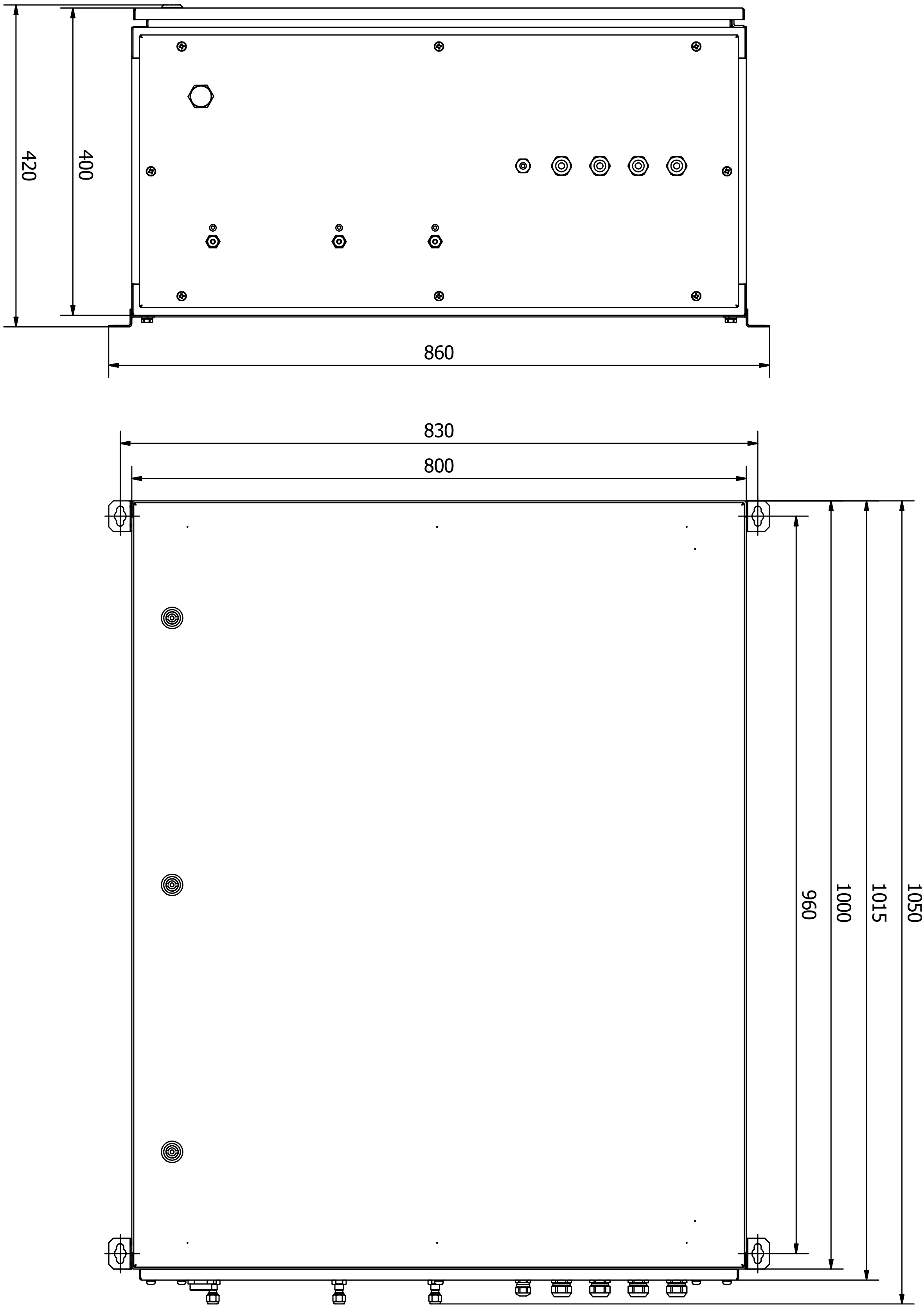


Figure 12 Diagram of GasEye Extractive Ex1 ET analyzer with dimensions

5.4. Components specification and wiring diagram

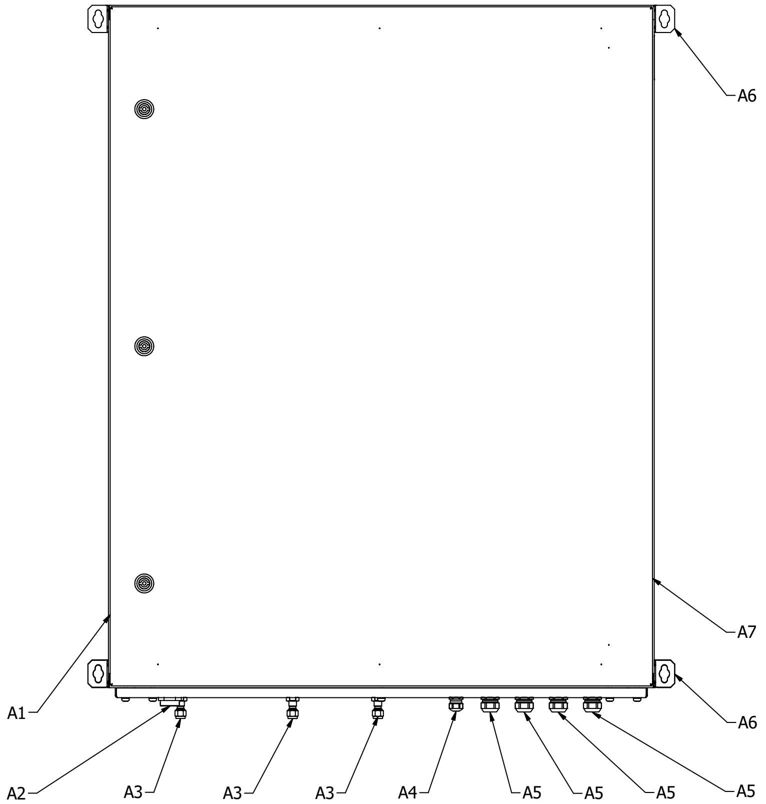


Figure 13 GasEye Extractive Ex1 ET - outside view

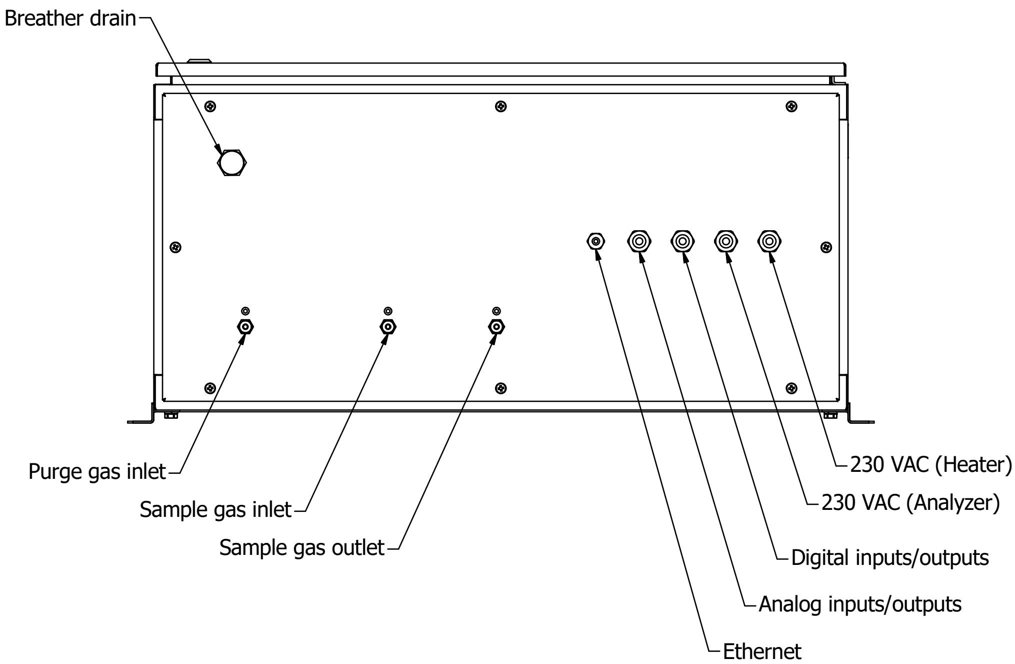


Figure 14 GasEye Extractive Ex1 ET - bottom panel

Table 7 GasEye Extractive Ex1 ET components specification

ID	Name	Component specification
A1	Enclosure	IP66, -30°C ÷ +80°C, stainless steel AISI 304
A2	Breather drain	IP66, -30°C ÷ +80°C, stainless steel
A3	Gas connector	Ø6mm compression fitting, stainless steel AISI 316
A4	Cable gland M16	IP68, -60°C ÷ +105°C, 5÷10mm, nickel-plated brass
A5	Cable gland M20	IP68, -60°C ÷ +105°C, 9÷14mm, nickel-plated brass
A6	Mounting bracket	For M8 screws, stainless steel AISI 304
A7	PE connector	For M8 screws, stainless steel AISI 304

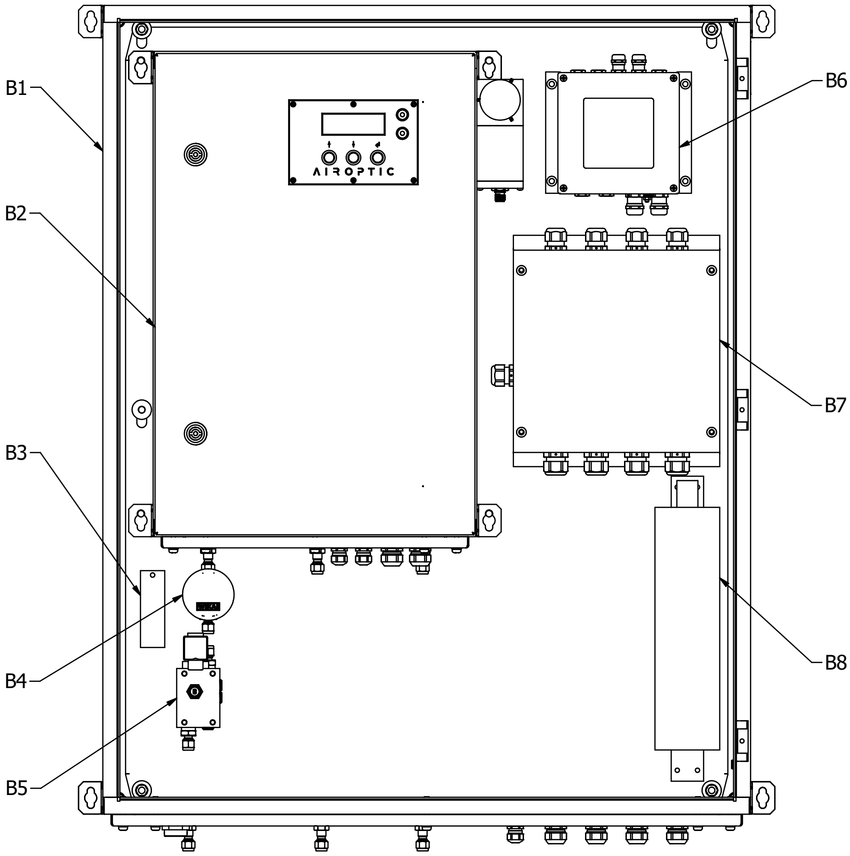


Figure 15 GasEye Extractive Ex1 ET - inside view

Table 8 GasEye Extractive Ex1 ET part specification

ID	Name	Part specification
B1	Enclosure	IP66, -30°C ÷ +80°C
B2	Gas analyzer	IP66, -30°C ÷ +60°C
B3	Thermostat	15°C NC, IP66, -60°C ÷ +60°C
B4	Manometer	IP54, -40°C ÷ +60°C
B5	Manifold	IP65, -28°C ÷ 65°C
B6	Purging controller	IP66, -20°C ÷ +70°C
B7	Junction box	IP66, -°C ÷ °C
B8	Convection type heater	AC230V, 100W, IP66, -60°C ÷ +60°C

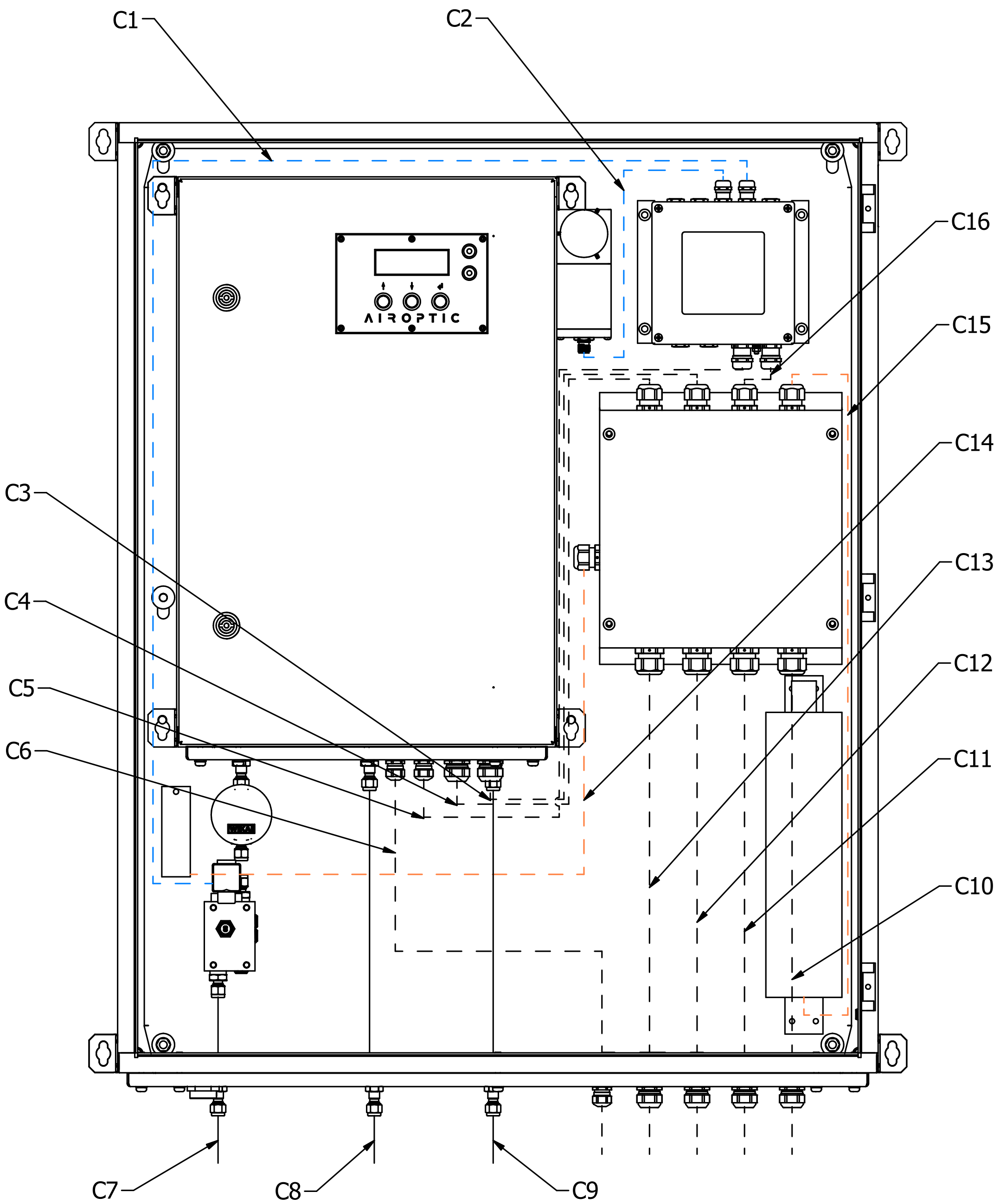


Figure 16 GasEye Extractive Ex1 ET - wiring diagram

Table 9 GasEye Extracitve Ex1 ET wiring specification

ID	Name	Cable specification
C1	Manifold cable	
C2	Vent cable	
C3	DO cable	
C4	AOUT cable	
C5	Purge controller power output cable	
C6	Ethernet cable	
C7	Purge gas inlet	
C8	Sample gas inlet	
C9	Sample gas outlet	
C10	Heater power supply cable	
C11	Analyzer power cable	

C12	Digital outputs cable	
C13	Analog outputs cable	
C14	Thermostat cable	
C15	Heater cable	
C16	Purge controller power input cable	

6. Installation and operation of the analyzer

6.1. Safety information

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

NOTICE	
CLASS 1 LASER PRODUCT	Internal invisible IR laser is a **Class I** product.

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.*

WARNING
Flammable or poisonous gas at the outlet
Please remember to provide tubing for the gas outlet to bring the species to a proper and safe area.

WARNING
Power supply
Do not apply power other than from the purge controller.

6.2. GasEye Extractive and GasEye Extractive Ex1 unpacking instruction

Before using the device, read all safety instructions and the device's instruction manual. Follow the instructions.

WARNING
System dried out
Do not open the cover in an atmosphere with high humidity.

WARNING
Cell under vacuum
Do not connect without sampling system and nitrogen purge.

WARNING
Ventiled housing
Do not open while energized in the presence of an explosive atmosphere. Power can be restored after closing the housing and after purging it in accordance with the startup procedure described in the manual.

The unpacking steps are shown below:

1. After opening the carton, you will see the top cover of the polystyrene.

Figure 17. View after opening the carton.

2. *There is a document bay in the location shown below.*

Figure 18. Closed document bay.

3. *Open the document bay by levering the styrofoam cover with your hand*

Figure 19. Document bay.

4. *Pull off the top side of the styrofoam by firmly grasping the corners of the foam. Location of local device nameplate with serial number and the location of the device key are shown in figure below.*

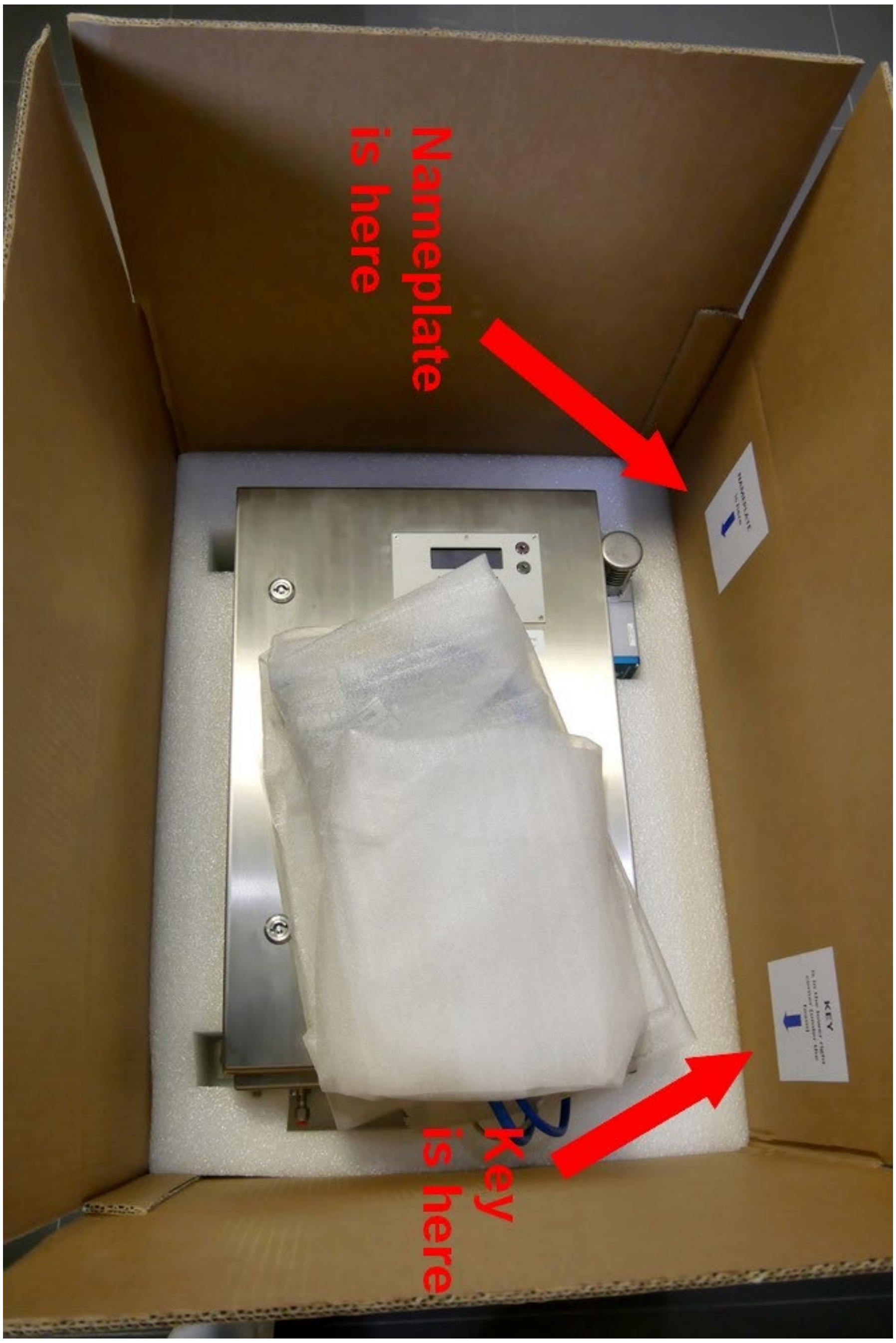


Figure 20. View after removing the top cover of styrofoam.

6.3. Description of the host connections

Depending on customer requirements, additional connections are available for analog or digital signals as well as Profinet / MODBUS TCP functionality.

Figure 21 shows an overview of the electronics user interface. All connections needed to start the analyzer are made through the electrical panel.

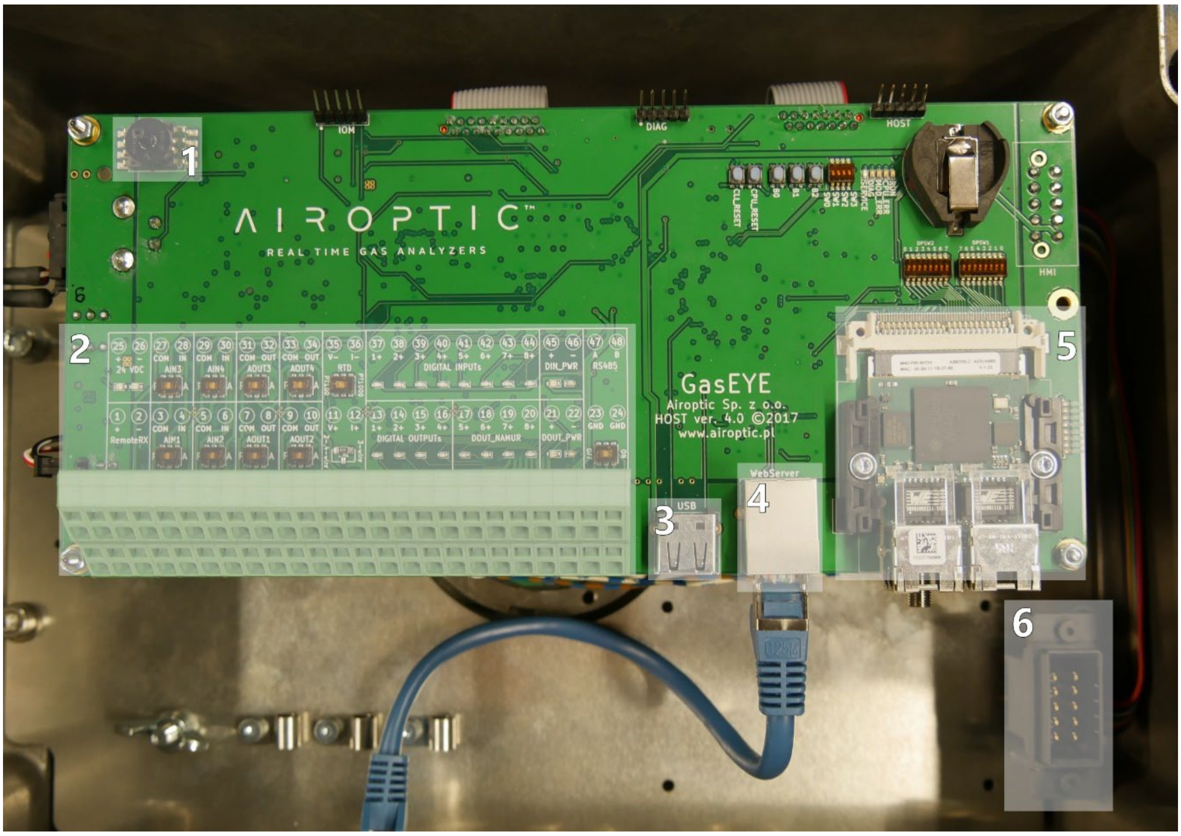


Figure 21. Electronics interface – illustrative photo.

1. Pressure sensor
2. Electric terminals
3. USB port
4. Ethernet port for WebServer connection
5. Interface Profinet (optional)
6. Front panel display connector

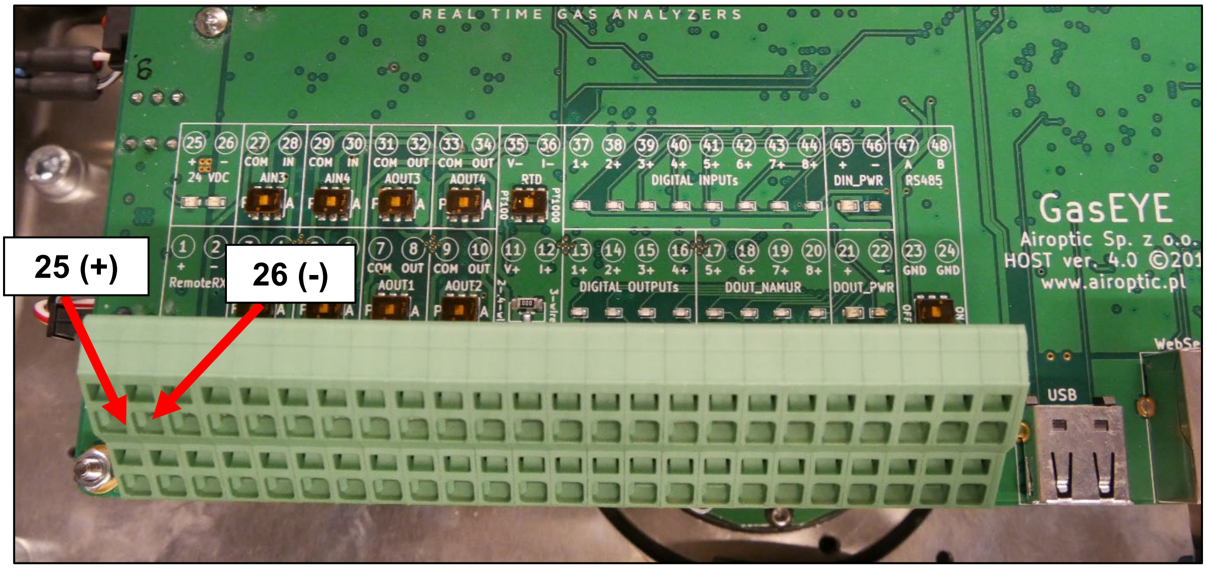


Figure 22. Location of power supply points (24V) for the electronics of the device

1. Pull the power cable through the opening in the housing. Secure cable using for this purpose the gland located at the opening.

2. Route the power cables to the main connector ports as shown in the figure below:
    a. **(+)** 24 VDC – **25**
    b. **(-)** – **26**

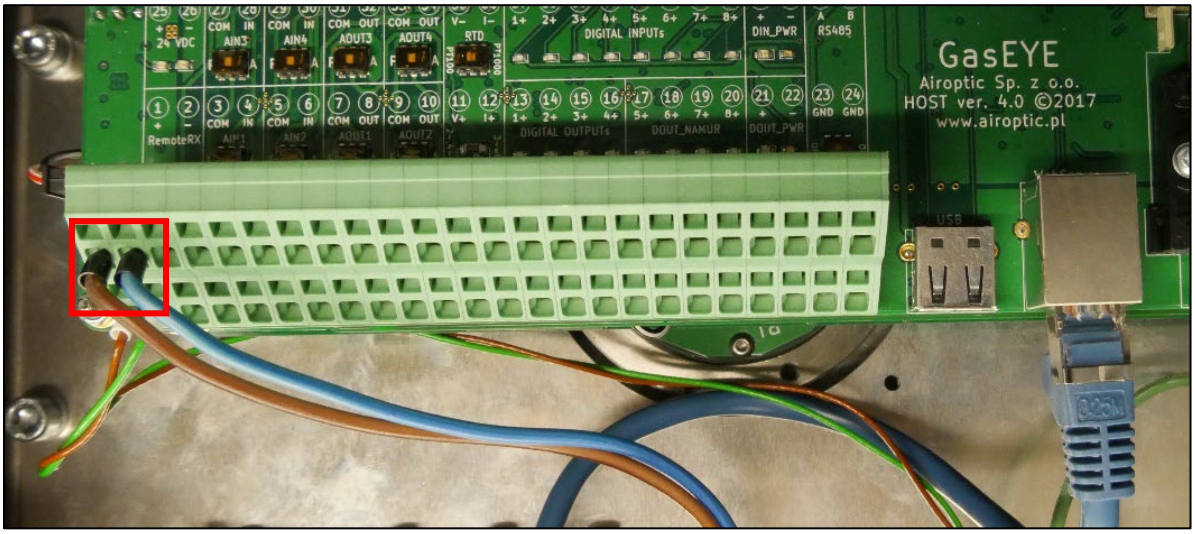


Figure 23. Power connection.

Before applying power, make sure that all connections have been made correctly.

The voltage of 230 VAC / 24 VDC is supplied to the device inside the analyzer cabinet. The connections between the power supply and the main connector are already made. 230 VAC supply voltage should be connected to the power supply socket in accordance with .

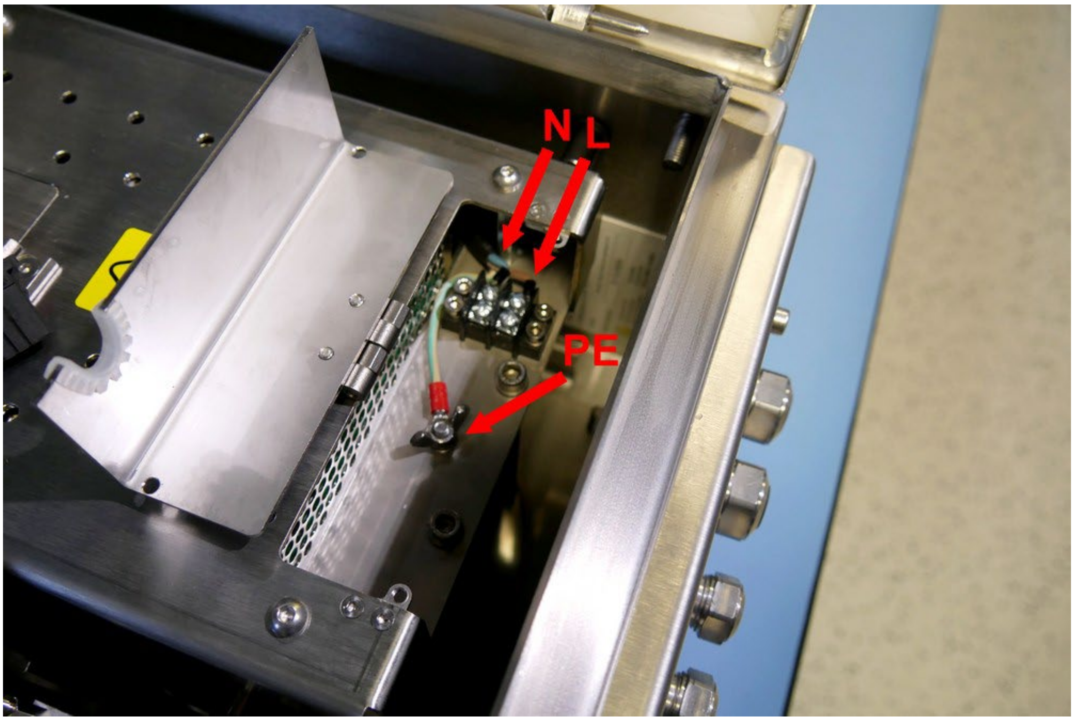


Figure 24. Connecting the power supply inside the analyzer cabinet to the built-in power supply

6.3.1. Electrical terminals

The following is a description of the electrical terminals with their functions. **Figure 25** and **Figure 26** show sequentially the numbering and configuration of the terminals mounted on the board. **Table 10** presents a description of the terminals. If analog input or output signals are used, they must be configured with switches that are available on the board above the electrical terminals.

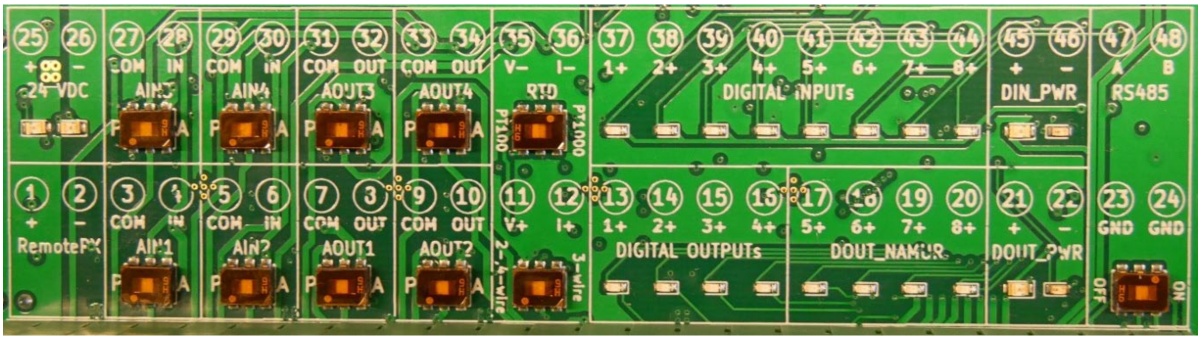


Figure 25. Electrical terminals numbering.

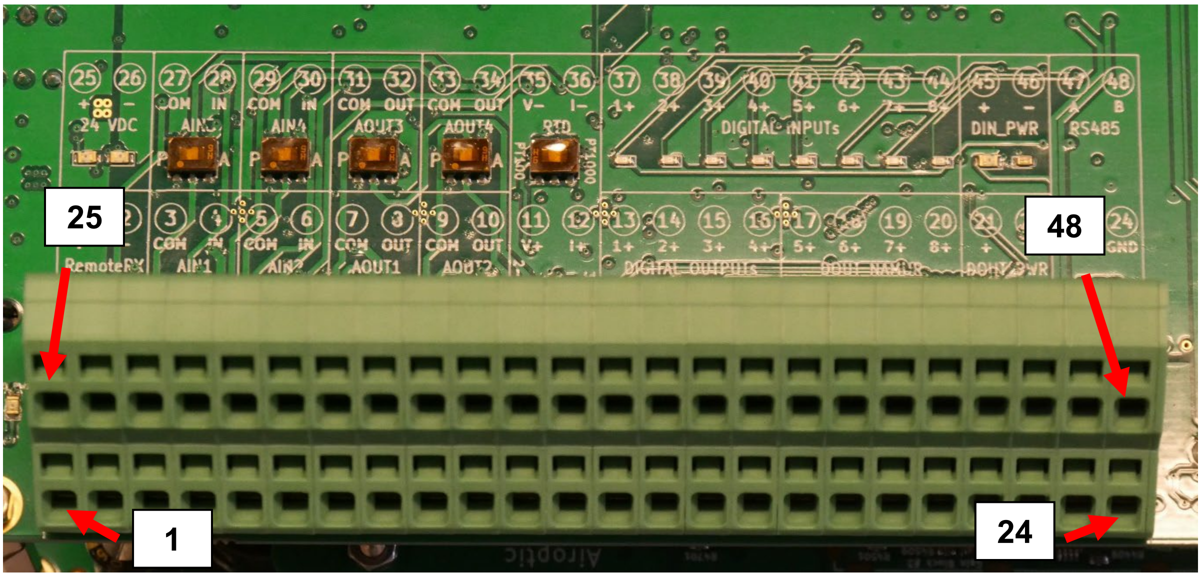


Figure 26. Electrical terminal configuration.

No.	Row	Function	Symbol		Characteristic
1	I	Supply voltage for receiver side	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		DOUT_NAMUR	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 10. Description of the electrical terminals

6.4. 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 27 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).

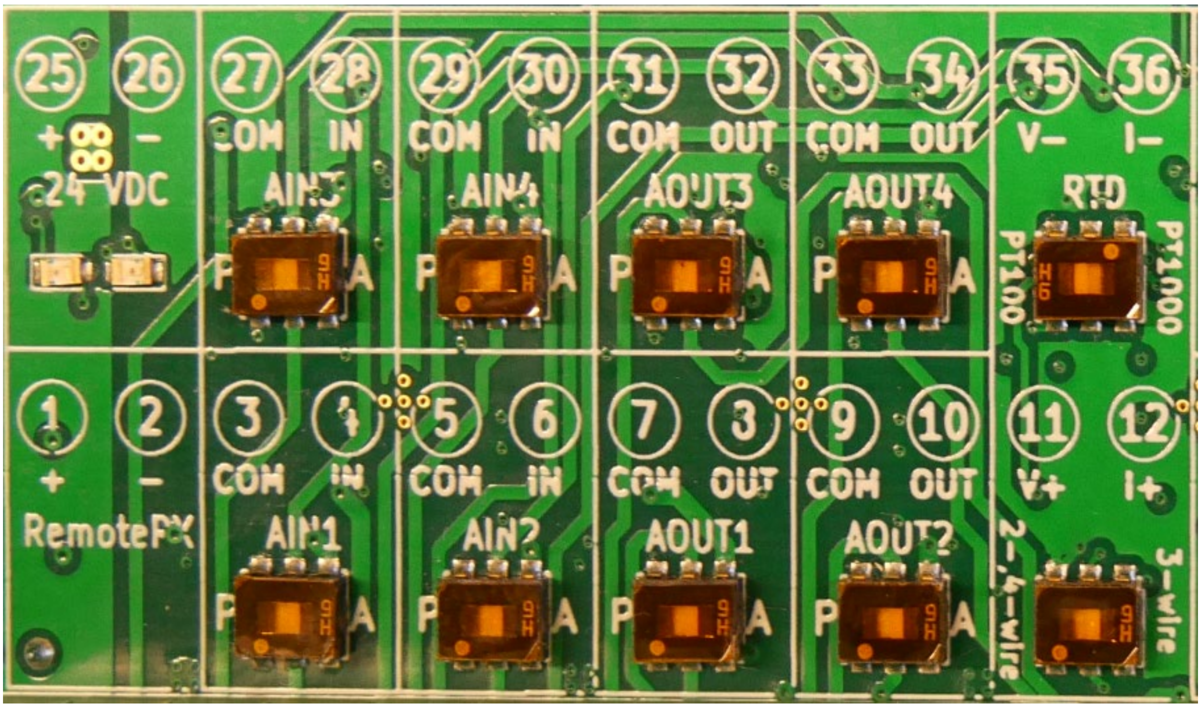


Figure 27. Analog input/output dip switches.

Analog outputs can operate in two modes accordingly to NAMUR NE43 and EN 15267-3:2008. The operation mode can be selected via WebServer in Parameters/AOUT tab. GasEYE device is generated 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 28**). 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.

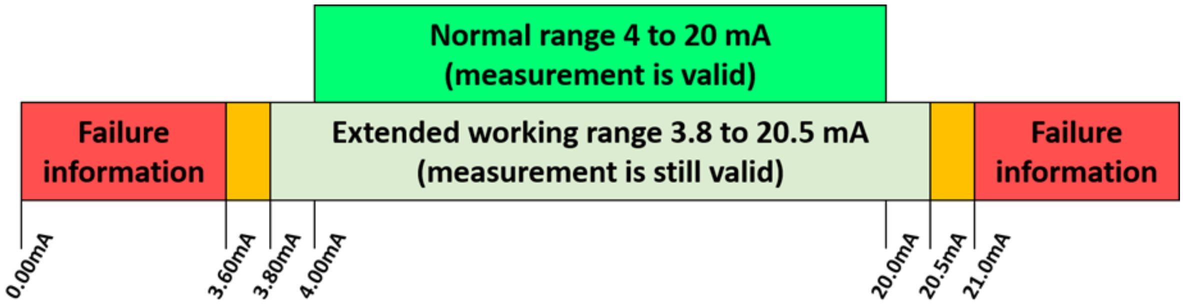


Figure 28. NAMUR NE43 Recommendation.

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 29**).

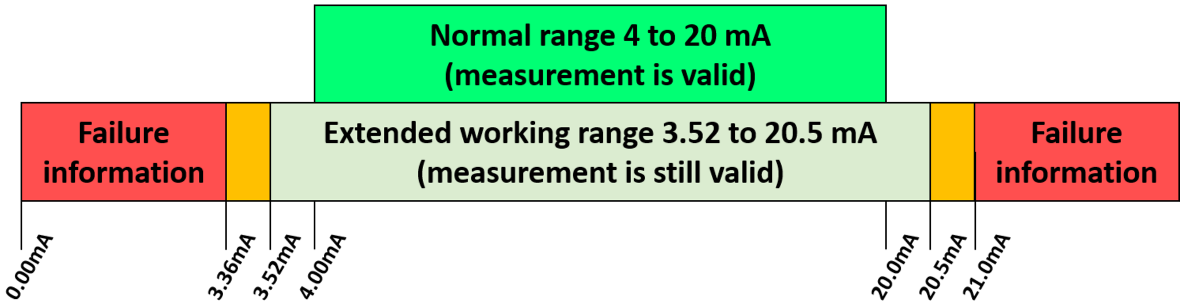


Figure 29. EN 15267-3:2008 Recommendation.

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

6.4.1. Active analog outputs

Active analog outputs need no external powering of the output terminal. Please refer to **Figure 30** for output signal connection.

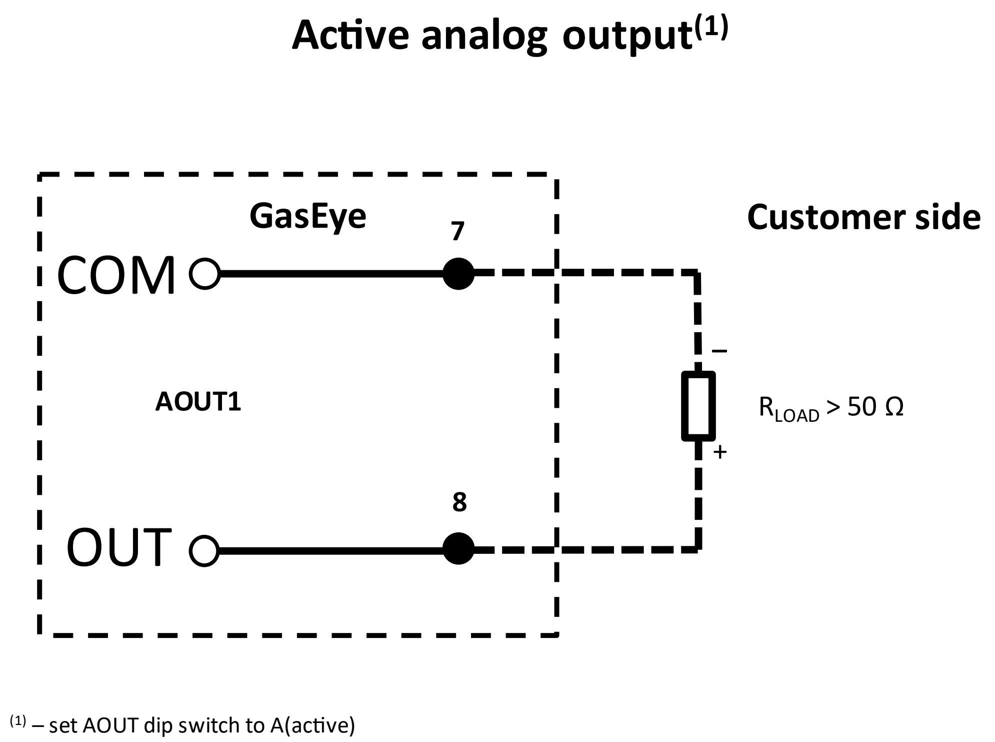


Figure 30. Exemplary usage of active analog output.

R_{LOAD} should be at least **50Ω**

WARNING
Active analog outputs
*GasEye Cross Duct 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.*

6.4.2. Passive analog outputs

Passive analog outputs require external powering for operation. Please refer to **Figure 31** for output signal connection.

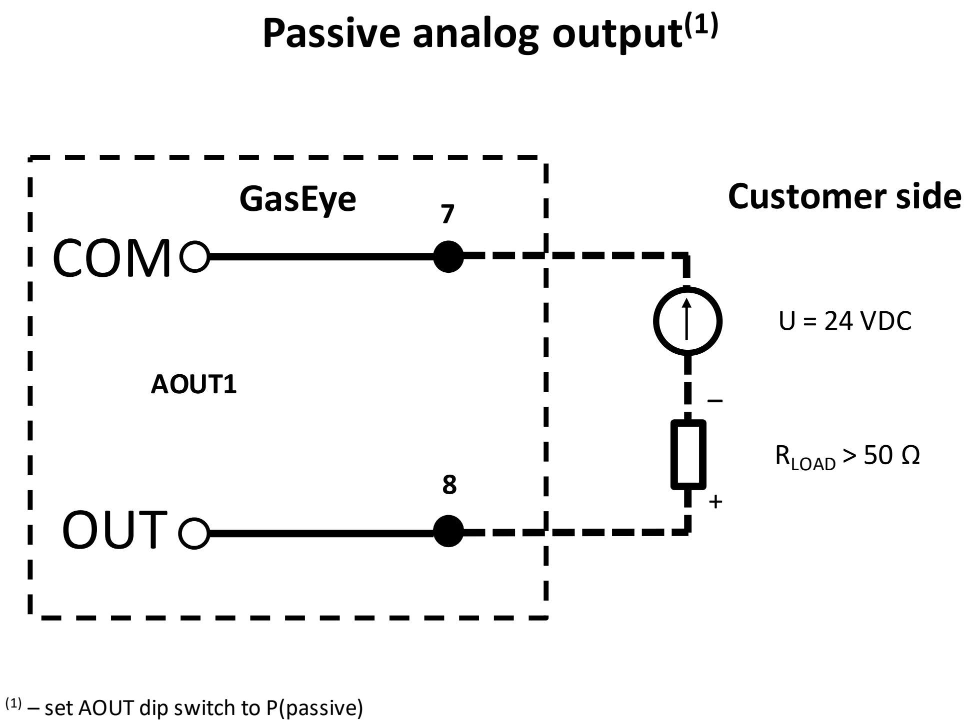


Figure 31. Exemplary usage of passive analog output.

$\mathbf{R_{LOAD}}$ should be at least **50Ω**

WARNING
Passive analog outputs
*GasEye Cross Duct 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.*

6.4.3. Active analog inputs

Active analog inputs need no external powering of the input terminal. Please refer to **Figure 32** for input signal connection.

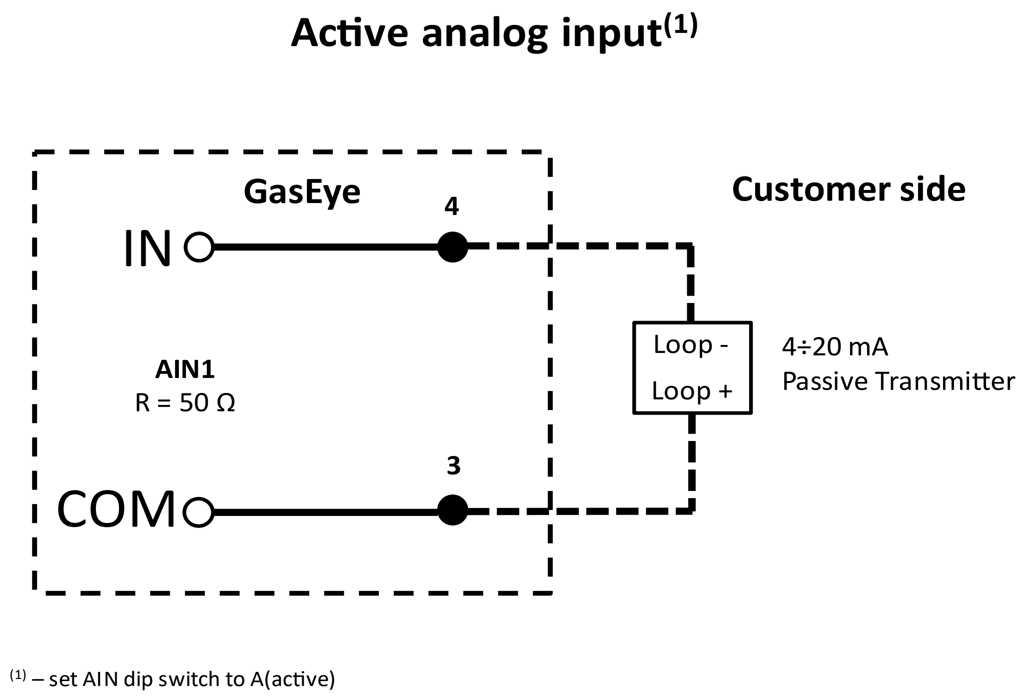


Figure 32. Exemplary usage of active analog input.

WARNINGS
Active analog inputs
*GasEye Cross Duct 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.*

6.4.4. Passive analog inputs

Passive analog inputs require external powering for operation. Please refer to **Figure 33** for input signal connection.

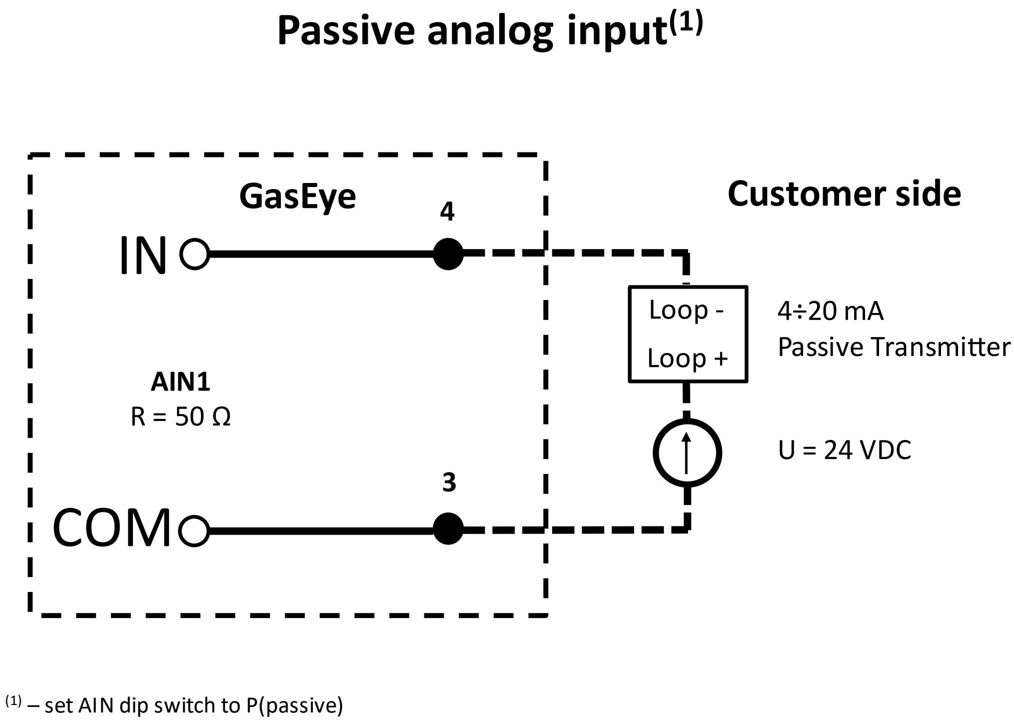


Figure 33. Exemplary usage of passive analog input.

WARNING
Passive analog inputs
*GasEye Cross Duct 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.*

6.4.5. 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.

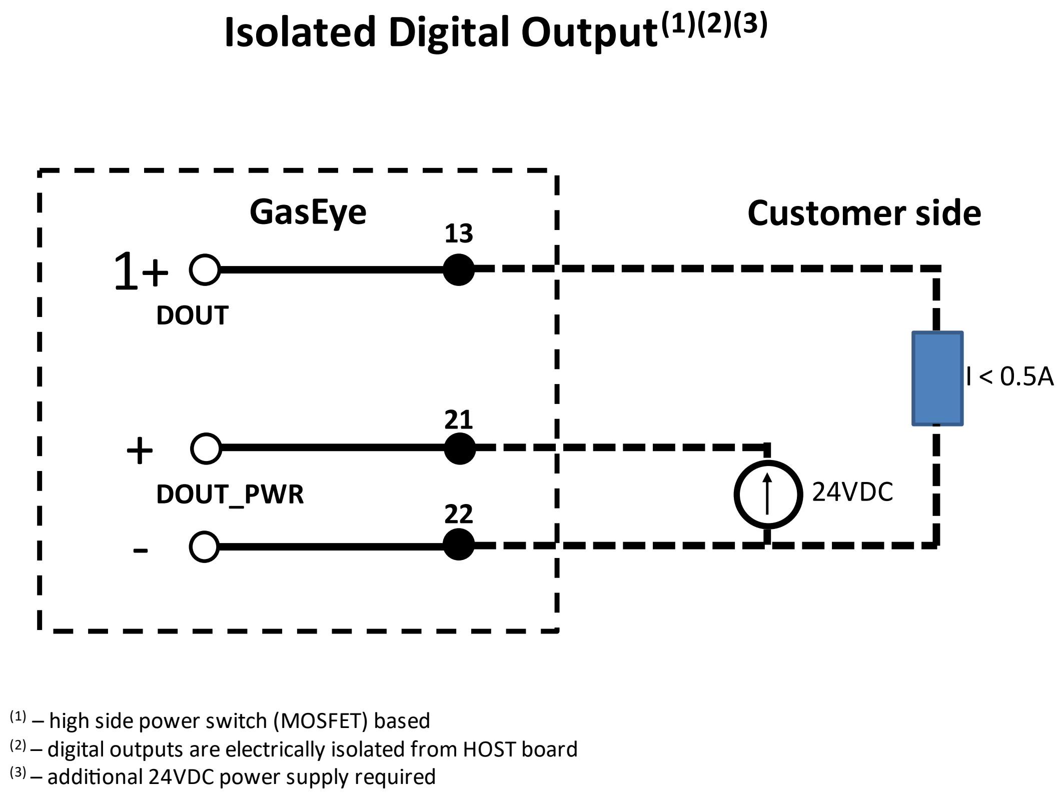


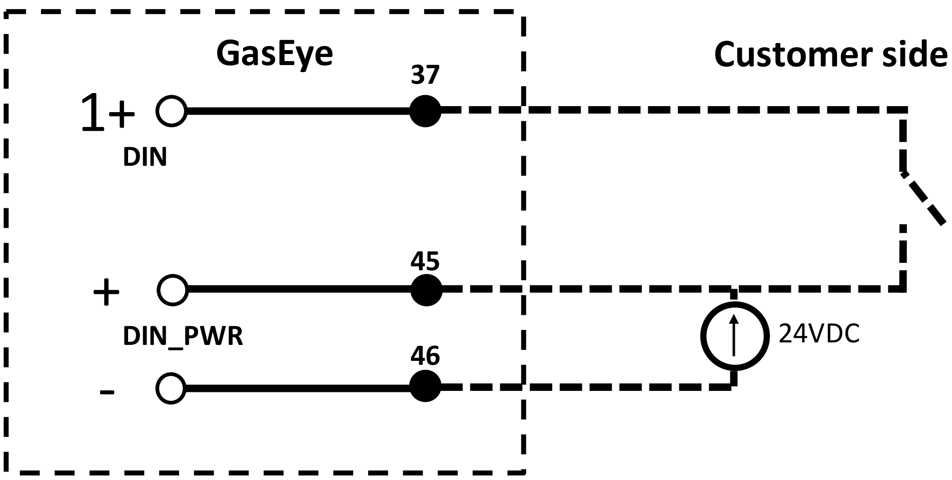
Figure 34. Exemplary usage of digital output.

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

6.4.6. 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.

Isolated Digital Input(1)(2)



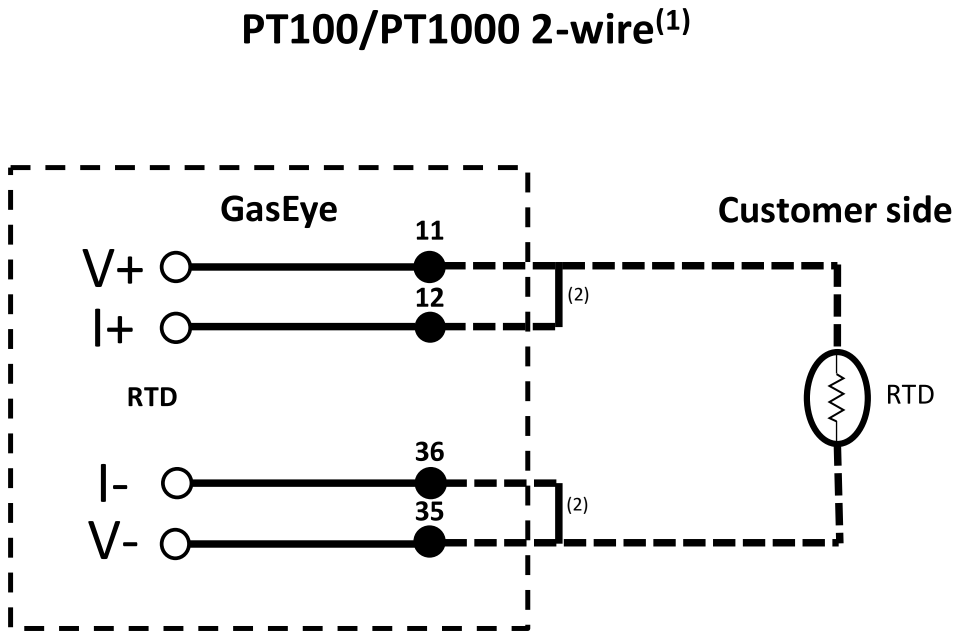
(1)	Wejścia cyfrowe są izolowane galwanicznie od płyty HOST
(2)	Wymagane dodatkowe zasilanie 24 VDC

Figure 35. Exemplary usage of digital input.

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

6.4.7. 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 36** to **Figure 38** for signal connection.

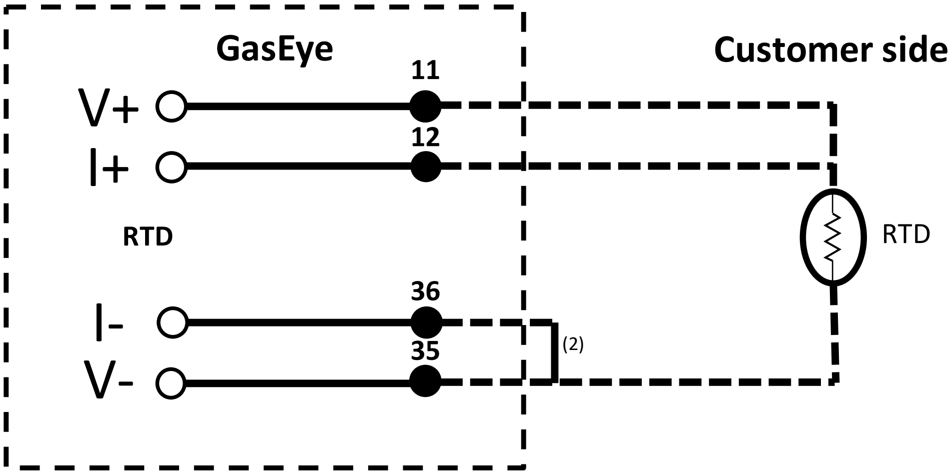


(1) – set 2-,4-wire dip switch, set PT100/PT1000 dip switch as required
(2) – external jumper required

Figure 36. Exemplary usage of 2-wire RTD.

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

PT100/PT1000 3-wire[1]

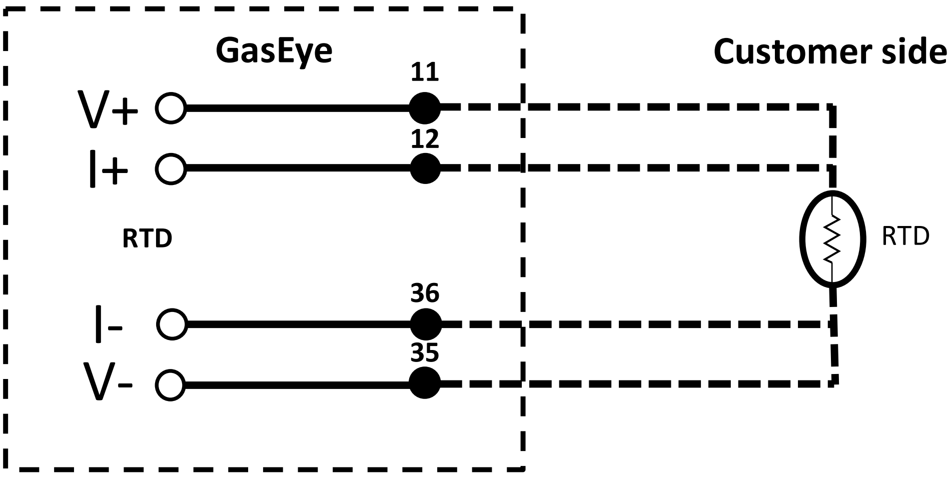


[1] – set 3-wire dip switch, set PT100/PT1000 dip switch as required
[2] – external jumper required

Figure 37. Exemplary usage of 3-wire RTD.

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

PT100/PT1000 4-wire[1]



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

Figure 38. Exemplary usage of 4-wire RTD.

6.5. Analyzer start-up procedure

The analyzer is delivered, calibrated and configured as per the order description. The analog output ranges assigned as standard and the digital output ranges are listed in the accompanying document.

The start-up procedure is as follows:

1. The analyzer is ready for operation when the appropriate temperature in the cuvette is reached. It may take up to 30 minutes for it to reach the right temperature. Until the required temperature is reached, the pump will not start, and the analyzer will not be ready for operation. The system will signal full readiness for operation by continuous lighting of the LED "SYSTEM READY" on the LCD display.

2. The minimum required gas flow is 1000 ml / min, input pressure 0.05 ÷ 0.3 barg.

3. If you need to reconfigure the system, connect the network cable to the PC and log in to the WebServer.

4. The analyzer is configured and ready to work.

6.6. Vacuum pump stop signal and reset

The vacuum pump will automatically shut dowun when the exhaust gas flow is too low (<800 ml / min) or a leak is detected in the system. In this case, the vacuum pump will stop after approx. 50 seconds. The vacuum stop signal is by default applied to DOUT 3 (GasEYE digital output 3). DOUT3 "1" means the pump is off and "0" means the pump is running.

To reset the vacuum pump, ensure proper gas sample flow to the analyzer and press the combination of buttons on the HMI panel (simultaneously press the UP / DOWN buttons for 5s). The pump should restart after approx. 2-3 minutes and the analyzer will be ready for operation again. If the problem persists even with correct gas flow, contact Airoptic service.

An alternative method of resetting the pump is to do so via the Web Server by selecting the "Pump Reset" button.

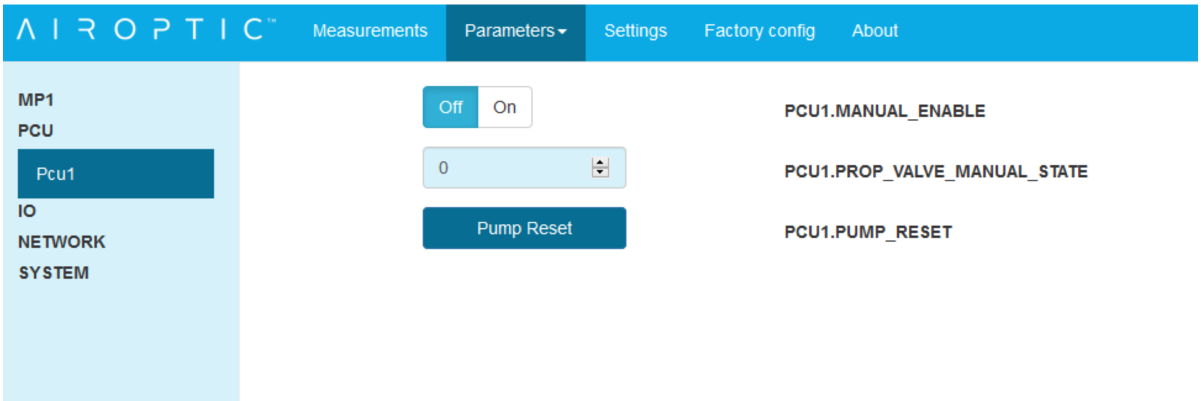


Figure 39. Pump parameters available from the Web Server level.

You can also check the pump status in the measurement list. If everything is OK and the pump is running then the status of the pump is 0, see **Figure 40**.

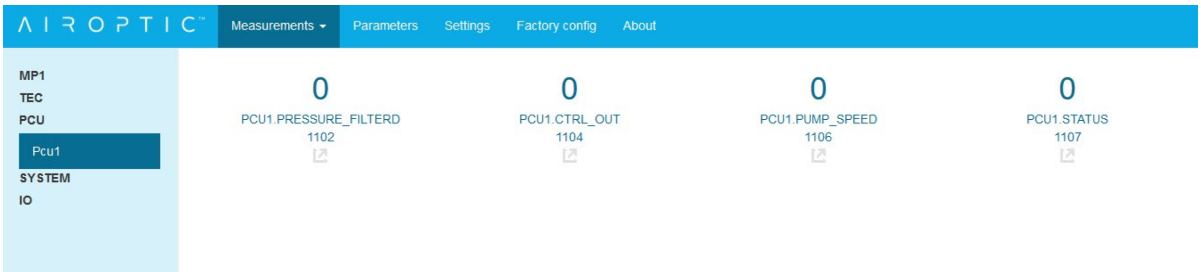


Figure 40. Pump operating status.

If the reset procedure fails, check the PUMP STATUS (PCU1.STATUS) on the Webserver's measurement grid.

Pump status (PCU1.STATUS) displays all other error codes, see table below. The error code is the sum of the existing error. Contact Airoptic and quote the error code displayed.

Bit No.	Description
0	Pump turned on, but no rotation pulses were detected for some time
1	The valve has been closed for a certain time but the pressure has not dropped to its set point which may indicate a leak
2	The valve was fully open for the specified time, but the pressure did not rise to the set point
3	No sensor data
4	Sensor measurement is still running
5	Failed to measure the signal from the sensor
6	The signal measurement program on the sensor has not run correctly
7	Sensor signal too low
8	Sensor signal too high
9	Failed to request a new measurement from the sensor
10	Analog output service error
11	Analogue output overheating
12	LoadError on the analog output was present for a long time
13	CommonModeOverrange on the analog output lasted for a long time
14	Sensor signal too low
15	Sensor signal too low

Table 11. Error codes for the pressure control system.

7. Industrial protocols connection

The GasEye Cross Duct 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.

7.1. 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.

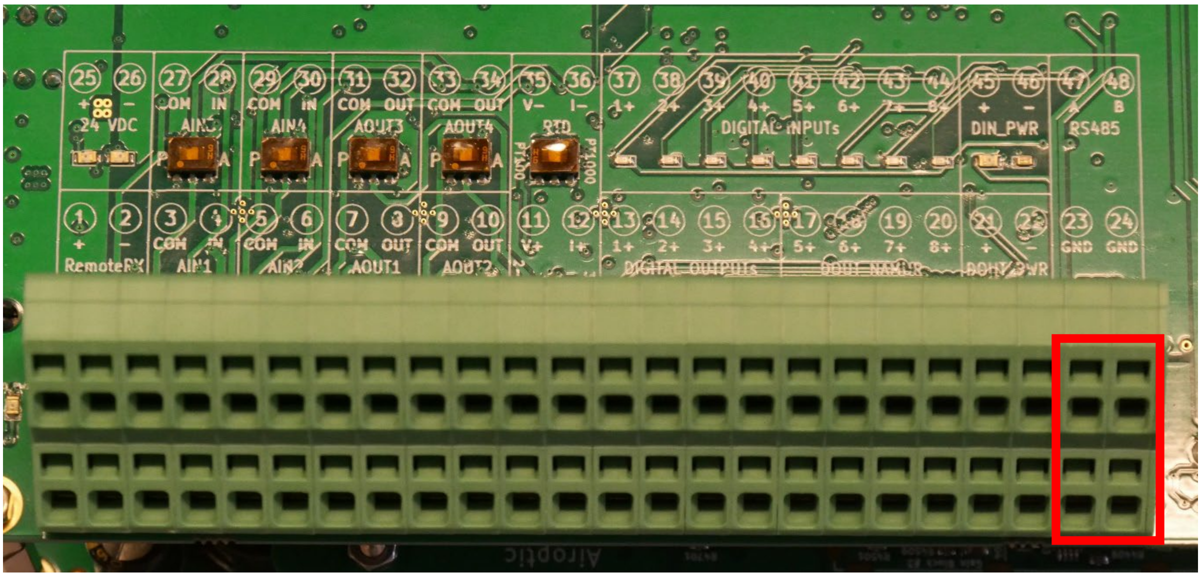


Figure 41. Location RS-485 socket on Analyzer PCB Host 4.X.

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 address from 1 to 247 are shown in the Table 12.

Register Name	Register address (hex)	Register address (dec)	Comments
	0x00	0	16 -bits of floating point value (first part) Process tempetature
PROCESS.TEMPERATURE	0x01	1	16 -bits of floating point value (second part) Process tempetature
	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
TEC1.THL_REF_AMP	0x3E	62	16 -bits of floating point value (first part)

			Laser amplitude reference
	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
AOUT1	0x5C	92	16 -bits of floating point value (first part) Analog output value
	0x5D	93	16 -bits of floating point value (second part) Analog output value
AOUT2	0x5E	94	16 -bits of floating point value (first part) Analog output value
	0x5F	95	16 -bits of floating point value (second part) Analog output value
AOUT3	0x60	96	16 -bits of floating point value (first part) Analog output value
	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 need to change parameters from HMI panel (value range 0-9999)

Table 12. Modbus Input register map (function 0x4).

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 13. Scaling to integer value example (0-27648).

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 need to change parameters from HMI panel (value range 0-9999)

Table 14. Holding Registers (Function 0x3 0x6 0x10).

7.2. 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 describe in previous chapter.

7.3. Profinet

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

7.4. 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:

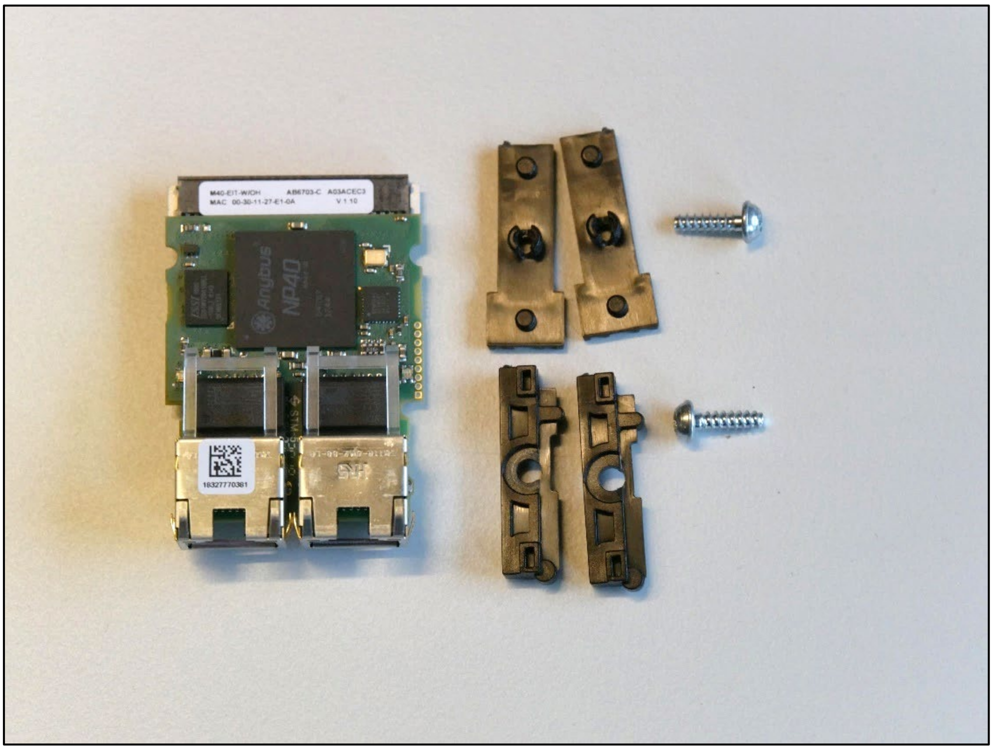


Figure 42. Elements of the ABCC-M40 module.

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

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

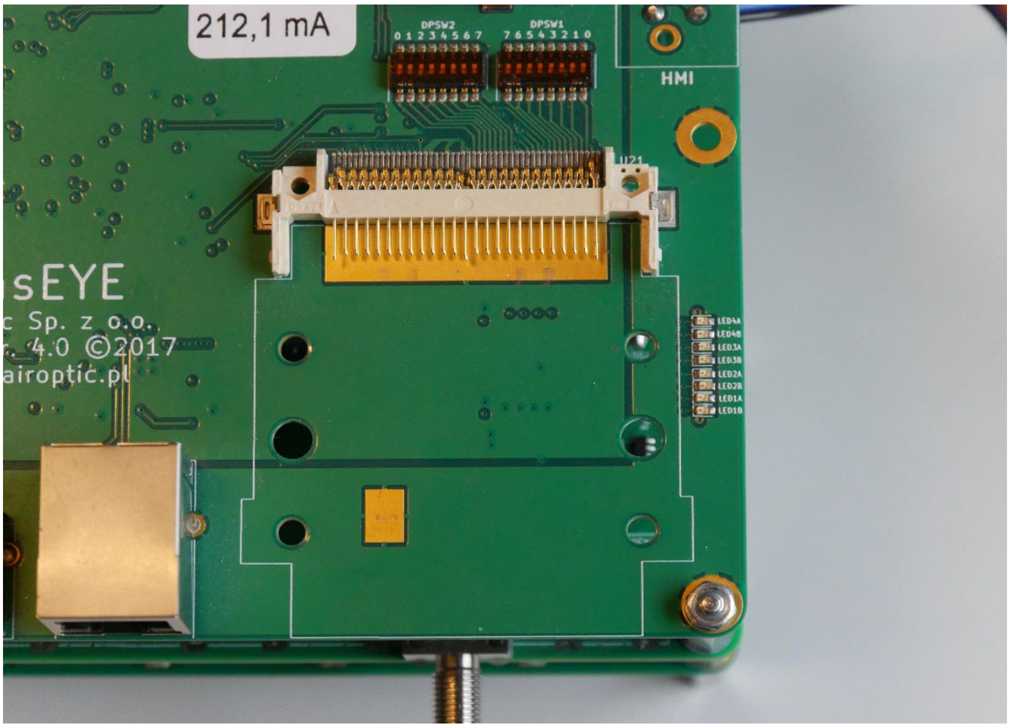


Figure 43. ABCC-M40 slot.

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

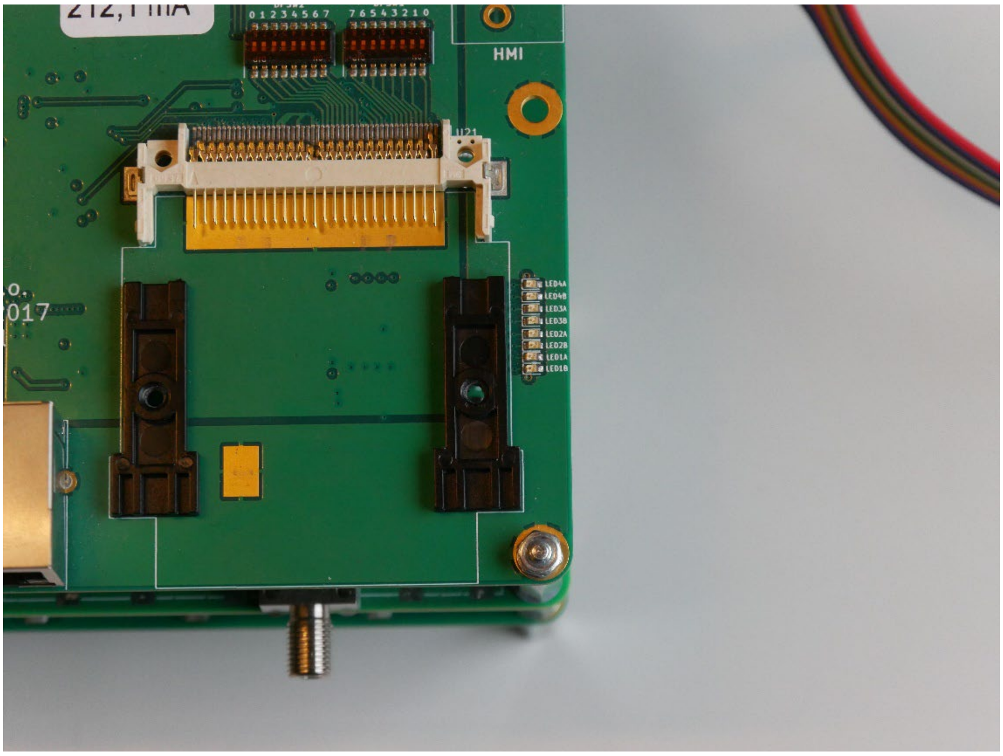


Figure 44. Supports inserting.

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

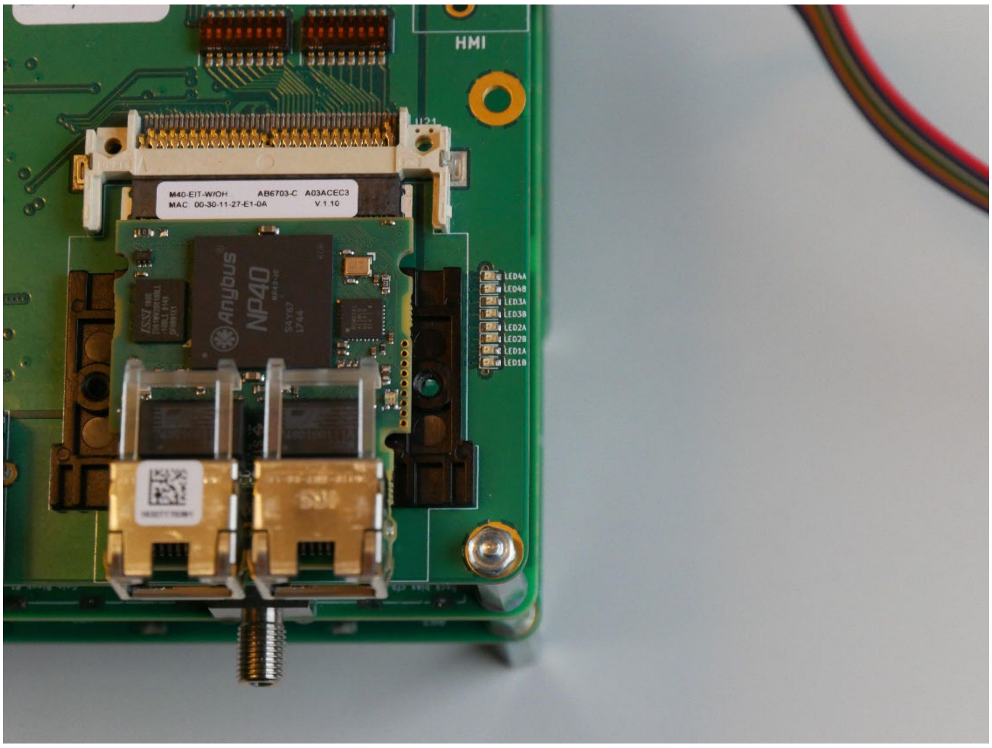


Figure 45. Plugging the ABCC-M40 module.

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

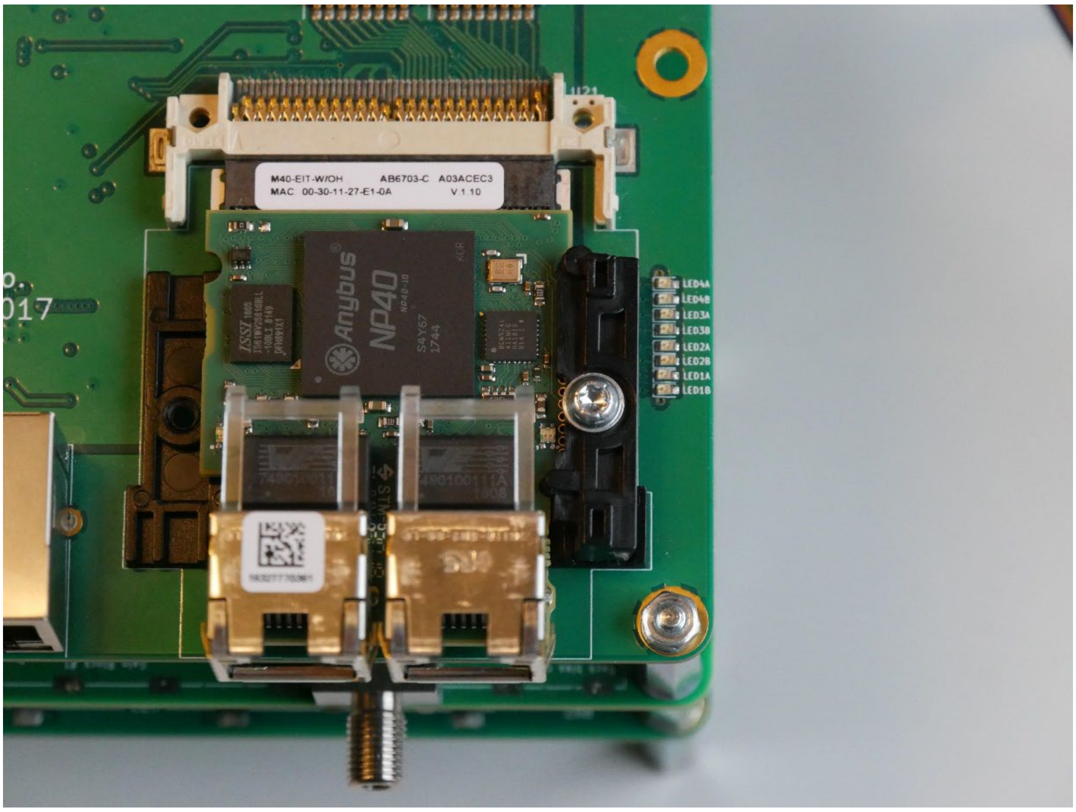


Figure 46. Putting the overlay 1/2.

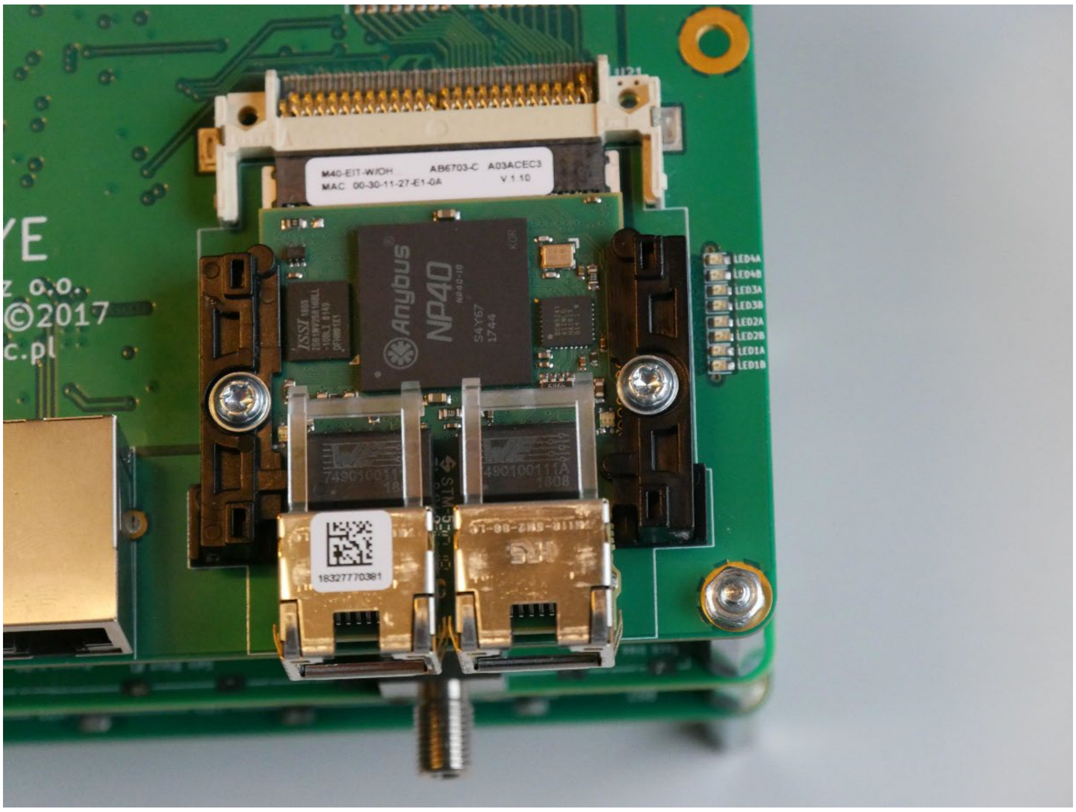


Figure 47. Putting the overlay 2/2.

8. 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 15. 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 15. 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 16. Startup procedure (SUP) troubleshooting steps.

9. 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.

9.1. Overview

Front panel of device has an alphanumerical display 4x20 (4 rows, 20 columns), three buttons and two LED's (**Figure 48**).

Figure 48. 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 49. Welcome message with Host software version.

9.2. 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
- Diagnostic
  - HMI version
  - Host version
- Measurements
  - Gas 1
  - Gas 2
  - Gas 3
  - Gas 4
  - Gas 5
  - Gas 6
  - Gas 7
  - Gas 8
  - 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)
  - 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

Figure 50. Main menu overview

9.2.1. SETTINGS

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

Figure 51. Front panel display – subcategories.

NETWORK SETTINGS

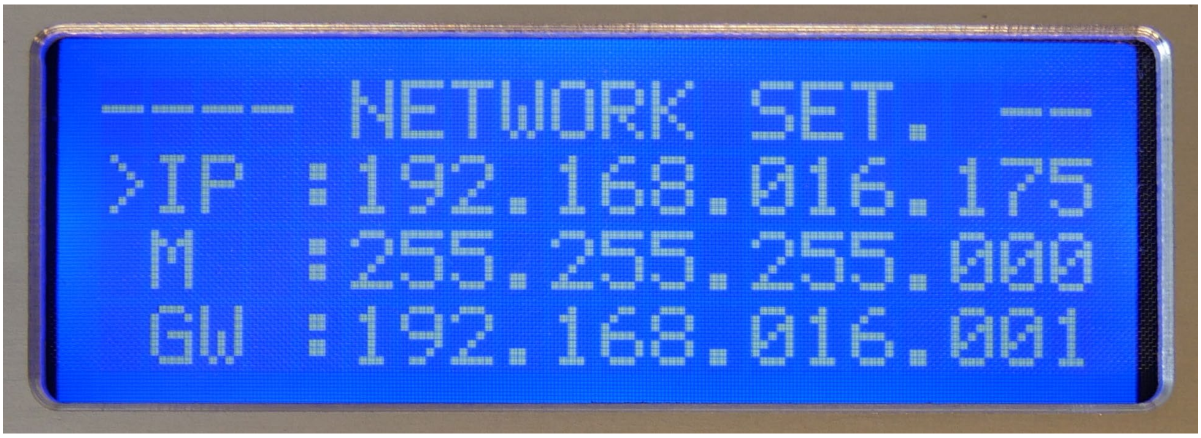


Figure 52. Front panel display - network settings.

Items in this category can be edited.

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

PARAMETERS

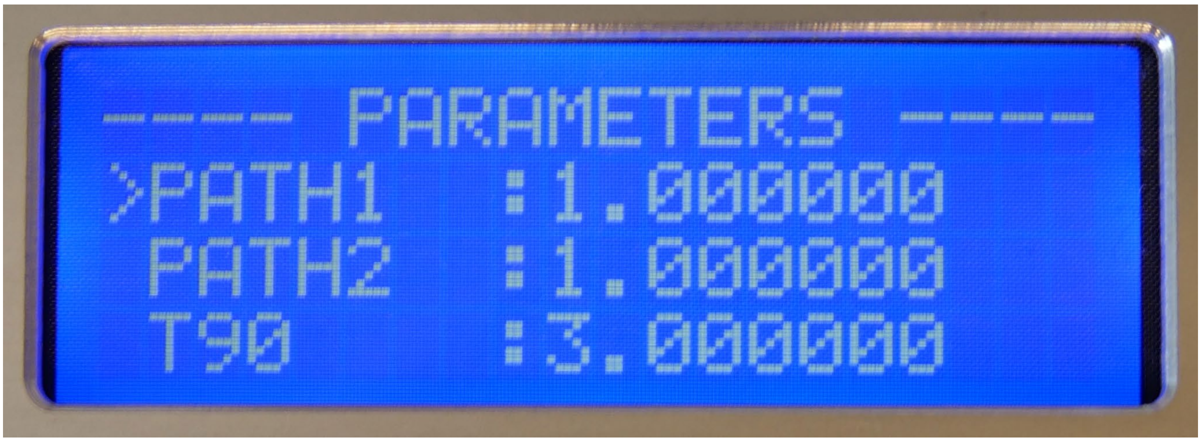


Figure 53. Front panel display - parameters.

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)

9.2.2. DIAGNOSTIC

In this category we can read the HMI and HOST version

Figure 54. Front panel display - diagnostic.

Items in this category are read-only.

HMI ver	HMI version
Host ver	Host version

9.2.3. MEASUREMENTS

Items in this category are read-only.

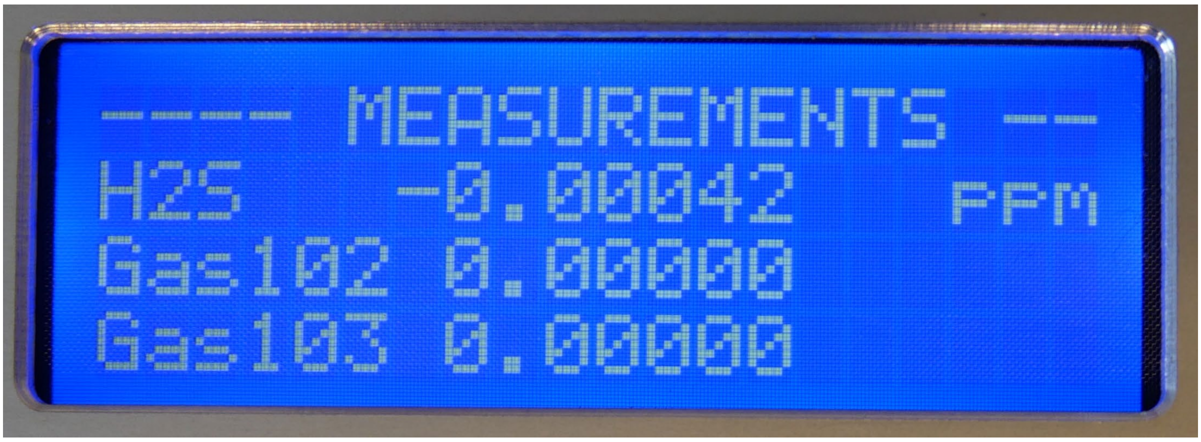


Figure 55. Front panel display – measurements GAS 1-3.

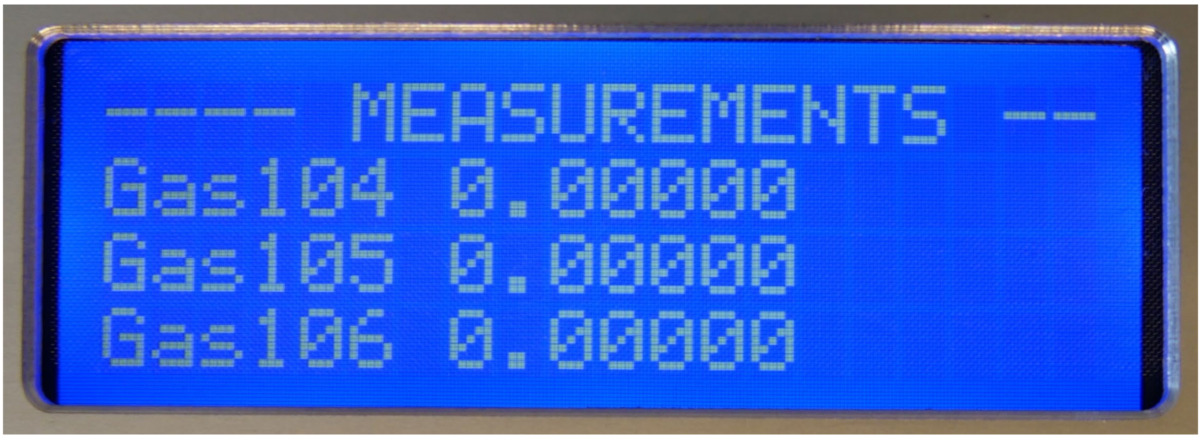


Figure 56. Front panel display – measurements GAS 4-6.

Figure 57. 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)

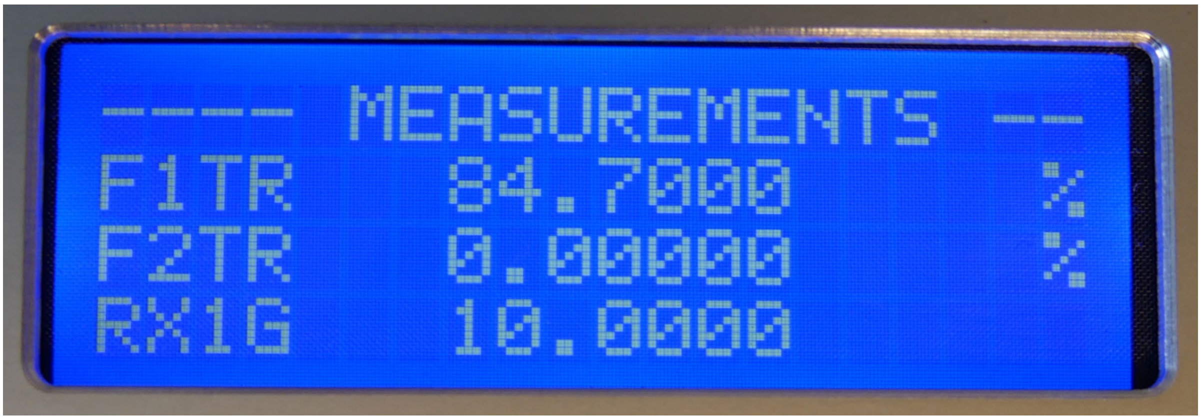


Figure 58. Front panel display – measurements F1TR, F2TR, RX1G.

F1TR	Displays transmission of fiber 1
F2TR	Displays transmission of fiber 2
RX1G	Fiber 1 remote RX gain

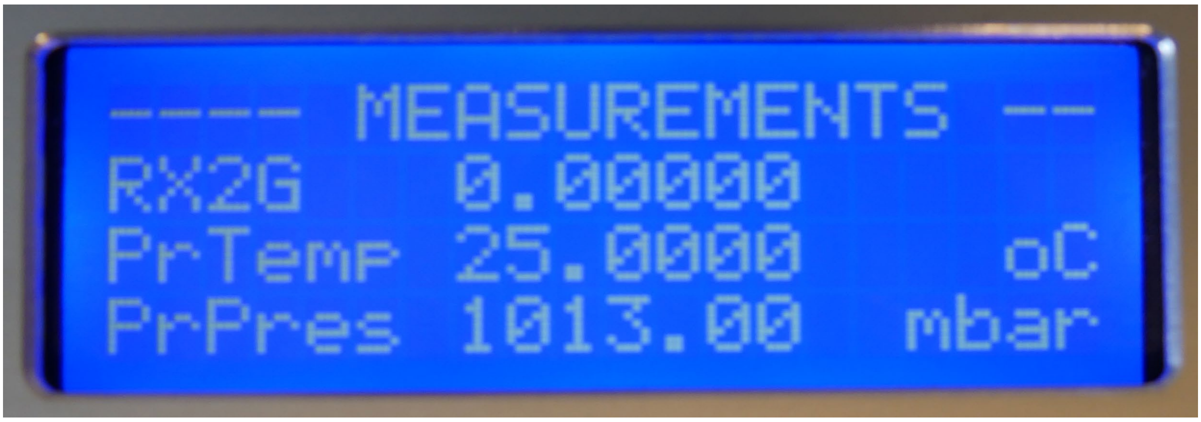


Figure 59. Front panel display – measurements RX2G, PrTemp, PrPres.

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

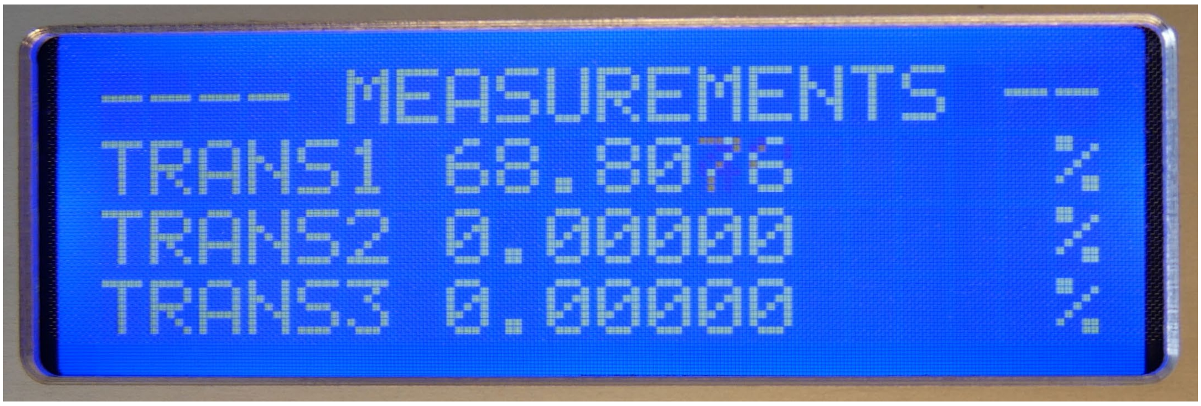
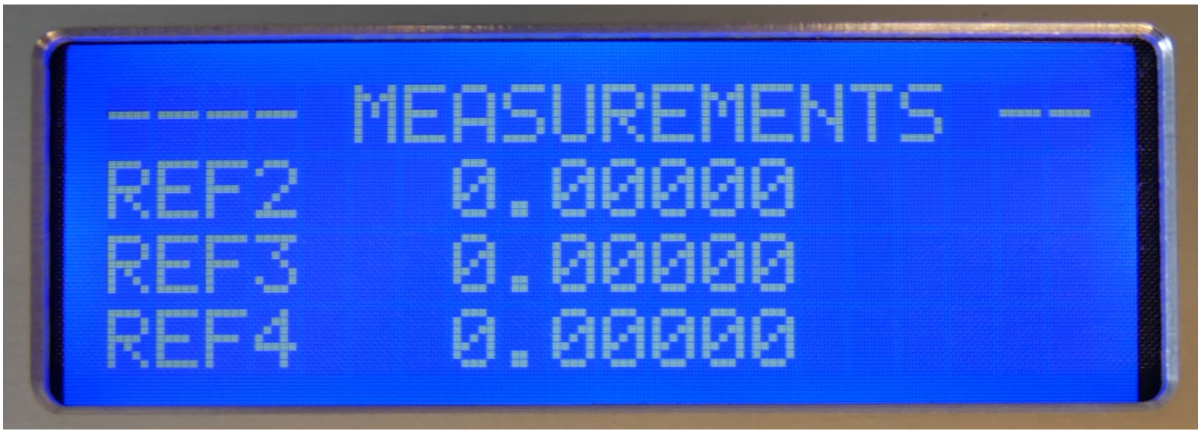


Figure 60. Front panel display – measurements TRANS1-3.

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

Figure 61. Front panel display – measurements TRANS4, SUP, REF1.

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



Rysunek 1. 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

9.2.4. ANALOG INPUT

Items in this category can be edited.

Figure 62. Front panel display – analog input AIN1-3.

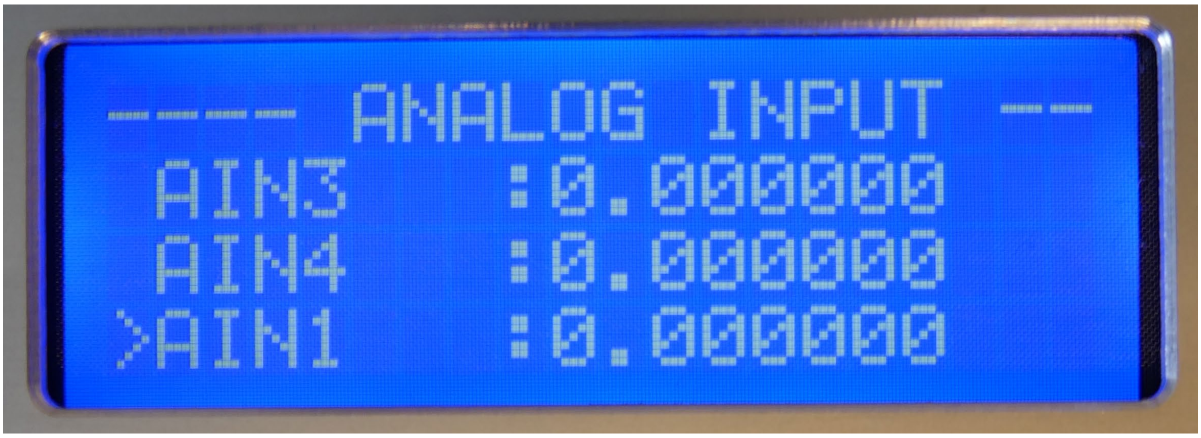


Figure 63. Front panel display – analog input AIN4.

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

9.2.5. ANALOG OUTPUT

Items in this category can be edited.

Figure 64. Front panel display – analog output AOUT1-3.

Figure 65. 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

9.3. 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 17. Front panel display – signals.

9.4. 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 18. Front panel display - buttons.

9.5. Editing parameters

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

Figure 66. Front panel display – Parameter selection.

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

Figure 67. 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 68. 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 69. Front panel display – Editing parameters.

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

Figure 70. Front panel display – Confirmation of new parameters.

6. Parameter was changed successfully.

9.6. Editing network settings

Network settings can be changed in the NETWORK SETTINGS category.

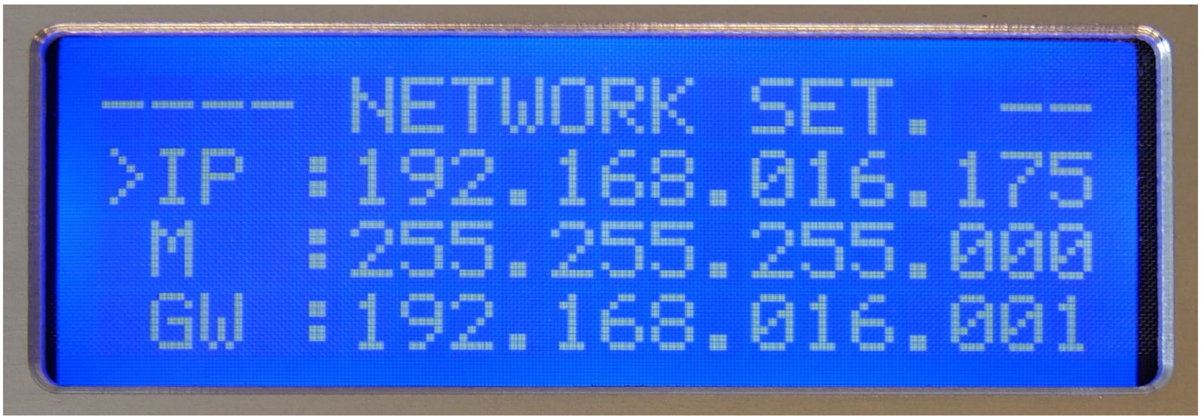


Figure 71. Front panel display - Editing network settings.

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”.

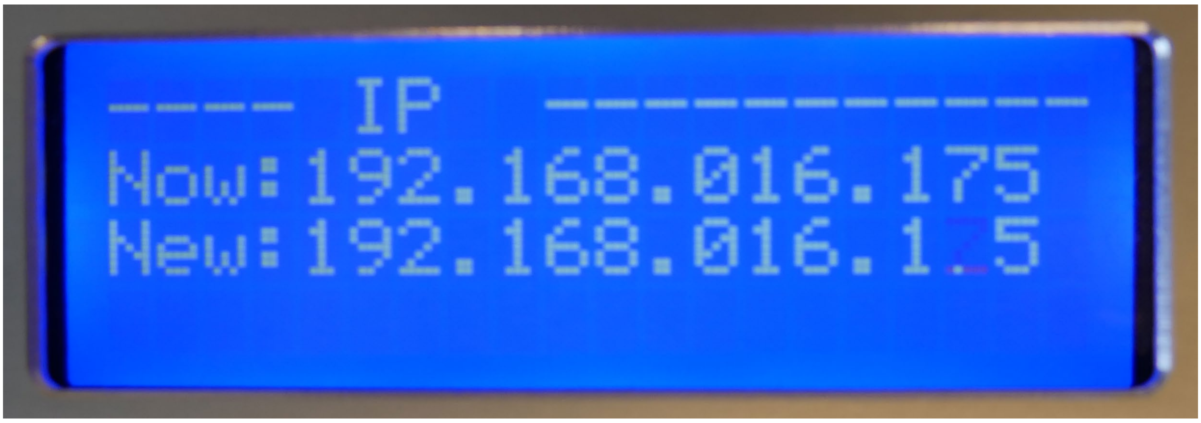


Figure 72. Front panel display – Editing IP address

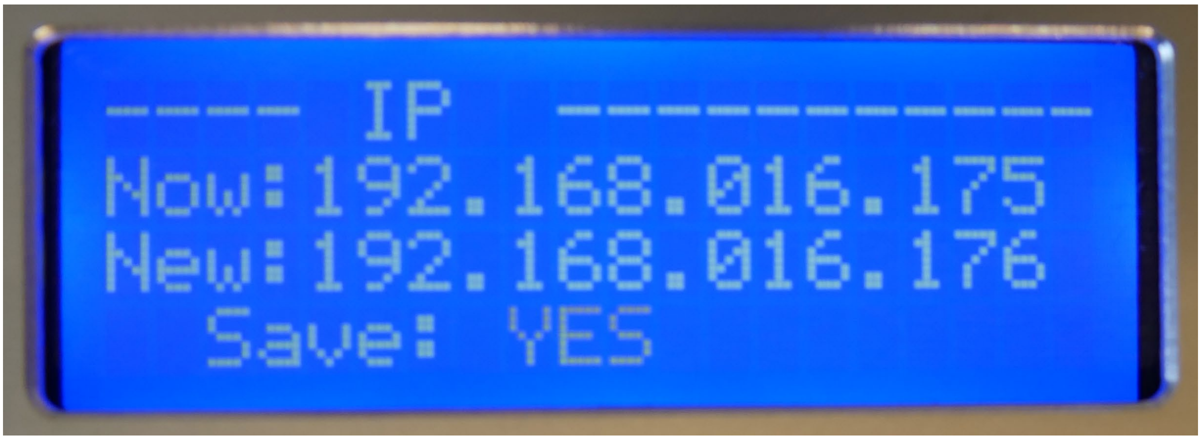


Figure 73. Front panel display – IP address confirmation

9.7. 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 74. Front panel display - AIN/AOUT editing.

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

Figure 75. 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 76. Front panel display – Confirmation of analog input parameters.

After confirmation, the new value of parameter is set.

10. WebServer application

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

10.1. Establishing communicatioon 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.

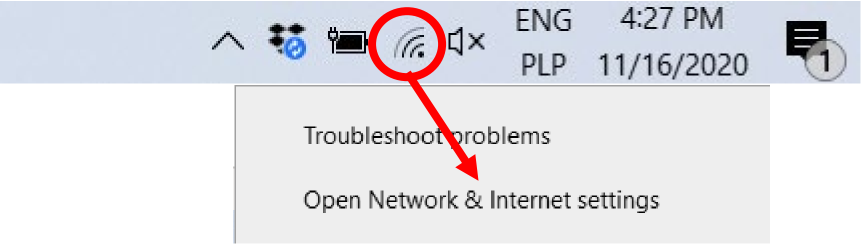


Figure 77. Network settings icon

2. Acess the Adapter settings b clicking on the “Ethernet” connection.

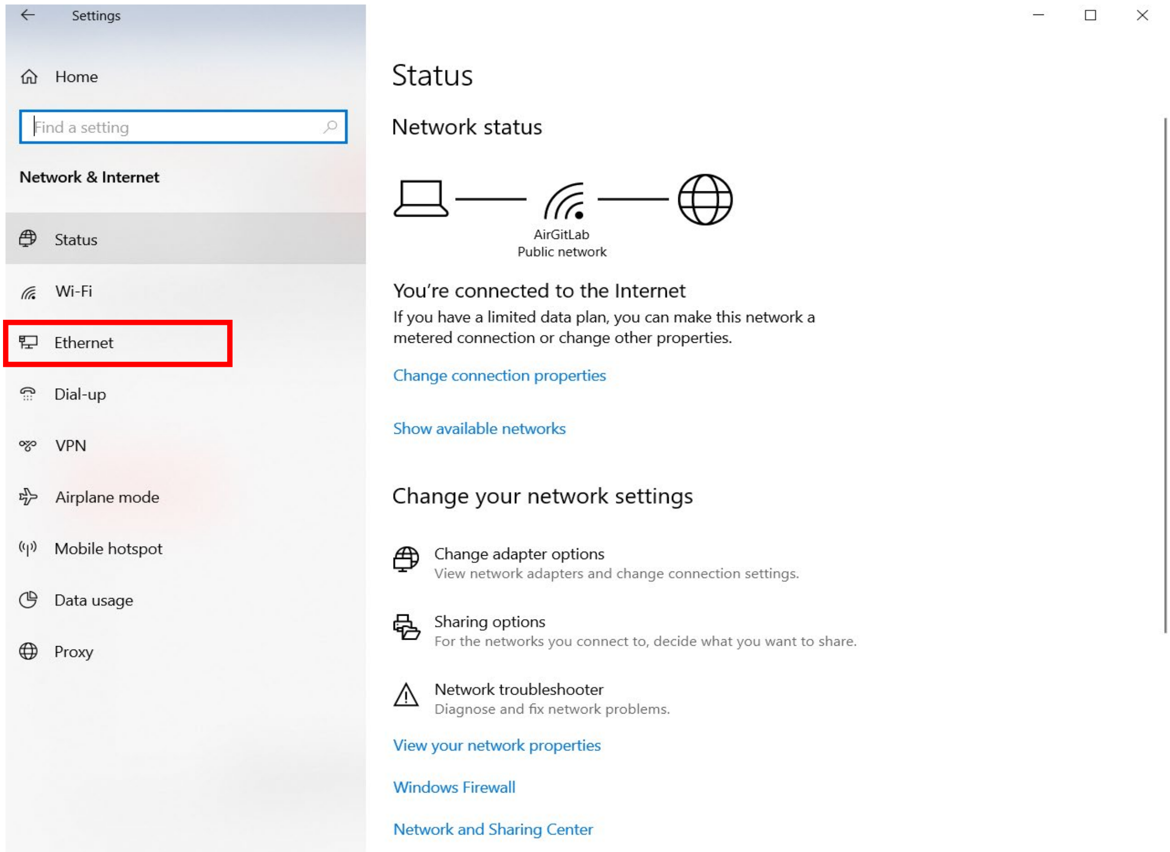


Figure 78. Network status window.

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

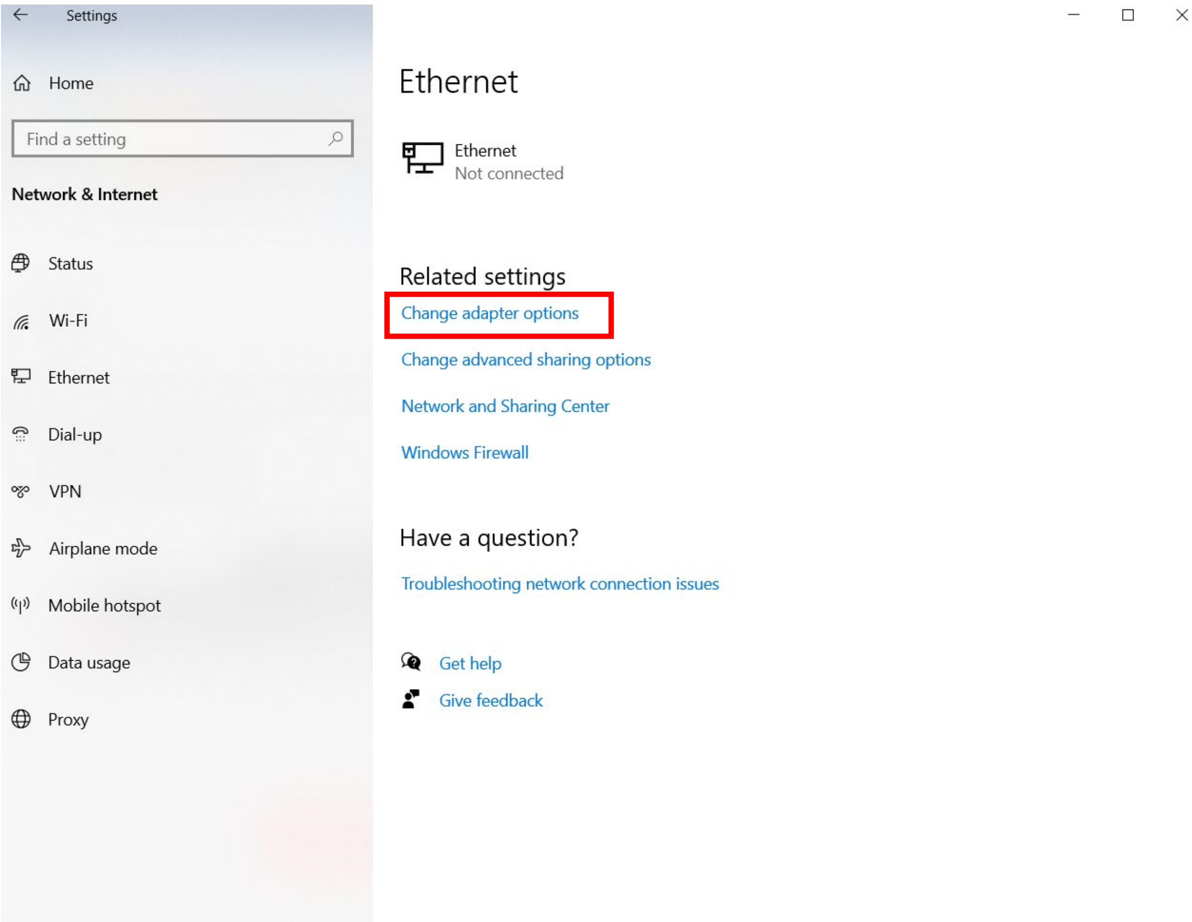


Figure 79. Ethernet settings window.

4. Open the Ethernet window.

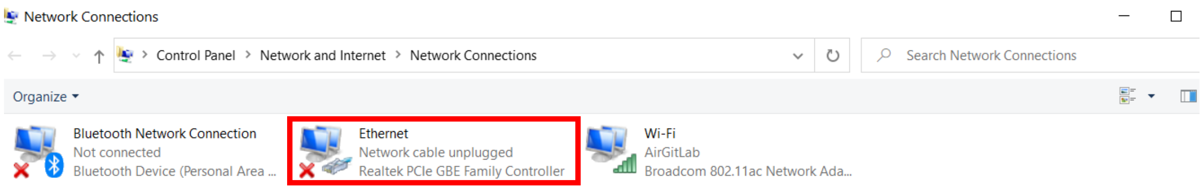


Figure 80. Network connections window.

5. Open Properties of a Ethernet Connection.

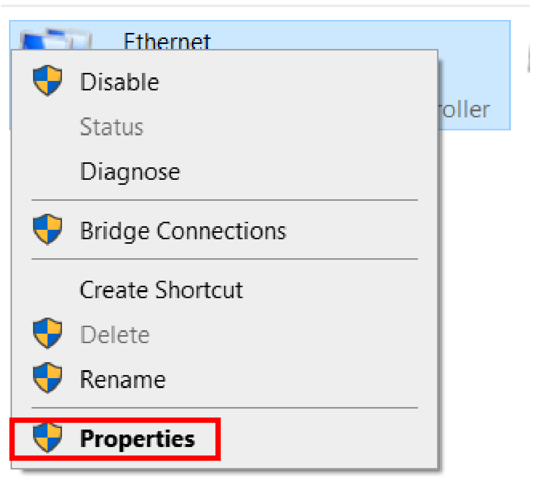


Figure 81. Ethernet connection properties.

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

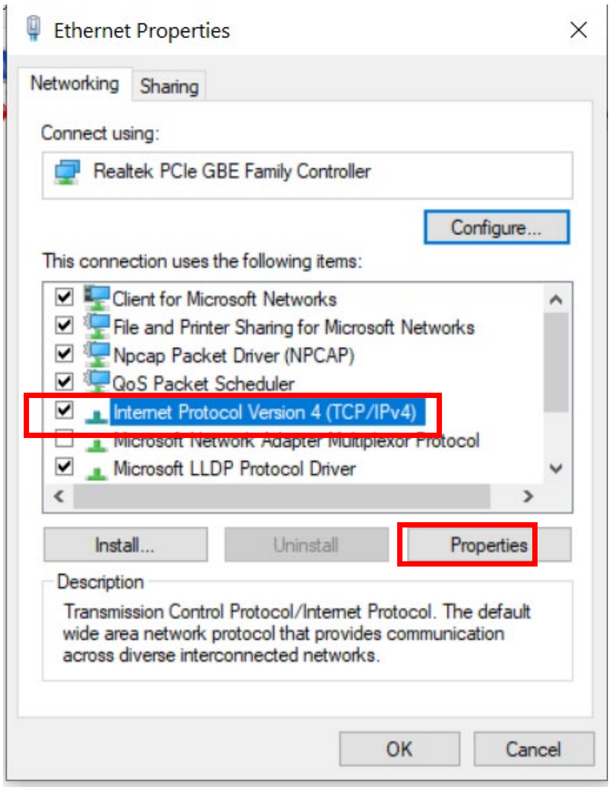


Figure 82. IPv4 Internet Protocol selection.

7. Select “Use the following IP address:”

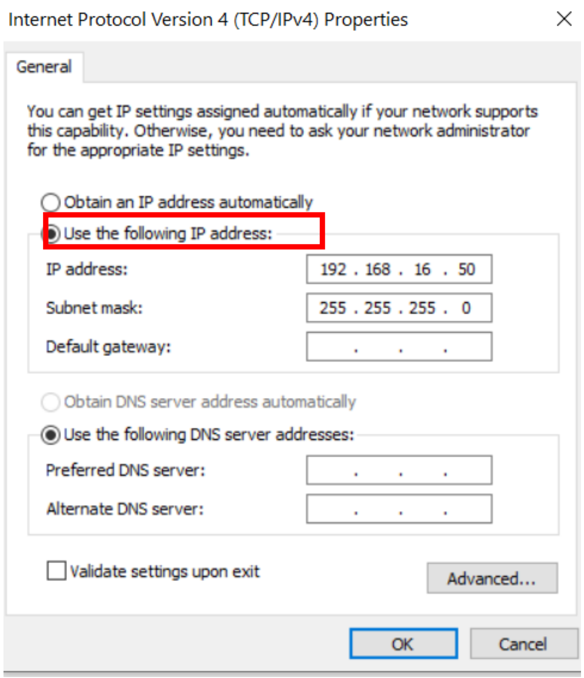


Figure 83. IP address selection.

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

9. Open a 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.

10.2. 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. After typing in the IP address in the web browser a Login panel shall appear (**Figure 84**). To log in provide the following information (**case sensitive!**):

Account: GasEYE
Password: #pi3.14

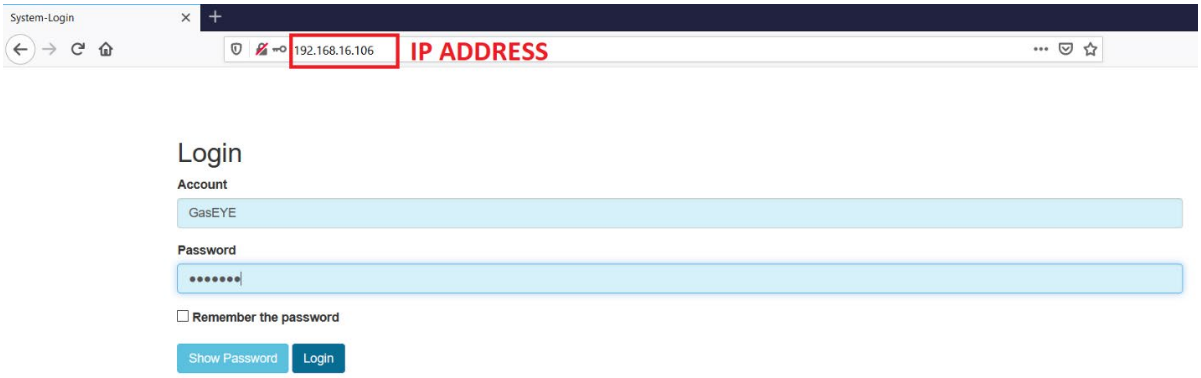


Figure 84. WebServer login page.

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

- **Measurements**
- **Parameters**
- **Settings**
- **Factory config**
- **About**

Figure 85. User access level – main bar 1/2.

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

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

Figure 86. User access level – main bar 2/2.

10.3. Measurement tab

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

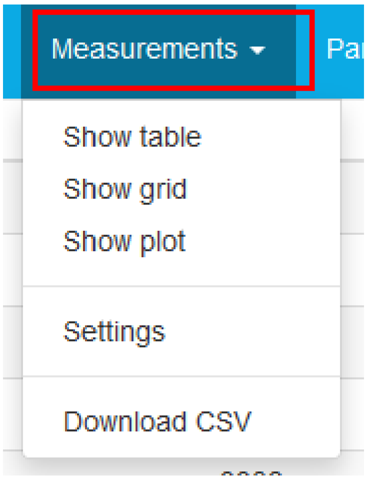


Figure 87. Webserver application - Measurement tab.

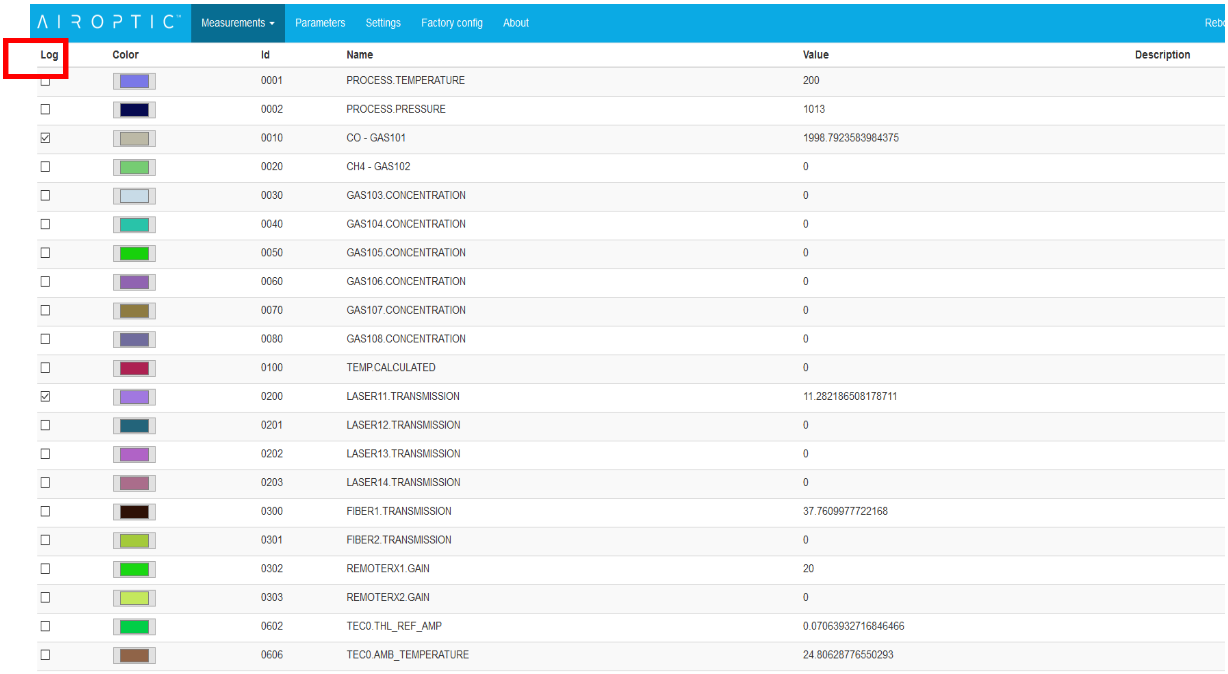
In the Measurement tab there are five functionalities that are accessible by clicking the respective field.

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.

Table 19. Measurement window functionalities.

10.3.1. 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 88**). 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 88. 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	0.05690891295671463	
☐		0030	GAS103.CONCENTRATION	0	
☐		0040	GAS104.CONCENTRATION	0	
☐		0050	GAS105.CONCENTRATION	0	

Figure 89. Excerpt from Measurement Table.

10.3.2. 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 appear to choose subgroups to present. (Subgroups can by hide/show by clicking on the group name – black font).

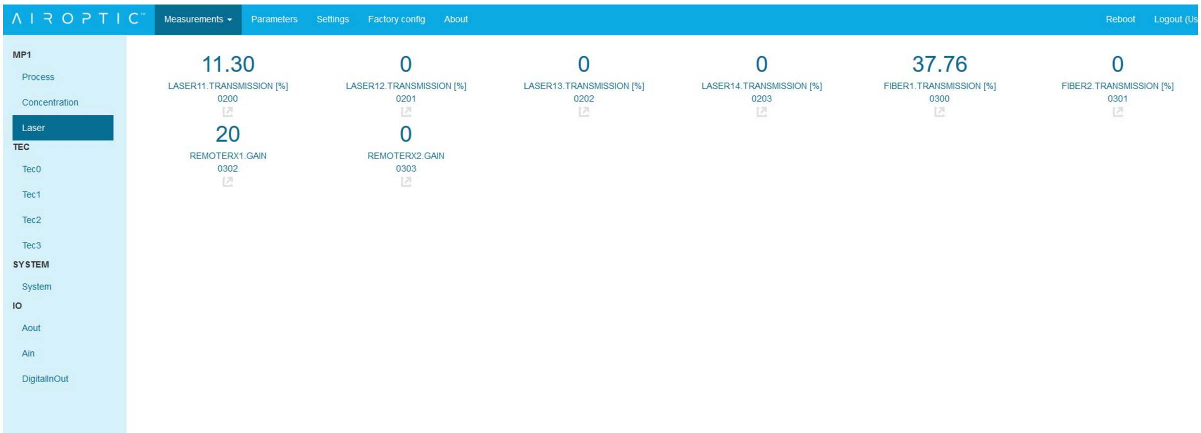
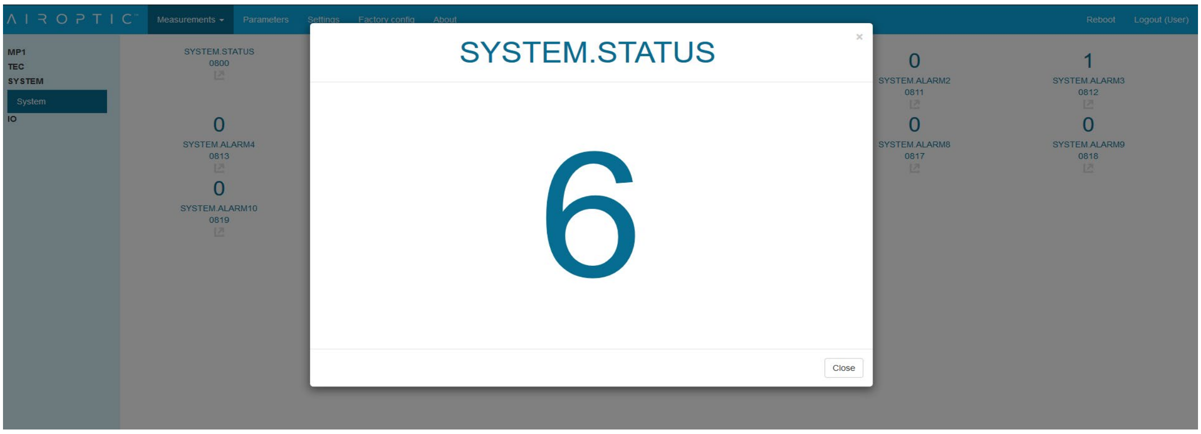


Figure 90. Measurements Show grid view.



Rysunek 2. Present measurement value in separate screen.

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

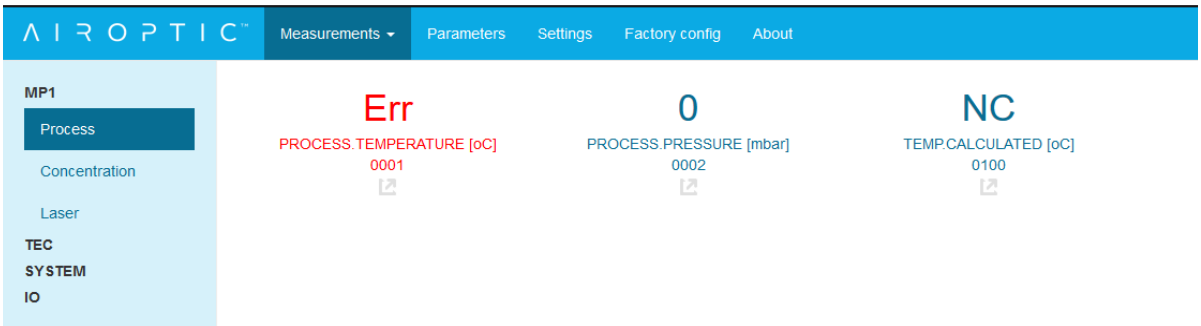


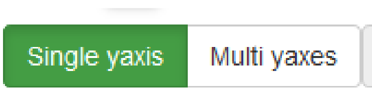
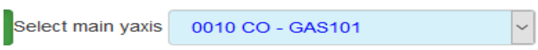
Figure 91. Presented data with additional flag detected.

10.3.3. Show Plot

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

Figure 92. Plot Window.

In the **Table 20** 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.

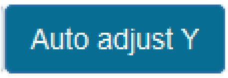
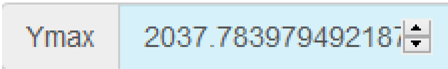
	Automatically adjusts the y-axis limits to fit the plot inside the plot window. The action is instantaneous and is not recurring.
	Manual y-axis minimum value.
	Manual y-axis maximum value.

Table 20. Plot Window functionalities.

10.4. 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

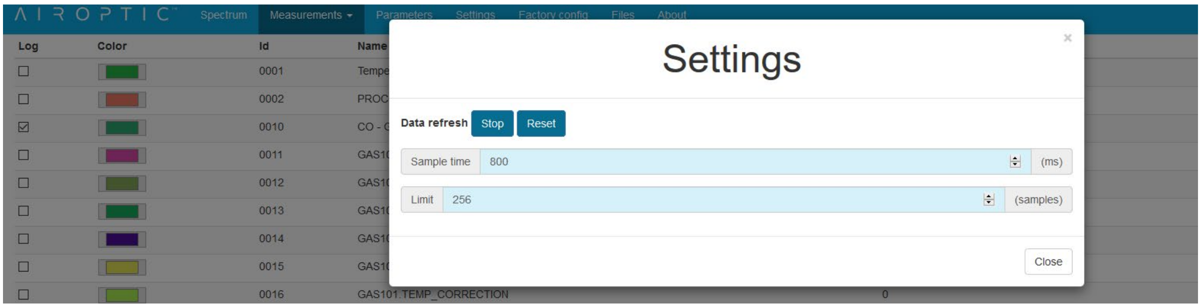


Figure 93. Modal window Settings.

10.5. Measurement Groups

There are four groups on the left side panel:

- MP1
- TEC
- SYSTEM
- IO

10.5.1. MP1 -> Process

Submodule display 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

Table 21. Process measurement list.

Figure 94. Process measurements window.

10.5.2. MP1 -> Concentration

Submodule display 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 22. Concentration measurement list.

Figure 95. Concentration measurements window.

10.5.3. MP1 -> Laser

Submodule display 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 23. Laser measurement list.

Figure 96. Laser measurements window.

10.5.4. TEC -> Tec0

Submodule display measurement from first laser temperature control module.

Laser measurements	
Name	**Name**
TEC0.THL_REF_AMP	***TEC0.THL_REF_AMP***
TEC0.AMB_TEMPERATURE	***TEC0.AMB_TEMPERATURE***

Table 24. Laser measurement list – Laser1 temperature control module.

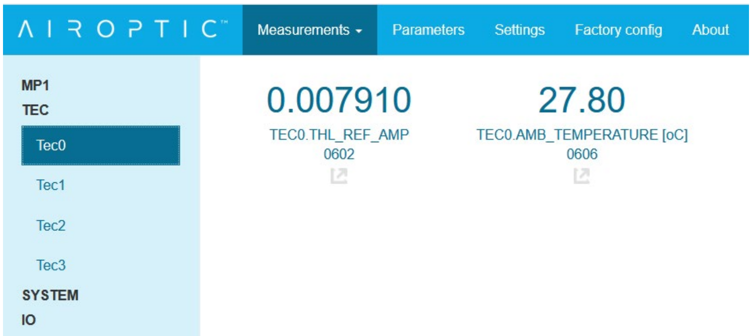


Figure 97. Laser temperature control module measurements window – Laser1.

10.5.5. TEC -> Tec1

Submodule display measurement from second laser temperature control module.

Laser measurements	
Name	**Name**
TEC1.THL_REF_AMP	***TEC1.THL_REF_AMP***

TEC1.AMB_TEMPERATURE	***TEC1.AMB_TEMPERATURE***

Table 25. Laser measurement list – Laser2 temperature control module.

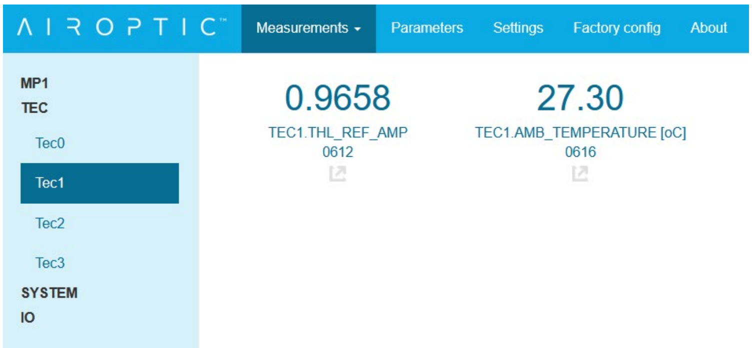


Figure 98. Laser temperature control module measurements window – Laser2.

10.5.6. TEC -> Tec2

Submodule display measurement from third laser temperature control module.

Laser measurements	
Name	**Name**
TEC2.THL_REF_AMP	***TEC2.THL_REF_AMP***
TEC2.AMB_TEMPERATURE	***TEC2.AMB_TEMPERATURE***

Table 26. Laser measurement list – Laser3 temperature control module.

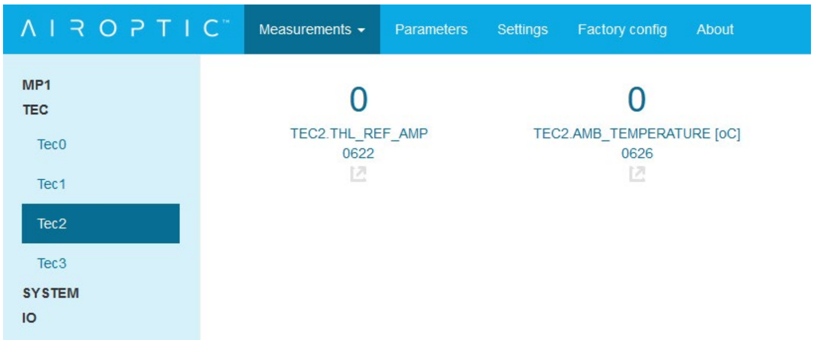


Figure 99. Laser temperature control module measurements window - Laser3.

10.5.7. TEC -> Tec3

Submodule display measurement from fourth laser temperature control module.

Laser measurements	
Name	**Name**
TEC3.THL_REF_AMP	***TEC3.THL_REF_AMP***
TEC3.AMB_TEMPERATURE	***TEC3.AMB_TEMPERATURE***

Table 27. Laser measurement list – Laser4 temperature control module.

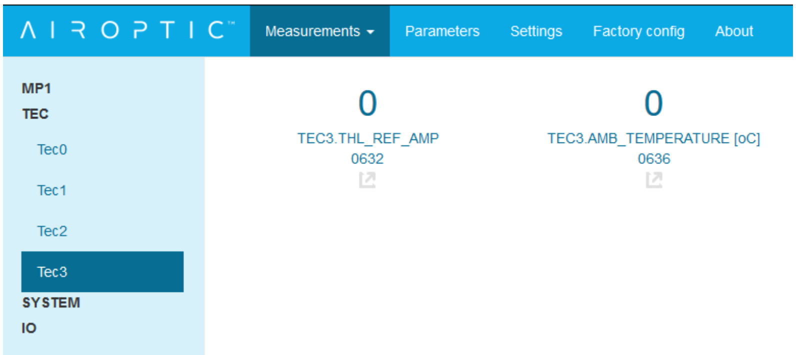


Figure 100. Laser temperature control module measurements window - Laser4.

10.5.8. System -> System

Submenu display system health.

System measurements	
Name	**Description**
SYSTEM.STATUS	6 – system ready
SYSTEM.STARTUP_PROCEDURE	Values described in page 107
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

Tabela 1. System measurement list.

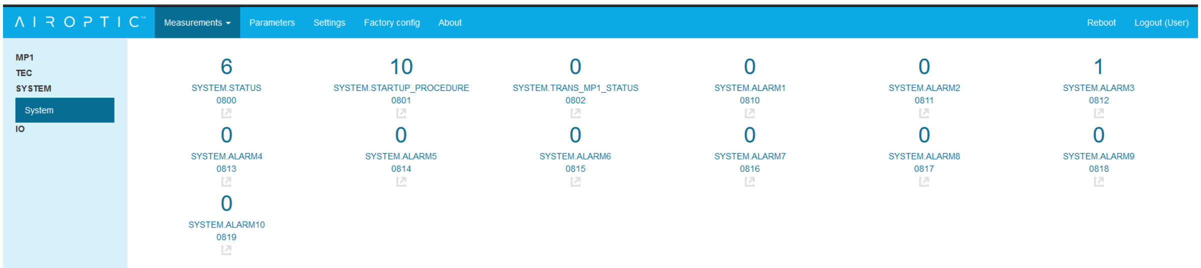


Figure 101. System measurements window.

10.5.9. IO -> Aout (Analog output measurement)

Submenu display 4 analog output channels set values

Analog outputs measurements	
Name	**Name**

AOUT1	***AOUT1***
AOUT2	***AOUT2***
AOUT3	***AOUT3***
AOUT4	***AOUT4***

Table 28. Analog outputs measurements list.

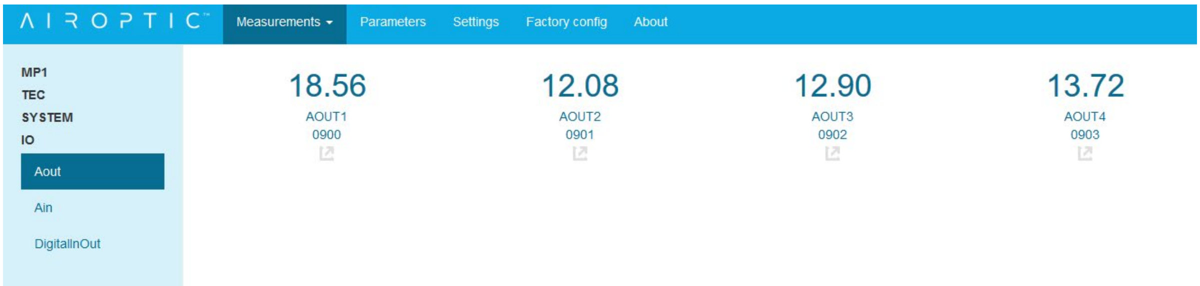


Figure 102. Analog output measurements window.

10.5.10. IO -> Ain (Analog input measurement)

Submenu display 4 analog input channels.

Analog inputs measurements	
Name	**Name**
AIN1	***AIN1***
AIN1.VAL	***AIN1.VAL***
AIN2	***AIN2***
AIN2.VAL	***AIN2.VAL***
AIN3	***AIN3***
AIN3.VAL	***AIN3.VAL***
AIN4	***AIN4***
AIN4.VAL	***AIN4.VAL***
RTD	***RTD***
AMB_PRESSURE	***AMB_PRESSURE***

Table 29. Analog inputs measurements list.

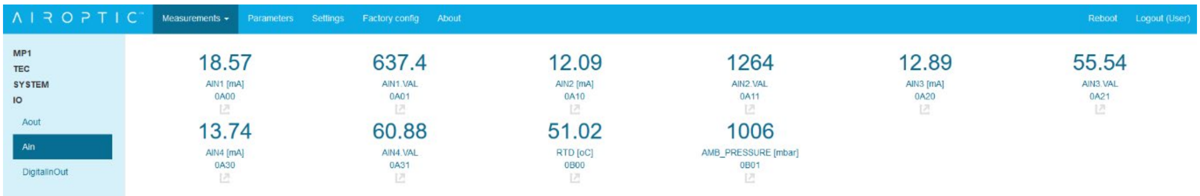


Figure 103. Analog input measurements window

10.5.11. IO -> DigitalInOut

Submenu display 8 digital inputs and 8 digital outputs values.

Digital inputs/outputs measurements	
Name	**Name**
DOUT1	***DOUT1***
DOUT2	***DOUT2***
DOUT3	***DOUT3***
DOUT4	***DOUT4***
DOUT5	***DOUT5***
DOUT6	***DOUT6***
DOUT7	***DOUT7***
DOUT8	***DOUT8***
DIN1	***DIN1***
DIN2	***DIN2***
DIN3	***DIN3***
DIN4	***DIN4***
DIN5	***DIN5***
DIN6	***DIN6***
DIN7	***DIN7***
DIN8	***DIN8***

Table 30. Digital inputs/outputs measurements list.

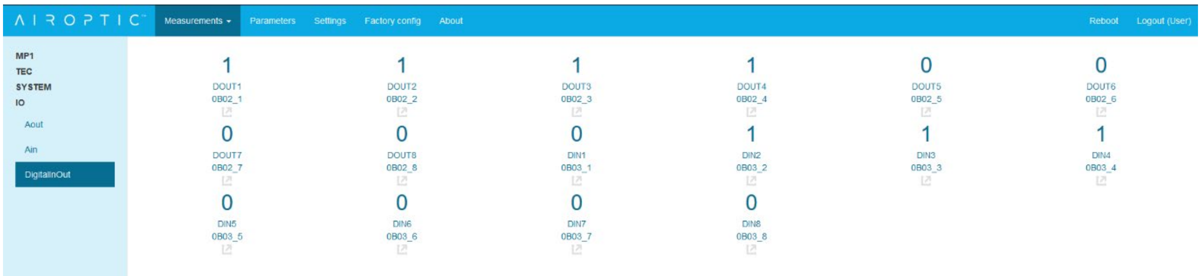


Figure 104. Digital input and output measurements window.

10.6. Parameters tab

In the User access mode it is possible to access and edit various parameters, see **Figure 105**.

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 2.**

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).

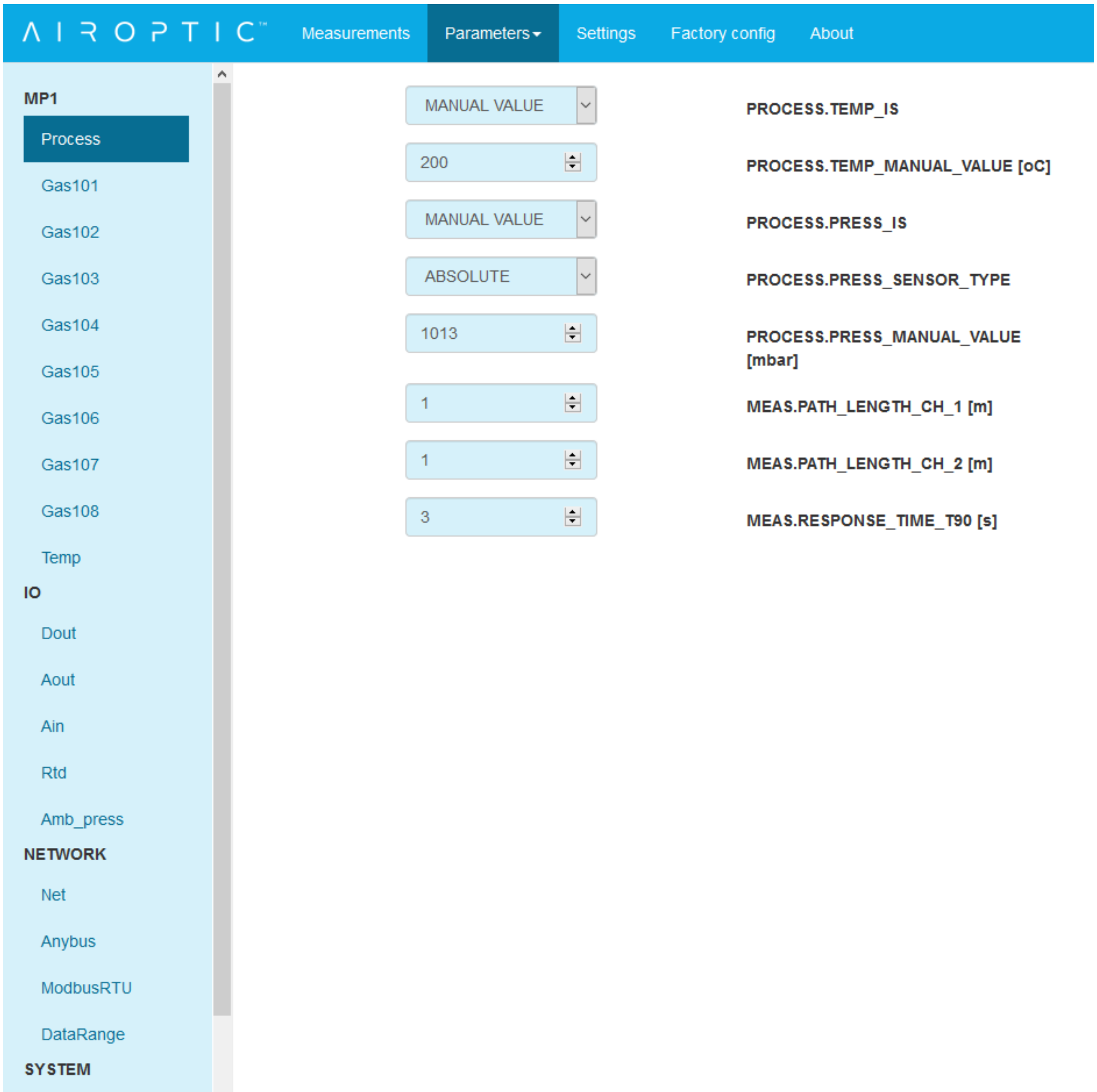


Figure 105. Process parameters window

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.**

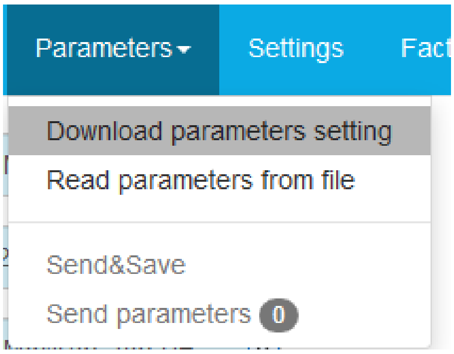


Figure 106. Webserver application - parameters Window.

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 31. Parameter Window functionalities.

10.6.1. Parameter groups

There are four main groups visible on the left panel:

- MP1
- IO
- NETWORK
- SYSTEM

10.6.2. 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

Table 32. Process parameters list.

Temperature sensor source	
Name	**Description**
MANUAL VALUE	Value is set manually by user from WebServer interface.
AIN1 AIN2 AIN3 AIN4	Temperature sensor is connect to analog input socket
AIN-RTD	Resistance temperature sensor
INDUSTRY_PROTOCOL	Temperature is send 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 Cross Duct)

Table 33. Temperature sensor source list.

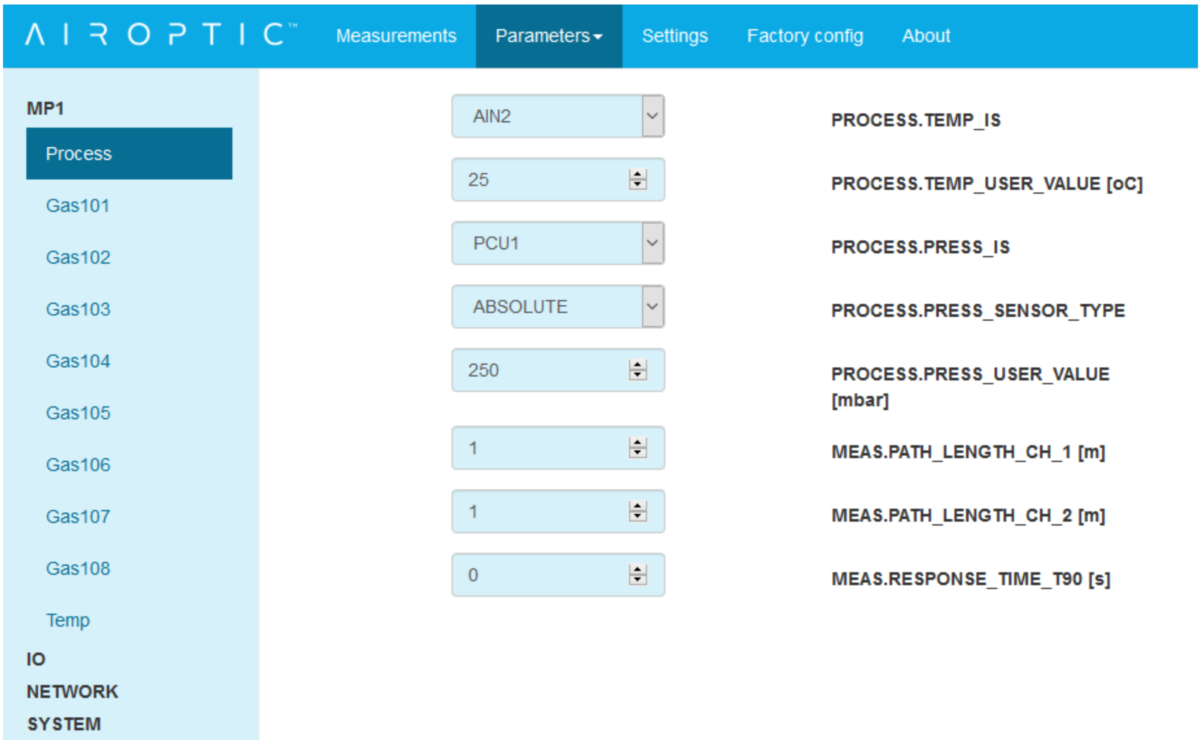


Figure 107. Process parameters window

10.6.3. 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 34. GAS101 parameters list.

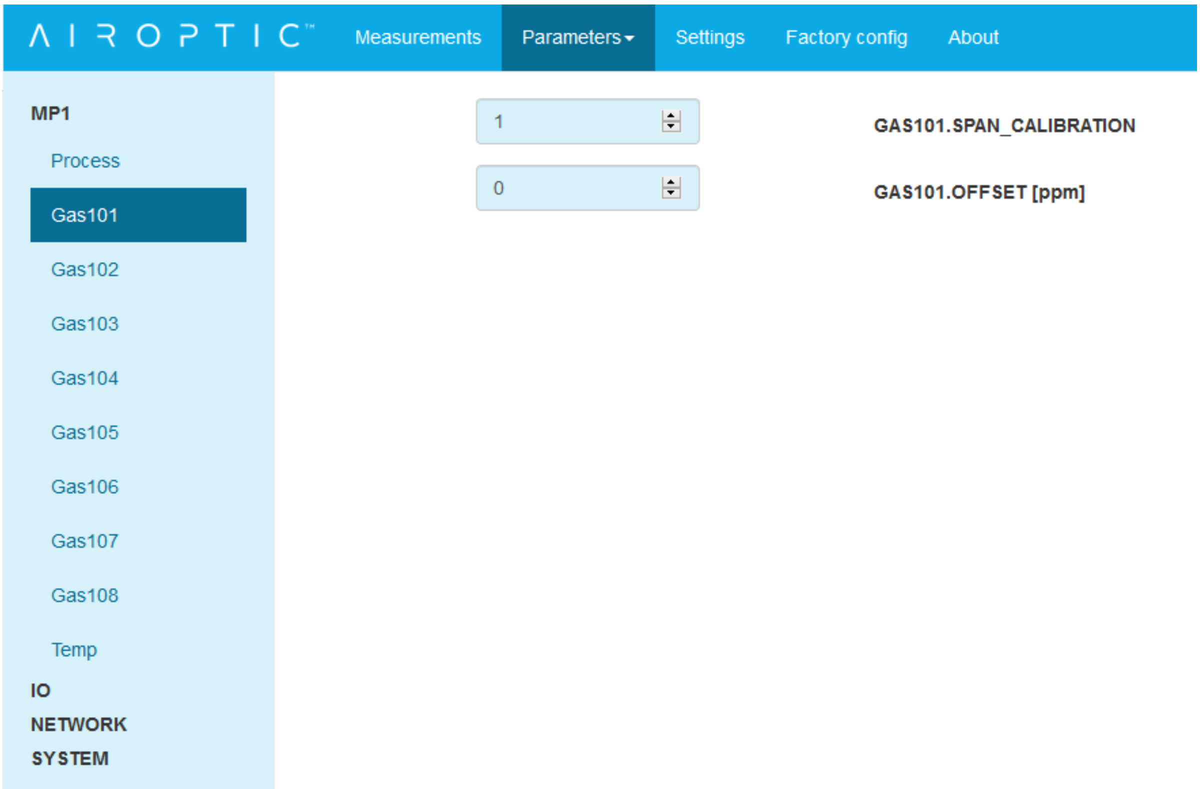


Figure 108. GAS101 parameters window

10.6.4. 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 35. GAS102 parameters list.

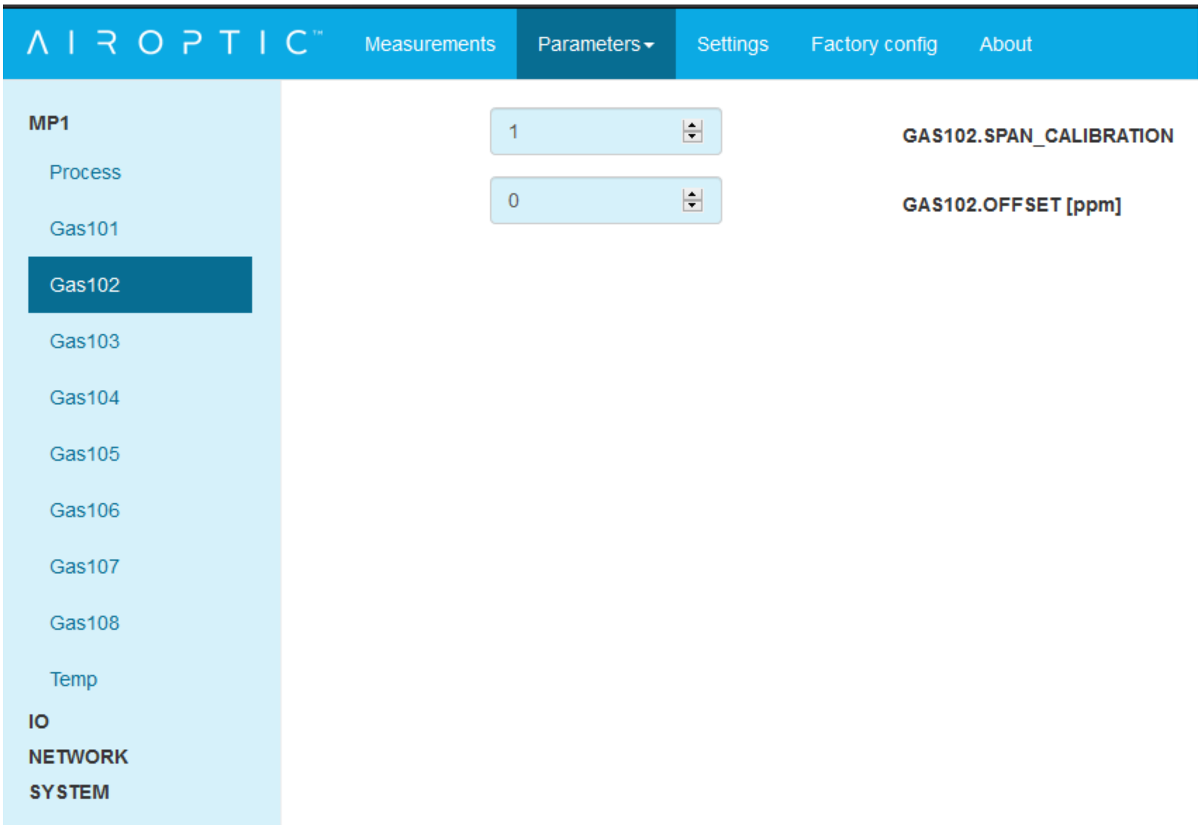


Figure 109. GAS102 parameters window.

10.6.5. 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 36. GAS103 parameters list.

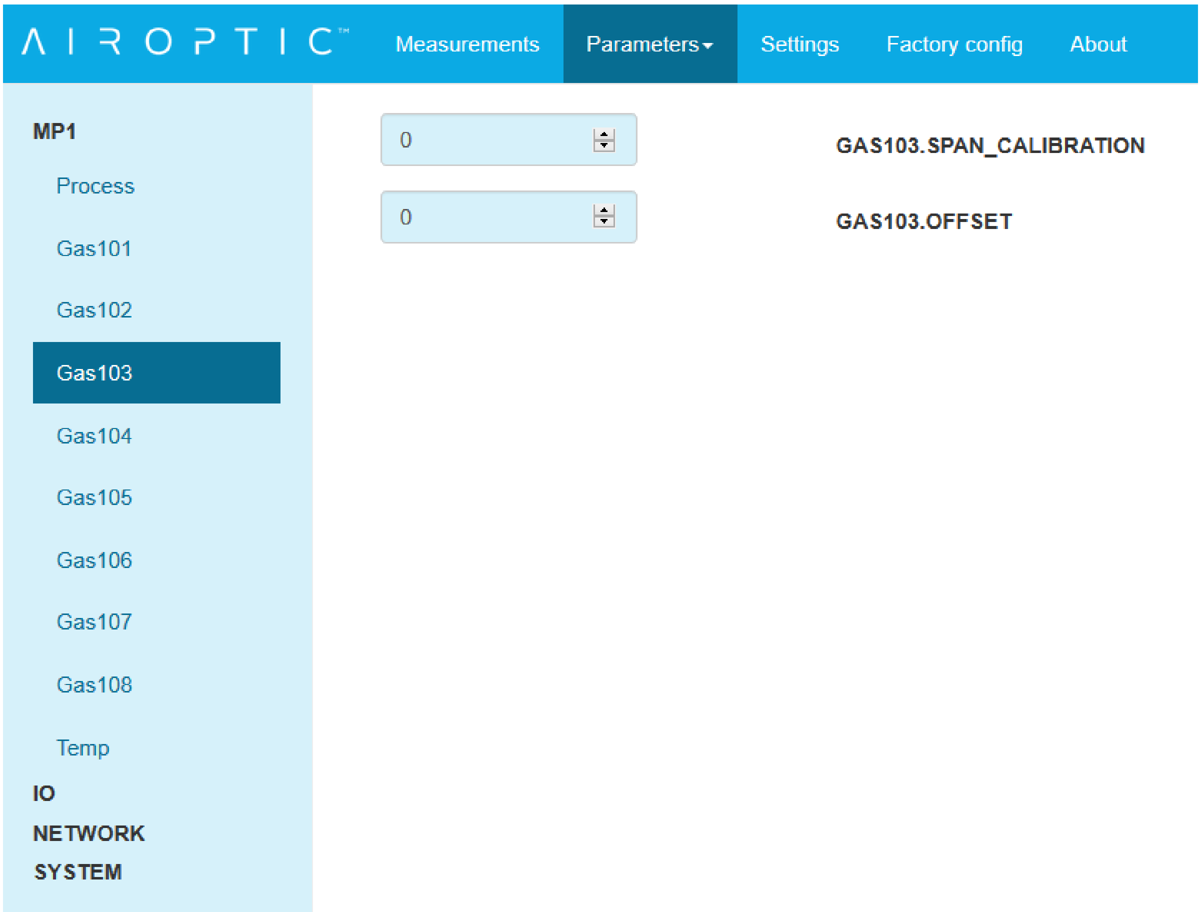


Figure 110. GAS103 parameters window

10.6.6. 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 37. GAS104 parameters list.

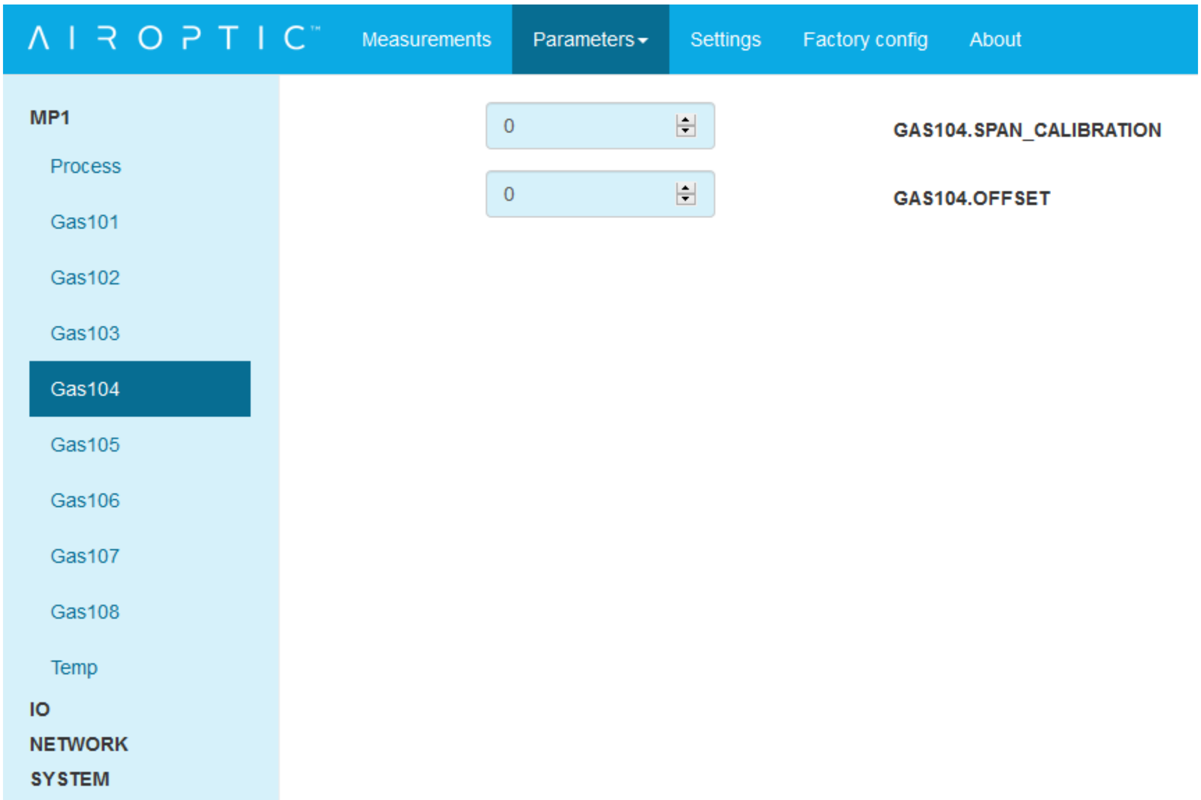


Figure 111. GAS104 parameters window

10.6.7. MP1 -> GAS106

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 38. GAS105 parameters list.

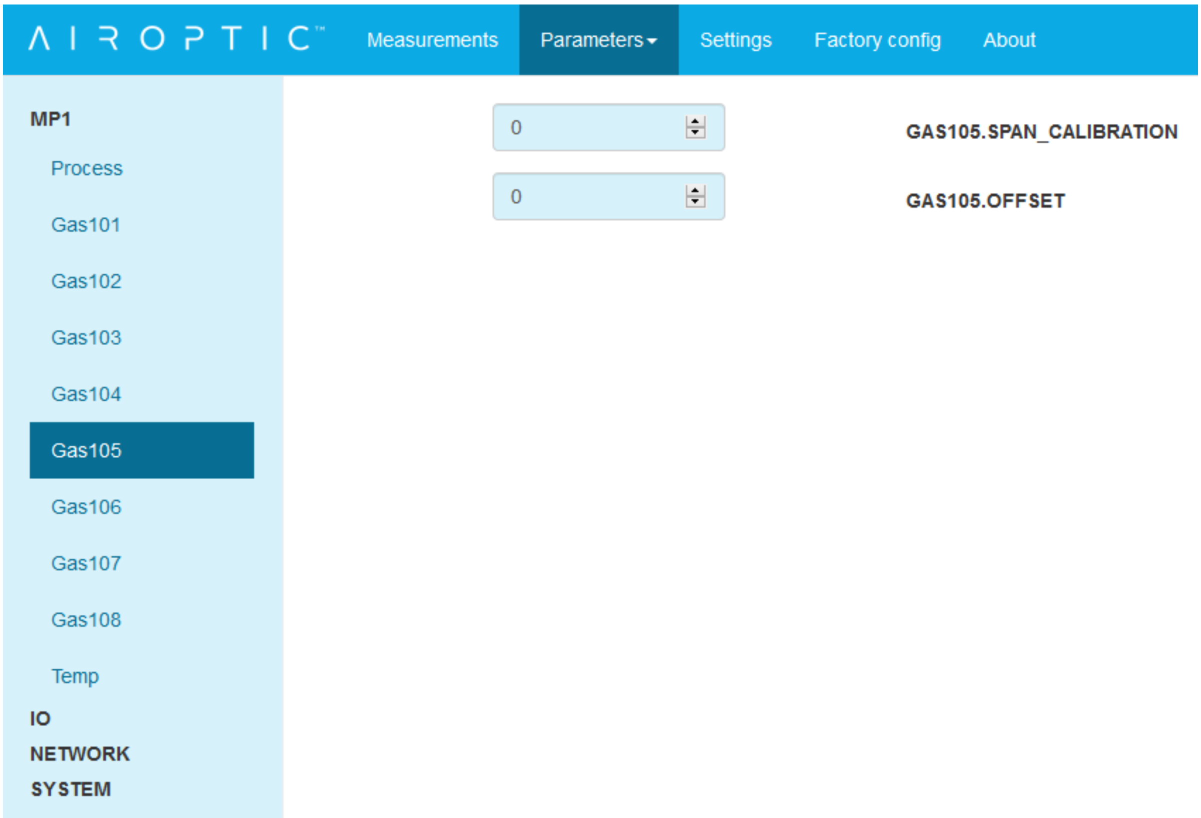


Figure 112. GAS105 parameters window.

10.6.8. 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 39. GAS106 parameters list.

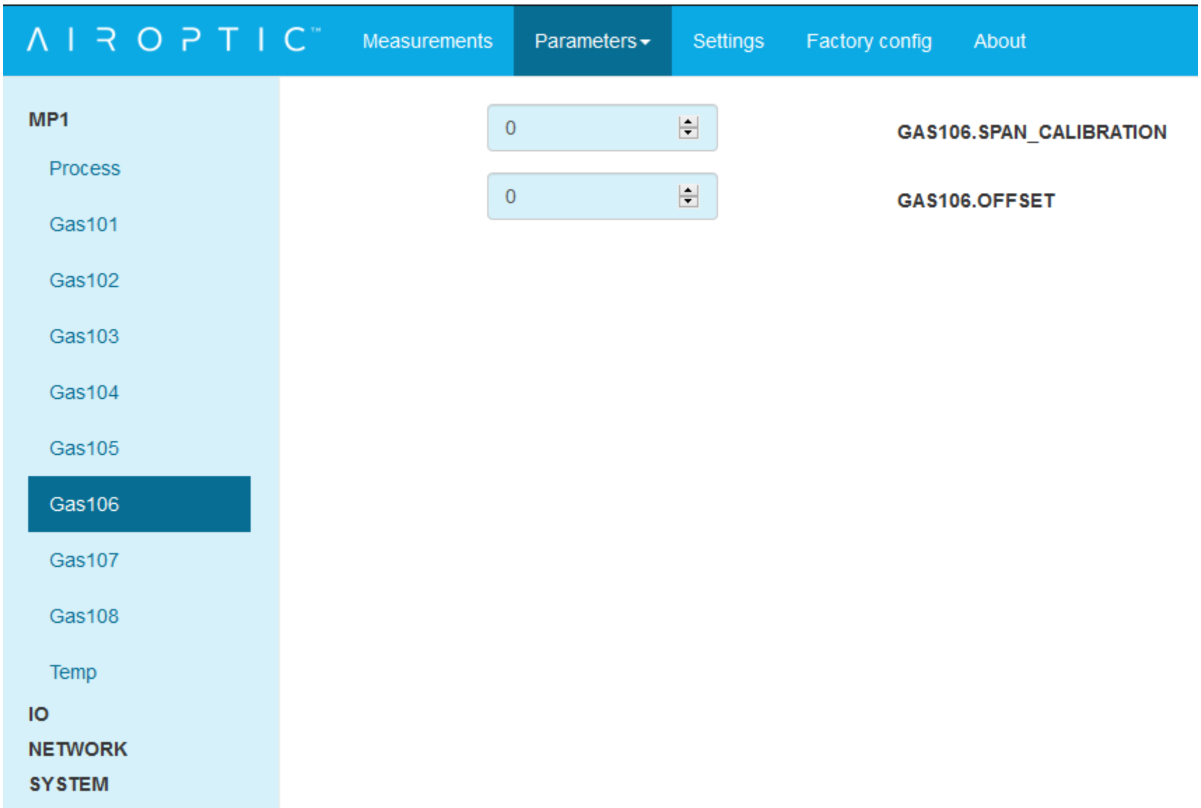


Figure 113. GAS106 parameters window

10.6.9. 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 40. GAS107 parameters list.

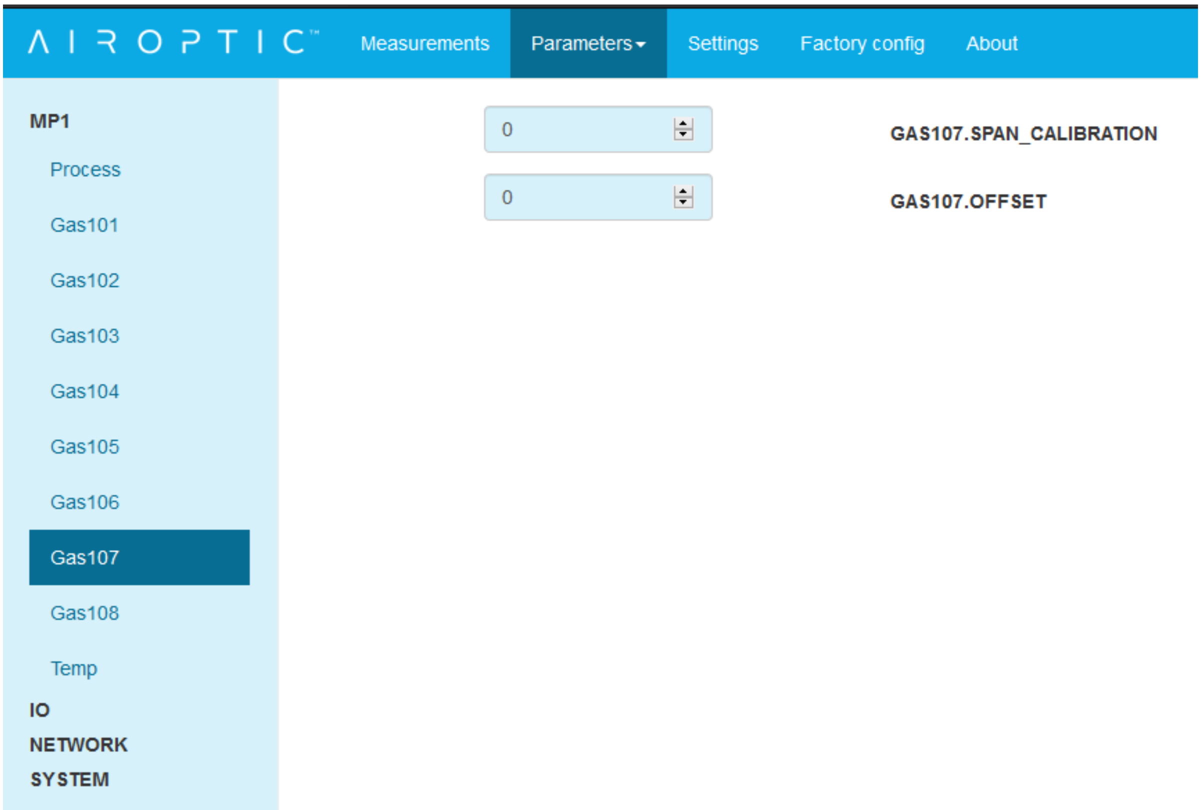


Figure 114. GAS107 parameters window.

10.6.10. 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 41. GAS108 parameters list.

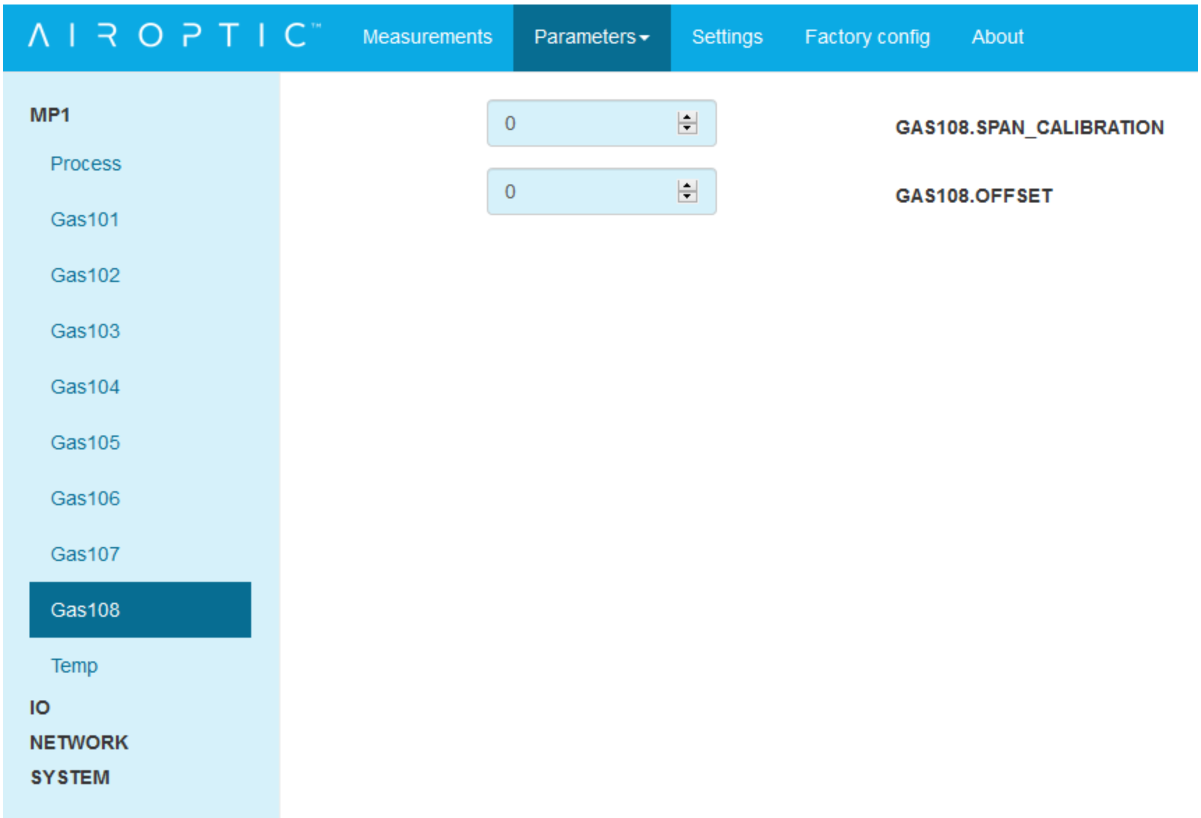


Figure 115. GAS108 parameters window.

10.6.11. 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 42. Temperature parameters list.

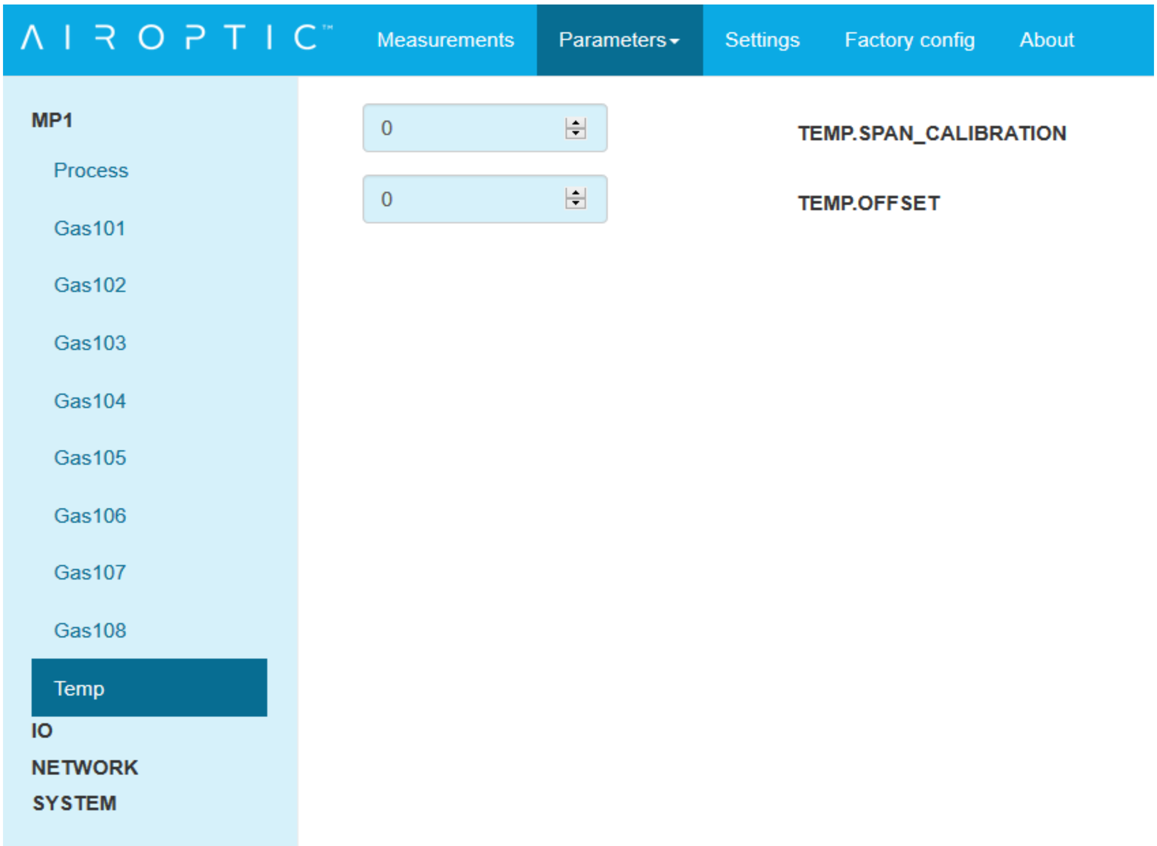


Figure 116. Temperature parameters window.

10.6.12. 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 forth 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 43. 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 Cross Duct) Set the digital output to high when is a pump error
RED_LASER_ON	Open path devices only

Table 44. Digital output operating mode list.

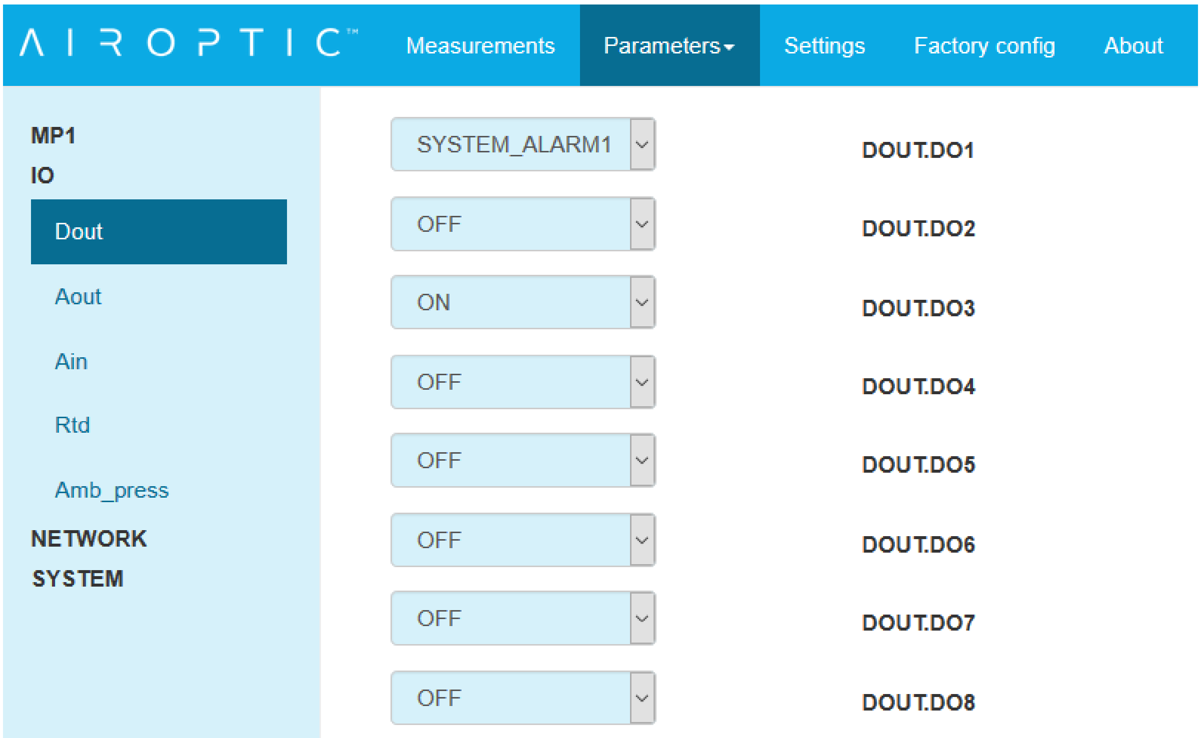


Figure 117. Dout parameters window.

10.6.13. 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 (more information can be find on Figure 51)

AOUT1.SELECT_SIGNAL	Measurement convert to analog output value. Available measurement are presented in Table XXX
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 convert to analog output value. Available measurement are presented in table XXX
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 convert to analog output value. Available measurement are presented in table XXX
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 convert to analog output value. Available measurement are presented in table XXX
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 45. 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 46. Analog output select signals list.

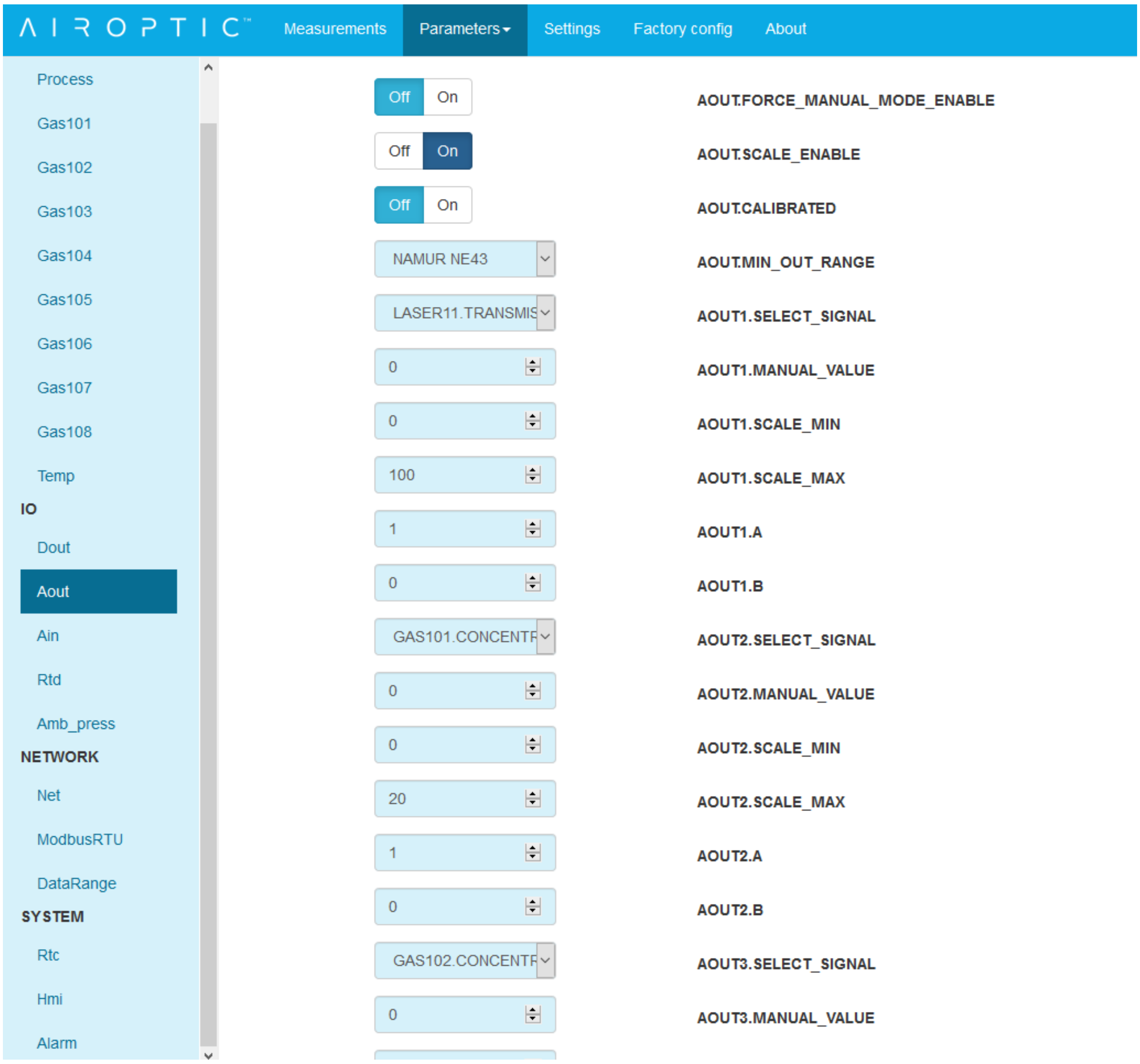


Figure 118. Aout parameters window.

10.6.14. 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 47. Analog inputs parameters list.

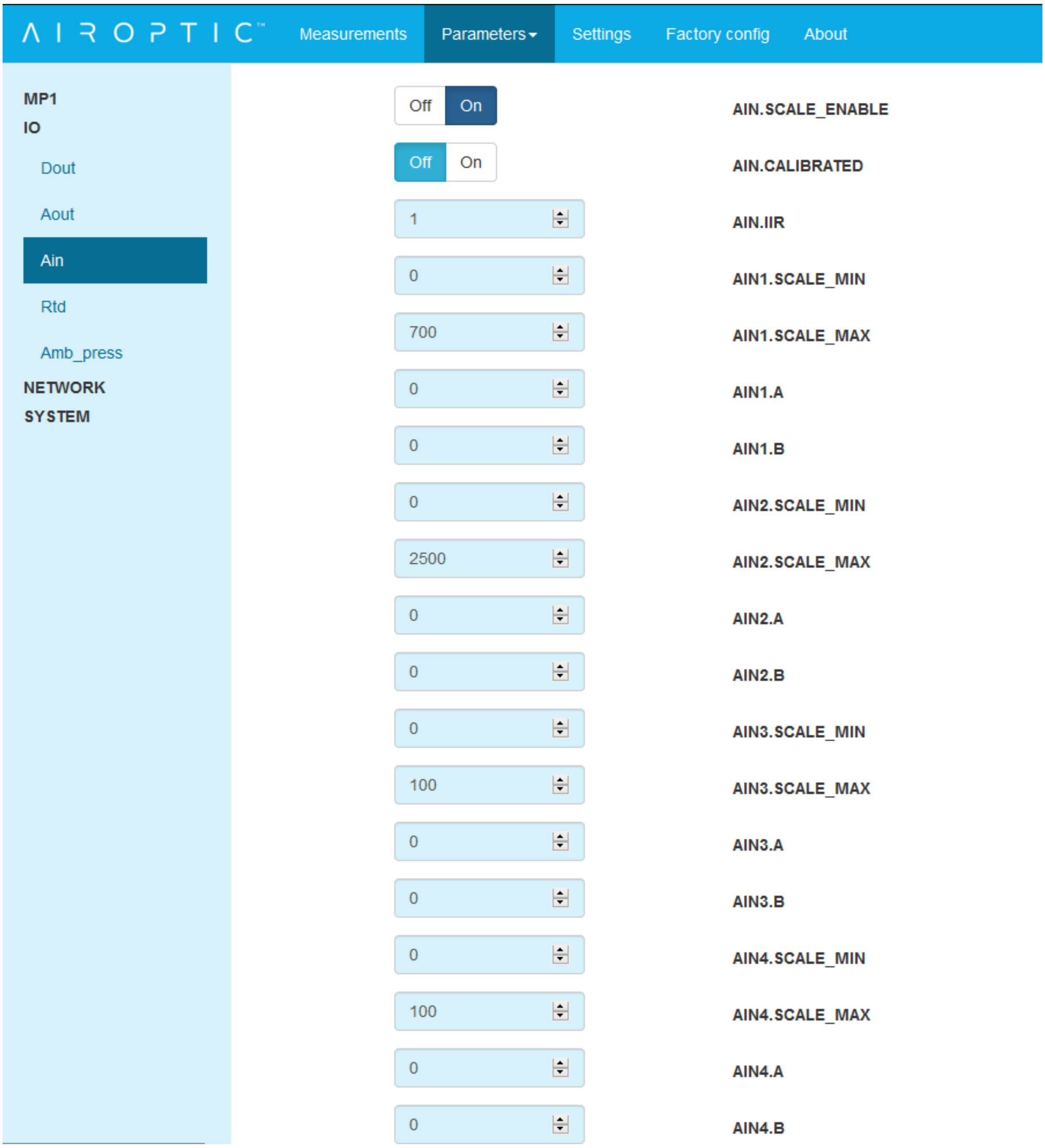


Figure 119. Ain parameters window.

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

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

Table 48. Resistance temperature sensor parameters list.

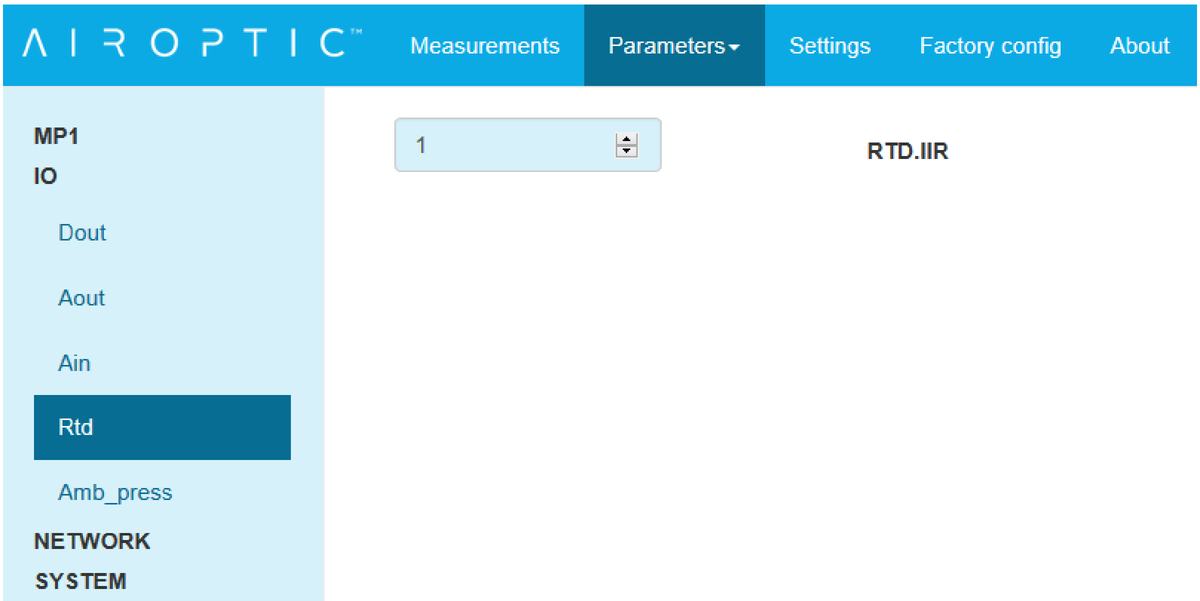


Figure 120. Resistance temperature detector window.

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

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

Table 49. Ambient pressure sensor parameters list.

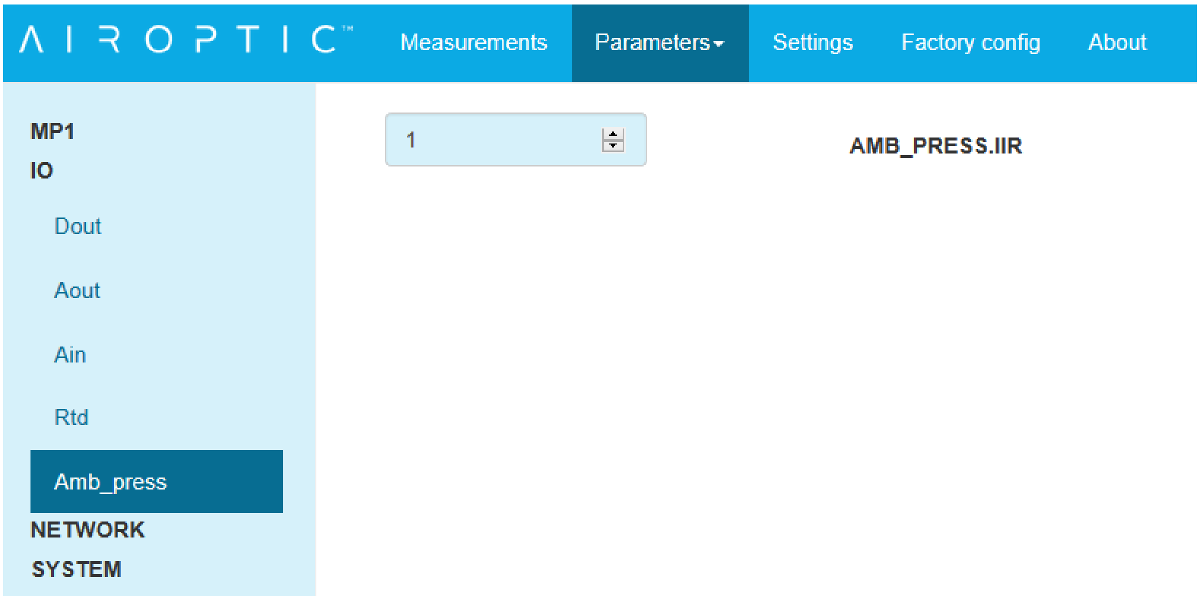


Figure 121. Ambient pressure sensor window.

10.6.17. 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 50. Service ethernet port parameters list.

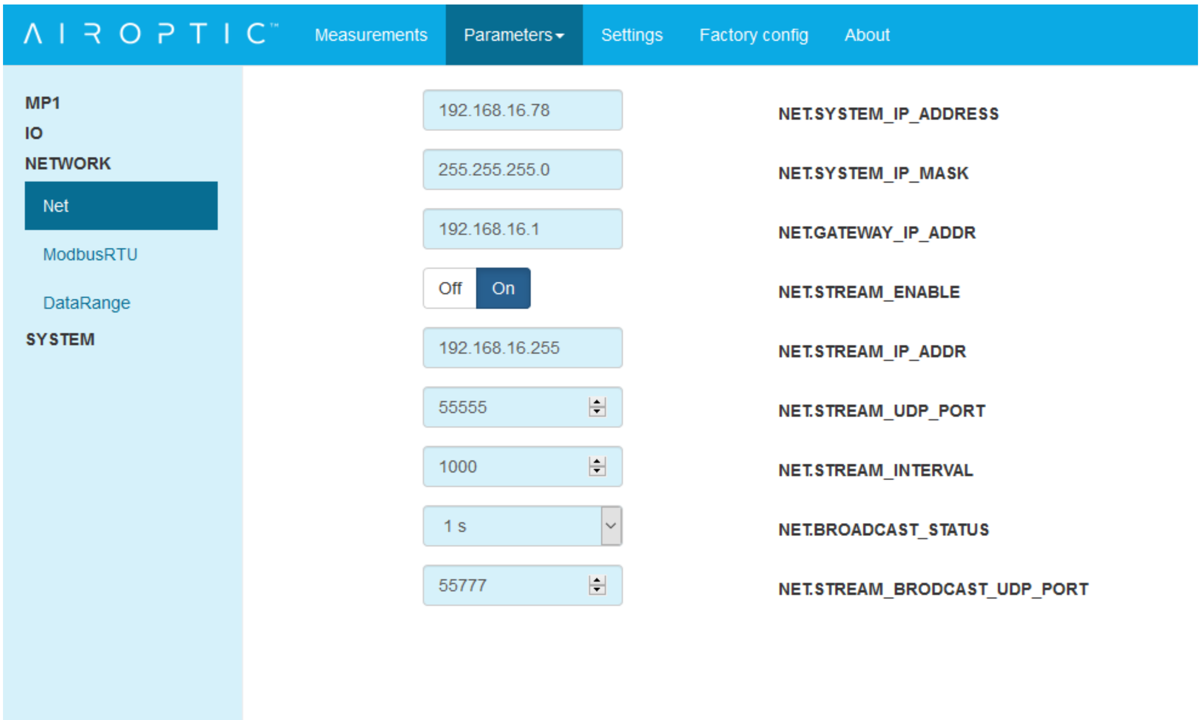


Figure 122. Service ethernet port configuration window.

10.6.18. 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 51. Service ethernet port parameters list.

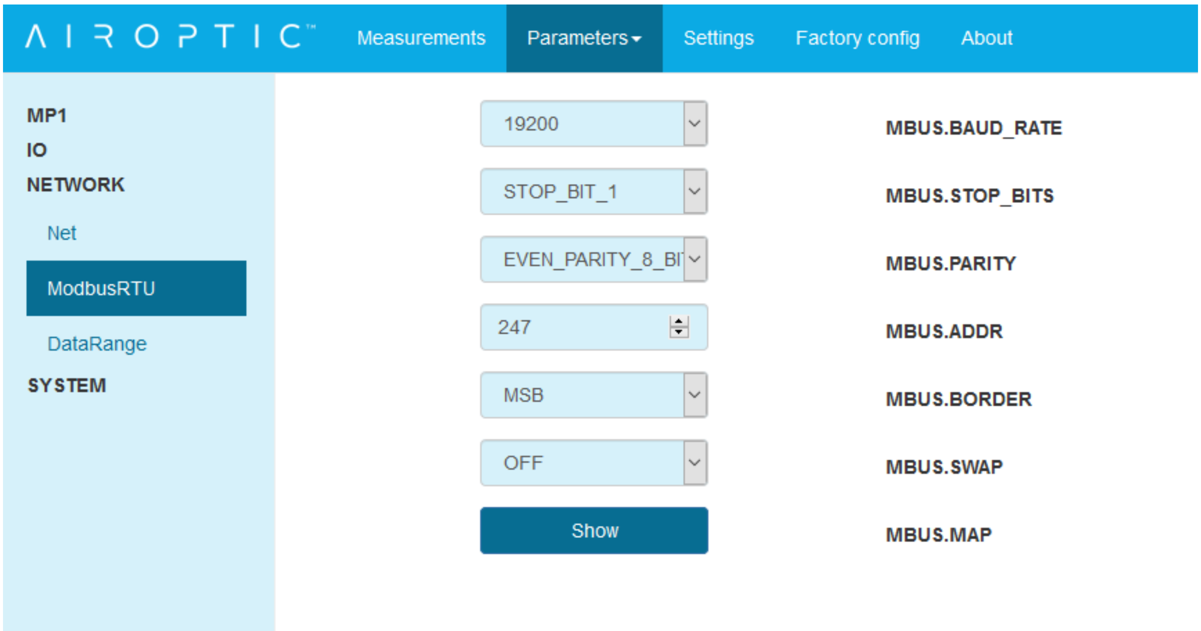


Figure 123. Modbus RTU configuration window.

10.6.19. NETWORK -> DataRange

Measured gases concentration can be re-calculated from floating point value to 16 bit integer and send this value by additional protocol register if main system can not work with floating point values.

Data range parameters	
Name	**Description**
GAS101.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS101.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS102.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS102.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS103.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS103.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value

GAS104.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS104.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS105.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS105.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS106.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS106.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS107.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS107.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value
GAS108.SCALE_MIN	Minimum gas concentration value use to recalculate floating point to 16 bit integer value
GAS108.SCALE_MAX	Maximum gas concentration value use to recalculate floating point to 16 bit integer value

Table 52. Data range parameters list.

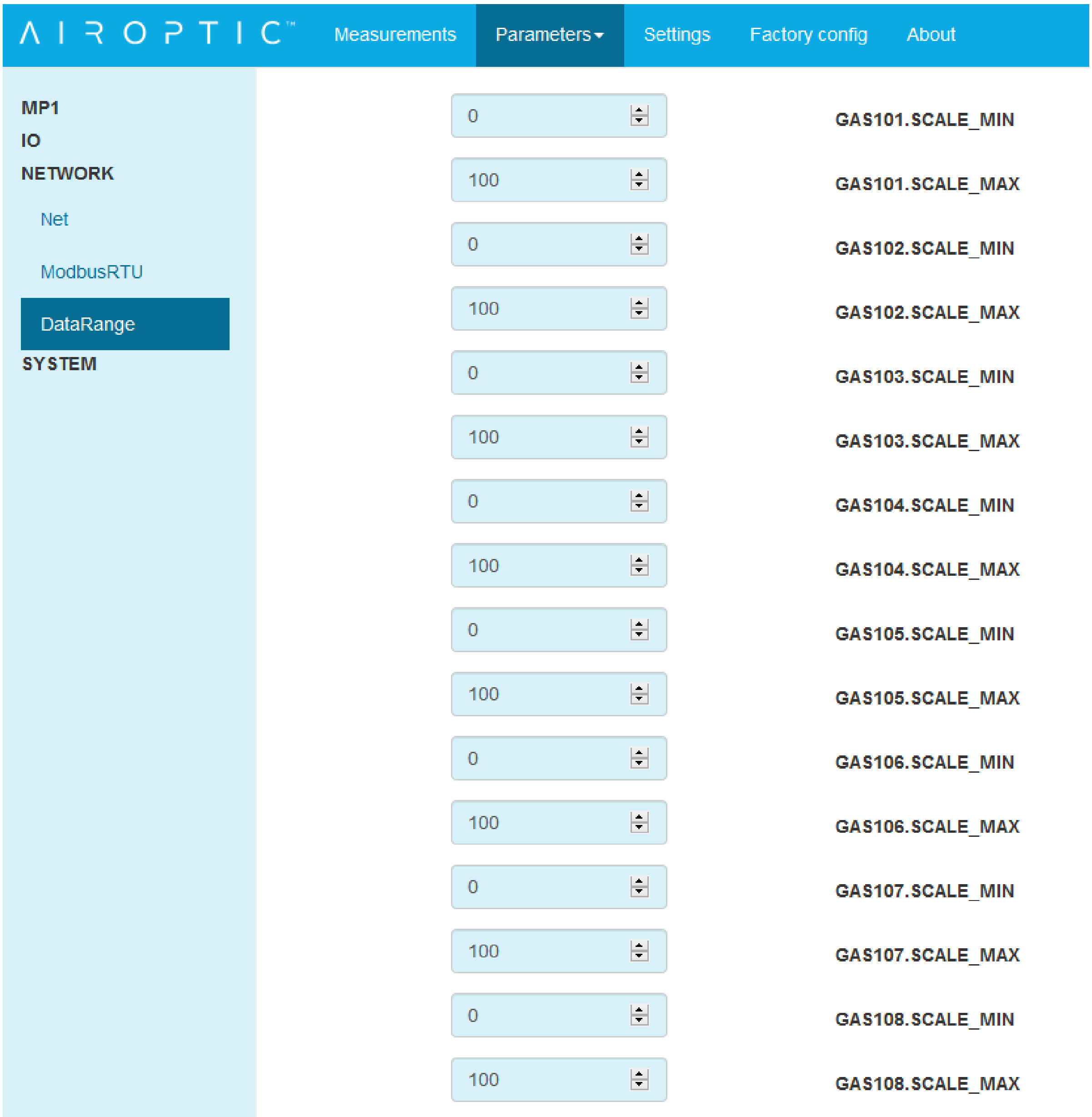


Figure 124. Data range configuration window.

10.6.20. 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 53. Real time clock parameters list.

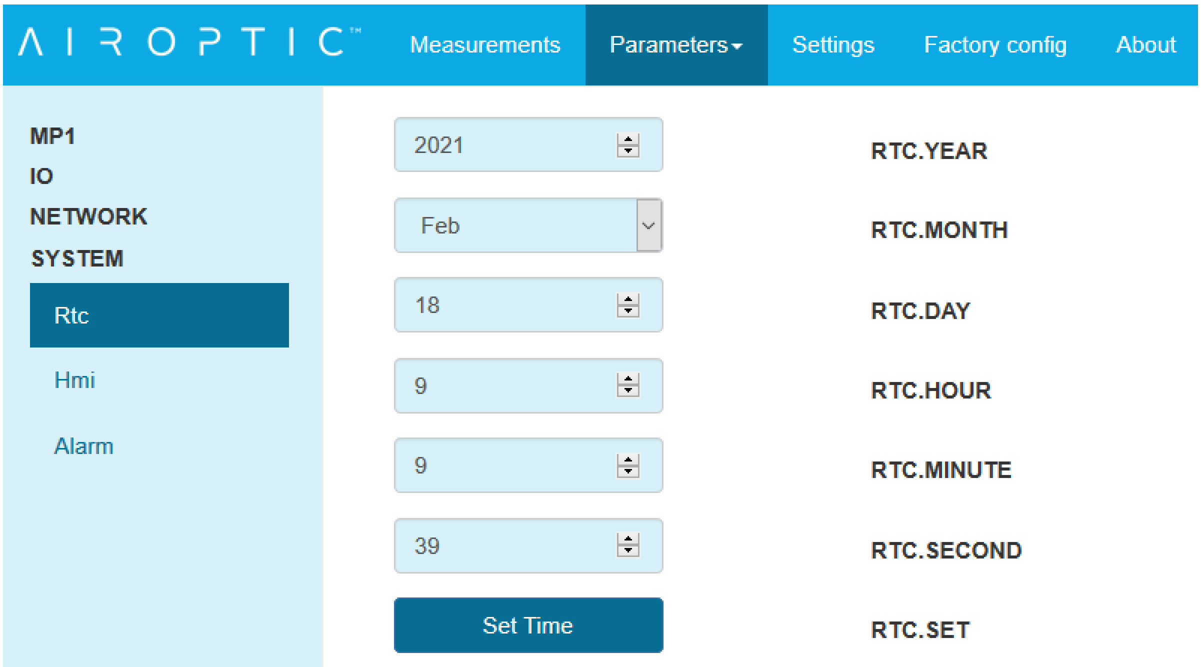


Figure 125. Rtc parameters window.

10.6.21. 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 54. HMI parameters list.

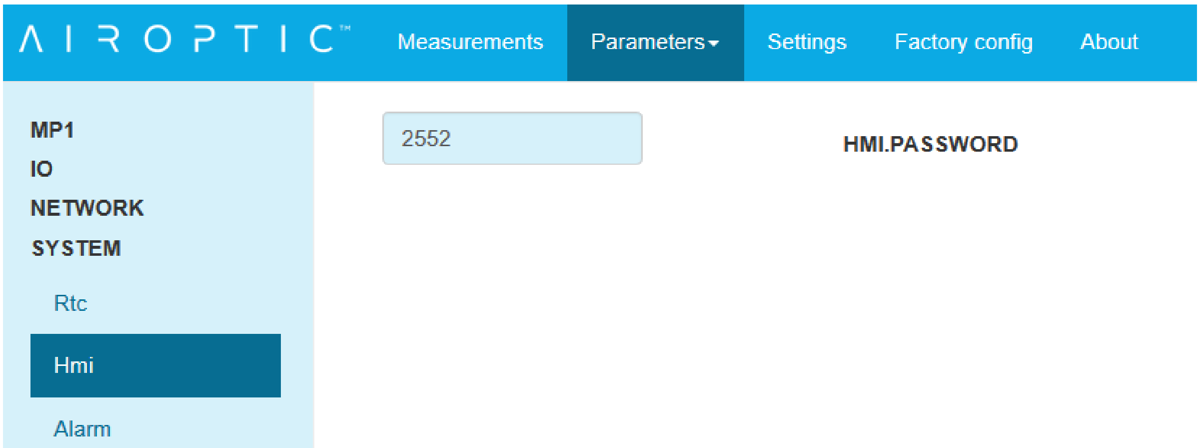


Figure 126. Hmi parameter window.

10.6.22. 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 55. Alarm parameters list.

Alarm signals list	
Name	**Description**
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)
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 56. Alarm signals list.

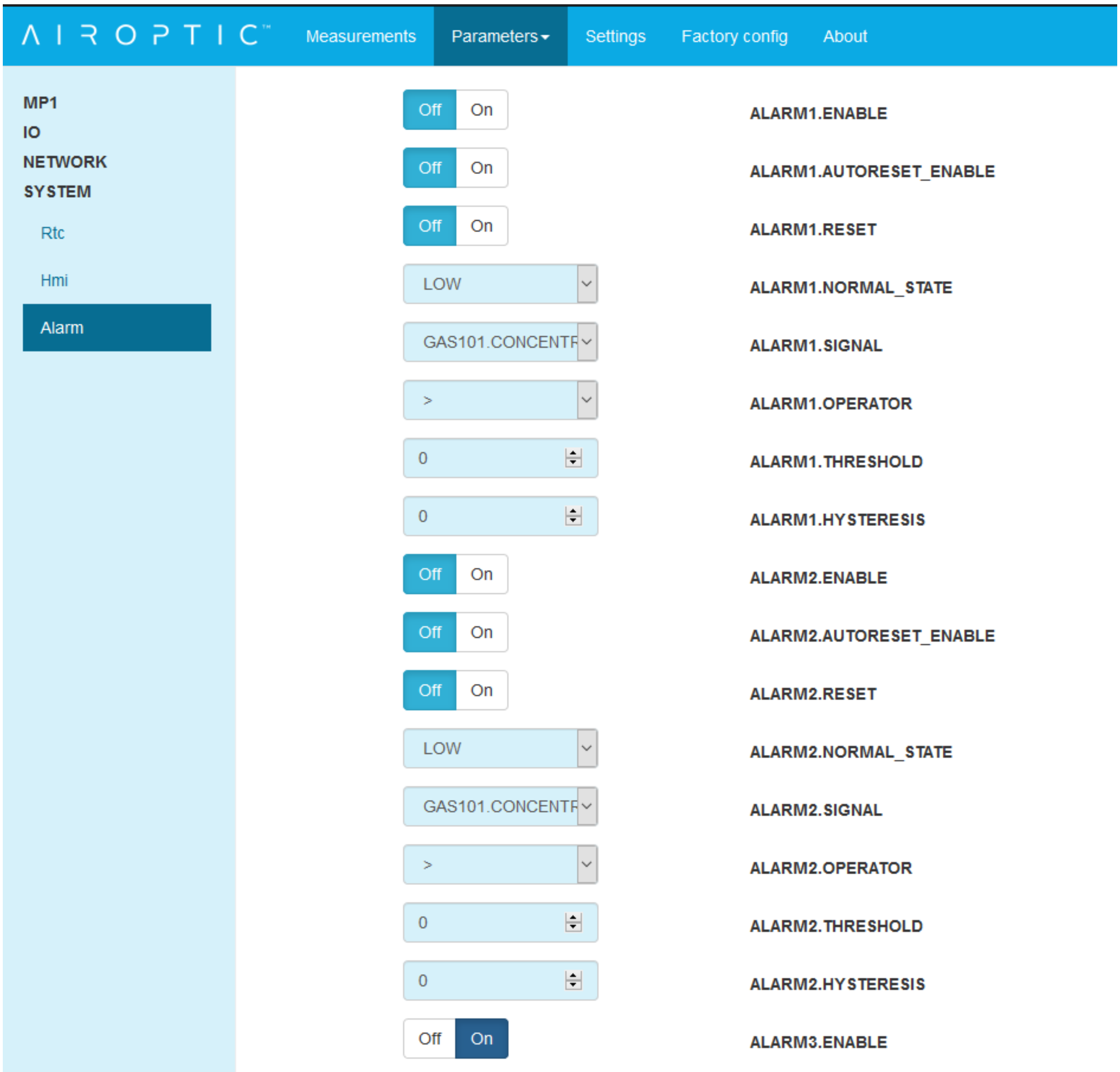


Figure 127. Alarm parameters window.

10.7. Settings tab

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

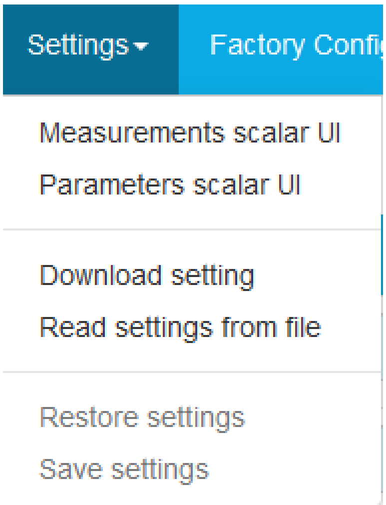


Figure 128. WebServer application - settings window.

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 57. *Settings window functionalities.*

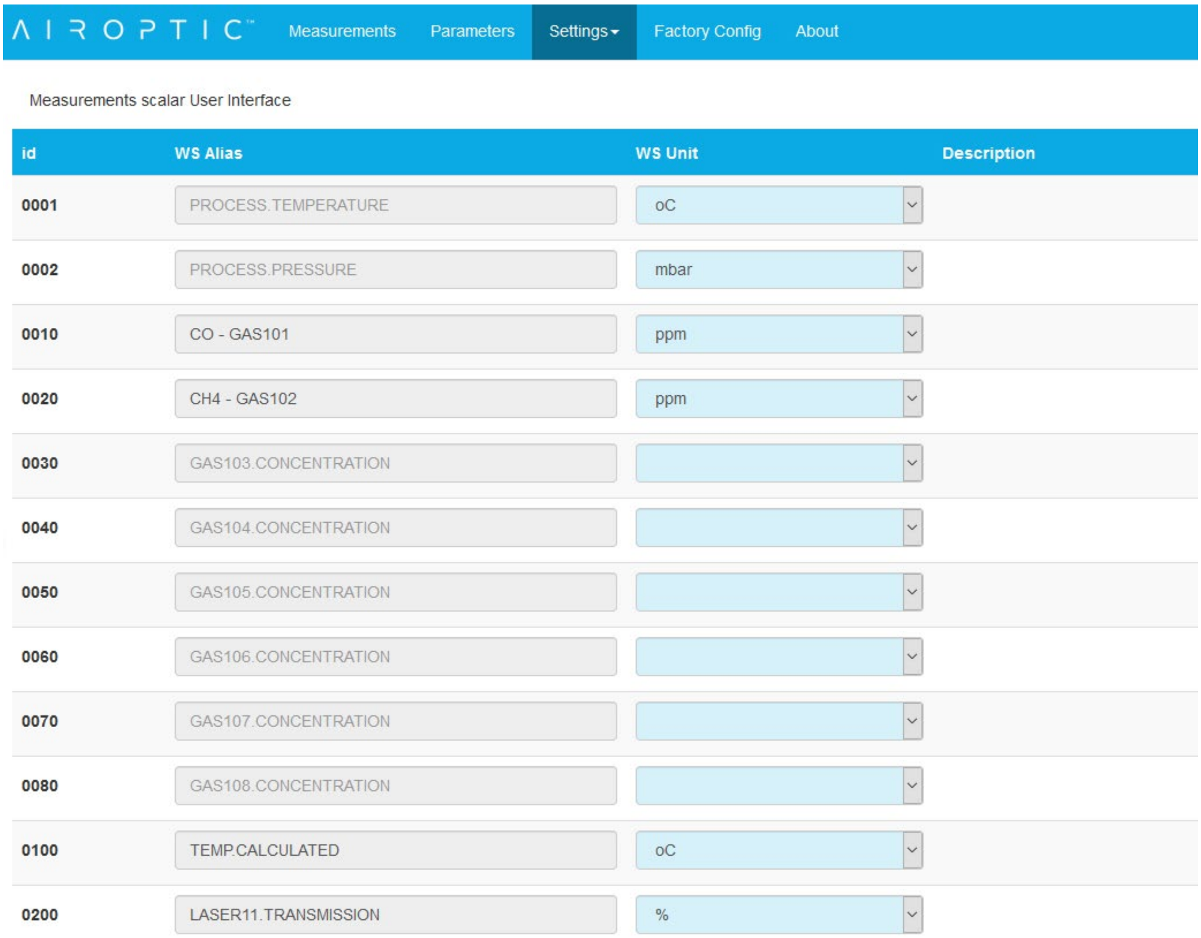


Figure 129. Settings window.

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.

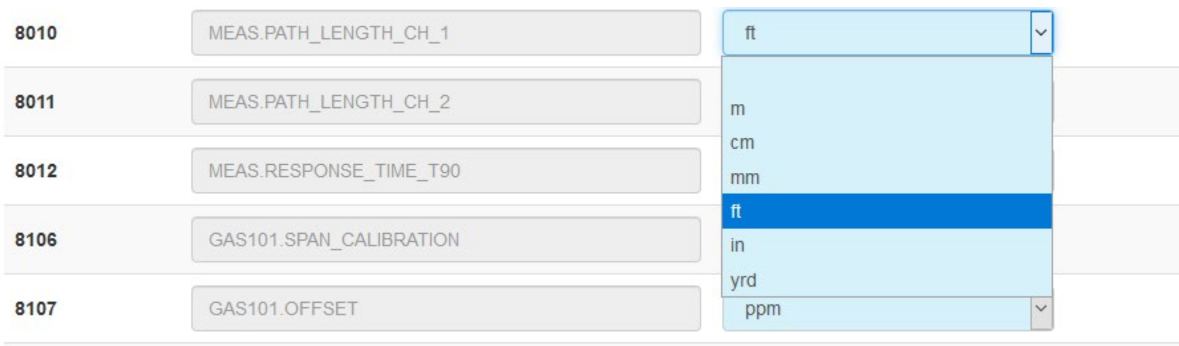


Figure 130. Settings window - making changes.

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

Figure 131. Settings window – applying changes.

10.8. Factor Config tab

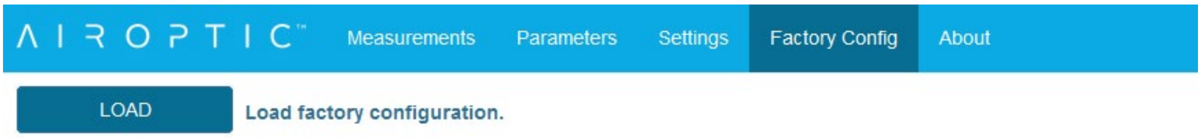
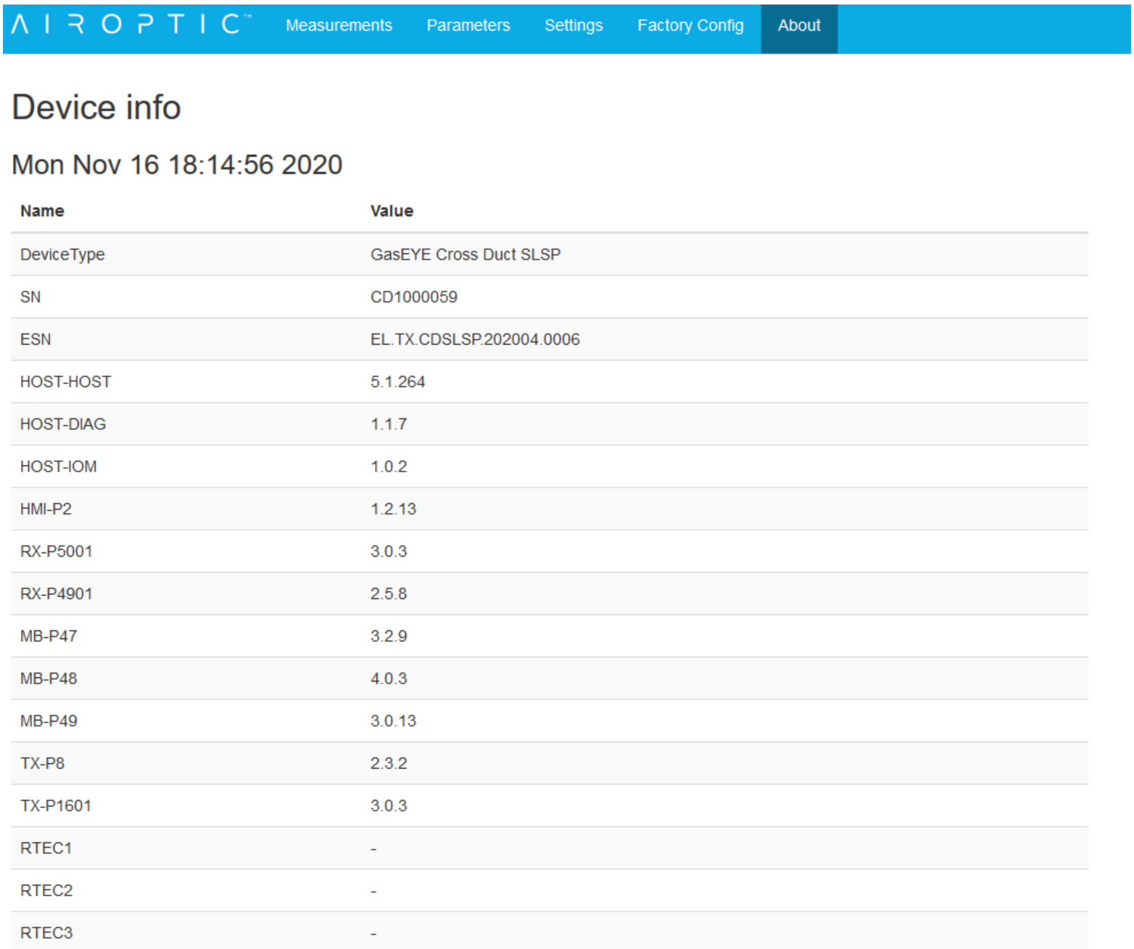


Figure 132. Settings window – applying changes.

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.

10.9. About tab

This page presents device firmware version.



Device info

Mon Nov 16 18:14:56 2020

Name	Value
DeviceType	GasEYE Cross Duct SLSP
SN	CD1000059
ESN	EL.TX.CDSLSP.202004.0006
HOST-HOST	5.1.264
HOST-DIAG	1.1.7
HOST-IOM	1.0.2
HMI-P2	1.2.13
RX-P5001	3.0.3
RX-P4901	2.5.8
MB-P47	3.2.9
MB-P48	4.0.3
MB-P49	3.0.13
TX-P8	2.3.2
TX-P1601	3.0.3
RTEC1	-
RTEC2	-
RTEC3	-

Figure 133. Device information page.

11. ATEX Zone 1/21

11.1. Basic requirements and safe use

The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitably functional condition, or use of the device other than for its intended purpose.

Installation should be carried out by qualified personnel having the necessary authorization to install electrical and pressure measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident.

Installation of device should be performed with particular care, in accordance with the regulations and standards applicable to that type of installation.

The general rules for connecting and using pressurized enclosure should conform to the rules and standards for equipment with Ex p as specified in:

- IEC 60079-14: Explosive atmospheres. Electrical installations design, selection and erection.
- IEC 60079-17: Explosive atmospheres. Electrical installations inspection and maintenance.

The GasEye is designed and manufactured in accordance with following standards:

- EN IEC 60079-0:2018;
- EN 60079-2:2014;
- EN 60079-26:2015
- EN 60079-28:2015

WARNING
Never install GasEye Extractive system in the ATEX zone without permission of the plant manager (hot work permit). Death, personal injury and/or damage to property may result if this is not complied.

WARNING
Observe the specifications of the examination certificate valid in your country. Observe the laws and regulations valid in your country for the electric installation in hazardous areas with risk of explosion. Regulations for installation of electric equipment in hazardous areas: DIN EN 60079-14.

WARNING
Never switch on or operate an analyzer with lid open. Before opening the device wait at least 3 minutes after de-energizing. Make sure that externally powered signals are also be de-energized. For secure disconnection of all signals the device should be operated in hazardous areas only via a switch-off unit placed outside the hazardous area.

WARNING
Never repair the device on site! Any components not mentioned in the spare parts list must be replaced or repaired by certified field service technicians. Failure to do so will also result in loss of Ex approval.

Information about possible ATEX use you will find on a label located on enclosure of the device.

11.2. Overview of the 1/21 zone purging system for the GasEye Extractive system

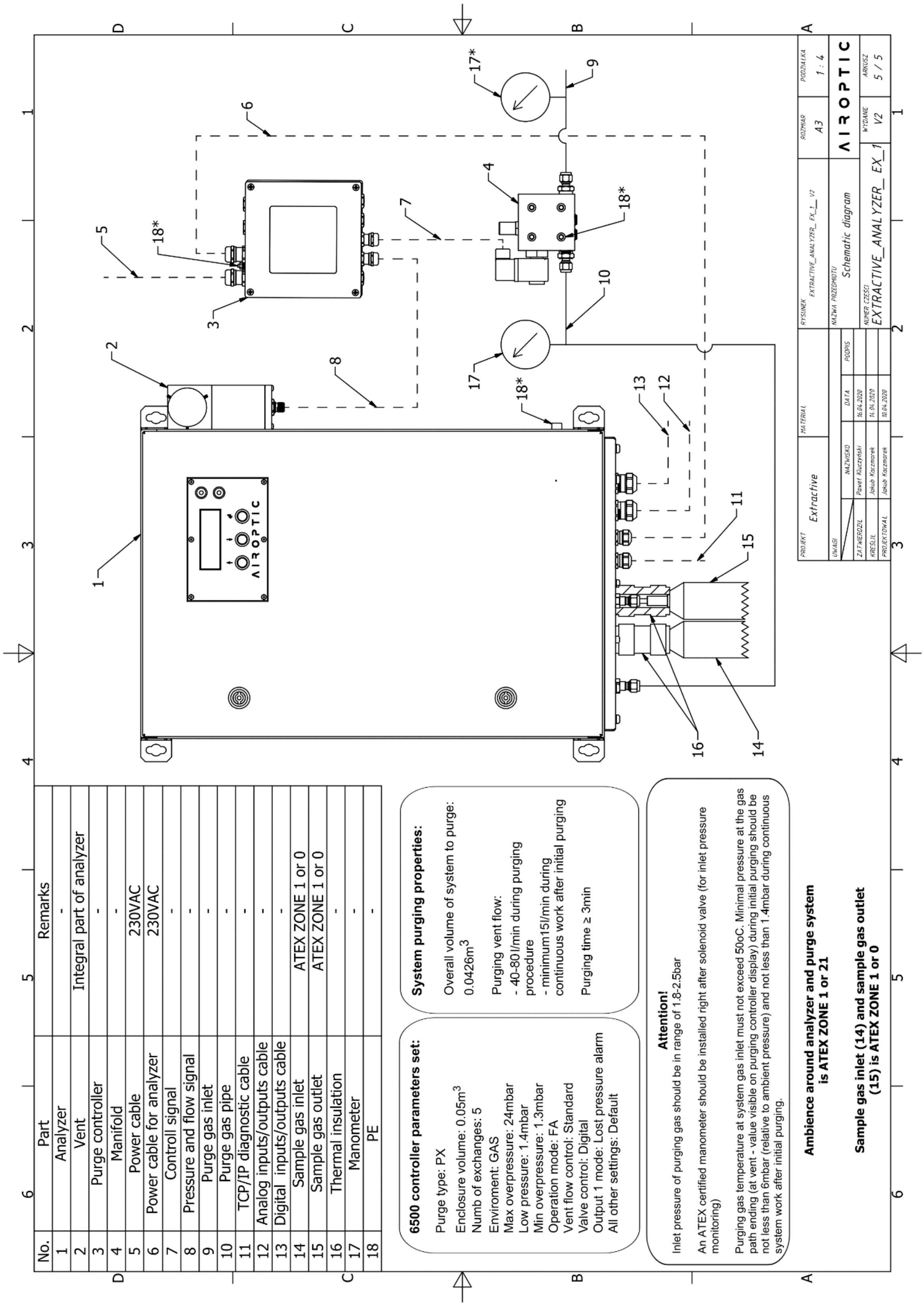


Figure 134. Overview of the purging system for GasEye Extractive system.

Numer	Opis	Informacje dodatkowe
1	Analyzer housing GasEye Extractive	-
2	Relief vent with housing EPV-6500-SS-07	-
3	Purging controller 6500-01-EXT1-PNO-LNO	-
4	Manifold block 6500-MAN-DV-01	-
5	$3x1mm^2$ cable (external power source for the entire system)	Power supply required: 230VAC/50Hz, $P_N \leq 300VA$
6	$3x1mm^2$ cable (switched power supply for the analyzer)	Power supply required: 230VAC/50Hz, $P_N \leq 300VA$
7	Manifold block control signal $3x1mm^2$.	Standart 2m, up to 50m
8	Relief vent pressure and flow signal. 4x0.34mm2 shielded cable.	Standard 5m, up to 60m
9	Purge gas inlet. 6mm Swagelok connector	-
10	Purge gas pipe. 6mm Swagelok connector on both sides.	-
11	TCP / IP diagnostic cable	-
12	Analog input/output cable	-
13	Digital input/output cable	-
14	Gas sample inlet. 6mm Swagelok connector. The pipe and connector are inside the thermal insulation.	ATEX ZONE 1 or 0
15	Gas sample outlet. 6mm Swagelok connector. Pipe and connector are inside the thermal insulation.	ATEX ZONE 1 or 0
16	Thermal insulation	-
17	Manometer	Pressure range of 0 to 10 barg
18	PE threaded connection	-

Tabela 2. Detailed explanation of the elements in the Figure 134.

Purging gas flow sequence:

(9) Purge gas inlet 6 mm -> (4) Manifold block -> (10) Purge gas pipe 6mm -> (1) Housing GasEye Extractive -> (2) Relief vent

11.3. Installation of purge system for Zone 1/21 of the GasEye Extractive analyzer.

11.3.1. Manifold installation

1. Connect a 6 mm gas tube to the manifold block inlet 9 (number designation according to **Figure 134**). The length depends on the customer. Make sure there is no purge gas flow into the system until installation is complete and the purge controller is energized.

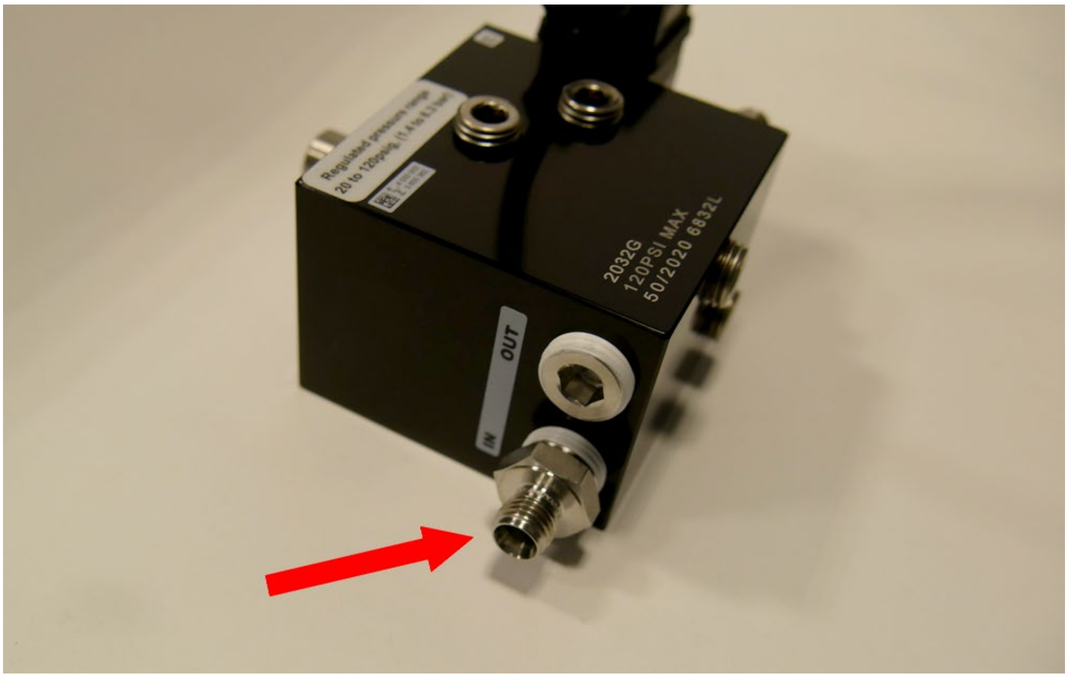


Figure 135. Manifold block gas inlet.

2. Connect a 6 mm gas tube (10) between the outlet of the manifold block and the purge inlet of the analyzer housing (1). Connect the ATEX pressure gauge (17) included in the kit between the manifold and the analyzer as shown in **Figure 136**. Use 14mm wrench.

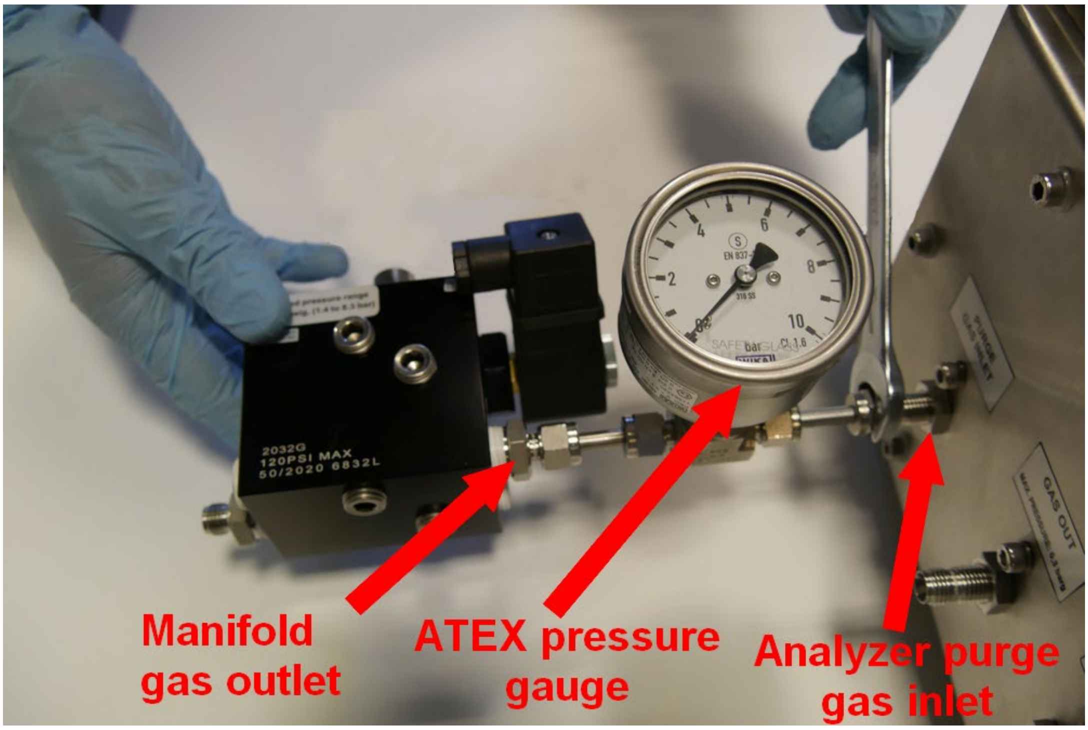


Figure 136. Manifold installation.

3. Install the manifold block control signal cable (7) (3x1mm^2 cable) between the 6500 “DV” terminals and the manifold block. Pass the cable through the cable gland on the manifold block and screw on the wires as shown on **Figure 139.**

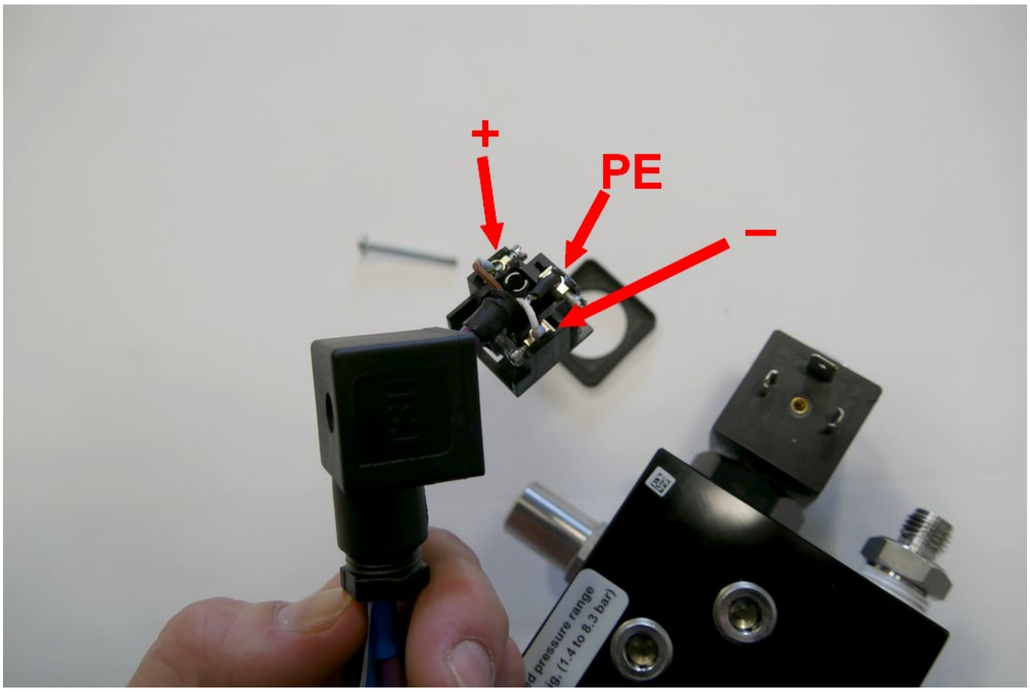


Figure 137. Manifold supply connection block pinout.

4. Close the manifold connection block and twist the plastic nut with 16mm wrench, then screw the block into the manifold using cross srew (Figure 138).

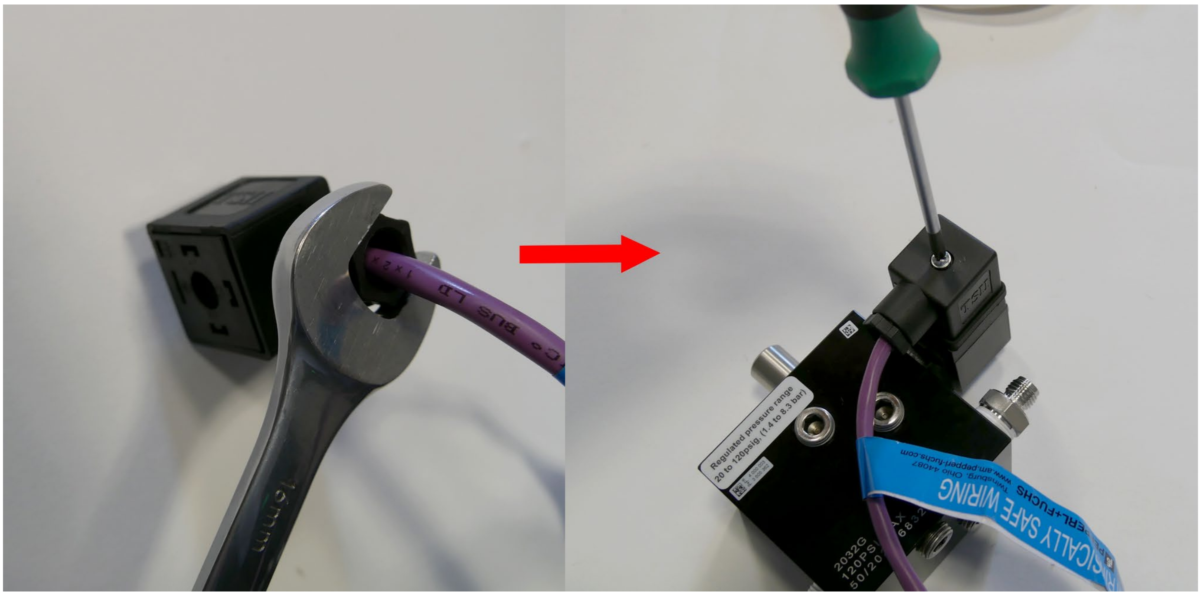


Figure 138. Manifold connection block closing.

5. Put the manifold control signal cable through M12 cable gland of the controller (**Figure 139**). After installation (**Figure 140**), affix the included blue stickers with the words “Intrinsically safe wiring” to both ends of the cable.

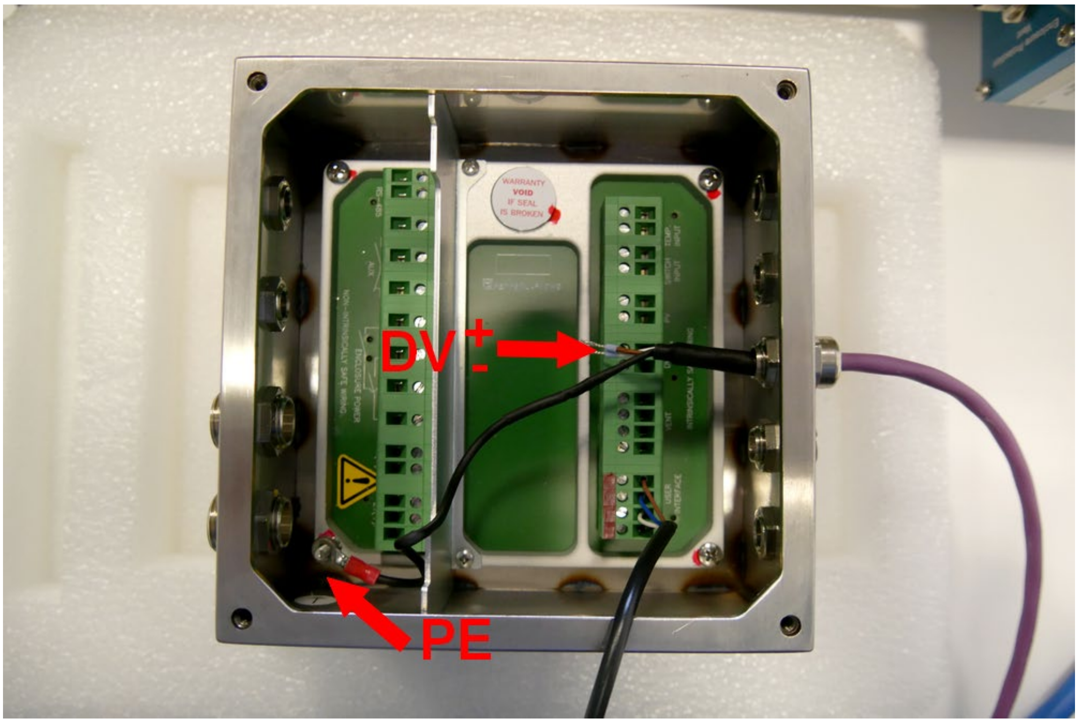


Figure 139. Manifold connectors – controller side.

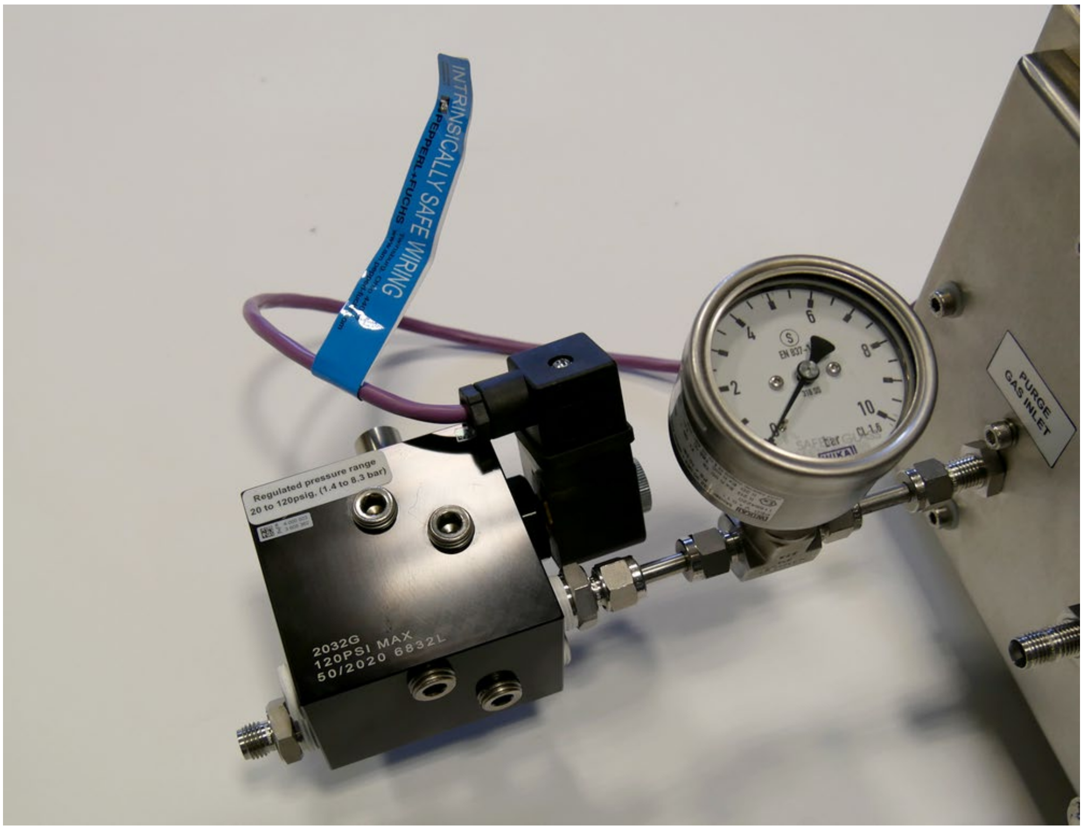


Figure 140. Manifold installed.

11.3.2. Vent installation

1. Connect the relief vent communication cable (8) between the purge controller (3) and the relief vent (2). On the controller side, lead the cable through the M12 gland (
2. Figure 141). After installation, affix the included blue stickers with the words “Intrinsically safe wiring” to both ends of the cable (Figure 142).

Wire number	Vent cable wire color	6500 controller terminal designation
1	Brown	“Vent +”
2	Blue	“Vent -“
3	White	“Vent A”
4	Black	“Vent B”
5	Black with ring terminal	Connect to grounding screw (PE)

Table 58. Vent pressure and flow signal cable connection (6500 system).

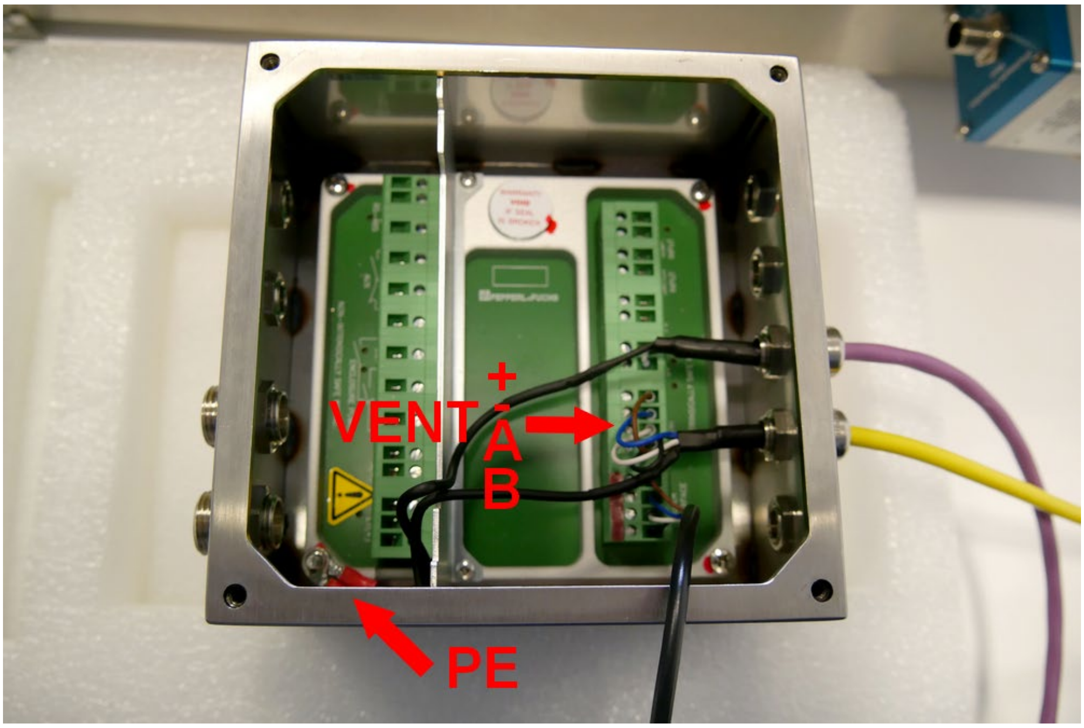


Figure 141. Vent connectors – controller side.

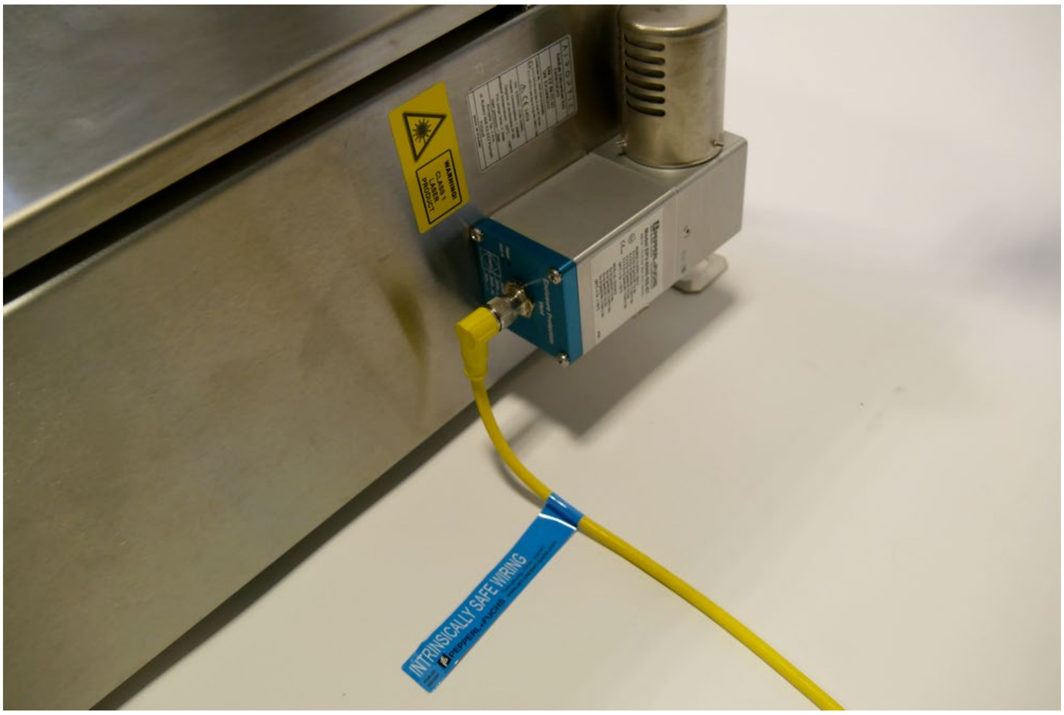


Figure 142. Vent cable installed.

11.3.3. Power supply installation

3. Connect the 3x1mm2 power cable (6) (Figure 143) between the purge controller (3) and the analyzer (1) - through the M16 gland (**Figure 144** and **Figure 145**).

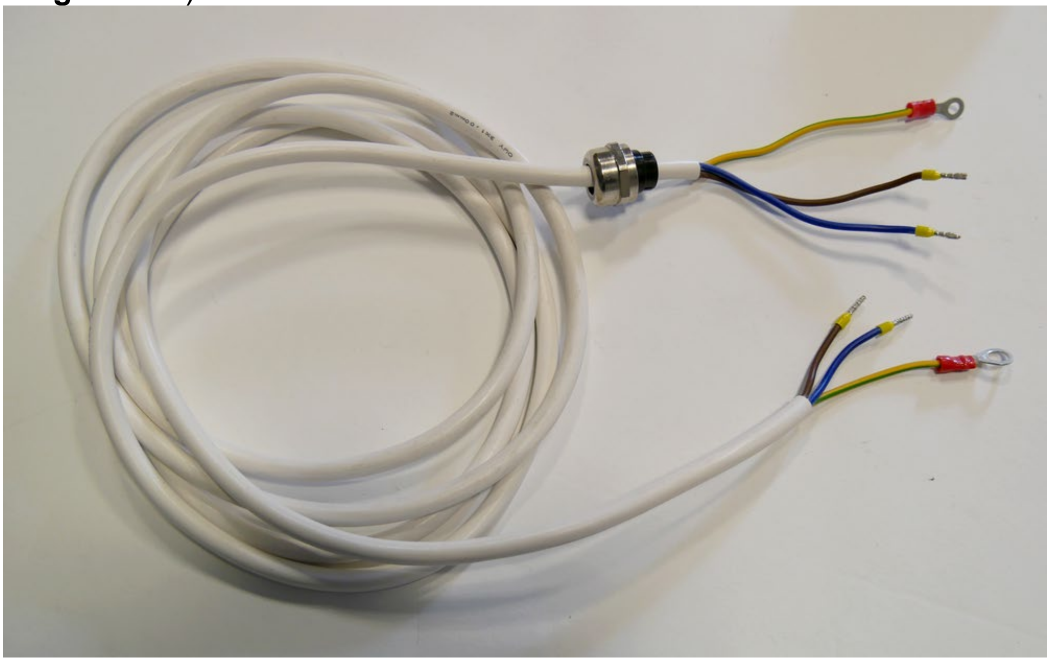


Figure 143. Analyzer supply cable.

Wire color	Description of the power supply input terminals	Description of the 6500 controller connection terminal
Brown	L	Relay contact “ENCLOSURE POWER OUT”
Blue	N	Relay contact “ENCLOSURE POWER OUT”
Green/Yellow	PE symbol	Connect to internal grounding screw (PE)

Table 59. Description of power terminals on the analyzer and controller side.

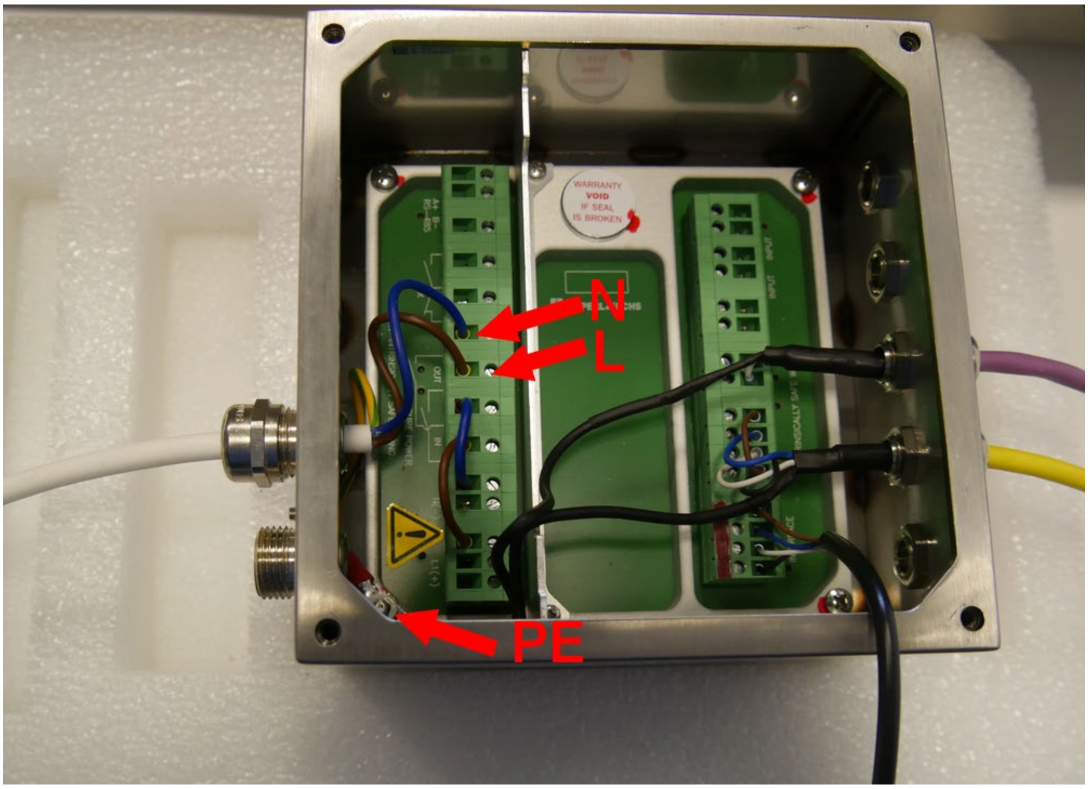


Figure 144. Analyzer power supply connection – controller side.

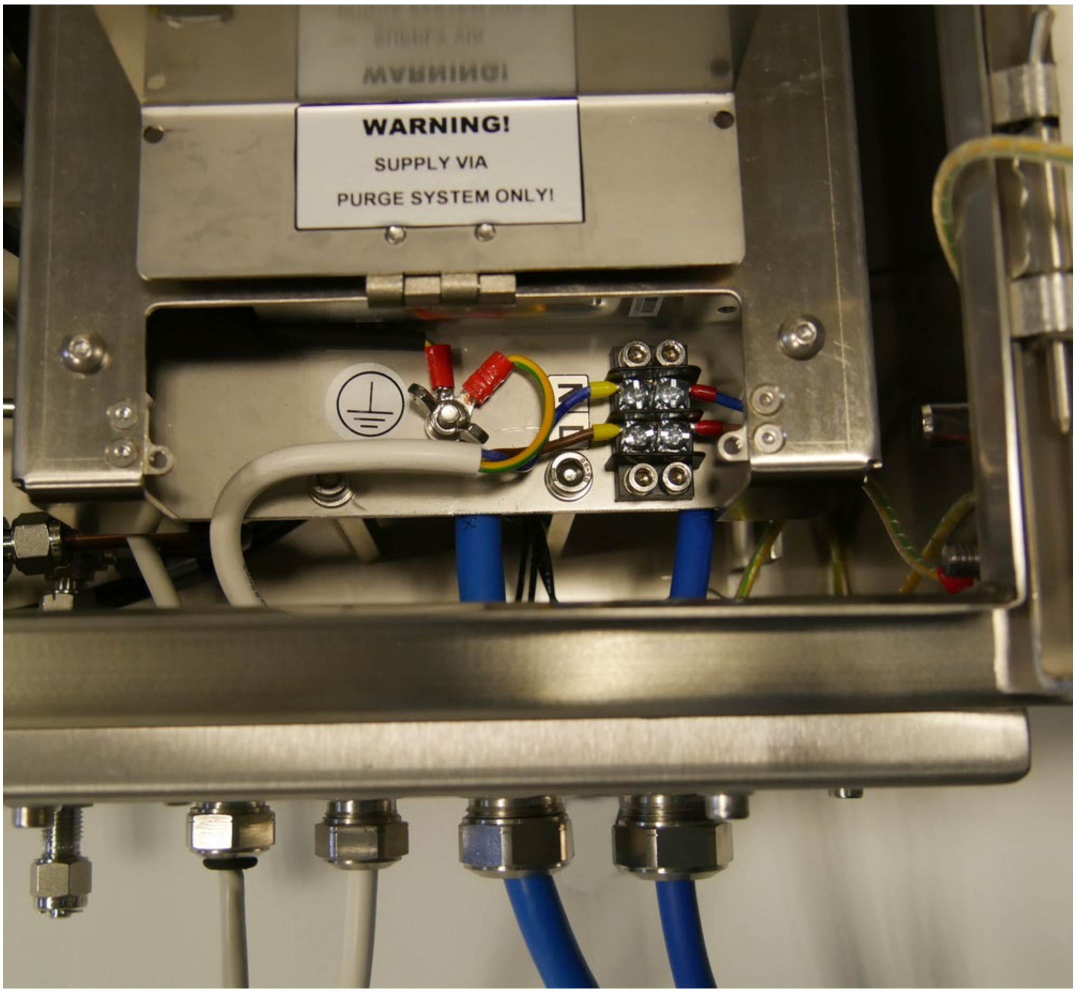


Figure 145. Analyzer power supply connection – analyzer side.

4. Connect a short 1mm^2 wire between the controller terminal labeled "L +" and the "ENCLOSURE POWER IN" terminal (wires not included in the delivery) Connect a short 1mm^2 wire between the controller terminal labeled "N-" and the "ENCLOSURE POWERIN" terminal (
Figure 146).

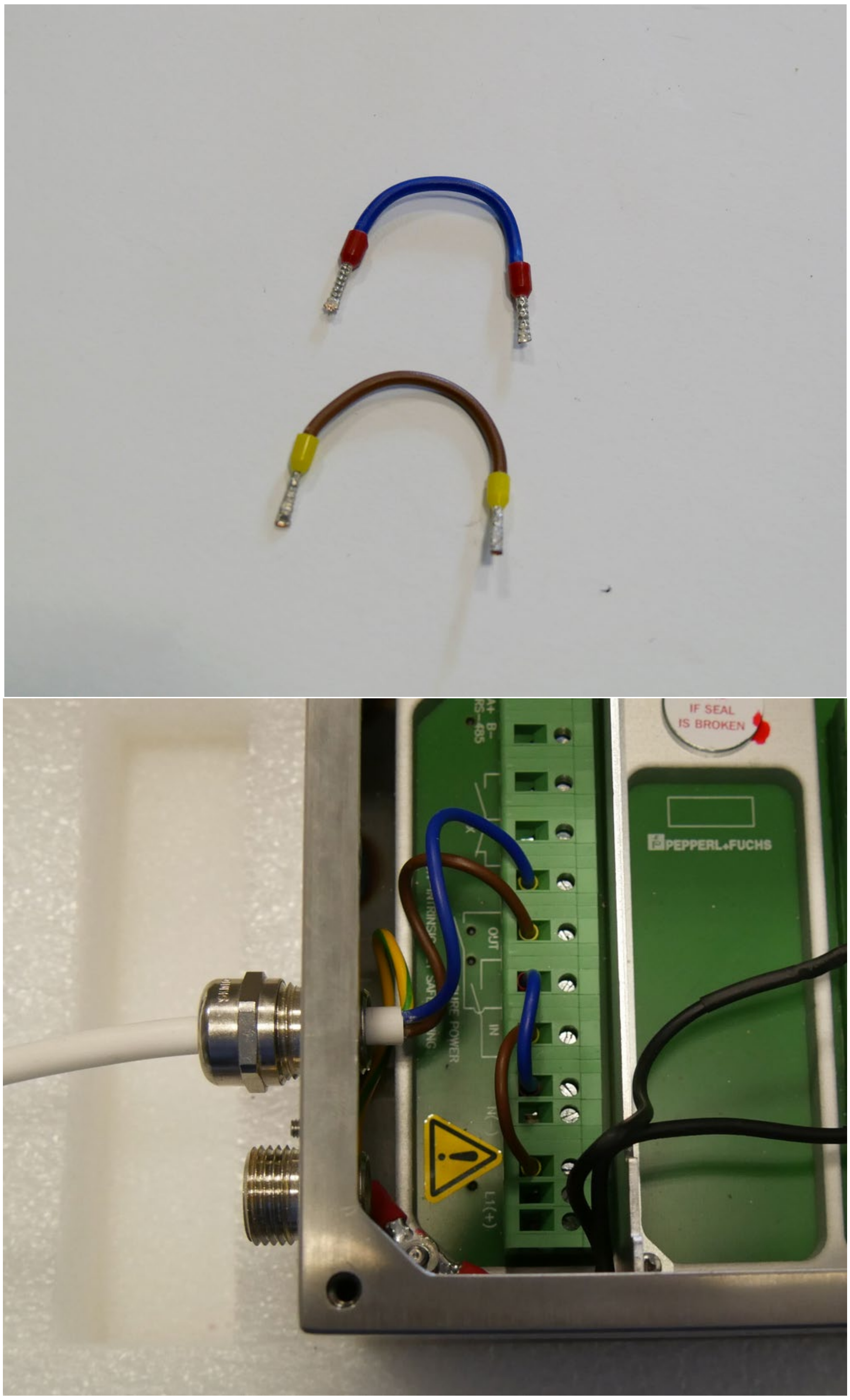


Figure 146. Connection jumpers for power relays.

7. Connect the external 3x1mm^2 power cable (5) (cable not included in the delivery, Figure 147) into purging controller (3) through the M16 gland as shown in **Figure 138.** Screw the PE nut with 7mm socket wrench.

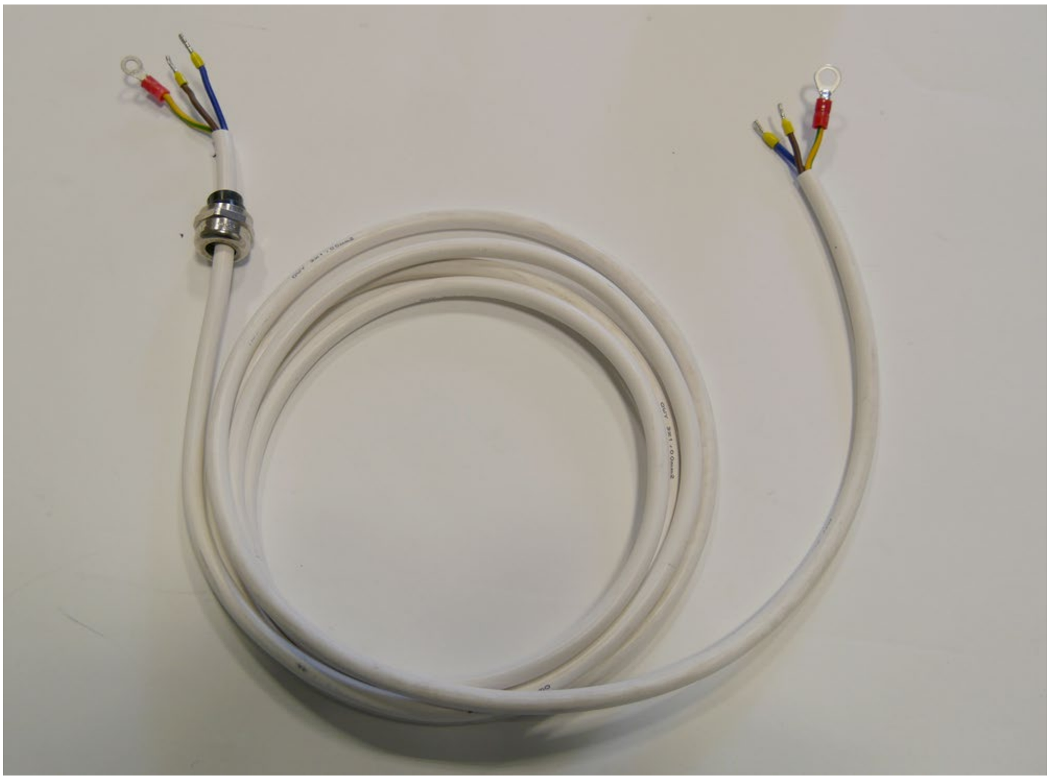


Figure 147. Main supply power cable.

Wire number	Cable wire color	6500 controller terminal designation
1	Brown	“L+”
2	Blue	“N-“
3	Yellow/Green	Connect to internal grounding screw (PE)

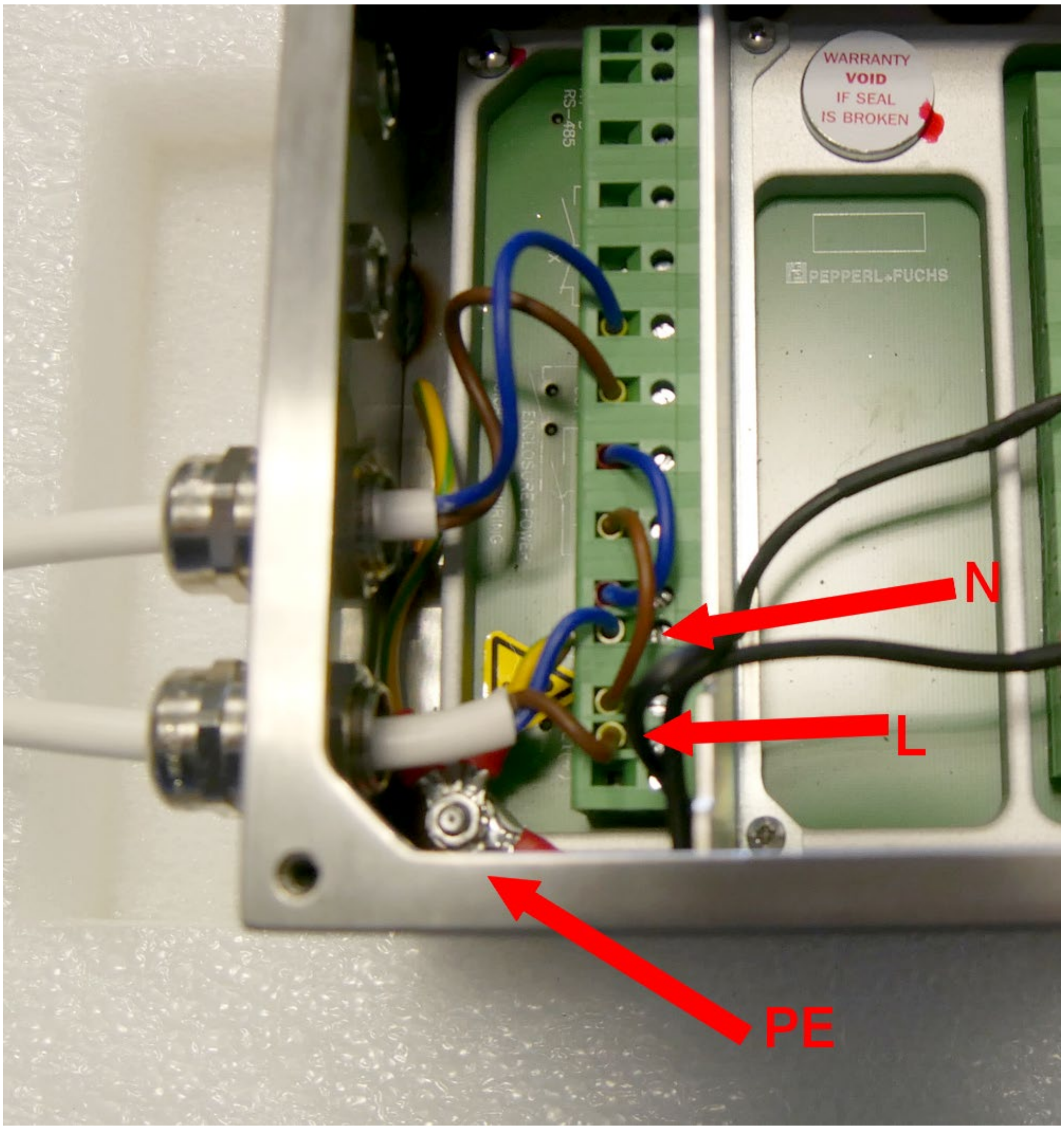


Figure 148. Main power supply cable installation.

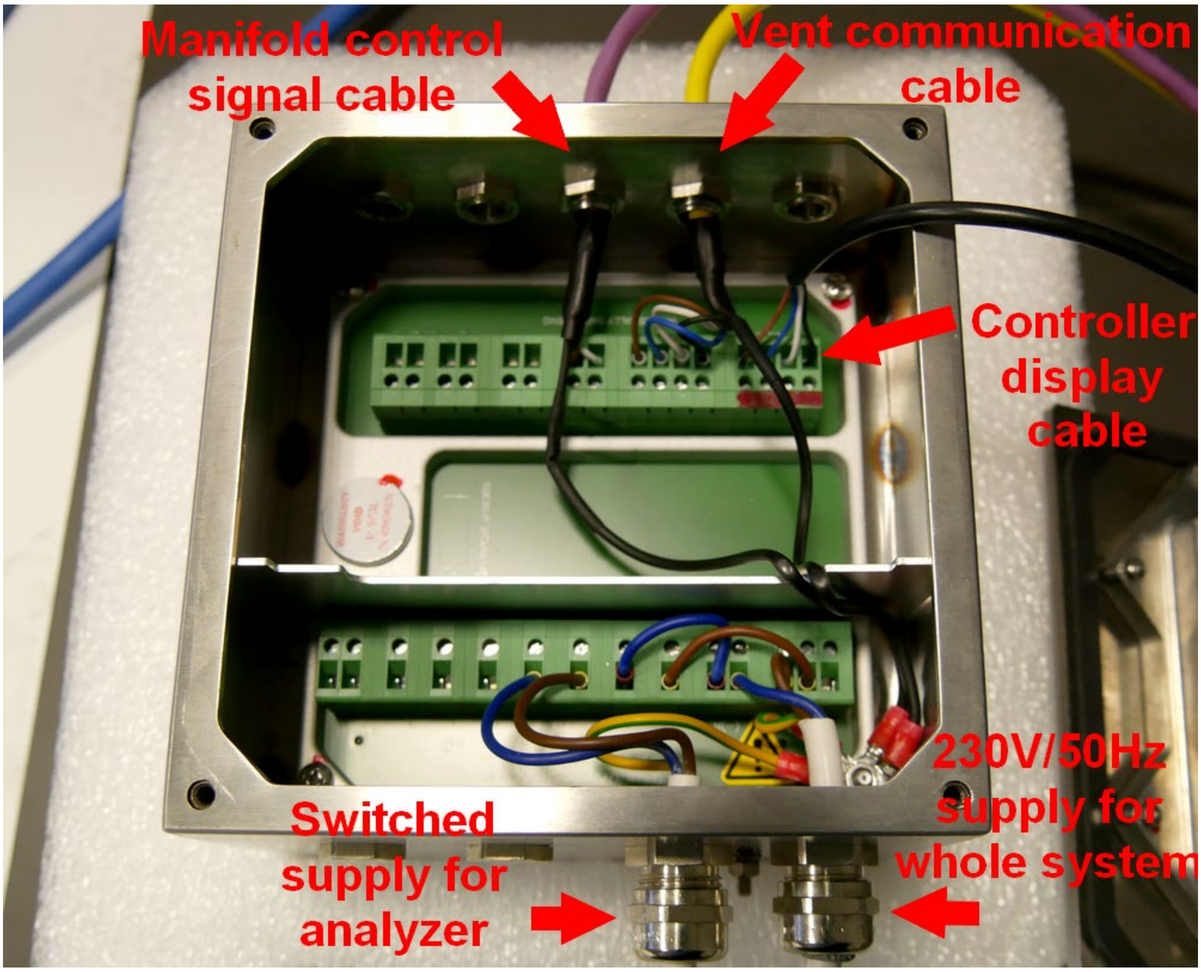


Figure 149. Properly installed electrical connections in the purge controller.

8. Close the analyzer and purge controller covers. Make sure all glands and covers are tightened well. Controller and analyzer housings should be sealed before starting (**Figure 150** and **Figure 151**). Use 16mm and 20mm wrenches for sealing controller glands and 19mm and 24mm wrenches for sealing analyzer glands.

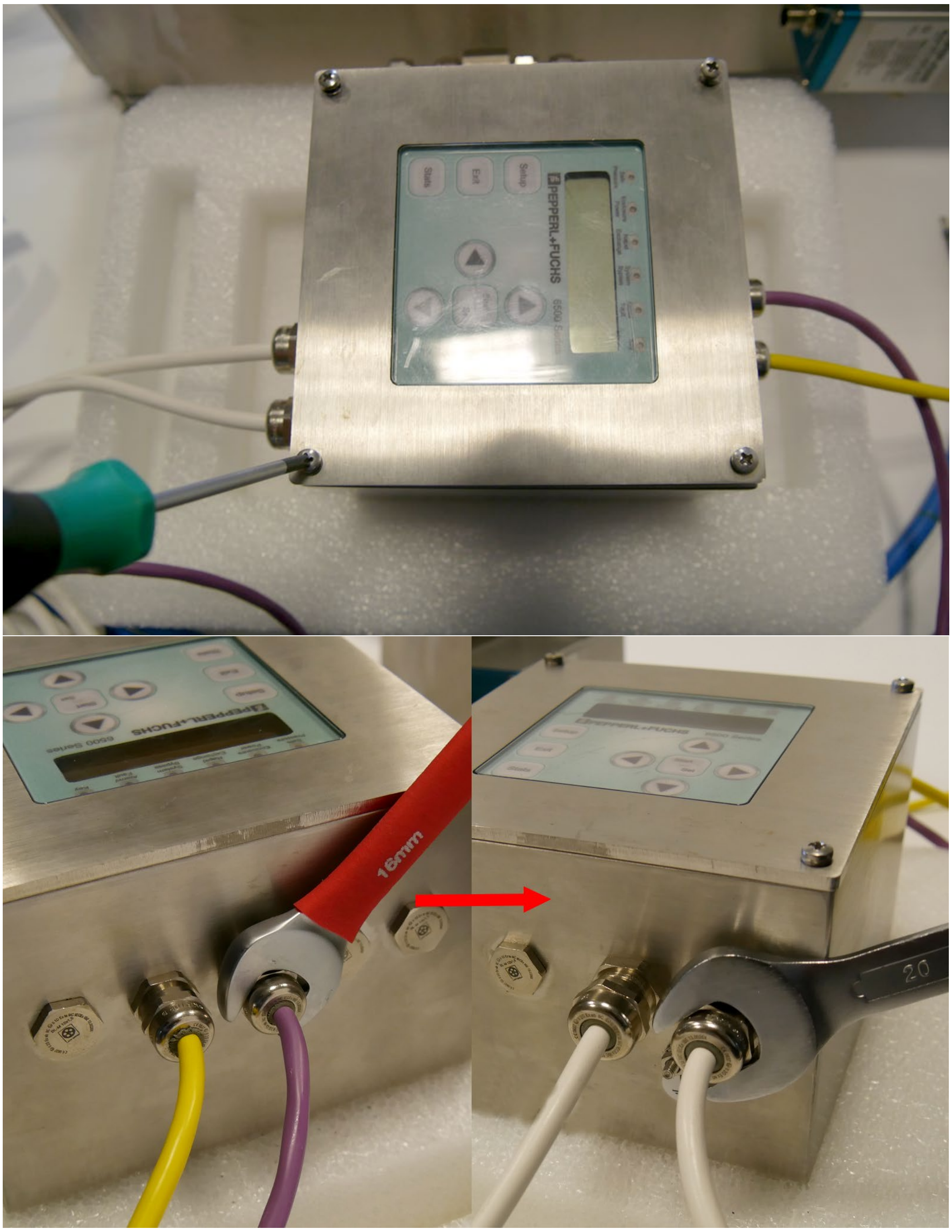


Figure 150. Closing and sealing the controller.

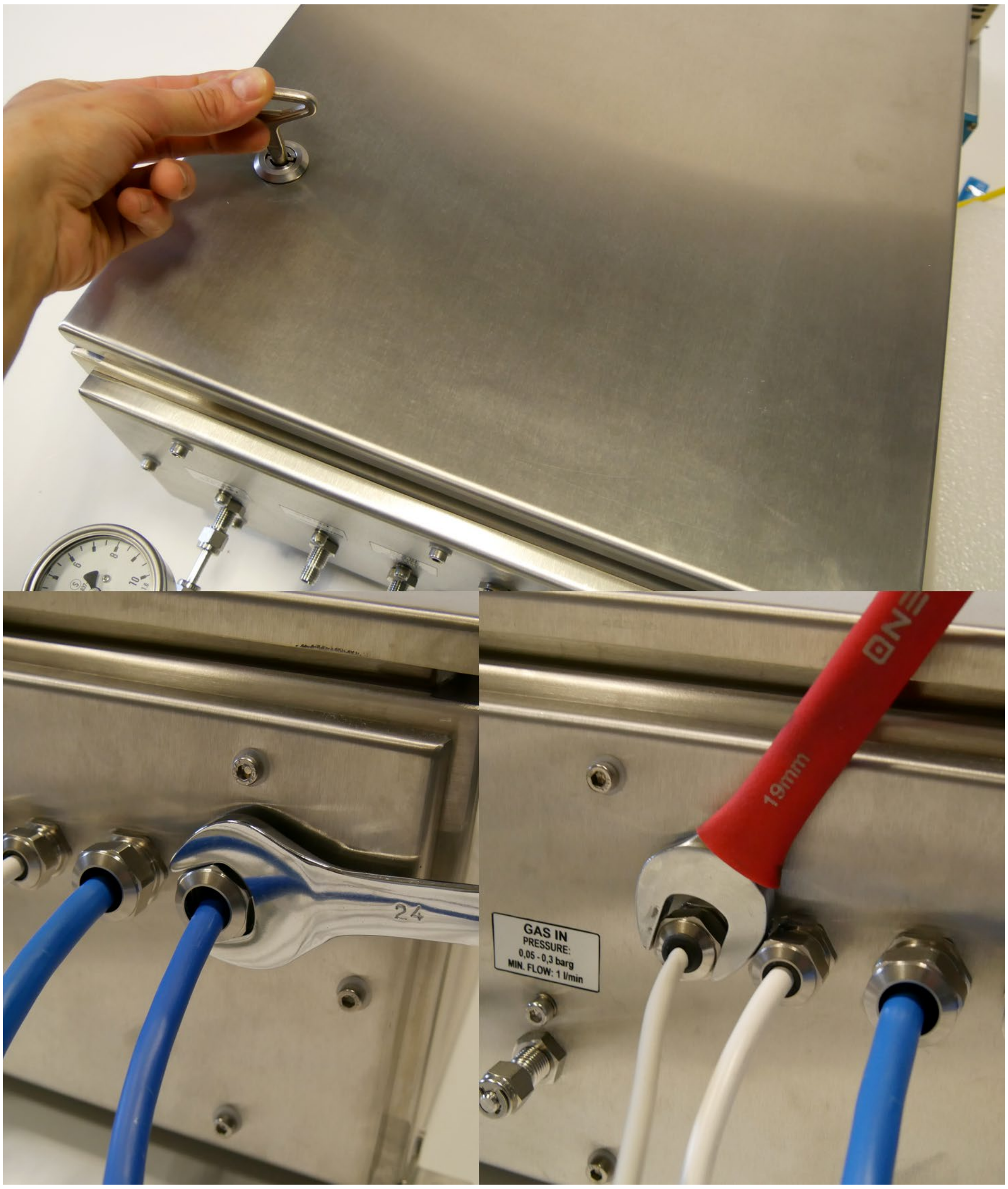


Figure 151. Closing and sealing the analyzer.

9. Make sure that all cables are insulated and that the insulation does not show signs of chafing or cuts. There should be no bare wires nor terminals exposed directly in the hazardous zone.
10. Installation is completed, the system should look like in **Figure 152**.

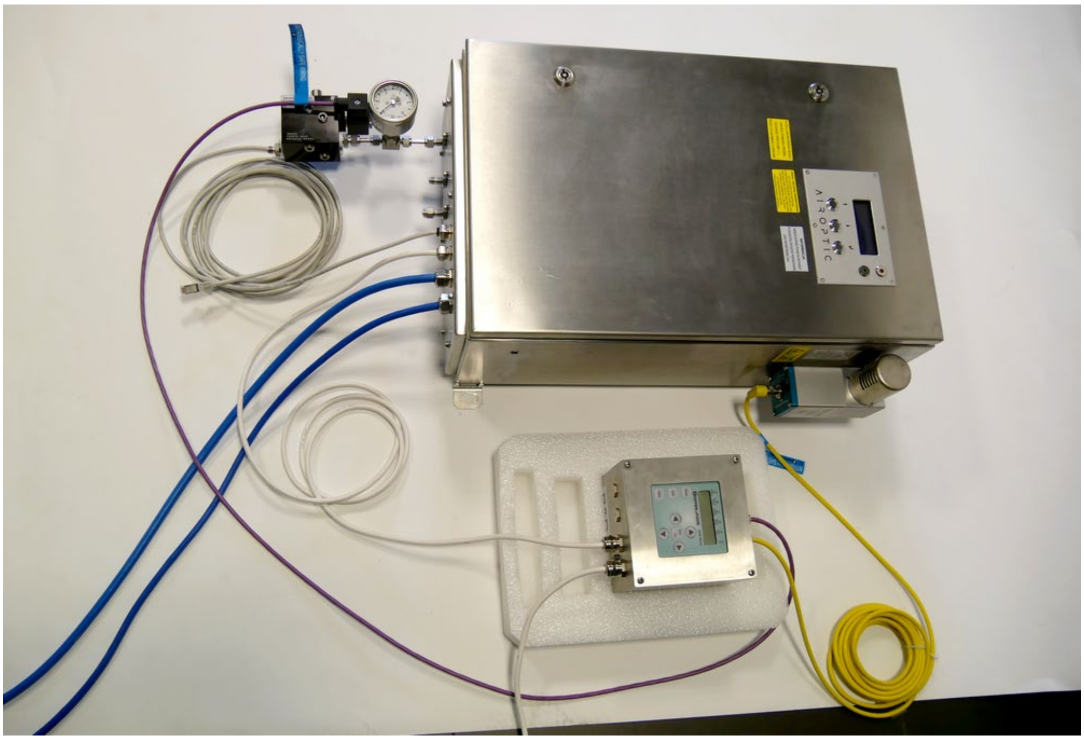


Figure 152. Purge system installed.

11.4. First start of the purge system

1. Make sure that the inlet pressure of the manifold block (4) is zero. Supply 230V / 50Hz power to the purging controller power input (5).
2. Wait about 20s for the initialization of the controller, after initialization, the message "Waiting for safe conditions" will appear on the screen of the controller. The operating parameters of the controller, i.e. pressure measured on the relief vent - "Vent pressure", gas flow ("Vent flow rate") and the percentage progress of the purge gas exchange ("purge gas exchange") are visible on the display of the controller after pressing the up arrow or down.

WARNING

All purge controller settings are predefined by Airoptic Sp. z o.o. The user is not authorized to make changes to them.

3. Apply gas to the inlet of the purging system (9). The pressure at the inlet of the manifold block should be 2 barg (measured after opening the manifold – i.e. when the pressure on the relief vent is over 1.4mbarg and the blue "safe pressure" LED lights up on the controller screen).
   If the pressure on the relief vent could not rise above 1.4mbarg, it means that there are leaks in the system or the needle valve of the manifold block (4) is too closed and should be opened - a special key is included in the kit - opening the needle valve should be done slowly by watching the pressure reading from the controller display. It is not recommended to open the needle valve completely.

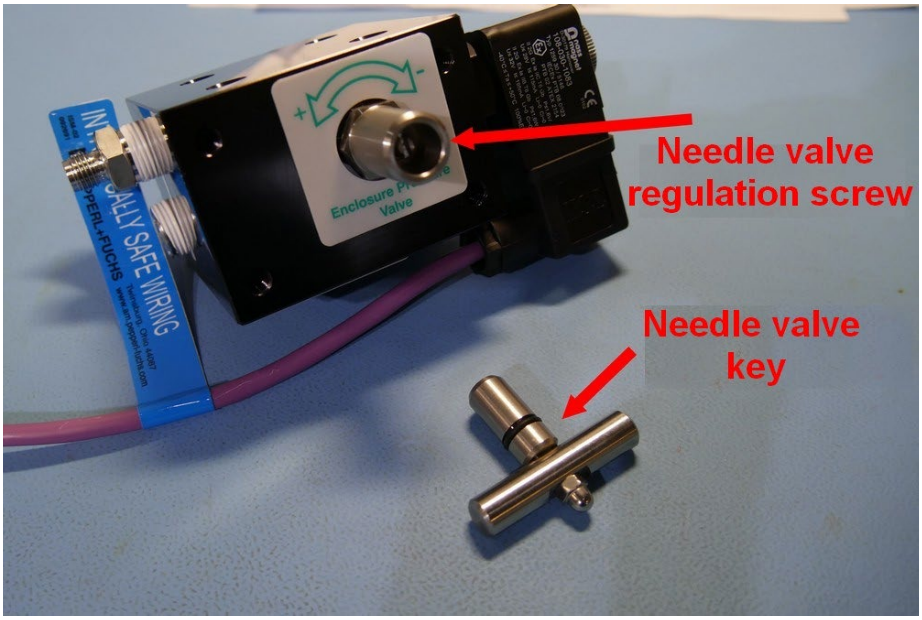


Figure 153. Adjustment of the neddle valve in the manifold block

4. The purge procedure will begin after the first flow read from the relief vent. The blue “Rapid exchange” LED will light up and the controller will start calculating the volume of the replaced gas based on the current flow value. The percentage progress of the gas exchange of the analyzer housing is visible in the main menu on the controller display after selecting the appropriate field with the up / down arrows.
5. When purging is complete, the manifold block (4) will close, gas will flow only through its needle valve to reduce the flow (continuous pressurization phase), and the analyzer is energized. The "Enclosure power" LED on the controller display will then turn green.
6. Power to the analyzer will be cut off when the relief vent overpressure is reduced to 1.4mbarg. When the pressure returns, the purge procedure will start again automatically.

11.5. Zone 1 and 21 purging system enclosures mounting

Enclosure of the 6500 controller should be mounted in proximity to GasEye Extractive housing using four M4 screws and spring washers. Holes for screws are placed on the back of the 6500 controller enclosure, see **Figure 154.**

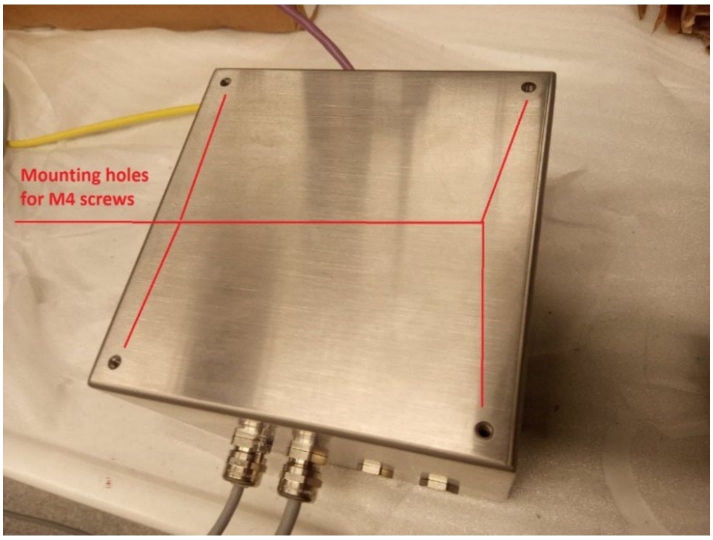


Figure 154. Mounting of the 6500 controller

This enclosure should be mounted in a way that does not block user access to the glands and display. Enclosure must not be exposed to UV light sources and direct sunlight.

Manifold should be mounted near GasEye Extractive using four kit-included screws (1/4"-20, 316 stainless steel) in a way that does not block user access to gas inlet and outlet and also to the needle valve regulation screw, see **Figure 155**.

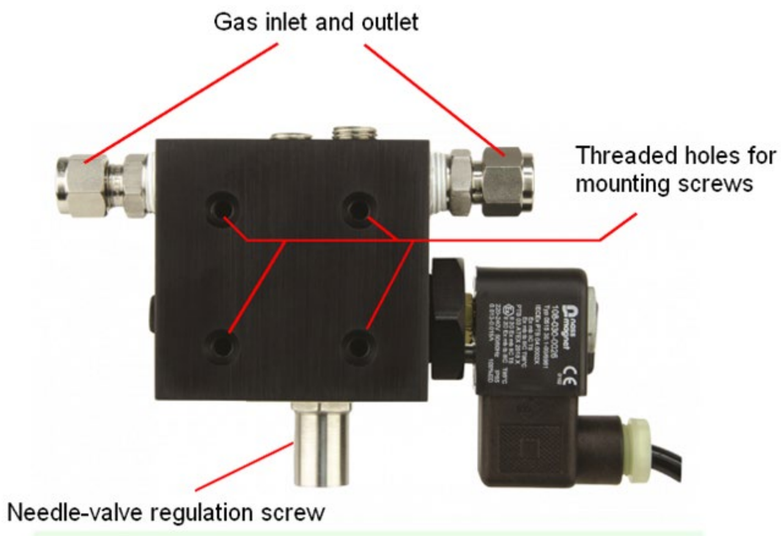


Figure 155. Manifold mounting holes.

11.6. Zone 1/21 purging system adjustment possibilities

6500-type purging systems are supplied by Airoptic with already configured software and hardware settings. However, some parameters can be adjusted by the user, those are:

- Inlet gas pressure

  User must supply regulated pressure gas source into manifold inlet. Pressure must not exceed 2.5barg. This pressure must be regulated to the value that gives the vent pressure reading on controller display of range 6-24mbar (during purging).

- Average gas flow rate after purging

  During purging procedure, 6500 controller opens manifold block completely, increasing gas flow through the system. After respective purge time there is no need to purge more so the solenoid valve is being closed and gas flows only through a needle valve which level of opening can be adjusted by the user after purging (special key is included in the kit).
  This adjustment regulates average value of the gas flow. If the needle valve is opened more, the flow is greater and compensation for system leakages is better, although the consumption of the gas will be greater too – even more than 40l/min. If the needle valve is rather closed, pressure at the vent may not raise above safe value (1.4mbar) and the power for GasEye system will be then interrupted.
  This needle valve is pre-adjusted by Airoptic - however, it is recommended to slowly adjust this needle valve to obtain vent pressure reading above ~2.5mbar (gives optimal gas consumption – around 13l/min).

WARNING
Customer is not allowed to change any other purging system settings nor replace any hardware element

11.7. System pressurization failure alarm

If pressurization failure of the enclosures occurs, power to the GasEye is cut-off by the 6500 purging controller. At the same time, auxiliary contacts of 6500 controller (AUX) are switched on when pressurization is too low. Those contacts can be used to generate additional alarms signals or switching. To use it properly, additional M12, stainless-steel gland must be installed near the AUX contacts:

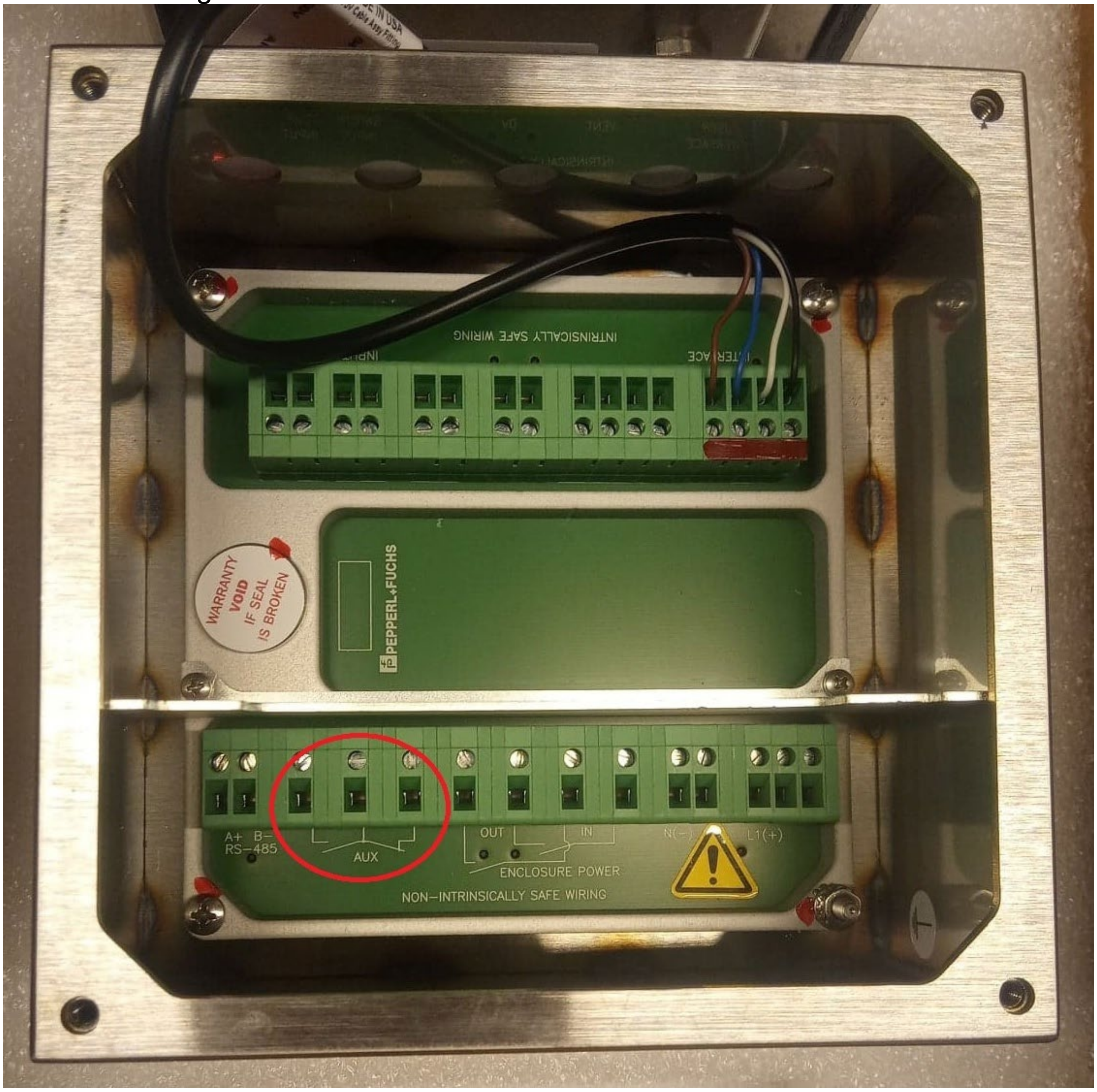


Figure 156. Alarm terminals for pressurization failure.

When alarm occurs, AUX contacts are energized and switched other way than visible on the picture above (white schematic lines on PCB).

Airoptic Sp. z o.o. supplies purging system controller without any connection to the auxiliary contacts nor dedicated gland installed.

11.8. System electrical connections – intrinsic safty warnings

Even though power to the GasEye analyser is cut-off by the purging controller (in case of pressurization loss), not all electrical connections that customer is supplying to the system are safe (intrinsically safe). Those are:

- Externally powered analog or digital connections to analyser (through Airoptic's 'customer cable')
- Externally powered ethernet communication cable
- Externally powered Modbus communication cable
- Externally powered ProfiNet communication cable
- Externally powered Profibus communication cable

WARNING

All non-intrinsically safe connections with GasEye analyzer that are powered other way than through the 6500 purge controller, must be cut-off when pressurization failure occurs to ensure safety.

To do this, auxiliary (AUX) alarm contacts in purging controller could be used, e.g. to control a switch to cut-off all non-intrinsically safe, externally powered electrical connections to the GasEye analyser.

We recommend that in case neither a switch nor intrinsically safe connection can be used, customer should choose to use active analog input and output settings on the GasEye analyser as they will be switched off by the purge controller. Similarly, digital output should be powered from the same switched supply provided to power the GasEye (i.e. from 6500 purge controller).

11.9. Connection and configuration of the PT100 temperature sensor (optional)

The purging controller type 6500 enables the connection of a PT100 type resistive temperature sensor. To combine the sensor and the reading as an alarm as an alarm to disconnect power to the analyzer, follow these steps:

1. Disconnect or close the purge gas access to the system and disconnect the equipment from the power supply.
2. Pass the PT100 sensor cable through the M12 gland in controller and connect its leads to the connectors marked "TEMP INPUT"

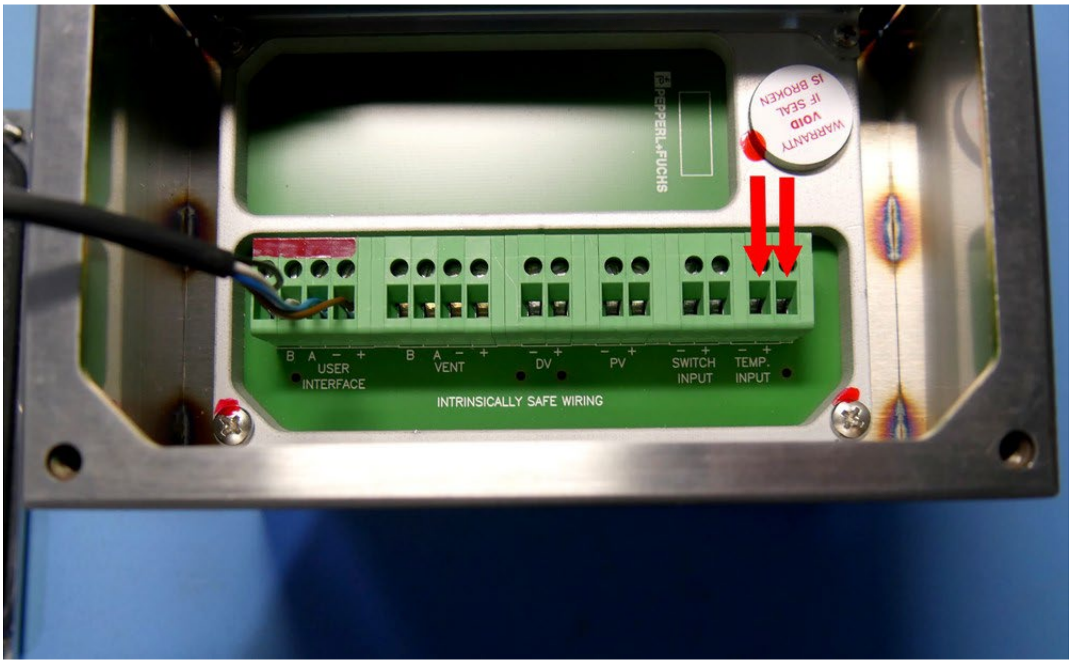


Figure 157. Terminals for connecting the PT100 temperature sensor.

3. Make sure the purge gas is disconnected or has zero pressure on the inlet and activate the purge controller.
4. Enter the controller SETUP options by entering the access PIN with arrows in the following sequence: up-> down-> up-> down and confirm with ENTER. From the menu, select INPUT SETTINGS -> TEMP AS INPUT -> TEMP 1 INPUT -> TEMP FUNCTION -> IMMEDIATE SHUTDOWN, then from the same TEMP 1 INPUT menu select the field ON SET POINT and set the desired alarm activation temperature value at which the power is to be disconnected analyzer. Then also configure the value of the field OFF SET POINT to the value of the alarm deactivation temperature.

5. After an alarm occurs, when the temperature drops below the OFF SET POINT value, the controller will automatically attempt to restart the purge procedure after which the analyzer will be re-energized.

6. Disconnect power to the device.
7. Place the temperature sensor in a suitable place in the analyzer after it has been passed through the analyzer housing bushing.

8. Close the analyzer and controller covers and start the system by feeding pressure purge gas according to the procedure described in section 8.7.

11.10. System conservation for zone 1 and 21

In order to insure safe and convenient operating conditions of 6500-type purging system, subsequent requirements must be satisfied:

- Inlet pressure of the gas must not exceed 2.5 barg
- Vent pressure reading on the controller display must not exceed 24mbar.
- An ATEX certified manometer should be installed right after solenoid valve for inlet pressure monitoring
- Temperature of the inlet gas must not exceed 50°C
- External parts made of plastic should be cleaned with a damp cloth, with the addition of antistatic fluids
- All metal parts of the system must be grounded
- System must not be exposed to UV light sources and direct sunlight
- When servicing, installing, and commissioning, the area must be free of all combustible material and/or hazardous explosive gas
- Only the terminal compartment of the control unit is accessible to users. Under no circumstances shall the control unit, manifold or vent be dismantled or removed from the supplied enclosure
- In case of any system failure, please contact Airoptic Sp. z o.o.

11.11. Contact information

Airoptic Sp. z o. o.
ul. Rubież 46B
61-612 Poznań, Poland

info@airoptic.pl
www.airoptic.pl

tel. +48 61 6272 128
fax.+48 61 6272 129

Appendix 1. Avarage life of the main components of the analyzer.

1. **Laser**

   Mean time to failure (MTTF): 50 000 hours.

2. **Detector**

   Mean time to failure (MTTF): 50 000 hours.

3. **Pump**

   a. Complete pump replacement every 2 years.
   b. Change the membrane at least once a year during continuous operation of the instrument.

Appendix 2. 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 3. Measurements list.

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

ID	Name	Description
0001	PROCESS.TEMPERATURE	
0002	PROCESS.PRESSURE	
0100	TEMP.CALCULATED	
0010	GAS101.CONCENTRATION	
0020	GAS102.CONCENTRATION	
0030	GAS103.CONCENTRATION	
0040	GAS104.CONCENTRATION	
0050	GAS105.CONCENTRATION	
0060	GAS106.CONCENTRATION	
0070	GAS107.CONCENTRATION	
0080	GAS108.CONCENTRATION	
0200	LASER11.TRANSMISSION	
0201	LASER12.TRANSMISSION	
0202	LASER13.TRANSMISSION	
0203	LASER14.TRANSMISSION	
0300	FIBER1.TRANSMISSION	
0301	FIBER2.TRANSMISSION	
0302	REMOTERX1.GAIN	
0303	REMOTERX2.GAIN	
0602	TEC0.THL_REF_AMP	
0606	TEC0.AMB_TEMPERATURE	
0612	TEC1.THL_REF_AMP	
0616	TEC1.AMB_TEMPERATURE	
0622	TEC2.THL_REF_AMP	
0626	TEC2.AMB_TEMPERATURE	
0632	TEC3.THL_REF_AMP	
0636	TEC3.AMB_TEMPERATURE	
0800	SYSTEM.STATUS	
0801	SYSTEM.STARTUP_PROCEDURE	
0802	SYSTEM.TRANS_MP1_STATUS	
0810	SYSTEM.ALARM1	
0811	SYSTEM.ALARM2	
0812	SYSTEM.ALARM3	
0813	SYSTEM.ALARM4	
0814	SYSTEM.ALARM5	
0815	SYSTEM.ALARM6	
0816	SYSTEM.ALARM7	
0817	SYSTEM.ALARM8	
0818	SYSTEM.ALARM9	
0819	SYSTEM.ALARM10	
0900	AOUT1	
0901	AOUT2	
0902	AOUT3	
0903	AOUT4	
0A00	AIN1	
0A01	AIN1.VAL	
0A10	AIN2	
0A11	AIN2.VAL	
0A20	AIN3	
0A21	AIN3.VAL	
0A30	AIN4	
0A31	AIN4.VAL	
0B00	RTD	
0B01	AMB_PRESSURE	
0B02	DOUT	
0B03	DIN	