APPROVED
General Director
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December 21, 2021.

Stationary gas detectors AXIOM

Operation Manual

RUSG.413216.004 OM

Chaikovsky 2021

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Introduction

This Operation Manual (OM) is intended for studying the design, structure and principle of operation of AXIOM stationary gas detectors (hereinafter - AXIOM, gas detector). This OM contains basic technical data, information on use, maintenance recommendations and other information necessary for proper operation, repair and storage of the gas detector.

The manufacturer reserves the right to make design changes related to the improvement of technical and consumer qualities, as a result of which minor discrepancies with the text, graphic material on the product are possible in the operating manual, not affecting the quality, functioning, reliability and durability of the product.

AXIOM gas detectors are approved for use in the Russian Federation and have a certificate of type approval of measuring instruments issued by the Federal Agency for Technical Regulation and Metrology, entered in the State Register of Measuring Instruments of the Russian Federation under the number 86018-22.

Up-to-date versions of permits and regulatory documents, certificates of conformity for gas detectors are available on the manufacturer's website www.mirax-safety.com in the Files or the Production section.

1 Safety precautions

Before installing, operating or servicing the equipment, please read this operating manual carefully. Pay particular attention to warning signs:

ATTENTION. Indicates a potentially hazardous situation which, if not avoided, may result in personal injury, damage to the device or environmental damage. Caution against improper handling of the device

INFORMATION. Additional information on handling the device.

The gas detector can only be operated by persons who have studied this manual and have been instructed on safety.

Do not operate the detector if it is mechanically damaged or if the seals are broken.

Do not open the housing of the gas detector in a blast danger area while the power supply is on.

Only trained personnel should have access to the internal parts of the detector for any work.

Installation and operation should comply with the rules and regulations of the Electrical Installation Regulations (EIR) and the Safety Rules in Gas Industry.

The gas detector should be installed and connected with the power supply disconnected.

The housing of the gas detector should be grounded. For grounding of the gas detector there are internal and external grounding devices marked with grounding signs according to GOST 21130-75.

Repairs to the gas detector should be performed only by the manufacturer's personnel or by persons authorized by the manufacturer to perform repairs.

Do not disassemble the gas detectors or interchange parts between them.

It is acceptable to replace the sensor under operating conditions without removing the power supply to the gas detector.

Do not expose the detector to temperatures outside the specified operating ranges.

Do not expose a stored gas detector to organic solvents or flammable liquids.

At the end of their service life, replaceable electrochemical sensors for oxygen and toxic gases should be disposed of in an environmentally friendly manner. Disposal should be carried out in accordance with local regulations on waste management practices and environmental protection legislation.

It is not allowed to discharge SRS-CGM into the atmosphere of working premises during adjustment and verification of the gas detector.

2 Purpose of the gas detector

AXIOM gas detectors are intended for measuring and transmitting information about the content of combustible gases and vapors of flammable liquids (including gases formed as a result of evaporation of combustible liquids such as oil, kerosene, gasoline, diesel fuel), toxic gases and oxygen in the air of the working area, process gas media, industrial premises and open spaces of industrial facilities, pipelines and air ducts; and to provide a warning alarm if the set threshold values are exceeded.

AXIOM gas detectors meet the requirements of GOST 31610.0-2014 (IEC 60079-0:2011), GOST IEC 60079-1-2013, GOST 12.2.007.0-75, GOST 13320-81, GOST 27540-87, GOST 26.011-80, GOST P 52931-2008, TR TC 012/2011, CU TR 020/2011, GOST 31610.11-2014, GOST 12.1.004.

The gas detectors are designed for stationary installation.

AXIOM gas detectors are manufactured in accordance with TU 26.51.53-002- 24060426-2021.

Field of application – blast danger areas of premises and outdoor processing units, in which the formation of explosive mixtures of gases and vapors with air is possible, according to GOST IEC 60079-1-2011), GOST 31610.11-2014 (IEC 60079-11:2011), GOST 31610.0-2014 (IEC 60079-0:2011) and explosion-proof labeling 1 Ex d [ia Ga] IIC T6 Gb X.

AXIOM gas detectors are equipped with two alarm LEDs, a status LED and an OLED graphic display.

According to the principle of operation AXIOM are categorized into:

- infrared AXIOM IR;
- electrochemical AXIOM EC;
- thermocatalytic AXIOM LEL;
- photoionized AXIOM PID;
- solid-state AXIOM MEMS;

Sampling method is diffusive.

Operating position of the gas detector in space – vertical, with the sensor facing downward.

Operation mode – continuous.

Analyzed medium – air of working area according to GOST 12.1.005-88, as well as gas medium of technological processes.

AXIOM gas detectors are subject to verification according to the verification procedure. Interval between verifications: – 1 year.

3 Manufacturer's warranty

Warranty period – 36 months from the date of sale. Sensor Warranty:

- for AXIOM IR – 36 months;
- for AXIOM LEL – 12 months;
- for AXIOM EC – 12 months;
- for AXIOM PID – 12 months;
- for AXIOM MEMS – 12 months;

During the warranty period the manufacturer shall replace or repair the defective components or the product as a whole free of charge, if the consumer has not violated the installation rules and operating conditions specified in the accompanying documents. The warranty repair period does not exceed 45 working days. Extension of the period of warranty repair of the product is allowed only by written agreement of the parties.

The warranty does not cover:

- fuses, batteries, filters, and parts that have failed due to normal wear and tear as a result of operation;
- any damage or defects caused by improper installation and commissioning, repair of the product by persons not accredited for repair and organizations that are not service centers authorized by the manufacturer;
- defects caused by force majeure (consequences of natural disasters, fires, floods, high-voltage discharges, lightning, etc.), accident, intentional or negligent actions of the customer or third parties.

It is strictly forbidden to connect the gas detector to 220V power supply. The manufacturer is not liable under warranty for this violation of the operating rules of the gas detector.

4 Design of the gas detector

4.1 Appearance

Depending on the housing material, gas detectors are divided into:

- gas detector in aluminum housing;
- gas detector in steel housing.

The appearance of the gas detector is shown in Figure 1.

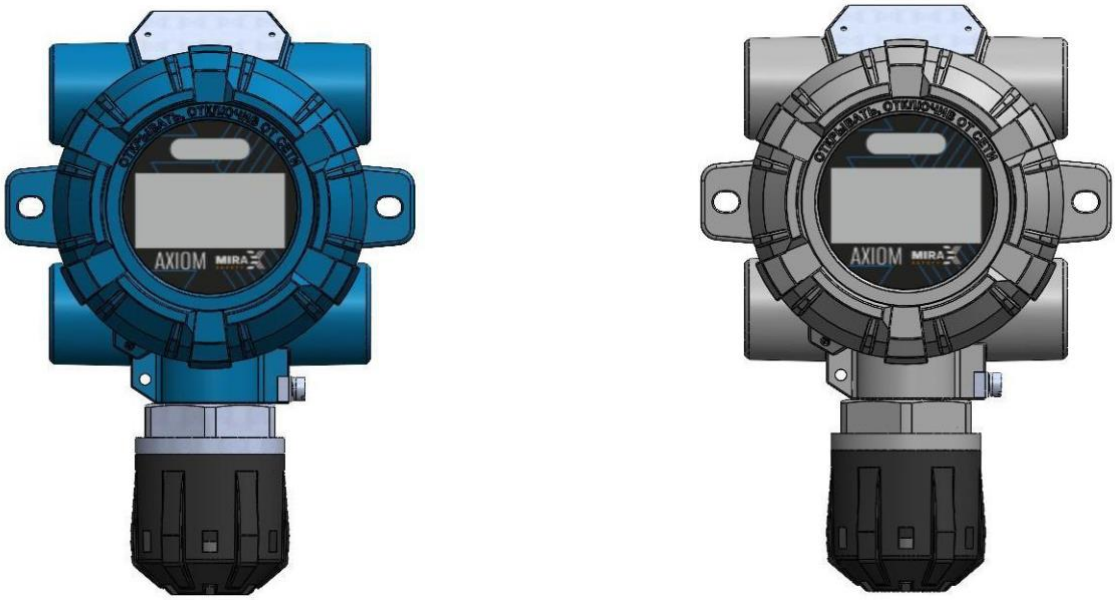
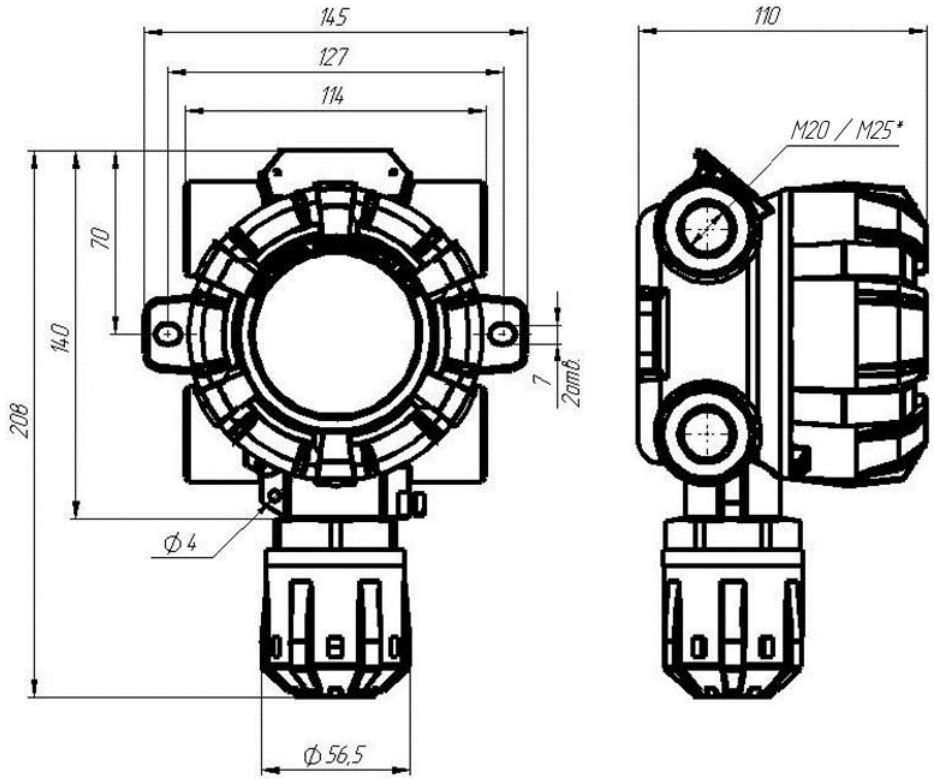


Figure 1 – Appearance view of AXIOM in aluminum case and steel case

4.2 Overall dimensions

The overall dimensions of the gas detector are shown in Figure 2. All dimensions are given in mm.



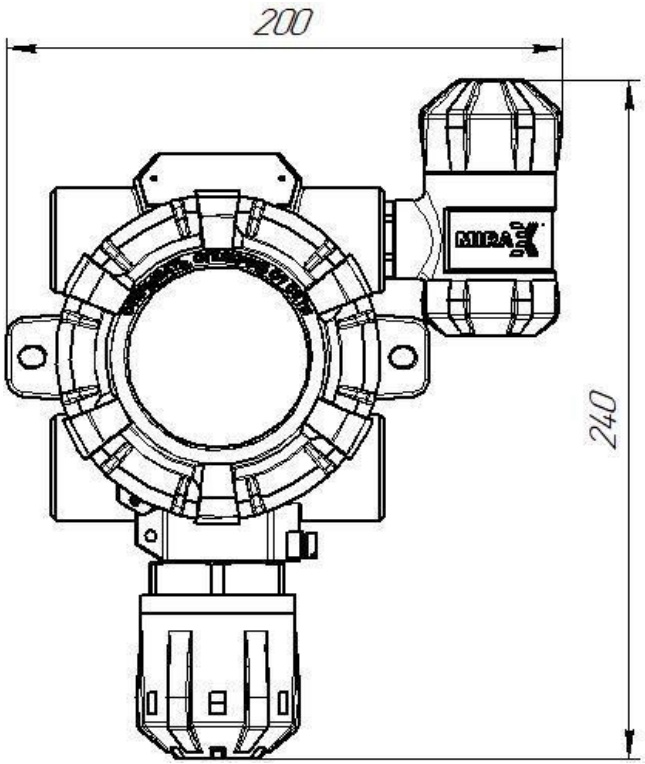


Figure 2 – AXIOM overall dimensions

4.3 Gas detector structure

The gas detector is structurally designed in a metal case with a cover. The housing of the gas detector has threaded inlets. Four cable glands/ducts located on both sides of the upper part of the gas detector housing serve for connecting the power supply and signal output. The bottom input provides a Smart-sensor connection. The gas detector housing has built-in lugs that allow for a variety of mounting options. The housing cover has a glass window that allows visual observation of the device status in the form of LED and digital indication, and also allows the use of the magnetic key to activate the three magnetic switches located on the front panel of the electronic module (Fig. 3). In addition, the magnetic key allows one person to make adjustments without having to access the internal components of the gas detector.

A locking screw is provided to prevent the cover from unscrewing. The locking screw is unscrewed with the hex wrench provided with the gas detector.

The gas detector consists of the following functional parts (Fig. 5):

- electronic module;
- Smart-sensor;
- housing and cover.

Smart sensor (infrared, thermocatalytic or electrochemical). The function of the sensor is to detect the target gas, convert the gas concentration into a digital signal and transmit this signal to the electronic module. Additionally, the sensor is equipped with a rain protection cowl.

The electronic module is used to transmit digital signal from Smart-sensor and connect external power supply circuits, analog and digital outputs.

The main functions of this module are: generation of analog and digital signals and their transmission to the external switching module, indication of the gas detector operation statuses. This module is equipped with magnetic switches for calibrating the gas detector.

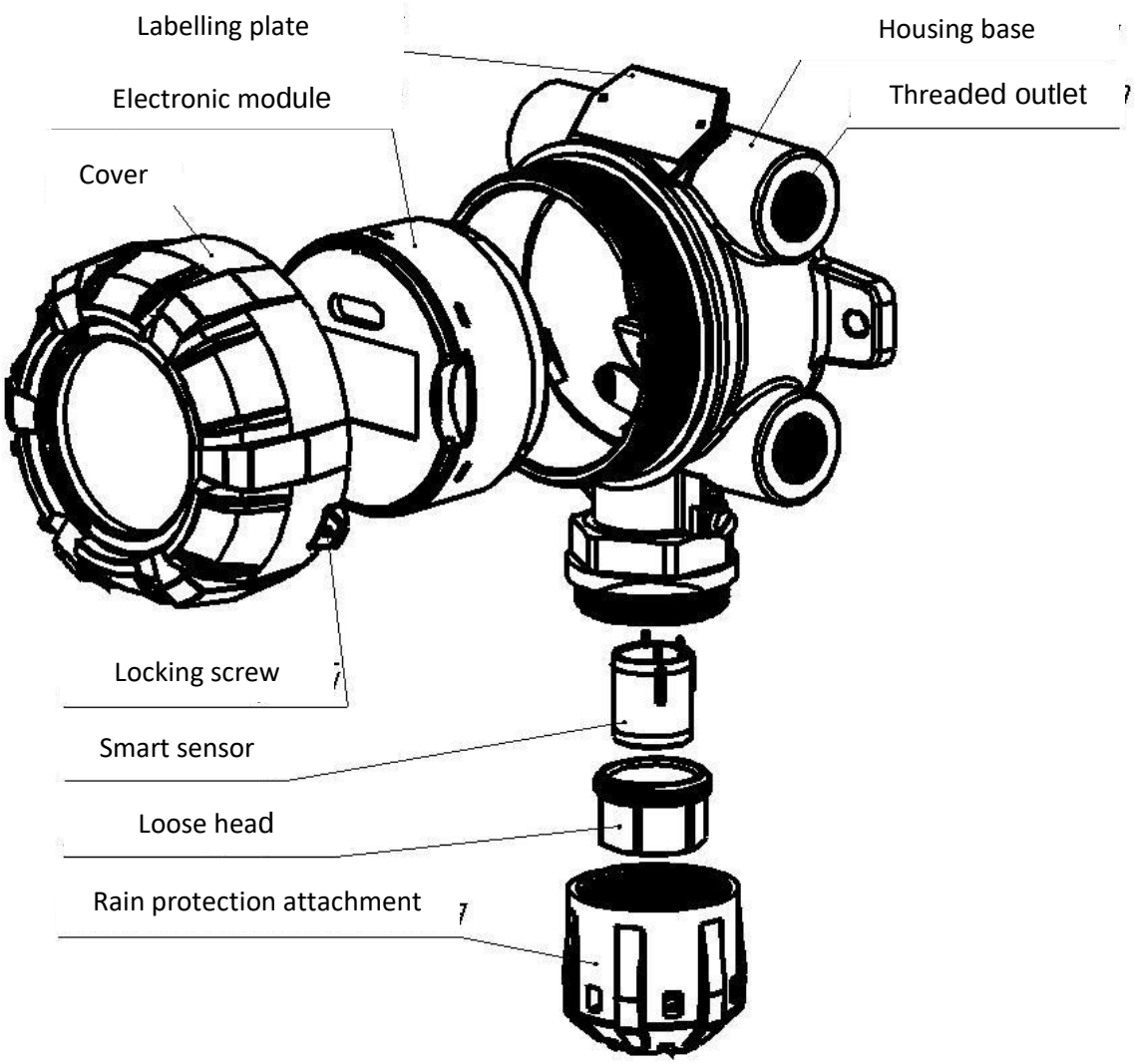


Figure 3 - AXIOM functional structure

4.4 Description of the front panel

The front panel of the gas detector has the following components (Fig. 4):

- Status LED and 2 additional amplifying LEDs,
- 1-ENTER/2-Down/3-Up magnetic switch zones for local adjustment,
- OLED display.

Normal operation of the device is characterized by the GREEN light of the Status LED.

If the gas concentration exceeds Threshold 1 or Threshold 2, the backlight flashes RED. For more details of the detector operation statuses see par.14.1, Table 4.

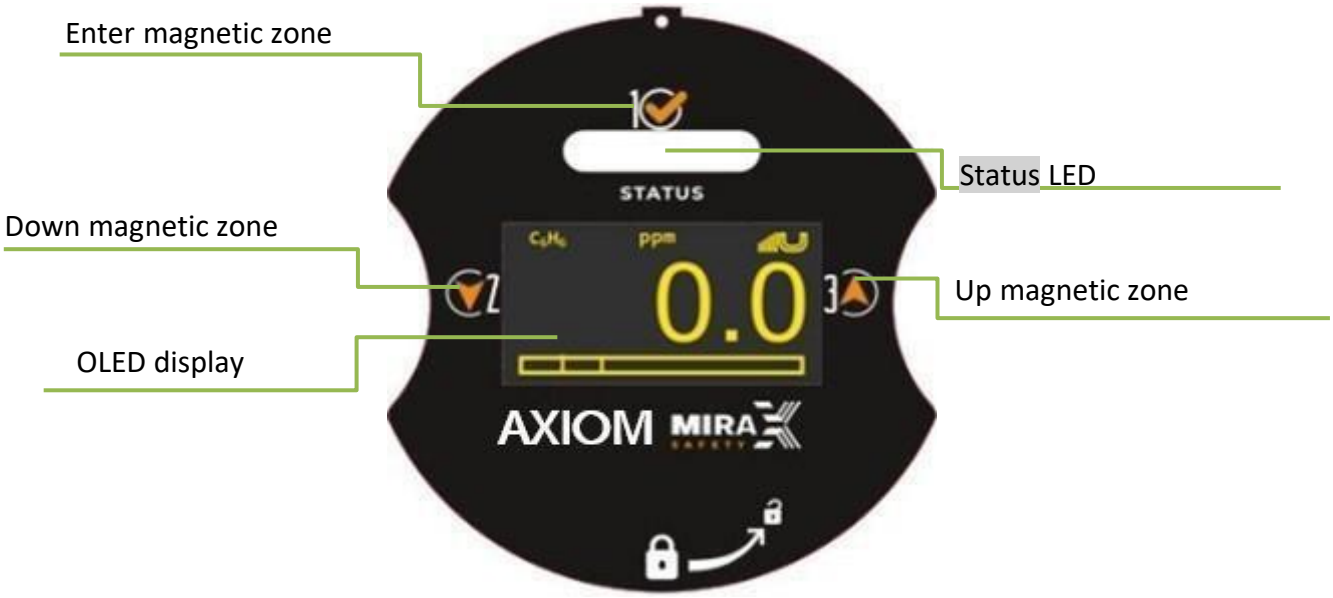
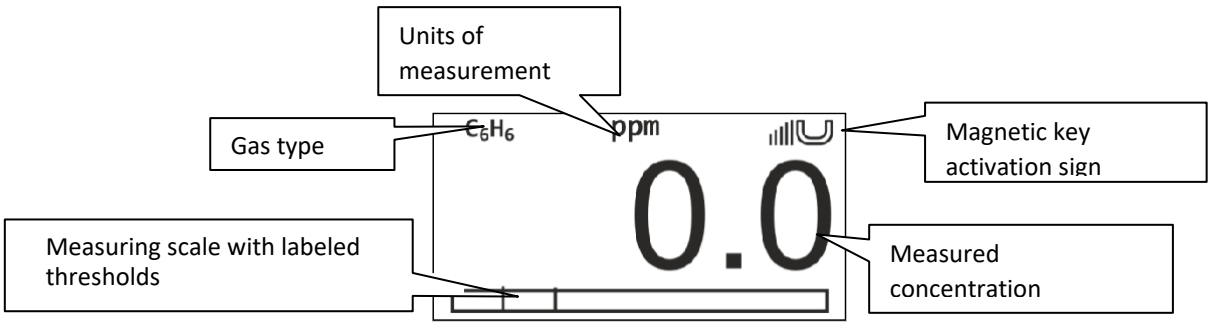


Figure 4- AXIOM front panel

4.5 Description of the OLED display

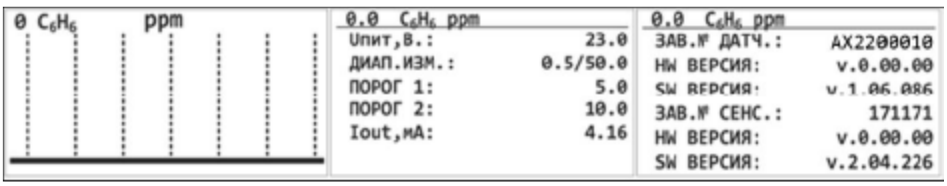
The AXIOM OLED display shows the type of gas, its concentration, the unit of measurement and the measuring scale with labeled thresholds. Data is presented on the display as numbers, bar graphs and symbolic icons.

When the gas detector is operated using the magnetic key, the display also shows information in the form of symbolic characters.



When the magnetic key is held to the icon (on the front panel of the device), the display shows a graph showing the measured concentration for the last time the detector has been in operation. The graph movement interval is configured in the menu (Menu ►Setup ►Interfaces ►Display). To return to the measurement mode, hold the magnetic key to the same icon or to the icon

When you hold the magnetic key to the icon, the display shows the current information of the gas detector. To return to the measurement mode, hold the magnetic key to the same icon or the icon



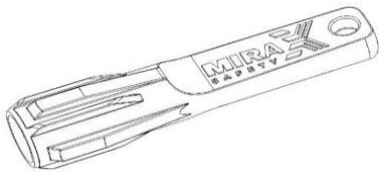
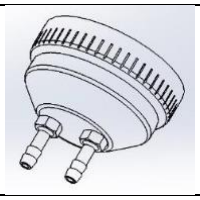
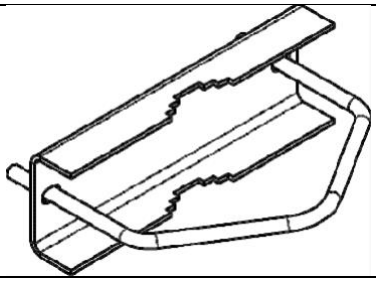
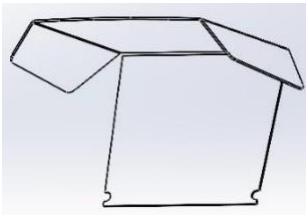
5 Package content

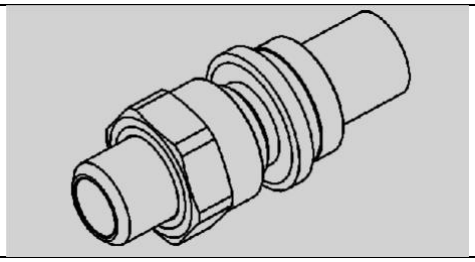
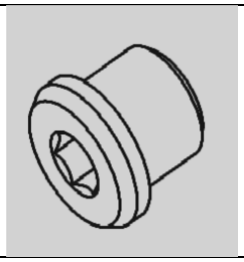
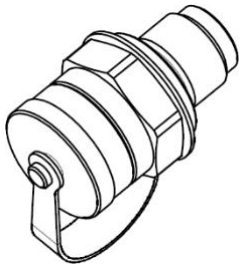
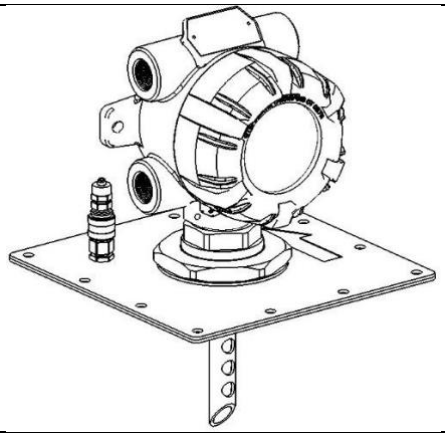
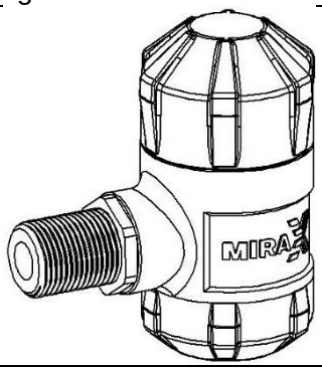
AXIOM gas detectors package content:

Name	Quantity, pcs.
AXIOM gas detector	1
Magnetic key (see item 1 below)	1
Hexagon wrench	1
Data Sheet	1
Operation Manual	1[1) 3)]
Verification procedure	1[2) 3)]
Certificate of Conformity to CU TR 012/2011	1[2) 3)]
Measurement instrument type description	1[2) 3)]
Certificate for Pattern Approval of Measuring Instruments	1[2) 3)]
Declaration of Conformity to CU TR 020/2011	1[2) 3)]
Package	1

Remarks:
[1)] One copy per 10 gas detectors in a batch, but not less than one copy per shipment.
[2)] One copy per batch.
[3)] Available on the website: www.mirax-safety.com

Optional accessories for AXIOM:

① Magnetic key. The magnetic key is used to adjust the gas detector.	② Calibration head*. Used to adjust gas detectors using a gas mixture. It is also required to perform periodic functioning checks.
	
③ Pipe mounting kit*. Allows the gas detector to be mounted on a pipe with a diameter of 38–68 mm.	④ Weather and sun protection canopy*. Designed to protect outdoor gas detectors from overheating in warm weather or heavy precipitation in winter*.
	
⑤ Cable gland*. Provides convenient and safe cable entry into the gas detector housing. The specific type of cable gland is specified when ordering. Installation tightening torque is 32.5 Nm (see par. 10.1)	⑥ Plug*. A plug shall be screwed into the free cable entry hole. Installation tightening torque is 30 Nm.

	
⑦ Connector for HART communicator connection*. An additional HART connector is used to output information via HART protocol to the communicator. Installation tightening torque is 7,5 Nm.	⑧ Air transfer duct installation kit*. Necessary if gas monitoring inside the ducts is required. Installation of this kit is carried out in accordance with par. 11.4.
	
9 Sound-and-light alarm*.	
	
Note – *Available on separate order..	

6 Storage and transportation

6.1 Storage of gas detectors

The detector and accompanying documentation are packed in a cardboard box. Method of packing, preparation for packing, transport packaging and materials used for packing, order of placement correspond to the drawings of the manufacturer.

The gas detectors in the manufacturer's package should be stored in warehouses of the supplier and the customer in storage conditions 3 according to GOST 15150-69 (enclosed or other premises with natural ventilation without artificially regulated climatic conditions)*. When stored in warehouses, gas detectors should be placed on racks.

*In the transportation container they withstand the effects of ambient air temperature from minus 55 °C to 70 °C. Before installing or switching on the gas detector, keep it switched off under normal conditions for at least 12 h.

If gas detectors have been stored for more than 12 months, zero calibration and sensitivity calibration should be performed at commissioning (Section 16).

After unpacking the gas detectors, storage conditions should not differ from those listed above.

The atmosphere of the storage room shall be free of harmful corrosive impurities.

The distance between heating devices of warehouses and gas detectors should be at least 0.5 m.

6.2 Transportation of gas detectors

Transportation conditions – according storage conditions 5(OZh4) according to GOST 15150-69. Temperature range: from -60 to +70 °C.

Gas detectors should be transported by air, rail, water and road in closed vehicles, as well as in heated sealed compartments of airplanes in accordance with the cargo transportation rules applicable to the respective mode of transport.

During handling and transportation, the packaged gas detectors shall not be subjected to sharp impacts or precipitation.

7 Labeling and sealing

The gas detector labeling contains:

- name and trademark of the manufacturer;
- gas detector type;
- molecular formula of the gas to be measured;
- measurement range;
- year of manufacture;
- gas detector serial number according to the manufacturer's numbering system;
- type approval mark according to IR 50.2.009;
- explosion-proof labeling;
- explosion safety mark in accordance with CU TR 012/2011;
- Customs Union conformity mark
- warning plate: Open with the mains disconnected;

- IP degree of protection;
- operating temperature;
- name of the certification body and the number of the certificate of conformity;
- grounding sign.

To protect against unauthorized access to the internal parts of the gas detector it is provided with sealing of units – electronic module. Seals have the form of destructible stickers.

8 Technical characteristics

8.1 Operation conditions

The gas detector is designed for operation in the following climatic conditions:

- ambient temperature: – from minus 60 to plus 65 ºC;
- relative humidity: not more than 98 %, at temperatures plus 35 ºC and lower without condensation;
- atmospheric pressure: from 84 to 106.7 kPa;
- content of mechanical and aggressive impurities in the controlled environment shall not exceed the MAC level according to GOST 12.1.005-88.

AXIOM gas detectors correspond to the D3 version according to GOST R 52931-2008 in terms of resistance and durability to ambient air temperature and humidity.

The gas detectors comply with the climatic version UKHL1 according to GOST 15150.

The gas detectors are resistant to the influence of sinusoidal vibration of the corresponding group of version V2 according to GOST R 52931-2008.

The gas detectors are operable in the electromagnetic environment of class 3 according to GOST R 51317.2.4 and according to the basic requirements for electromagnetic compatibility comply with GOST 30804.6.2.

The gas detectors are resistant in the following terms of electromagnetic compatibility:

- Resistance to electrostatic discharges according to GOST 30804.4.2, degree of severity 3 with quality criterion of functioning A;
- Resistance to radio-frequency electromagnetic field according to GOST 30804.4.3, degree of severity 4 with quality criterion of functioning A;
- Resistance to nanosecond pulse interference according to GOST 30804.4.4-2013, degree of severity 3 with the criterion of quality of functioning A;
- Resistance to microsecond pulse interference of high energy according to GOST R 51317.4.5, degree of severity 3 with the criterion of quality of functioning A;
- Resistance to conductive interference induced by radio-frequency electromagnetic fields according to GOST R 51317.4.6, degree of severity 3 with the criterion of quality of functioning A;
- Resistance to oscillating damping interference according to GOST IEC 61000-4- 12, degree of severity 3 with the criterion of quality of functioning A;
- Resistance to conductive interference in the frequency band from 0 to 150 kHz according to GOST R 51317.4.16, degree of severity 3 with the criterion of quality of functioning A;
- Resistance to external magnetic fields, constant or alternating with network frequency according to GOST R 50648, degree of severity 4 with quality criterion of functioning A;
- Resistance to impulse magnetic field according to GOST 30336, degree of severity 4 with quality criterion of functioning A.

8.2 Structural characteristics

The type and level of explosion protection of the gas detectors corresponds to 1 Ex d [ia Ga] IIC T6 Gb X, where:

X – special application conditions, which mean that the connection of external electrical circuits should be carried out using cable glands certified in accordance with CU TR 012/2011 with type of protection "explosion-proof enclosure d", with subgroup IIC, IP degree of protection and ambient temperature range not less than for the gas detector Unused holes should be covered with plugs with similar parameters.

The degree of protection of a person against electric shock of the gas detector corresponds to class III according to GOST 12.2.007.0-75.

Water, dust and foreign solid particles ingress protection degree of the gas detector corresponds to IP66/67 code according to GOST 14254-2015 (IEC 60529:2013).

Overall dimensions of the gas detector, not more than: 145×110×208 mm. Weight of the gas detector:

- not more than 2.0 kg in aluminum housing;
- not more than 3.9 kg in steel housing

The gas detector does not contain precious materials (precious metals and stones).

8.3 Electrical characteristics

- Gas detector power supply voltage: 12–36 VDC;
- Maximum voltage to the relay is 250 VAC;
- Maximum current to the relay is 2 A.

Power consumption of the gas detector, depending on the mode of operation:

- switching on – not more than 4.8 W;
- heating up – not more than 1.3 W;
- measurement mode – not more than 1.4 W;
- measurement mode, with active signaling (exceeding the threshold) – not more than 2.2 W;
- sensor heating – additional 3.3 W (automatic activation at ambient temperature from plus 5°C and below);

Gas detector heat-up time limit:

- AXIOM IR – not more than 2 min;
- AXIOM EC, AXIOM LEL, AXIOM PID, AXIOM MEMS, AXIOM FR – not more than 10 min.

The length of the cable line from the gas detector to the controller depends on the supply voltage and the cable selected. Length calculation is given in par.12.2.

The load resistance of the current loop circuit is not more than 500 Ohms.

8.4 Metrological characteristics of AXIOM

AXIOM component measurement ranges and basic error tolerance limits are available on the manufacturer's website http://www.mirax- safety.com. In the product section you should find the AXIOM gas detector and in the "Files" column the subheading "Type Description", which contains the necessary metrological information.

The gases detected by the combustible gas sensors are listed in Appendix A. Gas detectors with AXIOM EC electrochemical sensors can provide measurements of volumetric or mass gas concentration. Conversion of volume fraction values, ppm (or mln-1), to mass concentration, mg/m^3, is carried out according to the formula:

$$Cmg.m3 = \frac{M * Cppm}{R * \frac{T}{P}}$$

where $C_{mg/m3}$ is the value of gas concentration in mg/m^3;

C_{ppm} is the gas concentration value in ppm;

M is the molar mass of the gas;

R is the universal gas constant, equal to 8.314472;

P is the atmospheric pressure in kPa.

T is the temperature in K.

For normal conditions (T = 293.15 K, P = 101.325 kPa) the formula is as follows:

$$\mathrm{Cmg/m3} = \mathrm{Cppm} \cdot \mathrm{K},$$

where K is the conversion factor under normal conditions.

Refer to the detector data sheet for conversion factors under normal conditions.

Variation of the output signal, as a fraction of the basic error limit is not more than 0.5.

Allowable additional error caused by the change of ambient temperature for every 10 °C, as a fraction of the basic error limit is ±0.2.

Time to set the output signal of the gas detector to 0.9 level (T0.9): AXIOM IR – 5 s; AXIOM EC – 15 s; AXIOM LEL – 10 s; AXIOM PID – 15 s; AXIOM MEMS – 15 s;

The setting time of the output signal depends on the ambient temperature and the measured component.

The limit of acceptable time interval of the gas detector operation without correction of the output signal is not less than 6 months.

8.5 Characteristics of reliability

Average MTBF of the gas detector:

- AXIOM IR – not less than 100,000 h, with probability not less than 0.9 (GOST 27883);
- AXIOM EC, AXIOM LEL, AXIOM PID, AXIOM MEMS – not less than 35,000 h;

Failure criterion - unrecoverable output of the basic error beyond the allowable limits, failure to fulfill the functional purpose.

The full average service life of the gas detector is at least 20 years.

At the end of its service life, the gas detector shall be written off and disposed of according to the regulations of the operating facility.

8.6 Default configuration

AXIOM is shipped configured and ready for use according to the default parameters listed in the provided Table 1.

Table 1 – Default parameters

Function	Value/parameter	Description
Instrument type	Automatic selection depending on the type of connected sensor	AXIOM recognizes the sensor according to the gas type in its own sensor family: IR, LEL, EC, PID, MEMS sensors.
Output signals	2 mA	Heating up at switch-on
	3 mA	Service mode
	1.5 mA	Malfunction
	from 4.0 mA to 20.0 mA	Normal measurement mode
	23.0 mA	Exceeding the maximum allowable limit
Standby time	3 minutes	Time of automatic exit from the service mode
Sensor heating	Switching on at ambient temperature of +5°C	Automatic switching on

9 Interface

9.1 AXIOM interface types

The gas detector provides output of information about the measured concentration value via the following interfaces:

- OLED display;
- Status LED at the top of the front panel;
- 2 LEDs located on top for visual signaling of threshold values reached or malfunctions occurring;
- 4-20 mA current loop (the nominal static conversion function is described in Section 22);
- RS 485;
- HART protocol (local or current loop, optionally local HART is provided by a connector for connecting a HART communicator. The HART protocol menu is described in Section 20;
- via Bluetooth connection to the gas detector.

The gas detector communicates with the control system, telemechanics system or controller via NART, Modbus and/or 4-20 mA digital interfaces.

9.2 Bluetooth option and software operation

To work with the gas detector via Bluetooth, you need to download the software and install it on your Android mobile device. When working in blast danger areas, explosion-protected mobile devices shall be used.

9.3 PC connection

Connection to a PC is carried out using a USB-UART converter. The gas detectors are configured via the Mirax Configurator software. The software and User Guide are available at www.mirax-safety.com in the products section.

10 Pre-operation procedures

The gas detector shall be operated by persons who have studied this OM and passed the safety briefing
Do not operate the detector if it is mechanically damaged or if the seals are broken.

Only trained personnel should have access to the internal parts of the detector for any work.

After unpacking the gas detector, check the completeness, presence of seals, explosion protection labelings and make sure there is no mechanical damage.

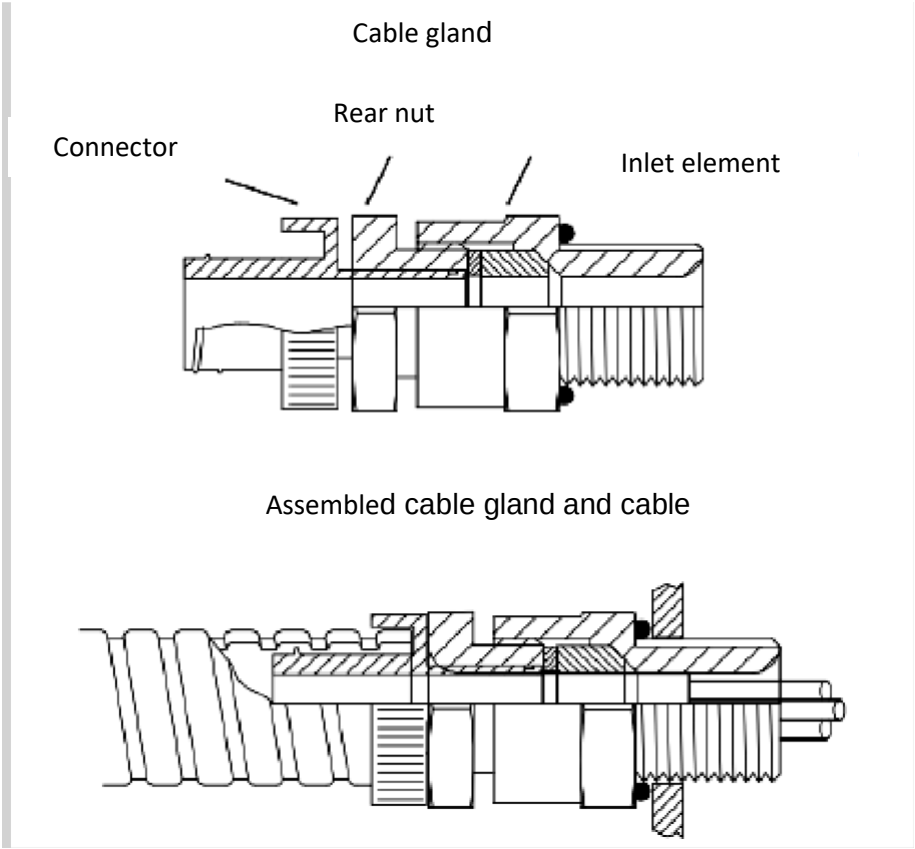
If the detector has been transported at sub-zero temperatures in the shipping package, leave it switched off under normal conditions for at least 12 hours.

If cable glands are provided, install them in the appropriate holes in the gas detector housing.

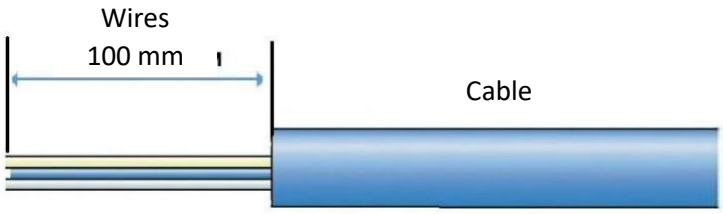
The design and type of cable gland may vary depending on the order.

10.1 Cable gland mounting

1. Fasten the cable gland inlet element into the appropriate holes in the gas detector housing. Tighten by hand, then tighten with a wrench. Tightening torque of the cable gland during mounting is 32.5 Nm.



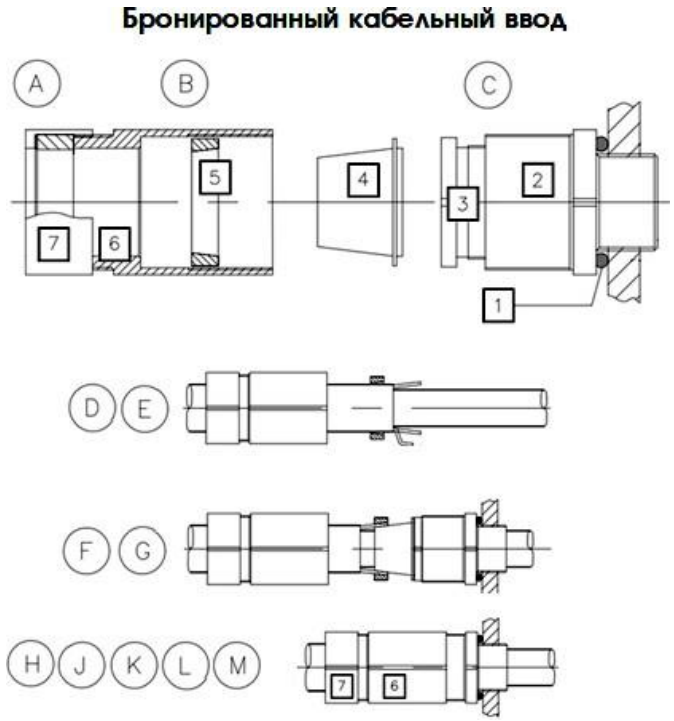
2. Prepare the cable according to the figure.



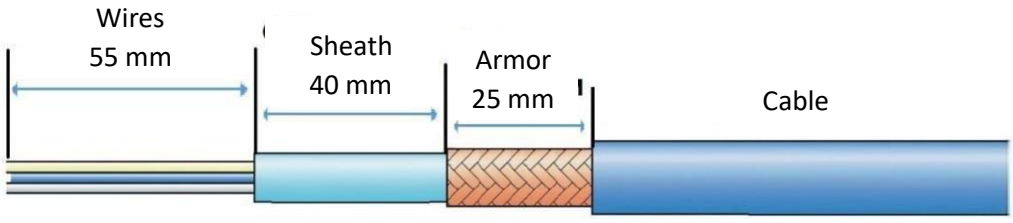
3. Insert the cable into the cable gland, pulling it through the rear nut and the inlet element. Position the cable properly. When tightening the cable gland, the seal shall clamp the outer sheath of the cable.
4. Attach the flexible metal conduit to the connector. Screw the connector inside the flexible metal conduit until it is fully seated and closed.
5. Connect the rear nut to the inlet element. Make sure that the seal is tightly connected to the cable sheath. Next, screw the rear nut into the inlet element by 2 turns. Hold the cable to prevent it from twisting during mounting.

10.2 Mounting the cable gland for armor-protected cable

A. Disconnect the gland as shown in the figure.



B. Remove ring 1 if it is not required. Install a sealing washer if necessary.
C. Attach part 2. Do not exceed the maximum tightening torque of 32.5 Nm.
D. Slide parts 5, 6 and 7 onto the cable as shown in the figure.
E. Prepare the cable according to the figure. Remove the outer sheath and armor to a length sufficient for mounting. Leave the armor of the required length.



F. Slide part 4 over the inner sheath and under the armor. Slide part 5 over the exposed armor.
G. Insert the cable through part 2. Screw in part 3.
H. If necessary, use a second wrench on part 2 at all stages to avoid stripping the sheath threads.
I. Tighten part 6 to part 2 with the required torque of 15 Nm.
J. Loosen part 6 to visually verify that the armor is securely fastened.
K. Tighten part 6 again with the required torque of 32.5 Nm.
L. Manually tighten part 7 to press the seal against the cable.

After mounting, the gland shall not be dismantled, except for special inspection. The gland is not subject to maintenance and spare parts are not supplied.

The gland parts are not interchangeable with respect to any other design. If parts from different manufacturers are used, the certificate will be considered invalid.

11 Mounting the gas detector

The gas detector shall be mounted at the facility in accordance with the duly approved design of the control system, which includes the gas detector.

The mounting and operation shall be guided by:

- Chapter 7.3. of Electrical Installation Regulations (EIR);
- Chapter 3.4. of Regulations for Operation of Consumer Electrical Installations
- Safety Regulations for Operation of Consumer Electrical Installations

Gas detectors shall be grounded. The ground screw is located on the outside of the housing and is labeled with  symbol.

11.1 Recommendations for optimal positioning of the gas detector

- The gas detector shall be placed in the location specified in the design documentation where gas is most likely to occur.
- To measure gases that are lighter than air, the gas detector should be positioned above the potential leakage point. To measure gases that are heavier than air, position the gas detector below the protected area.
- It is recommended to position the gas detector in a place with good air circulation. Restriction of natural airflow can cause delayed actuation.
- Do not position the gas detector in direct sunlight without the use of a weather and sun protection canopy.
- Do not position the gas detector in areas subject to rain, water, aerosols, mist or heavy condensation, dust sources, steam without the use of a weather and sun protection canopy.
- Do not position the gas detector near a heat source.
- It is recommended that the gas detector be installed in a location where it can be accessed for maintenance.

The gas detector has built-in lugs, with two mounting holes in the housing. The gas detector can be attached directly to a mounting surface (wall, plate) or to a 38-68 mm (1.5-2.7 in.) diameter pipe in a vertical position or in an air duct.

11.2 Installation the gas detector on the wall (plate)

When installing the gas detector on a wall (plate), the mounting dimensions for the mounting shall be observed according to Figure 5. All dimensions are given in mm. Install using M6 screws and nuts. A wall-mounted gas detector is shown in Figure 6. Ensure that the mounting screws are fully tightened and the correct lock washers are used. When installing the gas detector, make sure that the analyzed air is supplied to the gas detector and that there is sufficient space for subsequent disassembly and functioning checks.

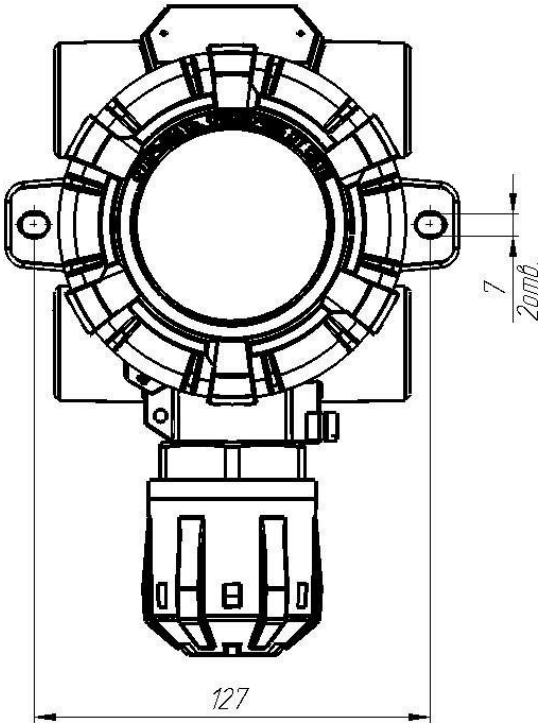


Figure 5 – Mounting dimensions

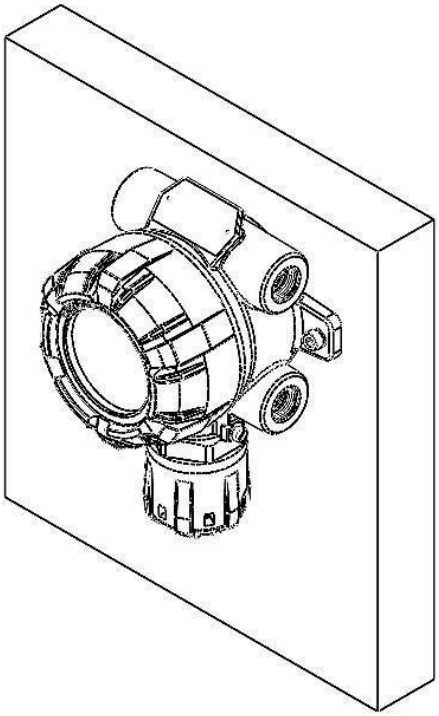


Figure 6 – A wall-mounted gas detector

11.3 Installing the gas detector on a pipe

When installing the gas detector on a pipe, use the pipe mounting kit (Fig. 7) (available as an option). The installed gas detector using the kit is shown in Figure 8. The maximum pipe diameter for installation is 68 mm and the minimum one is 38 mm. All dimensions are given in mm.

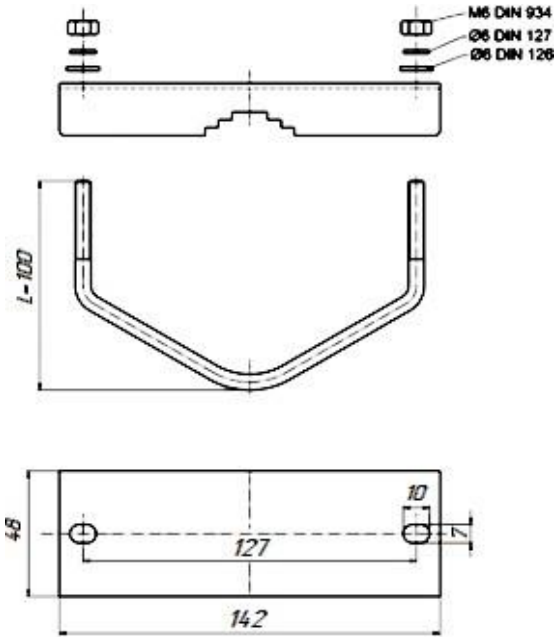


Figure 7 – Pipe mounting bracket

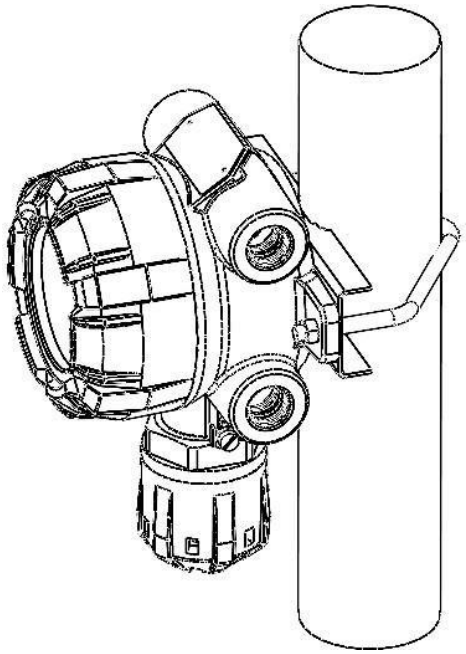


Figure 8 – Gas detector installed on the pipe

11.4 Installing the gas detector in an air duct

To install the air duct mounting kit (hereinafter – the kit), a place for installation shall be prepared in the upper wall of the air duct (Fig. 9). Other installation methods are permitted, provided that tightness and strength are maintained (e.g. self-tapping screws). All dimensions are given in mm.

The general view of the kit is shown in Figure 10.

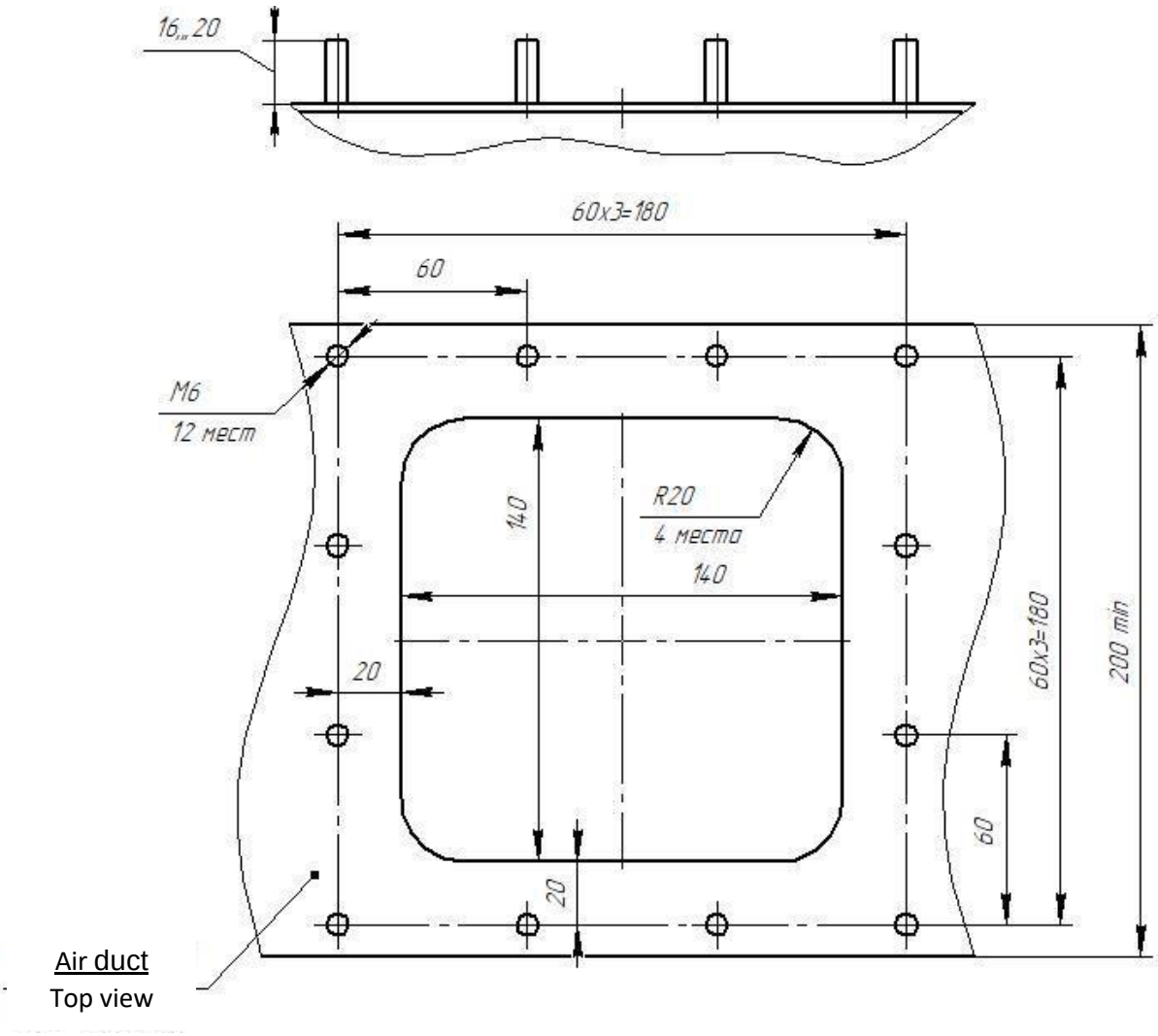


Figure 9 – Place for kit installation

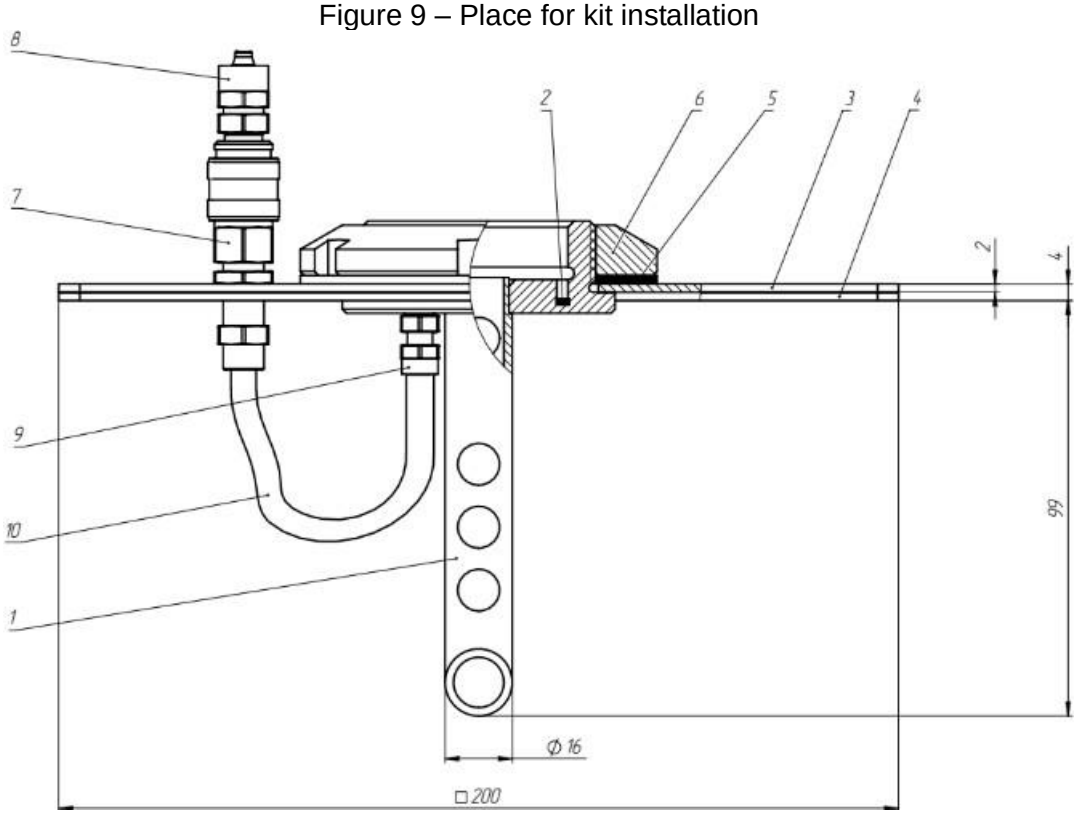


Fig. – 10 General view of the kit.

1 – coupling, 2 – internal seal, 3 – flange, 4 – flange rubber seal, 5 – nut rubber seal, 6 – nut, 7, 8, 9 – fitting, 10 – polyurethane tube.

To check the functioning of the gas detector, apply the appropriate gas mixture to the gas supply point using the quick-release connector (supplied). Gas mixture flow rate 0.4–0.6 l/min.

After completing the function check, the quick-release connector shall be disconnected to prevent gas from escaping from the air duct to the outside.

11.5 Installing the gas detector canopy

The appearance of the gas detector with the canopy installed when mounted on the pipe is shown in Figure 11.

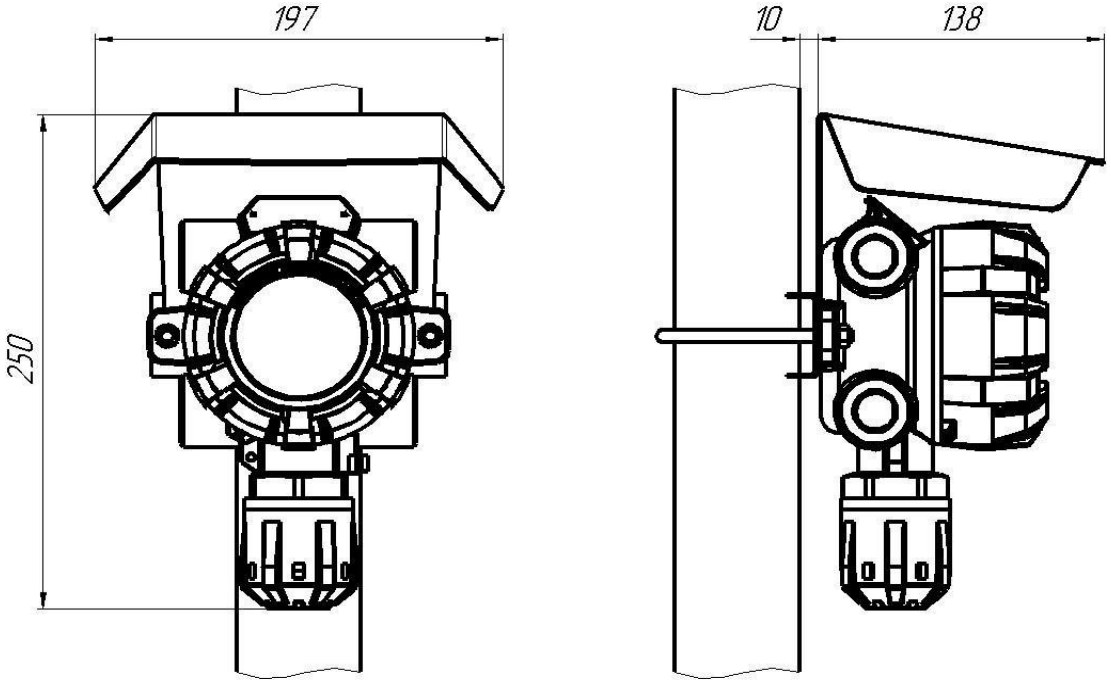


Figure 11 – Mounting the gas detector canopy

12 Connecting the gas detector

The gas detector can only be operated by persons who have studied this manual and have been instructed on safety.

Only trained personnel should have access to the internal parts of the detector for any work.

Installation and operation should comply with the rules and regulations of the Electrical Installation Regulations (EIR) and the Safety Rules in Gas Industry.

The gas detector should be installed and connected with the power supply disconnected.

The AXIOM power supply and interface circuits shall be connected in accordance with Section 12, and the voltages in the circuits shall not exceed Um: U_m = 32 V for power supply circuits.

The housing of the gas detector should be grounded. Internal and external grounding devices and grounding signs according to GOST 21130-75 are provided for grounding the gas detector.

Do not expose the detector to temperatures outside the specified operating ranges.

12.1 Wiring connection

Connect the wires inside the detector in the following sequence:

1) Unscrew the locking screw in the gas detector cover (Fig. 12).
2) Unscrew the cover by thread.
3) Remove the electronic module by turning it counterclockwise and pulling it toward you.

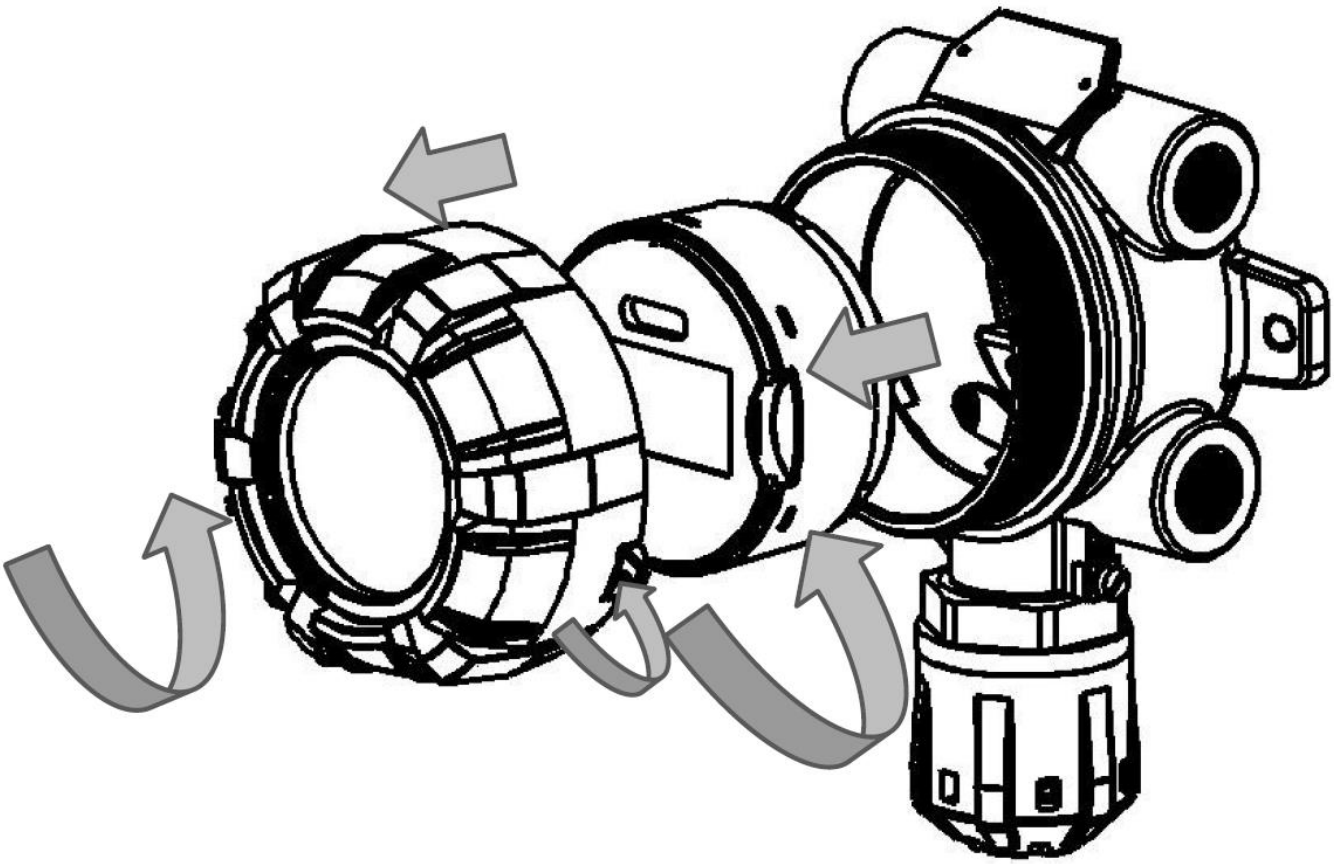


Figure 12 – AXIOM disassembly scheme

4) Carry out cable connections in accordance with the intended use and labelings on the module according to Figure 13. Avoid ingress of moisture into the gas detector during performance of works. The maximum cross-section of the clamped wire is 2.5 mm^2. When connecting two wires to one terminal: the maximum cross-section shall be 1.5 mm^2.
5) After performing connection, reassemble in reverse order. Do not allow particulate matter or dirt to enter the threaded connection between the cover and housing of the detector.

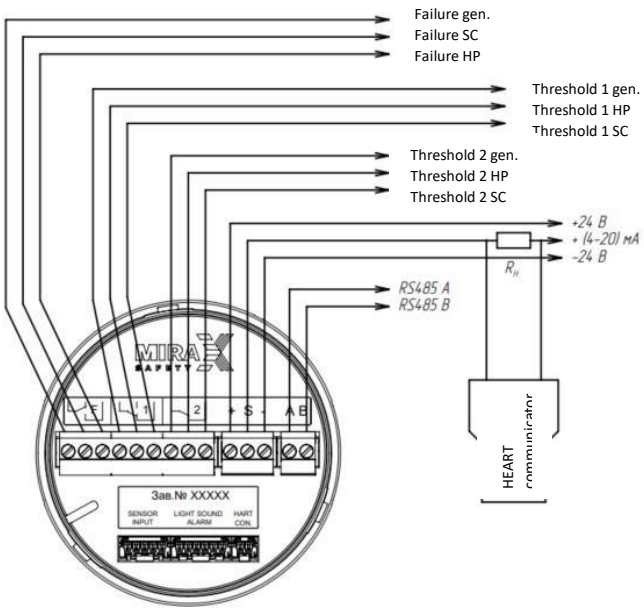


Figure 13 – AXIOM gas detector connection scheme

12.2 Calculating the length of the cable line

To calculate the maximum allowable length of the gas detector's power cable, determine the following:

- $_{linemax}$ total maximum resistance,
- $_{core}$ the maximum electrical resistance to direct current of a 1 km long conductive core.

Calculate the maximum allowable cable length using the following formula:

$$Llinemax = \frac{Rlinemax}{2 * rcore}, (km)$$

where $L_{linemax}$ is the maximum length of the supply cable in km,

$R_{linemax}$ is the total maximum resistance of the cable in ohms,

r_{core} is the maximum electrical resistance to direct current of a conductive core with a length of 1 km (at plus 20°C) in ohm/km. This information is specified in the quality certificate for the cable or according to GOST 22483-2012. The power is supplied by two cores of the cable, so it is necessary to take into account the resistance of both cores. For this purpose it is necessary to add the value 2 to the denominator.

The total maximum resistance of the cable is calculated using the following formula:

$$Rlinemax = \frac{Usource - Umin}{Icons}.(Ohm)$$

where U_{source} is the supply voltage of the power source (e.g. power supply unit, controller, etc.) in volts,

U_{min} – minimum supply voltage of the gas detector in volts. For AXIOM the minimum voltage is 12 V.

$I_{cons.}$ is the current consumption of the gas detector at minimum supply voltage in amperes. For AXIOM it will be 0.525 A.

Table 2 shows the estimated maximum lengths of the power cable between the controller and the gas detector.

These calculations do not take into account temperature corrections and actual cable quality.

Table 2 – Maximum length of the two-core power cable

Core cross-section, mm^2	**$R_{linemax}$, Ohms**	**r_{core} (at plus 20°C), ohm/km**	**$L_{linemax}$, km**
0.50	20.95	39.6	0.26
0.75		25.5	0.41
1.0		21.8	0.48
1.5		14.0	0.74
2.5		7.49	1.39
4		4.79	2.18
6		3.11	3.36
10		1.99	5.26
16		1.21	8.65
25		0.809	12.94
35		0.551	19
Note: These calculations do not take into account temperature corrections and actual cable quality.			

12.3 Grounding

Proper grounding shall be performed to limit the effects of radio frequency interference and ensure electromagnetic compatibility.

When shielded cable is used, the shield covering the line conductors protects them from parasitic capacitive coupling and external magnetic fields. This shield shall be connected to the ground screw at only one extreme point, usually at the controller side (Figure 14). The shield at the other end, at the gas detector side, shall be terminated or connected to a free output.

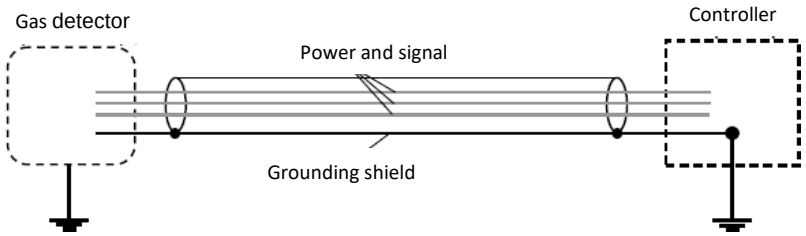


Figure 14 – Shielded cable grounding

Grounding the shield on both sides is unacceptable: potential differences can cause currents that will result in incorrect readings or false triggering of the gas detectors.

In order to ensure protective grounding, according to Chapter 7.3 of the EIR, the housing of the gas detector shall be grounded. For this purpose, it has an external grounding screw and a grounding symbol according to GOST 21130-75. Conductors specifically designed for this purpose shall be used as grounding conductors.

To connect the grounding conductor, loosen the ground screw so that you can wrap the wire around it in a U shape. Then lift the clamp and place the wire between the clamp and the housing of the gas detector. Lower the clamp and tighten the ground screw.

13 First switch-on (commissioning)

Do not open the detector in a blast danger area while the power supply is on.

Only trained personnel should have access to the internal parts of the detector for any work.

The housing of the gas detector shall be grounded. Internal and external grounding devices and grounding signs according to GOST 21130-75 are provided for grounding the gas detector.

Do not disassemble the gas detectors or interchange parts between them.

Do not expose the detector to temperatures outside the specified operating ranges.

It is strictly forbidden to connect the gas detector to 220V power supply. The manufacturer is not liable under warranty for this violation of the operating rules of the gas detector.

13.1 Checking the power supply connection

Be sure to perform a zero calibration before using the gas detector to determine the presence of gas. The corresponding procedure is described in Section 16.

Unscrew the locking screw on the top cover of the gas detector (Figure 15). Unscrew the cover by thread. Remove the electronic module by turning it counterclockwise and pulling it toward you. Avoid ingress of moisture into the gas detector during performance of works.

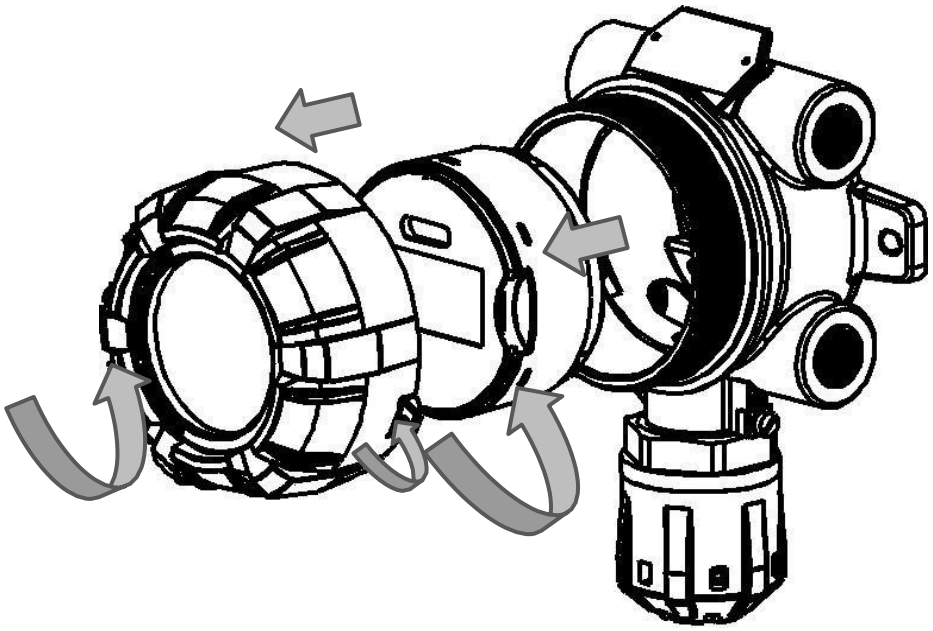


Figure 15 – Gas detector disassembly scheme

1) Ensure that all electrical connections are carried out correctly, as per Section 12.
2) Reassemble in reverse order after the check has been performed. Do not allow particulate matter or dirt to enter the threaded connection between the cover and housing of the detector.
3) Apply external power to the gas detector.
4) After that the procedure of start-up, initialization and heat-up of the gas detector will begin (Table 3). The gas detector will then enter the measurement mode.

Table 3 – Interface Statuses

Process	Digital indication	Light signaling type
Startup	AXIOM	Three LEDs glow red. After that, alternating glow of red LEDs for 2 sec. Status LED alternately lights up in all colors and switches to white.
Initialization/heat-up	Initialization	The central Status LED alternately illuminates white with a frequency of 1 time per second.
The gas detector is in good working order*. Low value of the volume ratio of the detected component (up to THRESHOLD 1)	Concentration value	Status LED alternately glows green with a frequency of 1 time per second.

*If the gas detector has not been calibrated after installation, the red light after heat-up does not indicate the presence of gas. The zero calibration of the gas detector shall be performed (Section 16).

A complete description of each process and the type of light signaling is described in Table 4.

13.2 Mounting check

Before commissioning the gas detector, the following checks shall be performed:

1) Whether the mounting bolts/nuts of the gas detector are securely tightened. Check that the gas detector cannot be moved by hand.
2) The cable gland/plug is tightened "all the way". Tightening torque:

- Cable gland – 32.5 Nm;
- Plug – 30 Nm;

Check that the cable gland and/or plug cannot be moved by hand.

3) The housing cover is securely tightened "all the way", the locking screw is locked. Check that the gas detector cover cannot be moved by hand.

14 Checking the indication and functioning

14.1 Checking the indication

The indication is checked after the first switch-on to verify the correct operation of the device. Zero calibration (Section 16) shall be performed to ensure correct indication after the first switch-on of the detector.

When the gas detector is turned on in a room with an atmosphere free of combustible and toxic gases, the alarms and indications in accordance with Table 4 shall be performed. When the concentration of the detected gases reaches the threshold values or in case of malfunctions, the gas detector performs indication and signaling in accordance with Table 4.

All indication signals and interface statuses are described in Table 4.

Table 4 - AXIOM gas detector interface statuses

Process		**Light indication type**	**4-20 mA current loop**	**Display indication**
The device is switched off		-	-	-
Preparation for measurement	Startup	3 LEDs glow red. LEDs glow red alternately for 2 seconds. Status LED – alternate glow of all colors and switching to white.	-	AXIOM
	Initialization/heat-up	Status LED alternately glows white with a frequency of 1 time per second.	2	Initialization
Measurement	The gas detector is in good working order; low value of the volume fraction of the detected component (up to THRESHOLD 1).	Status LED alternately glows green with a frequency of 1 time per second.	4-20	Concentration value
	The value of the volume ratio of the detected component exceeds the value limits of THRESHOLD 1	Status LED is permanently glows red. Single flash of 3 LEDs at a frequency of 1 time per second in red color	4-20	Concentration value/Threshold 1
	The value of the volume ratio of the detected component is outside the value of THRESHOLD 2	Status LED constantly glows red Double flash of 3 LEDs 1 time per second in red color	4-20	Concentration value/Threshold 2

Process		Light indication type	4-20 mA current loop	Display indication
Calibration	Zero calibration	Alternating single flash of the Status LED in pink color	3	Calibration algorithm/process
	Concentration calibration	Alternating double flash of the Status LED in pink color	3	Calibration algorithm/process
	4 mA current output calibration	Alternating single flash of the Status LED in blue color	4	Calibration algorithm/process
	20 mA current output calibration	Alternating double flash of the Status LED in blue color	20	Calibration algorithm/process
Malfunctions	Exceeding the reading range	Status LED alternately glows yellow The LEDs flash in a short triple flash at a rate of 1 time per second.	22	Concentration value
	No connection with the sensor	Status LED permanently glows yellow Alternating glow of the 2 outermost red LEDs with triple short flashes at a frequency of 1 time per second.	1.5	Instrument breakdown

15 Gas detector operation

The AXIOM gas detector is shipped configured and ready for operation according to the default parameters listed in paragraph 8.6.

After mounting the gas detector perform a zero calibration (Section 16), after which the gas detector is ready for operation.

For AXIOM, zero adjustment is carried out after mounting directly at the place of operation at start-up and further when its readings deviate from zero by a value within the error limits. If the zero drift of the device exceeds the daily error limits, the detector needs to be replaced and sent to the manufacturer for repair.

The operation of the gas detector or the measurement mode is characterized by the GREEN light of the Status LED.

If the gas concentration exceeds the lower or upper alarm limit (THRESHOLD 1, THRESHOLD 2), the LED indication flashes RED.

A complete list of gas detector indications is provided in Section 14 Table 4.

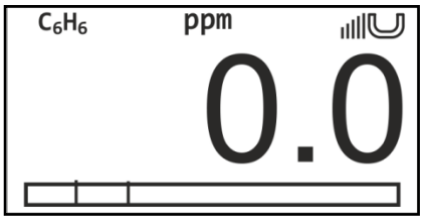
15.1 Structure of operating modes

There are 3 modes of operation for the gas detector.

1) Measurement mode refers to the normal state of the device when the gas detector is measuring gas concentration. This mode regularly checks for malfunction or warning conditions and activates the corresponding relay contacts, depending on the configuration set.
2) The calibration mode allows performing zero calibration and sensitivity of the sensor.
3) The service mode allows changing the configuration parameters of the gas detector functions according to your specific needs.

15.2 Gas detector main menu

To enter the main menu of the gas detector, hold the magnet to the icon for 5 seconds in the measurement mode. When the magnet is held, the magnet icon and a vertical time report will appear in the upper right corner of the display. After that, the main menu opens.



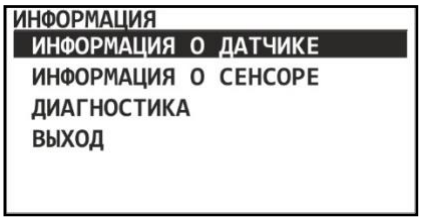
The main menu contains the following menu items:

- "Information"– shows information about the gas detector, sensor, and device diagnostics data.
- "Calibration" – in this menu it is possible to calibrate the zero and range of the gas detector using the magnetic key and CGM/VZG.
- "Setup" – in this menu you can configure the parameters of the gas detector and sensor, interfaces, as well as change the access password.
- "Testing" – this menu allows you to test the operation of the current output, as well as view information about the gas detector and automatically test the device display.

To navigate through the menu items, hold the magnet against the corresponding icon or . To access a menu item, briefly hold the magnet against the icon. To exit from a lower menu item to the upper menu level or from the main menu to the measurement mode, there is an "Exit" line. You can also exit by bringing the magnet to the icon and holding it for 2 seconds.

The submenu marked with the symbol is available for operation only to the manufacturer specialists and is protected by the access password (at factory settings). It is also possible to set a password to restrict the user access (see para. 15.2.3.3.).

15.2.1 "Information" menu



The "Information" menu contains information about the gas detector and sensor, as well as instrument diagnostics data. If the device malfunctions, the data obtained shall be reported to the manufacturer's technical support service, which will help to identify the cause of the malfunction.

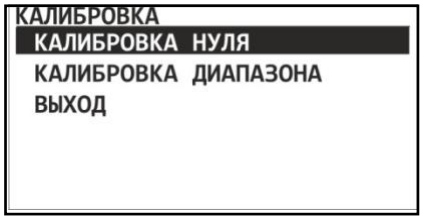
Item "Readings range" is available for editing by the user. Others are available for reading only, or can be edited by the manufacturer's specialists. Such items marked with the icon .

In the "Instrument Information" submenu, you can view information about the gas detector, including factory number, type, instrument build version, software version, sensor measurement range, analog output measurement range, units of measurement and display units, last calibration concentration, hours of operation, and device status.

In the "Sensor" Information submenu, you can view information about the sensor installed in the detector, such as sensor factory number, gas type, assembly version, software version, units of measurement range, minimum and maximum ADC values, current concentration, molar mass, sensor runtime in hours, and more.

The "Diagnostics" submenu allows viewing diagnostic information about the instrument, such as gas detector supply voltage, current, resistance, gas detector temperature, sensor voltage, and more.

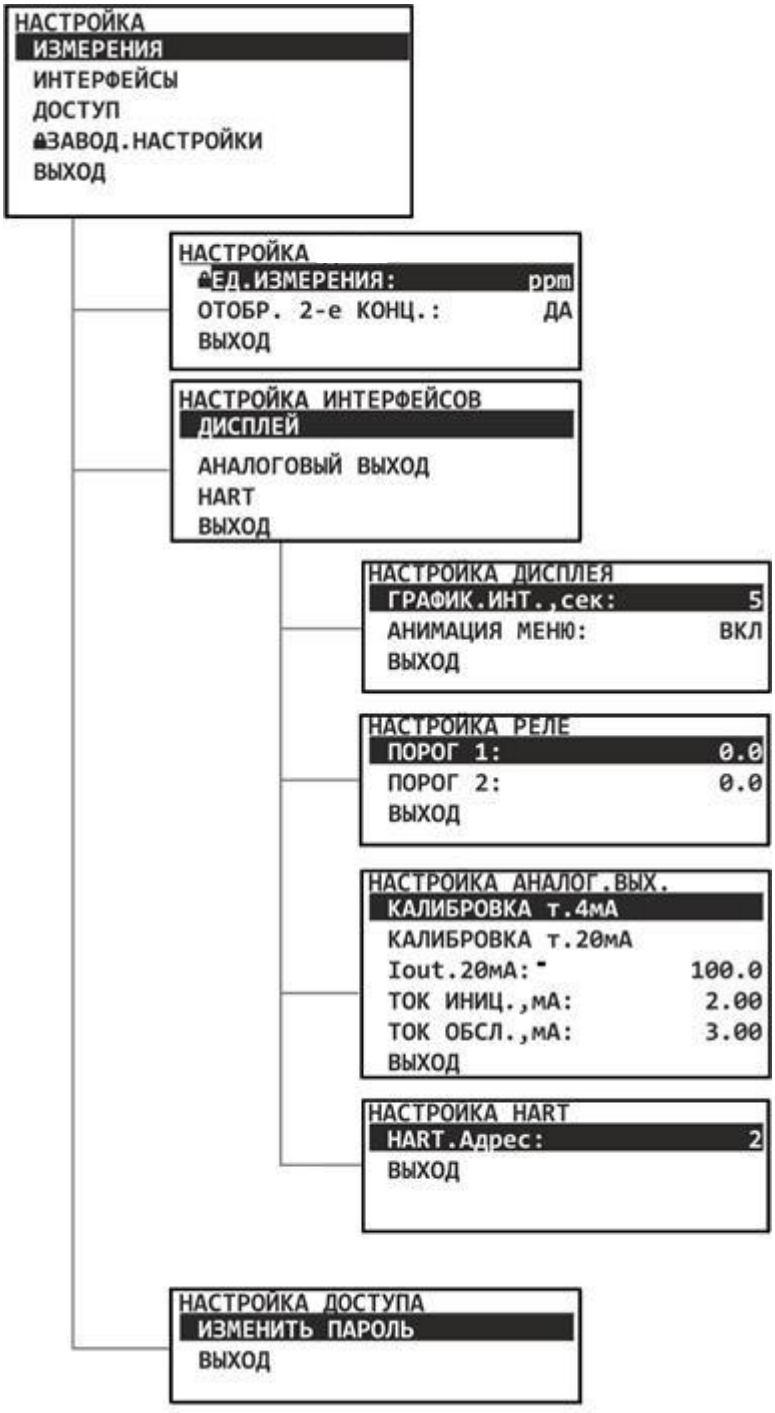
15.2.2. "Calibration" menu



The "Calibration" menu contains the following menu items: "Zero calibration", "Range calibration". The calibration procedure and possible methods are described in detail in Section 16.

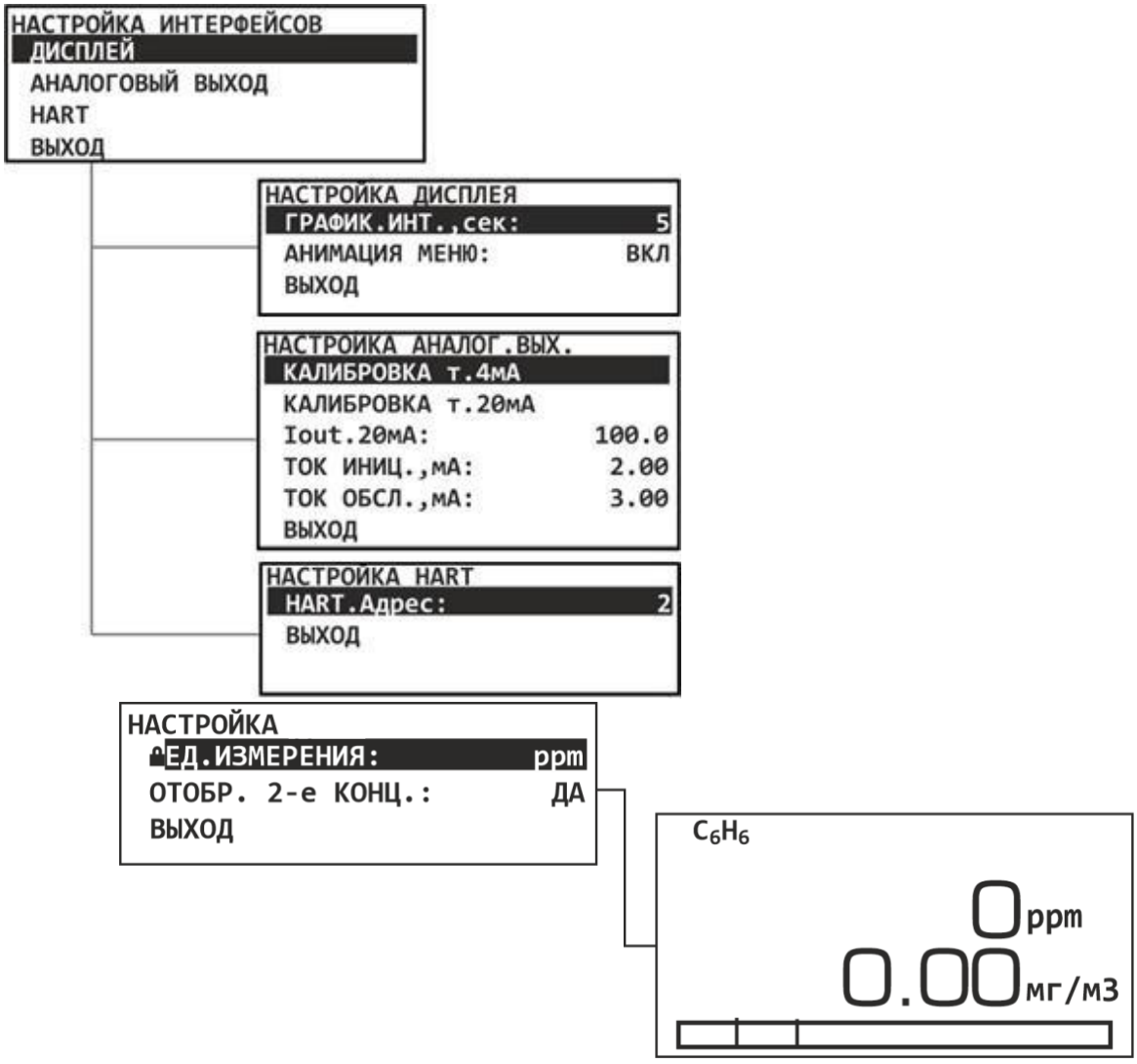
15.2.3 "Setup" menu

The "Setup" menu contains the following menu items: "Measurements", "Interfaces", "Access", "Factory settings".



15.2.3.1 "Measurements" setup submenu

The "Measurements" submenu allows configuring the measurement parameters of the gas detector. It is possible to select displaying two concentrations simultaneously in mg/m^3 and ppm.

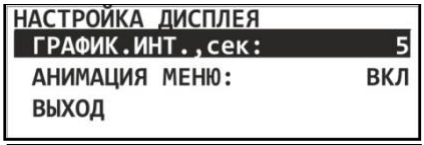


15.2.3.2 In the "Interfaces" setup submenu

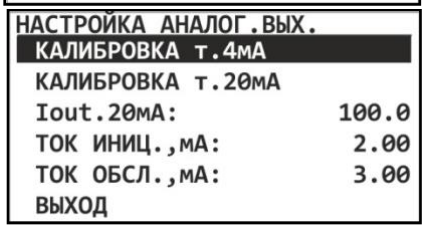
You can edit the setting parameters in the following order:

- by bringing the magnet to the or icons go to the parameter to be edited,
- enter the parameter editing mode by holding the magnet to the icon,
- by holding the magnet at the or icons for 2 seconds the shifting between the digits is carried out (the selected digit flashes),
- changing the selected digit is performed by briefly holding the magnet to or icons,
- holding the magnet at the icon for 2 seconds will save the edited parameter and exit the editing mode. Exit the editing mode without saving is performed by briefly holding the magnet to the icon.

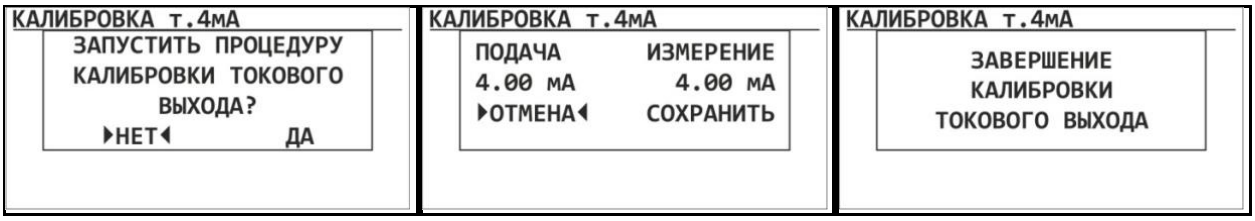
1) In the "Display Setup" submenu, you can enable/disable the display animation and set the data collection interval for the graph showing the measured concentration for the last time the gas detector has been running (para. 4.5).



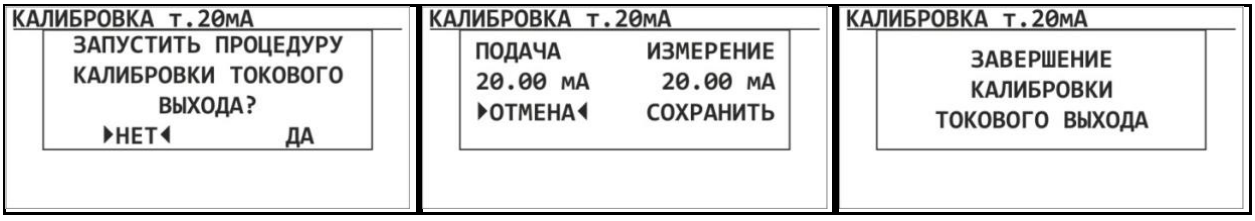
2) In the "Analog Output Calibration" submenu, you can calibrate the current output at 4 mA and 20 mA points.



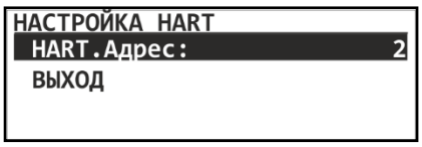
To start the procedure for calibrating the current output at the 4 mA point, go to the "Yes" line. On the next screen, enter the current setting value (default is 4.00 mA) and the measured current value of the gas detector analog output. Then you need to save by moving the cursor to the "Save" line. If necessary, you can abort the calibration of the current output by selecting the "Cancel" line. When the calibration is complete, the display shows the status "Current output calibration complete" for a few seconds. The detector then goes back to the "Analog Output Calibration" menu.



To start the procedure for calibrating the current output at the 20 mA point, go to the "Yes" line. On the next screen, enter the current setting value (default 20.00 mA) and the measured current value of the analog output of the gas detector. Then you need to save by moving the cursor to the "Save" line. If necessary, you can abort the calibration of the current output by selecting the "Cancel" line. When the calibration is complete, the display shows the status "Current output calibration complete" for a few seconds. The detector then goes back to the "Calibration" menu.



3) In the "HART Setup" submenu you can change the HART address.



15.2.3.3 "Access" setup submenu

In the "Access" submenu, you can change the password for access. Setting an access password will restrict access to the following menu items:

Menu ► Information ► Instrument information ► Readings range.

Menu ► Calibration ► Zero calibration.

Menu ► Calibration ► Range calibration.

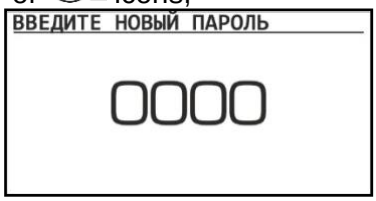
Menu ► Setup ► Measurements.

Menu ► Setup ► Access.

Menu ► Setup ► Factory settings.

The password is edited and saved in a manner similar to editing the gas detector parameters:

- enter the password editing mode by holding the magnet to the icon,
- by holding the magnet at the or icons for 2 seconds the shifting between the digits is carried out (the selected digit flashes),
- changing the selected digit is performed by briefly holding the magnet to or icons,



- holding the magnet against the icon for 2 seconds will save the password and return to the "Access" submenu. Exit edit mode without saving is performed by briefly holding the magnet against the icon. The default password is 0000.

15.2.3.4 "Factory settings" setup submenu

In the "Factory settings" submenu you can update the device parameters to the factory settings.

15.2.4 "Testing" menu

The testing menu contains the following menu items: "Relay Test", "Analog Output Test", "Display Test", "Instrument Test".

15.2.4.1 "Analog output test” testing submenu

The "Analog output test” submenu allows you to test the 4-20 mA analog output. To do this, enter any current value in the "Setting" column in the range of 4.00 to 20.00 mA and monitor the value of the current output in the "Measurement" column and on the current output of the gas detector itself. If the results are not satisfactory, the current output shall be recalibrated in the "Analog Output Setup" menu.

15.2.4.2 "Display test” testing submenu

The display test is performed automatically in the form of an animation on the display. When complete, a window is displayed with the caption: The test is complete.

15.2.4.3 "Instrument Test” testing submenu

Testing of the gas detector is performed in automatic mode and takes place throughout the entire time the instrument is in operation.

16 Zero setting and sensitivity calibration

Do not operate the detector if it is mechanically damaged or if the seals are broken.

Do not open the detector in an explosive environment while the power supply is on.

Only trained personnel should have access to the internal parts of the detector for any work.

The housing of the gas detector should be grounded. Internal and external grounding devices and grounding signs according to GOST 21130-75 are provided for grounding the gas detector.

Do not disassemble the gas detectors or interchange parts between them.

It is not allowed to discharge SRS-CGM into the atmosphere of working premises during adjustment and verification of the gas detector.

For the AXIOM gas detector, zero adjustment is performed at startup and then when the reading deviates from zero by a value within the error range.

If the zero drift of the device exceeds the daily error limits, the detector needs to be replaced and sent to the manufacturer for repair.

After power is applied, in order to begin the calibration process, keep the detector powered on for the following periods of time:

AXIOM IR – 10 minutes;

AXIOM LEL – 1 hour;

AXIOM EC – 1 hour*;

AXIOM EC (O_2) – 24 hours;

AXIOM EC (NO_2) – 24 hours.

AXIOM PID – 1 hour;

AXIOM MEMS – 1 hour;

*The heat-up time can be increased depending on the electrochemical sensor used. For more specific information refer to the detector data sheet in Section 2.2 Basic Technical Characteristics.

In zero and sensitivity calibration mode, the current output signal of the gas detector is inhibited (default 3.0 mA) to avoid false alarms.

If the environment in which the gas detector is installed contains any residual amount of the gas to be detected, then an VZG (verification zero gas) cylinder must be used to set the zero. If there is no residual quantity of the gas to be determined in the environment, then ambient air can be used for zero calibration. It is recommended to use zero air or high purity nitrogen as VZG.

Ambient air can be used to calibrate the oxygen sensor (20.9 vol. % of oxygen). For zero calibration nitrogen (N_2) shall be used. Nitrogen (N_2) must be shall for zero calibration.
To achieve the required accuracy when calibrating the sensitivity, calibration gas shsll be used at a concentration between 25% and 75% of the measurement range.

To calibrate the gas detector, use an appropriate gas cylinder, constant flow regulator, and calibration nozzle (see Section 5). The flow rates used for the various calibration gases are shown below.

Gas type	Flow rate (l/min)
Gas mixtures CH_3COOH acetic acid	from 0.3 to 0.5
Air or N_2 for zero setting	from 0.5 to 1.0
Combustible gases (thermocatalytic sensor)	from 1 to 1.5
O_2	from 0.5 to 1.0
H_2S	
CO	
H_2	
Toxic gases	
Combustible gases (infrared sensor)	from 0.4 to 0.6
CO_2	

16.1 Zero calibration using a magnetic key

Magnet zero calibration requires:

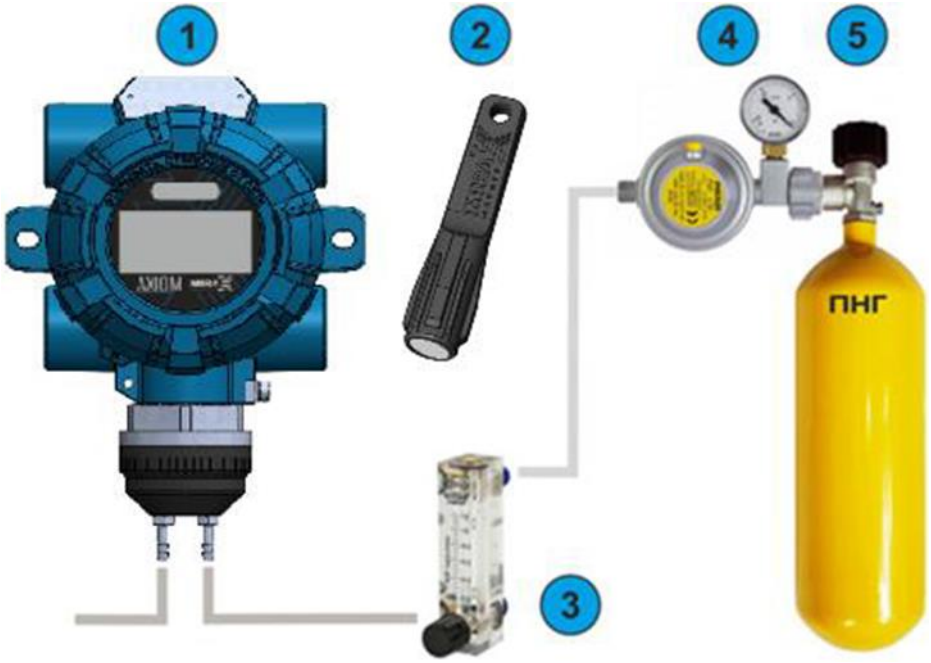
① AXIOM;

② Magnetic key;

③ Rotameter;

④ Gas regulator;

⑤ VZG (verification zero gas) or a known clean atmosphere with no residual quantity of the gas to be determined.



If ambient air CANNOT be used as a reliable calibration gas for setting the ZERO, install the calibration nozzle on the gas detector (see Section 5) and connect the VZG to the gas detector.

For the oxygen sensor, nitrogen (N_2) shall be used for zero calibration.

1) To enter the calibration mode, bring the magnet to the zone, hold the magnet in this position for 2 seconds and then remove it. Status LED starts flashing frequently (green, 10 times per second), after which it enters the zero calibration mode – flashing bright pink at a frequency of 1 time per second.
2) If VZG is used for zero setting, it shall be fed through the calibration nozzle. Gas flow rate is from 0.5 to 1.0 l/min.
3) After 3 minutes, briefly bring the magnet to the zone. The process of saving the data will begin. Alternating single flash of the Status LED in blue for 5 seconds.
4) If VZG is used for zero setting, turn off the gas supply. The zero setting is complete and saved.
5) This will be followed by a return to the zero calibration mode. Status LED flashes bright pink at a frequency of 1 time per second.
6) If you do not need to calibrate the sensitivity, briefly bring the magnet to the "Enter" zone. The gas detector will enter the measurement mode (Status LED glows green with a frequency of 1 time per second), or wait for 2 minutes till the gas detector will automatically enter the measurement mode.

16.2 Sensitivity (range) calibration using the magnetic key

Magnet sensitivity calibration requires:

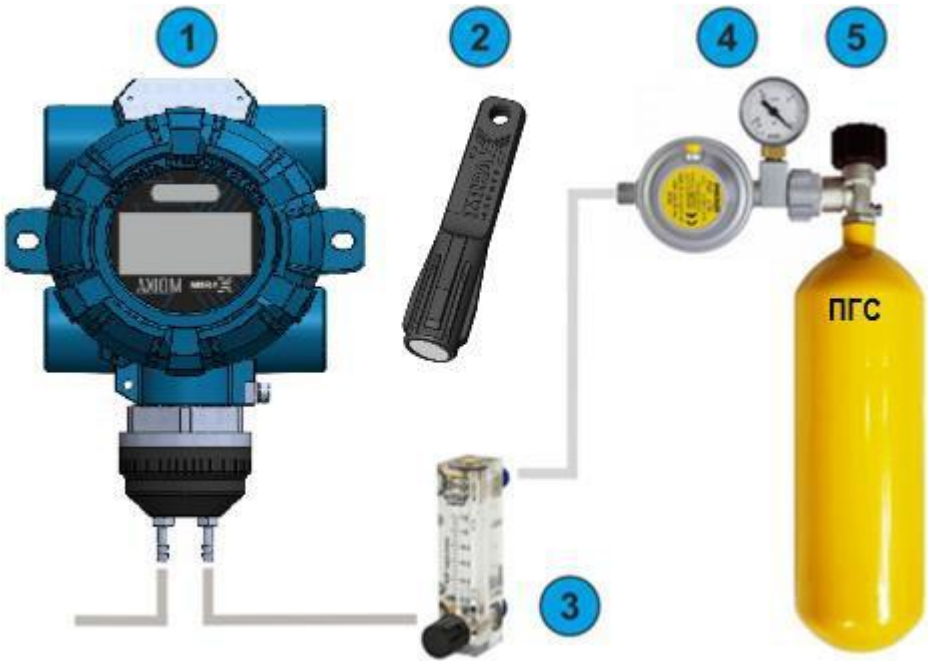
①AXIOM with calibration nozzle;

② Magnetic key;

③ Rotameter;

④ Gas regulator;

⑤ SRS-CGM (standard reference sample – control gas mixture.



For the oxygen sensor, ambient air (20.9 vol. % of oxygen) can be used for sensitivity calibration.

1) Bring the magnet to the magnetic zones in the following sequence: , , , , . The gas detector will enter the sensitivity calibration mode. Status LED flashes twice in bright pink at a frequency of 1 time per second.
2) Supply the SRS-CGM (25...75 % of the measuring range), using the calibration nozzle.
3) After 3 minutes, briefly bring the magnet to the zone. The process of saving the data will begin. Alternating single flash of the Status LED in blue color for 5 seconds.
4) Disconnect the supply of VZG gas. Sensitivity calibration has been performed and saved.
5) This will be followed by a return to the sensitivity calibration mode (You can repeat saving if necessary). Status LED flashes bright pink at a frequency of 1 time per second.
6) Exit the calibration mode by bringing the magnet to the "Enter" zone. Without a magnet, the detector will remain in sensitivity calibration mode for 5 minutes and then enter the measurement mode (Status LED will flash green at a frequency of 1 time per second).

16.3 Zero calibration using the menu

Zero calibration requires:

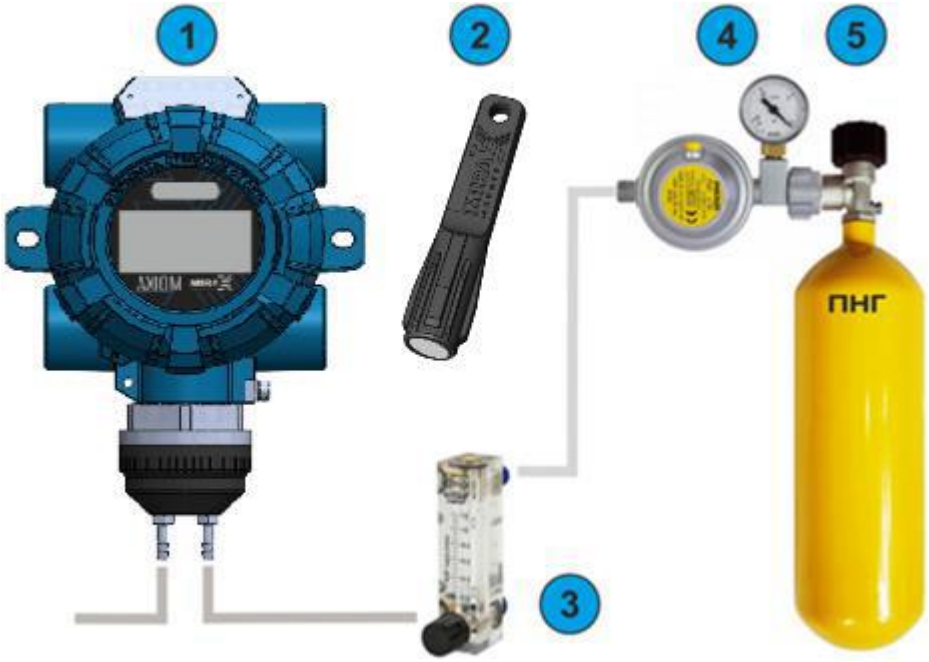
❶ AXIOM;

❷ Magnetic key:;

❸ Rotameter;

❹ Gas regulator;

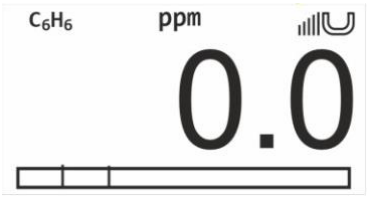
❺ VZG (verification zero gas) or a known clean atmosphere with no residual quantity of the gas to be determined.



If ambient air CANNOT be used as a reliable calibration gas for setting the ZERO, install a calibration nozzle on the gas detector (see Section 5) and connect the VZG to the gas detector.

For the oxygen sensor, nitrogen (N_2) shall be used for zero calibration.

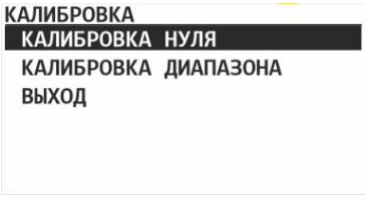
1) To enter the main menu of the gas detector, hold the magnet to the icon for 5 seconds in the measurement mode. When the magnet is held, the magnet icon and a vertical time report will appear in the upper right corner of the display.



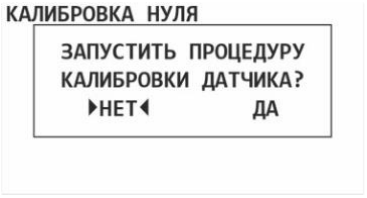
2) After that, the main menu opens. To navigate through the menu items, bring the magnet to the corresponding "Calibration" icon

Briefly hold the magnet against the icon.

3) In the opened window, select: "Zero calibration" using the corresponding or icons to navigate through the lines. Briefly hold the magnet against the icon.

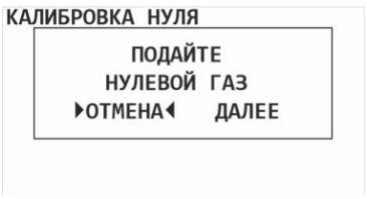


4) To start this procedure, go to the "Yes" line using the appropriate or icons.
Briefly hold the magnet against the icon.



5) If VZG is used for zero setting, it shall be fed through the calibration nozzle. Gas flow rate is from 0.5 to 1.0 l/min.

6) To start this procedure, go to the "Next" line using the appropriate or icons. Briefly hold the magnet against the icon.



7) The zero calibration procedure takes at least 30 seconds. After that it is necessary to go to the "Save" line using the corresponding or icons.
Briefly hold the magnet against the icon.

8) If VZG is used for zero setting, turn off the gas supply. The zero setting is complete and saved.

9) When calibration is complete, the display shows the status "Instruments calibration complete" for a few seconds. The detector then goes back to the "Calibration" menu. Briefly hold the magnet against the icon.

16.4 Sensitivity (range) calibration using the menu

Sensitivity (range) calibration using the magnet requires:

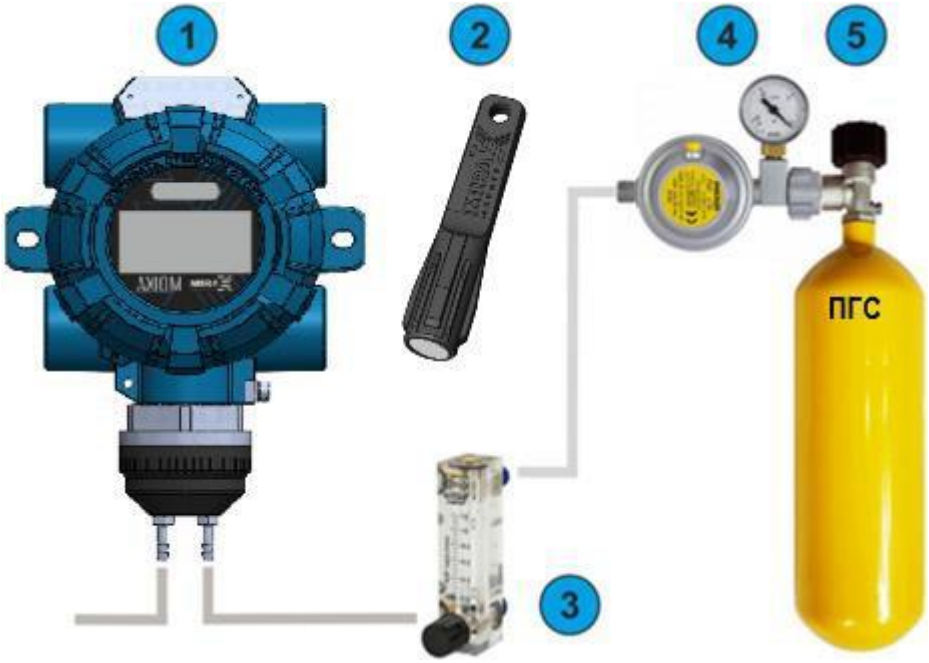
❶ AXIOM with calibration nozzle;

❷ Magnetic key:

❸Rotameter;

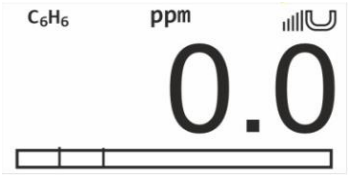
❹ Gas regulator;

❺ SRS-CGM (standard reference sample – control gas mixture..



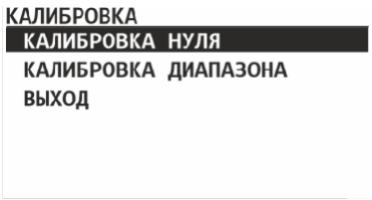
For the oxygen sensor, ambient air (20.9 vol. % of oxygen) can be used for sensitivity calibration.

1) To enter the main menu of the gas detector in the measurement (normal operation mode), hold the magnet against the icon for 5 seconds. When the magnet is held, the magnet icon and a vertical time report are displayed in the upper right corner of the display.

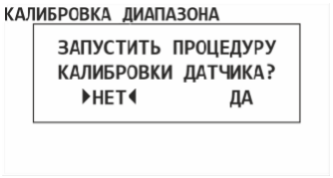


2) In the main menu that opens, select "Calibration" item. To navigate through the menu items, hold the magnet against the icon. To enter, briefly hold the magnet against the icon.

3) In the opened window, select: "Range Calibration" item using the appropriate or icons to navigate through the lines. To enter the "Range Calibration", briefly hold the magnet against the icon.



4) To start this procedure, go to the "Yes" line using the appropriate or icons.
Briefly hold the magnet against the icon.



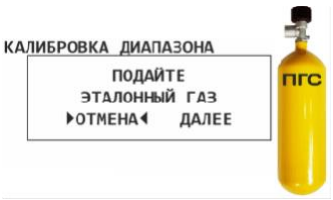
5) Then enter the concentration of the supplied gas*.

*The default concentration is the concentration recorded in the "AXIOM Setup" submenu.

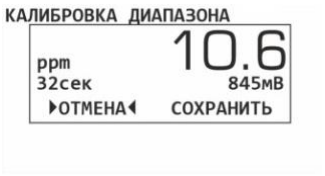
To change the value:

- Using the appropriate or icons to navigate through the lines. As you move to the concentration value, the numbers will begin to "flash", changing the background from yellow to black.
- Briefly hold the magnet against the icon. The number change mode is activated.
- The numeric values change one character at a time. To select the digit to be changed, bring and hold the magnetic key near the or icons. The digit being changed will "flash".
- To increase the digits, briefly bring the magnet to the icon; to decrease the digits – to the icon.
- To save the set value, briefly hold the magnet against the icon.

6) To start this procedure, go to the "Next" line using the appropriate or icons.
Supply the SRS-CGM (reference gas) to the gas detector (with a concentration of 25...75% of the measuring range) equipped the calibration nozzle.
Briefly hold the magnet against the icon.



7) The range calibration procedure lasts at least 30 seconds. Afterwards, the calibration parameters shall be saved
Using the appropriate or icons select the "Save" command.
Briefly hold the magnet against the icon.



8) Disconnect the supply of VZG gas.
When calibration is complete, the display shows the status "Instruments calibration complete" for a few seconds. The detector then goes back to the "Calibration" menu.

16.5 Zero calibration using HART communicator

Detailed description of the supported commands, the communication protocol of the HART interface as well as the HART menu structure according to section 20.

This option shall be supported when HART is connected via a current loop according to Figure 12.

Zero calibration requires:

① AXIOM with HART current loop option;

② Rotameter;

③ Gas regulator;

④ VZG (verification zero gas) or a known clean atmosphere with no residual quantity of the gas to be determined;

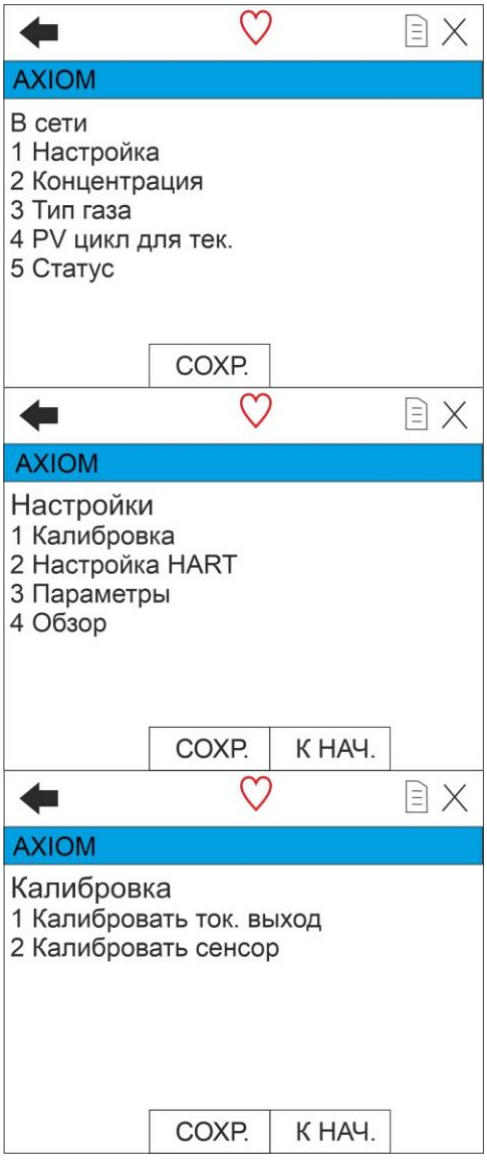
⑤ HART communicator.

If ambient air CANNOT be used as a reliable calibration gas for setting the ZERO, install the calibration nozzle (see Section 5) on the gas detector and connect the VZG to it.

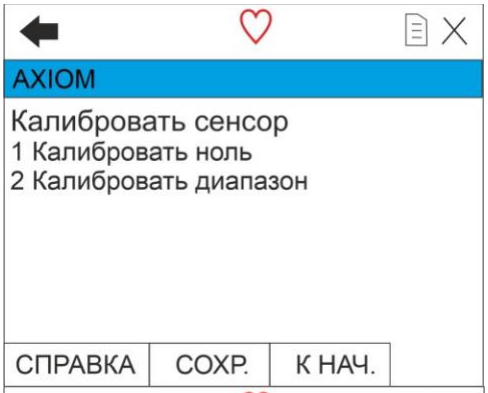
1) Turn on the HART communicator (if necessary, go from the main menu to the connection settings section) and wait until communication with the gas detector is established.
Once the connection is established, the main menu will be displayed.
You need to select the "Settings" item.

2) Then select the "Calibration" menu item.

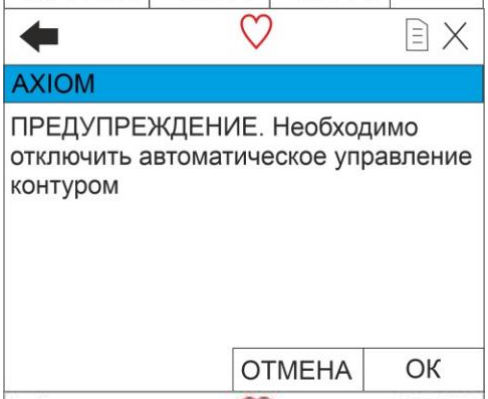
3) Next, select "Calibrate Sensor" item.



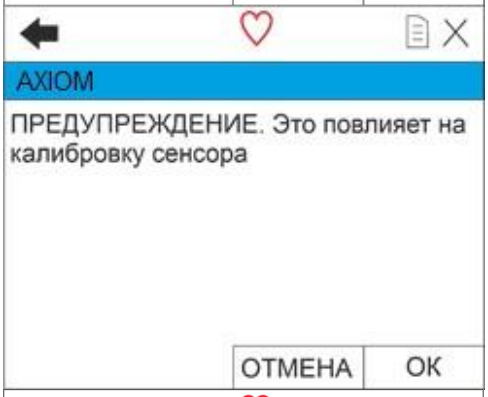
4) Select "Calibrate Zero" to calibrate the sensor zero.



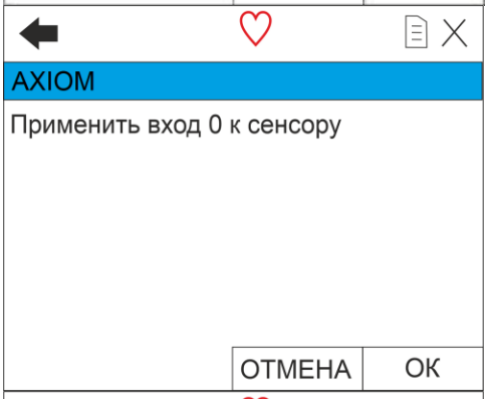
5) Next, a warning message will appear: "Automatic loop control needs to be disabled." That is, the value of the current output is fixed and does not correspond to the sensor reading (exactly for the period of this operation). Press "OK."



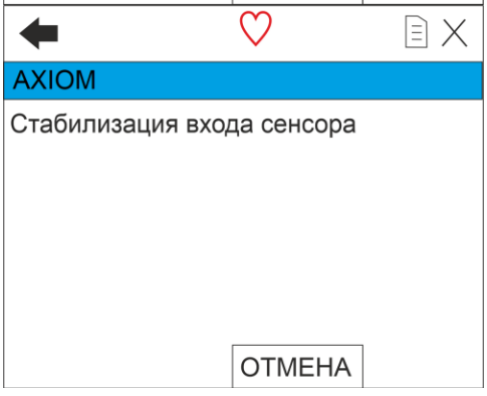
6) The next warning will appear: "This will affect the sensor calibration."



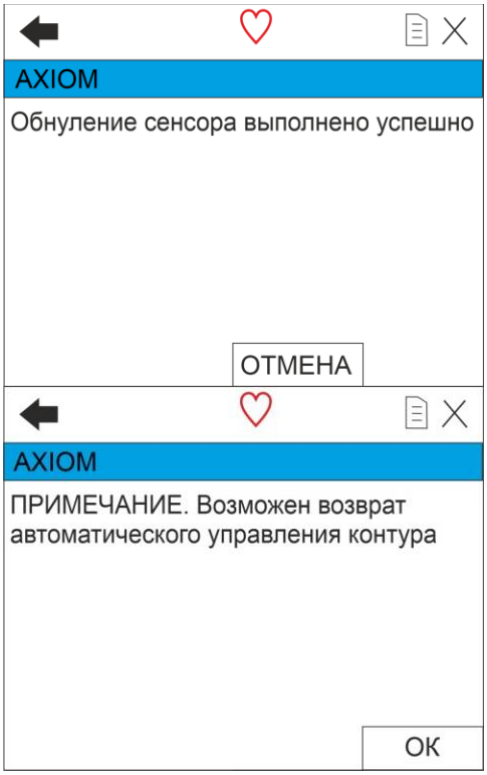
7) Next, the following message will appear: "Apply input 0 to the sensor". Ensure that the calibration is performed in a clean atmosphere with no residual detectable gas, or supply VZG to the AXIOM.



8) After that you should press "OK" and wait for the sensor readings to stabilize.



9) 9) A notification window will appear indicating that the zero calibration is complete.
If VZG is used for zero setting, turn off the gas supply.



10) This completes zero calibration. A note will appear: "Automatic loop control return is possible."

16.6 Sensitivity calibration using HART communicator

Detailed description of the supported commands, the communication protocol over the HART interface as well as the HART menu structure according to section 20.

This option shall be supported when HART is connected via a current loop according to Figure 12.

Sensitivity calibration requires:

❶ AXIOM with HART current loop option;

❷ HART communicator.

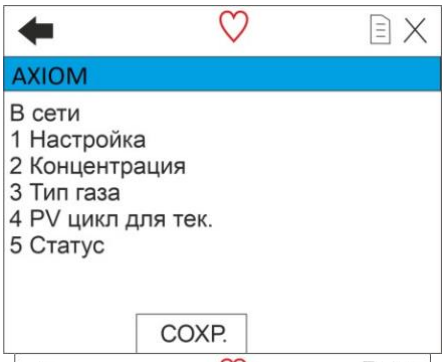
❸Rotameter;

❹ Gas regulator;

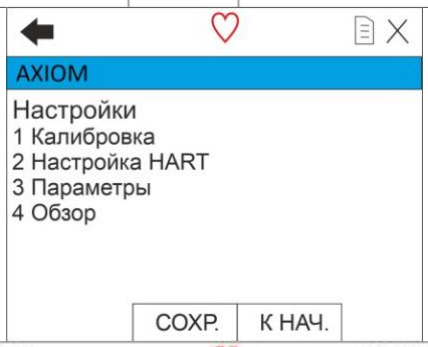
❺ VZG (verification zero gas) or a known clean atmosphere with no residual quantity of the gas to be determined;

❻ SRS-CGM (standard reference sample – control gas mixture.. If ambient air CANNOT be used as a reliable calibration gas for setting the ZERO, remove the moisture-proof attachment, install the calibration nozzle (see Section 5) on the gas detector and connect the VZG to it.

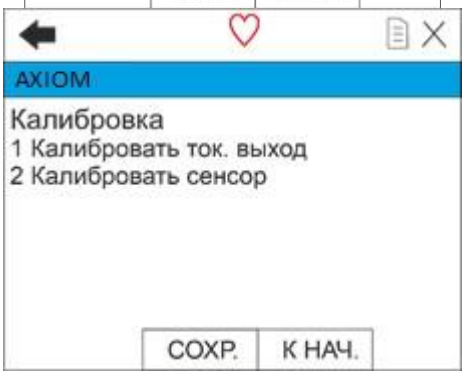
1) Turn on the HART communicator (if necessary go from the main menu to the connection settings section) and wait until communication with the gas detector is established.
Once the connection is established, the main menu will be displayed. You need to select the "Settings" item.



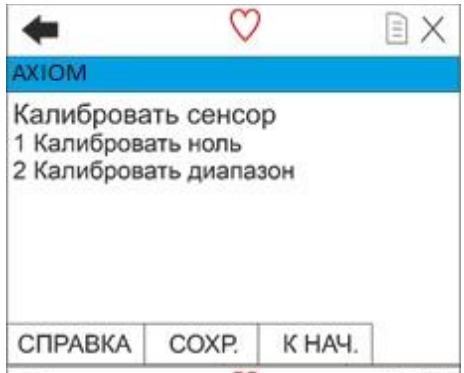
2) Then select the"Calibration" menu item.



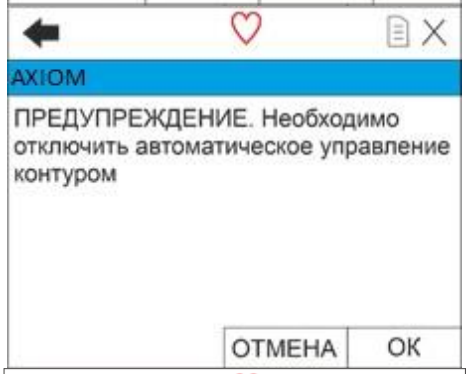
3) Next, select "Calibrate Sensor" item

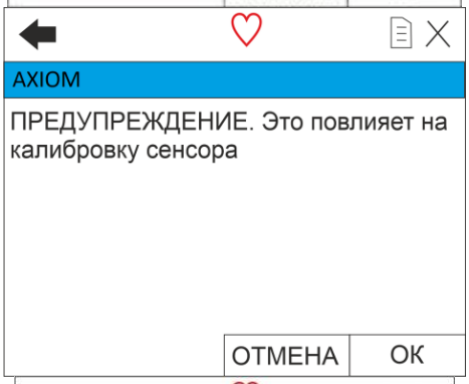


4) Select "Calibrate Range" item to calibrate the sensitivity range of the sensor.

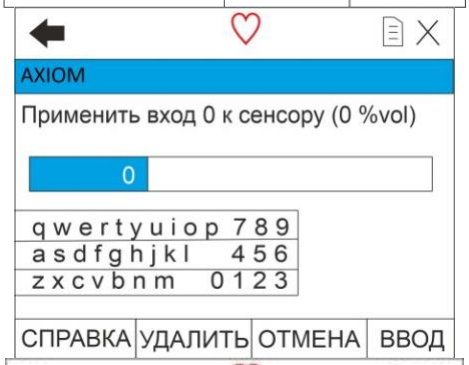


5) Next, a warning message will appear:
"Automatic loop control needs to be disabled." That is, the value of the current output is fixed and does not correspond to the sensor reading (exactly for the period of this operation).
Press "OK."
The next warning will appear:
"This will affect the calibration of the sensor". Press "OK"

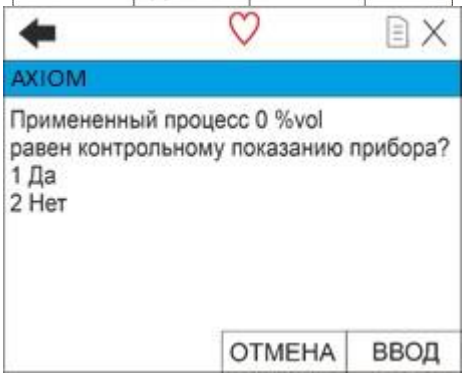




6) Next, the following message will appear: "Apply input 0 to sensor (0 % vol)".
Ensure that the calibration is performed in a clean atmosphere with no residual detectable gas or supply VZG to the AXIOM.
Enter the value "0" in the field.



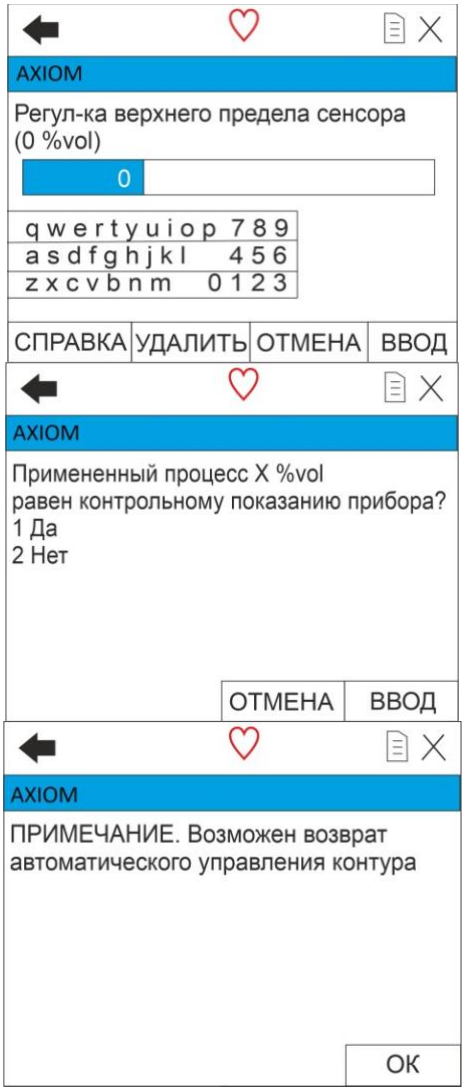
7) In the line "Process applied" the reading should be "0 % vol".
Press "Yes".



8) Supply the SRS-CGM for range calibration.
After three minutes, the supplied concentration needs to be entered into the input box.

9) In the "Process applied" line the reading should be "X % vol".
X is the range calibration value entered above.
If the values match the entered concentration, click "Yes".

10) Calibration complete. A note will appear: "Automatic loop control return is possible."



17 Possible malfunctions

Possible malfunctions of the gas detector are displayed on the LED indicator (OLED display) as error codes.

Error code displayed by the gas detector	Error description	Action to take when an error is detected
	System errors	
Error code 12	Defective 12 MHz quartz resonator	Send the detector to the manufacturer for repair
Error code 20	Defective internal heating source	
Error code 21	Defective sensor heating source	
Error code 25	Defective EEPROM AT25	
Error code 32	Low voltage in the 3.3 V circuit	
Error code 34	High voltage in the 3.3 V circuit	
Error code 45	Defective FLASH AT25	
Error code 49	Low voltage in the 5.0 V circuit	
Error code 51	High voltage in the 5.0 V circuit	
Error code 54	Defective DAC AD5410 (current output)	
Error code 75	STLM75 temperature sensor malfunction	
INSTRUMENT BREAKDOWN	No sensor	Install a functioning sensor

	Sensor malfunctions	
Error code 11	Defective ADS1113	Install a functioning sensor
Error code 25	Defective EEPROM AT25	
Error code 30	Bridge voltage 3.0 V is out of tolerance	
Error code 33	Bridge voltage 3.3 V is out of tolerance	
Error code 50	Bridge voltage 5.0 V is out of tolerance	
Error code 75	Defective STLM75	
Error code 91	Defective LMP91000	
Note:* Contact the manufacturer to purchase the sensor.		

18 Technical maintenance

Only trained personnel should have access to the internal parts of the detector for any work.

The gas detector can only be operated by persons who have studied this manual and have been instructed on safety.

Do not operate the detector if it is mechanically damaged or if the seals are broken.

Do not open the detector in an explosive environment while the power supply is on.

The housing of the gas detector should be grounded. Internal and external grounding devices and grounding signs according to GOST 21130-75 are provided for grounding the gas detector.

Repairs to the gas detector should be performed only by the manufacturer's personnel or by persons authorized by the manufacturer to perform repairs.

Do not disassemble the gas detectors or interchange parts between them.

Do not expose the detector to temperatures outside the specified operating ranges.

At the end of their service life, replaceable electrochemical sensors for oxygen and toxic gases shall be disposed of in an environmentally friendly manner. Disposal should be carried out in accordance with local regulations on waste management practices and environmental protection legislation.

Do not incinerate electrochemical sensors because the cells may emit toxic vapors when burned.

Current repair of the gas detector is not applicable.

18.1 General guidelines

Technical maintenance (TM) is performed to ensure normal operation of the gas detector during its lifetime.

Technical maintenance shall be carried out by trained persons who know the safety rules for working with electrical installations in blast danger areas, who have studied this manual, certified and authorized to work with these products.

Types and timing of maintenance activities:

- external visual inspection of the gas detector – at least once every 6 months;
- periodic functioning check – at least once every 6 months;
- cleaning of the metal-ceramic filter of the gas detector – once a year;
- sensor replacement – as required;
- verification –- once a year.

External visual inspection of the gas detector and periodic functioning checks are performed on-site. Flame arrestor filter cleaning and sensor replacement shall be carried out in an explosion-proof area (can be carried out with the instrument switched on).

18.2 External visual inspection

When performing an external visual inspection, make sure that the gas detector is free of mechanical damage and contaminants that could affect the gas detector functioning. If necessary, remove contamination using a damp cloth and soap.

18.3 Periodic functioning check

Periodic functioning check includes checking the zero reading and sensitivity of the gas detector.

The check shall be performed using VZG (zero air or high purity nitrogen) and a CGM with a concentration between 25% and 75% of the measuring range of the component to be determined, using a calibration nozzle. If the CGM with the component to be determined is not available in pressurized cylinders, it is allowed to supply a substitute gas mixture (equivalent gas) using a conversion factor. Actual value. C of the equivalent gas concentration corresponding to the value of the component to be determined is calculated according to the following formula:

$$C = C1 \bullet K,$$

where C_1 is the concentration value of the equivalent gas,

K_1 is the conversion factor.

For equivalent gas and conversion factor, refer to the data sheet of the gas detector.

Example: The gas detector is set for diesel fuel. Equivalent gas: propane. Conversion factor: 3.18. When a gas mixture of 25% LFL propane is supplied, the diesel fuel concentration value will be: 25*3.18=79,5% LFL.

Monitor the gas detector readings on a (4-20 mA) current loop in accordance with Section 22. In case the readings are outside the tolerance limits, correct the zero readings and sensitivity according to Section 16.

18.4 Cleaning the ceramic-metal filter

Cleaning is carried out to restore the filter capacity. It is necessary to remove the moisture-proof attachment of the measuring module, unscrew the sensor cover (Fig. 25) and purge the filter inside it with compressed air from both sides, starting from the inner side. If visible dirt remains after purging covering the pores of the filter, it needs to be replaced. The sensor cover and filter assembly needs to be replaced.

To order a spare part – sensor cover with ceramic-metal filter, please contact the manufacturer.

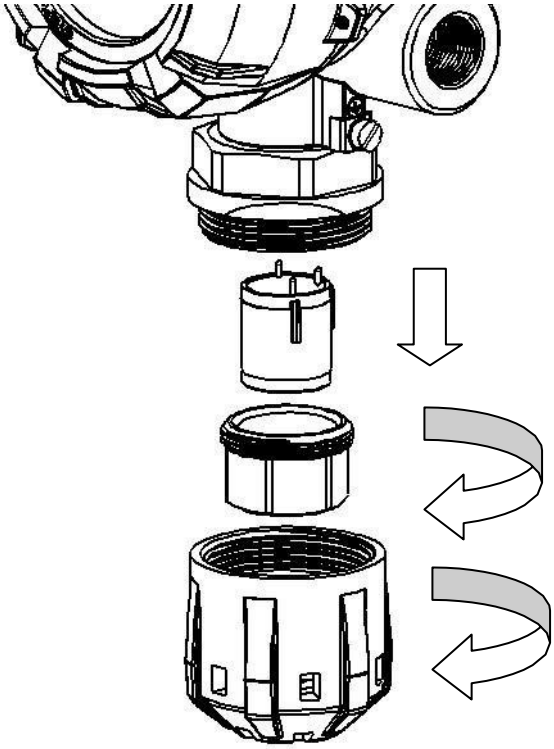


Figure 15 – Disassembly scheme for sensor replacement

18.5 Sensor replacement

The sensor is replaced if the readings are out of tolerance and cannot be corrected, or if the sensor fails.

Sensor replacement requires (Fig. 15):

- disconnect power to the detector,
- unscrew the rain cover,
- unscrew the loose head that covers the sensor,
- gently pull the sensor and remove it from the connector,
- install the new sensor in the connector,
- Reassemble in reverse order.

To order a spare part – sensor, please contact the manufacturer.

After replacing the sensor, it is necessary to perform the initial verification of the gas dyeycecщк according to the verification procedure.

18.6 Verification

Gas detectors are subject to initial verification before commissioning and after repair, as well as to periodic verification during operation. Interval between verifications is 1 year.

Verification shall be performed according to the verification procedure. The up-to-date version is available on the manufacturer's website. In the Products section you should find AXIOM, and in the "Files" column – the "Verification Procedures" subheading, which contains the necessary information.

AXIOM gas detectors can be verified on-site in their operating position without disassembly under the following conditions:

- ambient air temperature, C	20□5;
- relative humidity, %	from 30 to 80;
- atmospheric pressure, kPa	from 84 to 106.7;
- Cylinders with CGM shall be kept at the temperature 20□5□C for at least 24 hours;	
- mechanical effects, dust, aggressive impurities, external electric and magnetic fields (except earth fields) and deviations from the working position are not recommended.	

20 HART menu structure

The HART protocol (Highway Addressable Remote Transducer) is designed for the connection of industrial instruments. HART allows digital data and power to be transmitted over two wires while maintaining compatibility with analog instruments of the 4-20 mA current loop standard.

Typical application area for HART is explosion-proof equipment, where the low power of the HART signal makes it easy to meet the requirements of intrinsically safe circuit standards.

Advantages of using the HART protocol:

- Transmission of parameters via 4-20 mA current loop and digital interface via the same communication line;
- Transmission of (accompanying) digital information without interrupting the main analog signal;
- Completely open standard;
- Standard commands and data structure for various devices;
- High signal-to-interference immunity.

Communicators are used to configure HART protocol compatible gas detectors. For example, the Emerson 475 communicator. In order to be able to work with this type of instruments, you need to load a so-called device description driver (DD or DTM) into the communicator (gas detector description file). Download DD files for AXIOM from the official website.

By connecting a HART communicator to the gas detector, it is possible to perform the following operations:

- Zero and range calibration;
- Changing the thresholds of the gas detector triggering;
- Obtaining information about the gas detector

HART menu structure:

WELCOME SCREEN	
Menu item	**Data example**
1. DeviceSetup	
2. GasConcentration	0 %LEL
4. PV Loop current	4 mA
5. CurrentGas	Methane
7. LoopCurrentMode	Point to Point HART Mode
*Selecting DeviceSetup opens the following menu items	

The menu structures are shown below:

- ► Online
  - ► Setup
    - ► Sensor calibration
      - Zero calibration
      - Range calibration
    - ► Parameters
      - Threshold 1
      - Threshold type 1
      - Threshold 2
      - Threshold type 2
    - Activate the service menu
    - ► Browse
      - Model
      - Distributor
      - Device ID
      - Tag
      - Long tag
      - Descriptor
      - Message
      - Date
      - Final assembly No.
      - HART protocol version
      - Device pol. ver.
      - Software version
      - Polling address
      - Cycle mode for curr.
    - Concentration
    - Gas type
    - PV Cycle for curr.
    - Current status

21 RS485 exchange protocol

Axiom. RS485 exchange protocol

Interface RS485 (default settings: 9600 bit/s, 8 databits, Nonparity, stopbit 1; Modbus address – last two digits of the factory number).

HOLD group registers:

0x03 – group of registers read

0x06 – write one register

0x10 – register group write

Address	Description	Range	Access
0x0000	Module ID		R/-
0x0001	St. byte – RS485 network address: 1…255		
0x0002	HART network address	1...15	R/W
0x0003	Status: bit 0 – always 0 bit 1 – threshold 1 bit 2 – threshold 2 bit 3 – no sensor or the sensor is damaged; bit 5 – signal excess bit 6 – module initialization in progress bit 7 – mode 0 – operating, 1 – service bit 8 – standby bit 10 – emergency (some problems with the instrument)		R/-
0x0004	Module Settings: - bit 4..7 – Measurement unit -- 0 – vol. % -- 1 – ppm For IR and MEMS: -- 2 – % LFL IEC -- 3 – % LFL ISO Others: -- 2 – ppb -- 3 – % LFL -- 4 – mg/cm^3 -- 5 – µg/cm^3 bit 8..9 – Discreteness: -- 0 – *1; -- 1 – *10; -- 2 – *100; bit 10..15 – Reserve		R/W
...			
0x0006	Upper range value	0...65535	R/W
0x0007	Threshold 1	0...65535	R/W
0x0008	Threshold 2	0...65535	R/W

0x0009	Hysteresises - bit 0..7 – Hysteresis 1 - bit 8..15 – Hysteresis 2		R/W
...			
0x000C	Calibration mode Read: 0 – operating mode 1 – zero calibration 2 – concentration calibration 3 – point calibration 4 mA 4 – 20 mA point calibration 5 – current output testing Write: 0x0000 – exit to operation mode 0x185D – Mode. Zero calibration 0x64C4 – Mode. Concentration calibration 0x5530 – Mode. Point calibration 4 mA 0x55C3 – Mode. Point calibration 20 mA 0x3535 – Mode. Current output testing 0x7294 – changes saving		R/W
0x000D	Calibration gas concentration		R/W
0x000E	Concentration at magnetic calibration		R/W
0x000F	Current in initialization mode, * 100, mA		R/-
0x0010	Current in service mode, * 100, mA		R/-
...			
0x0012	Dead zone		R/W
...			
0x001B	SENSOR. Sensor type		R/-
...			
0x0020	SENSOR. Gas name. Symb. 0 and 1		R/-
0x0021	SENSOR. Gas name. Symb. 2 and 3		R/-
0x0022	SENSOR. Gas name. Symb. 4 and 5		R/-
0x0023	SENSOR. Gas name. Symb. 6 and 7		R/-
0x0024	SENSOR. Gas name. Symb. 8 and 9		R/-
0x0025	SENSOR. Gas name. Symb. 10 and 11		R/-
0x0026	SENSOR. Gas name. Symb. 12 and 13		R/-
0x0027	SENSOR. Gas name. Symb. 14 and 15		R/-
...			
0x0071	20 mA range reference point Lo		R/W
0x0072	20 mA range reference point Hi		R/W
...			
0x0075	Dual display enabling		R/W

INPUT group registers

0x04 – group of registers read

Address	Description	Range	Access
0x0000	Module ID		R/-
0x0101	Factory number Hi		R/-
0x0102	Factory number Lo		R/-
0x0103	Software version		R/-
0x0104	Software version. Build		R/-
0x0105	Output current * 100		R/-
0x0106	Lo condition: bit 0 – always 0 bit 1 – threshold 1 bit 2 – threshold 2 bit 3 – no sensor or the sensor is damaged bit 5 – signal excess bit 6 – module initialization in progress bit 7 – mode 0 – operating, 1 – service bit 10 – emergency (some problems with the instrument)		R/-
...			
0x0110	Current concentration value		R/-

22 Nominal static conversion function

The concentration value output from the current loop is calculated using the nominal static conversion function. The function shows the dependence of the electric current strength of the output signal on the concentration of the component to be determined:

$$Inom = 16 * \frac{Ci}{Cmax} + 4 \quad (1)$$

where I_{nom} is the output current in mA;

C_i is the measured concentration in % vol;

C_{max} is the maximum value of the volume rate of the determined component corresponding to the output current of 20 mA.

Calculation of the measured concentration is carried out according to the following formula:

$$C = \frac{Ii - I0}{K}, \quad (2)$$

where I_i is the output current of the gas detector at the check point (mA);

I_0 is the initial output current of the gas detector of 4 mA

K is the conversion factor:

$$K = 16 \frac{mA}{Cmax - Cmin} \quad (3)$$

where C_{max} is the maximum concentration of the measurement range;

C_{min} = 0 is the minimum concentration of the measurement range.

Appendix A

for Pattern Approval of Measuring Instruments

ФЕДЕРАЛЬНОЕ АГЕНТСТВО
ПО ТЕХНИЧЕСКОМУ РЕГУЛИРОВАНИЮ И МЕТРОЛОГИИ

СЕРТИФИКАТ

об утверждении типа средств измерений
№ 86018-22

Срок действия утверждения типа до **30 июня 2027 г.**

НАИМЕНОВАНИЕ И ОБОЗНАЧЕНИЕ ТИПА СРЕДСТВ ИЗМЕРЕНИЙ
Газоанализаторы стационарные AXIOM

ИЗГОТОВИТЕЛЬ
Общество с ограниченной ответственностью "Миракс" (ООО "Миракс"), Пермский край, г. Чайковский

ПРАВООБЛАДАТЕЛЬ
Общество с ограниченной ответственностью "Миракс" (ООО "Миракс"), Пермский край, г. Чайковский

КОД ИДЕНТИФИКАЦИИ ПРОИЗВОДСТВА
ОС

ДОКУМЕНТ НА ПОВЕРКУ
МП-421/01-2022

ИНТЕРВАЛ МЕЖДУ ПОВЕРКАМИ **1 год**

Тип средств измерений утвержден приказом Федерального агентства по техническому регулированию и метрологии **от 30 июня 2022 г. N 1603.**

Заместитель Руководителя

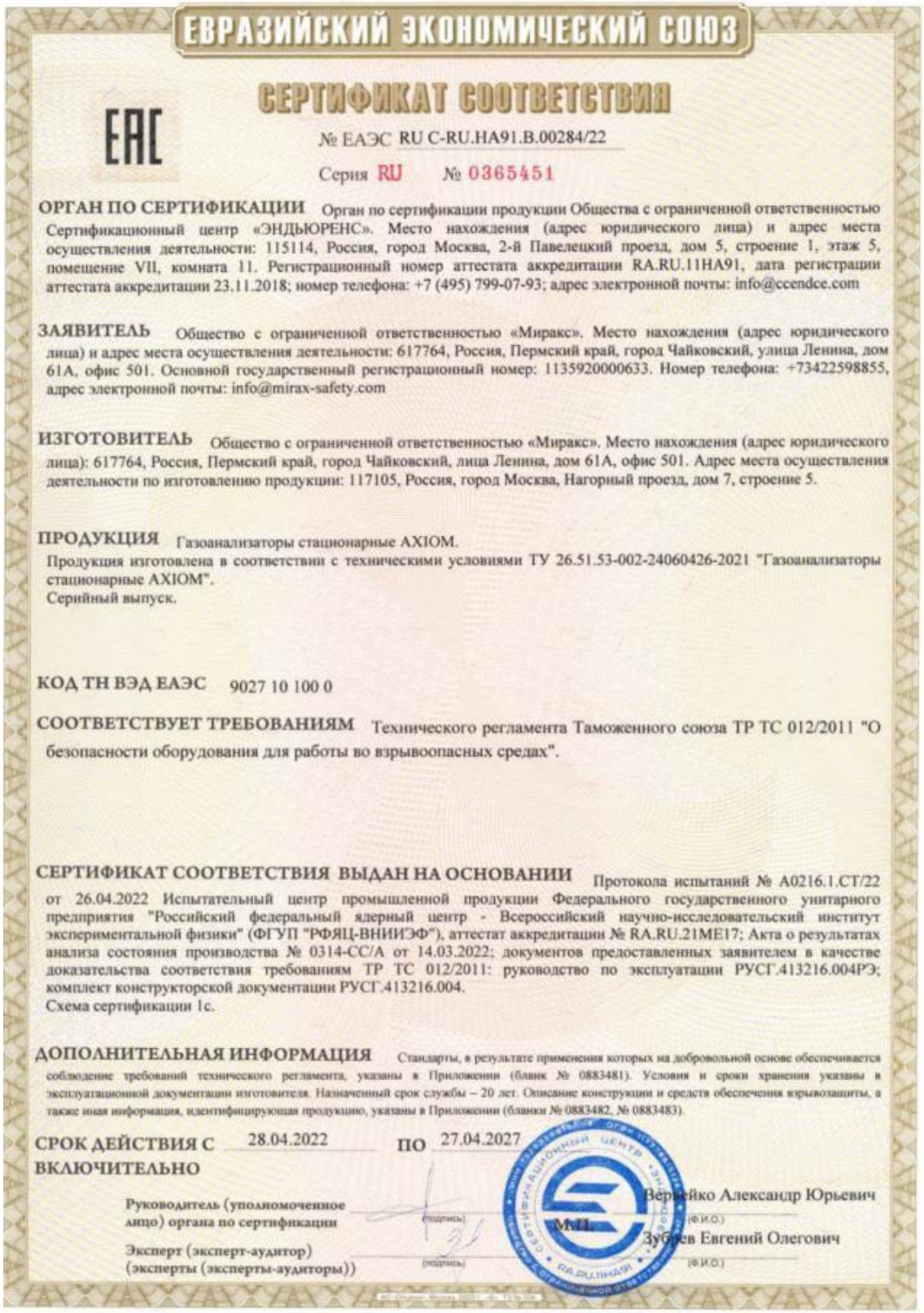
Подлинник электронного документа, подписанного ЭП, хранится в системе электронного документооборота Федерального агентства по техническому регулированию и метрологии.
СВЕДЕНИЯ О СЕРТИФИКАТЕ ЭП
Сертификат: 02ABCAC000FAAD21844EF916F2181860D8
Кому выдан: Потемкин Борис Михайлович
Действителен: с 10.12.2021 до 10.12.2022

Б.М.Потемкин

«18» июля 2022 г.

Appendix B

Certificate of Conformity to CU TR 012/2011



ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

EAC

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЕАЭС RU C-RU.HA91.B.00284/22

Серия RU № 0365451

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации продукции Общества с ограниченной ответственностью Сертификационный центр «ЭНДЬЮРЕНС». Место нахождения (адрес юридического лица) и адрес места осуществления деятельности: 115114, Россия, город Москва, 2-й Павелецкий проезд, дом 5, строение 1, этаж 5, помещение VII, комната 11. Регистрационный номер аттестата аккредитации RA.RU.11HA91, дата регистрации аттестата аккредитации 23.11.2018; номер телефона: +7 (495) 799-07-93; адрес электронной почты: info@ccendce.com

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Миракс». Место нахождения (адрес юридического лица) и адрес места осуществления деятельности: 617764, Россия, Пермский край, город Чайковский, улица Ленина, дом 61А, офис 501. Основной государственный регистрационный номер: 1135920000633. Номер телефона: +73422598855, адрес электронной почты: info@mirax-safety.com

ИЗГОТОВИТЕЛЬ Общество с ограниченной ответственностью «Миракс». Место нахождения (адрес юридического лица): 617764, Россия, Пермский край, город Чайковский, лица Ленина, дом 61А, офис 501. Адрес места осуществления деятельности по изготовлению продукции: 117105, Россия, город Москва, Нагорный проезд, дом 7, строение 5.

ПРОДУКЦИЯ Газоанализаторы стационарные AXIOM.
Продукция изготовлена в соответствии с техническими условиями ТУ 26.51.53-002-24060426-2021 "Газоанализаторы стационарные AXIOM".
Серийный выпуск.

КОД ТН ВЭД ЕАЭС 9027 10 100 0

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ Технического регламента Таможенного союза ТР ТС 012/2011 "О безопасности оборудования для работы во взрывоопасных средах".

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ Протокола испытаний № А0216.1.СТ/22 от 26.04.2022 Испытательный центр промышленной продукции Федерального государственного унитарного предприятия "Российский федеральный ядерный центр - Всероссийский научно-исследовательский институт экспериментальной физики" (ФГУП "РФЯЦ-ВНИИЭФ"), аттестат аккредитации № RA.RU.21ME17; Акта о результатах анализа состояния производства № 0314-СС/А от 14.03.2022; документов предоставленных заявителем в качестве доказательства соответствия требованиям ТР ТС 012/2011: руководство по эксплуатации РУСГ.413216.004РЭ; комплект конструкторской документации РУСГ.413216.004.
Схема сертификации 1с.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Стандарты, в результате применения которых на добровольной основе обеспечивается соблюдение требований технического регламента, указаны в Приложении (бланк № 0883481). Условия и сроки хранения указаны в эксплуатационной документации изготовителя. Назначенный срок службы – 20 лет. Описание конструкции и средств обеспечения взрывозащиты, а также иная информация, идентифицирующая продукцию, указаны в Приложении (бланки № 0883482, № 0883483).

СРОК ДЕЙСТВИЯ С 28.04.2022 **ПО** 27.04.2027 **ВКЛЮЧИТЕЛЬНО**

Руководитель (уполномоченное лицо) органа по сертификации (подпись) Верейко Александр Юрьевич (Ф.И.О.)

М.П.

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Зубарев Евгений Олегович (Ф.И.О.)

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

лист 1

ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-RU.HA91.B.00284/22

Серия RU № 0883481

Сведения о стандартах, применяемых на добровольной основе для соблюдения требований технического регламента Таможенного союза ТР ТС 012/2011 "О безопасности оборудования для работы во взрывоопасных средах"

Обозначение стандартов	Наименование стандартов
ГОСТ 31610.0-2014 (IEC 60079-0:2011)	Взрывоопасные среды. Часть 0. Оборудование. Общие требования.
ГОСТ IEC 60079-1-2011	Взрывоопасные среды. Часть 1. Оборудование с видом взрывозащиты "взрывонепроницаемые оболочки "d"
ГОСТ 31610.11-2014 (IEC 60079-11:2011)	Взрывоопасные среды. Часть 11. Оборудование с видом взрывозащиты "искробезопасная электрическая цепь "i"

Руководитель (уполномоченное лицо) органа по сертификации (подпись) Воронько Александр Юрьевич (Ф.И.О.)

М.П.

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Зубрев Евгений Олегович (Ф.И.О.)

ПРИЛОЖЕНИЕ

К СЕРТИФИКАТУ СООТВЕТСТВИЯ № ЕАЭС RU C-RU.HA91.B.00284/22

Серия RU № 0883482

1. НАЗНАЧЕНИЕ И ОБЛАСТЬ ПРИМЕНЕНИЯ

Газоанализаторы стационарные AXIOM (далее – газоанализаторы) предназначены для измерения и передачи информации о содержании горючих газов и паров горючих жидкостей (в том числе газов, образованных в результате испарения горючих жидкостей таких как керосин, бензин, дизельное топливо), токсичных газов и кислорода в воздухе рабочей зоны, технологических газовых средах, промышленных помещений и открытых пространств промышленных объектов, трубопроводах и воздуховодах; и подачи предупредительной сигнализации о превышении установленных пороговых значений.

Область применения - взрывоопасные зоны помещений и наружных установок, в соответствии с присвоенной маркировкой взрывозащиты, требованиями ГОСТ IEC 60079-14-2013 и отраслевых Правил безопасности, регламентирующих применение данного оборудования во взрывоопасных зонах.

2. ОСНОВНЫЕ ТЕХНИЧЕСКИЕ ДАННЫЕ

2.1 Основные технические характеристики газоанализаторов приведены в Таблице 2.1

Таблица 2.1

Наименование параметра	Значение
Ex-маркировка по ГОСТ 31610.0-2014 (IEC 60079-0:2011)	1Ex d [ia Ga] IIC T6 Gb X
Напряжение питания постоянного тока, В	от 12 до 36
Максимальное напряжение постоянного тока, U_m, В	36
Степень защиты от внешних воздействий, обеспечиваемая оболочкой по ГОСТ 14254-2015 (IEC 60529:2013)	IP66/IP67
Диапазон температур окружающей среды при эксплуатации, °С:	от минус 60 до плюс 65 от минус 40 до плюс 65 от минус 55 до плюс 60

3. ОПИСАНИЕ КОНСТРУКЦИИ И СРЕДСТВ ОБЕСПЕЧЕНИЯ ВЗРЫВОЗАЩИТЫ

3.1 Описание конструкции

Конструктивно газоанализатор выполнен в металлическом корпусе с крышкой. Корпус газоанализатора имеет резьбовые вводы. Четыре ввода кабелей и кабелепроводов, расположенные по обеим сторонам верхней части корпуса газоанализатора, предназначены для подключения источника питания, сигнальных выходов. Нижний ввод обеспечивает подключение Smart-сенсора газоанализатора. В корпус газоанализатора встроены проушины, которые позволяют использовать различные варианты монтажа. На крышке корпуса имеется стеклянное окно, которое позволяет визуально наблюдать за состоянием прибора в виде светодиодной и цифровой индикации, а также позволяет использовать магнитный ключ для активации трех магнитных переключателей, расположенных на передней панели электронного модуля. Для предотвращения откручивания крышки предусмотрен стопорный винт. Smart-сенсор газоанализатора состоит из измерительного сенсора и электронной платы. Функция сенсора – обнаружение целевого газа, преобразование концентрации газа в цифровой сигнал и передача этого сигнала в электронный модуль. Дополнительно сенсор оснащается насадкой от влаги и пыли. Допускается замена сенсора в условиях эксплуатации без снятия напряжения питания на газоанализатор.

3.2 Описание средств обеспечения взрывозащиты

Взрывозащищенность газоанализаторов обеспечивается видом взрывозащиты "взрывонепроницаемые оболочки "d" по ГОСТ IEC 60079-1-2011,"искробезопасная электрическая цепь "i" по ГОСТ 31610.11-2014 (IEC 60079-11:2011), а также выполнением конструкции в соответствии с ГОСТ 31610.0-2014 (IEC 60079-0:2011).

4. СПЕЦИАЛЬНЫЕ УСЛОВИЯ ПРИМЕНЕНИЯ «X»

Знак «X» в маркировке взрывозащиты газоанализаторов указывает на специальные условия применения, заключающиеся в следующем:

- подсоединение внешних электрических цепей должно осуществляться с помощью сертифицированных в соответствии с ТР ТС 012/2011 кабельных вводов с видом взрывозащиты "взрывонепроницаемая оболочка "d", с подгруппой IIC, со степенью защиты IP и диапазоном температур окружающей среды, не ниже указанной для газоанализатора. Неиспользуемые отверстия должны быть закрыты заглушками с аналогичными параметрами;
- существует риск разряда статического электричества на поверхности влагозащитной насадки сенсора газоанализатора. Для очистки указанной части необходимо использовать только чистую влажную ветошь.

Руководитель (уполномоченное лицо) органа по сертификации _____ (подпись) Вервейко Александр Юрьевич (Ф.И.О.)

М.П.

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) _____ (подпись) Зубрев Евгений Олегович (Ф.И.О.)

Appendix C

Declaration of Conformity to CU TR 020/201

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

ДЕКЛАРАЦИЯ О СООТВЕТСТВИИ

Заявитель: ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "МИРАКС", Место нахождения: 617764, РОССИЯ, Пермский край, г Чайковский, городской округ Чайковский, улица Ленина, дом 61А, офис 501, ОГРН: 1135920000633, Номер телефона: +7 3422598855, Адрес электронной почты: info@mirax-safety.com

В лице: ГЕНЕРАЛЬНЫЙ ДИРЕКТОР ШАШОВ АНТОН АНДРЕЕВИЧ

заявляет, что Газоанализаторы стационарные AXIOM, Газоанализаторы стационарные AXIOM

Изготовитель: ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "МИРАКС", Место нахождения: 617764, РОССИЯ, Пермский край, г Чайковский, городской округ Чайковский, улица Ленина, дом 61А, офис 501, Адрес места осуществления деятельности по изготовлению продукции: 117105, Россия, город Москва, Нагорный проезд, дом 7, строение 5, этаж 3, №300

Документ, в соответствии с которым изготовлена продукция: Продукция изготовлена в соответствии с ТУ 26.51.53-002-24060426-2021 «Газоанализаторы стационарные AXIOM»

Коды ТН ВЭД ЕАЭС: 9027101000

Серийный выпуск,

Соответствует требованиям ТР ТС 020/2011 Электромагнитная совместимость технических средств

Декларация о соответствии принята на основании протокола 083-01-22/12-ЦТ выдан 19.01.2022 испытательной лабораторией "Испытательная лаборатория "Научно-исследовательский испытательный центр "Циркон-тест" ООО "ПрофНадзор""; Схема декларирования: 1д;

Дополнительная информация Стандарты и иные нормативные документы: ГОСТ 30969-2002 (МЭК 61326-1:1997), "Совместимость технических средств электромагнитная. Электрическое оборудование для измерения, управления и лабораторного применения. Требования и методы испытаний", раздел 4, подразделы 6.2, 6.5 и 7.2; Условия и сроки хранения: Условия хранения продукции в соответствии с требованиями ГОСТ 15150-69. Срок хранения (службы, годности) указан в прилагаемой к продукции эксплуатационной документации

Декларация о соответствии действительна с даты регистрации по 24.01.2027 **включительно**

М.П. ШАШОВ АНТОН АНДРЕЕВИЧ

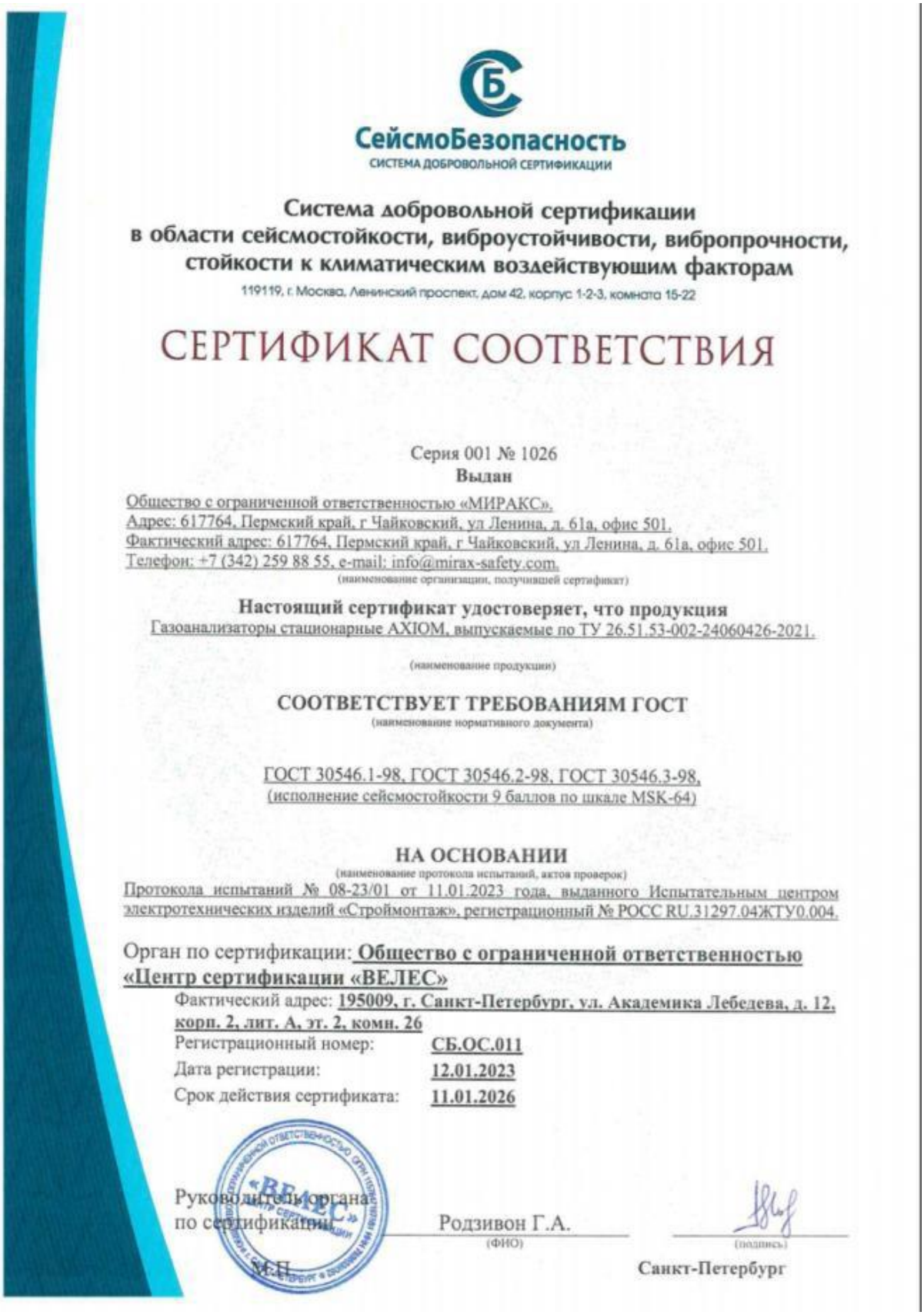
(подпись) (Ф. И. О. заявителя)

Регистрационный номер декларации о соответствии: ЕАЭС N RU Д-RU.PA01.B.31131/22

Дата регистрации декларации о соответствии: 25.01.2022

Appendix D

Seismic Resistance Conformity Certificate



СейсмоБезопасность
СИСТЕМА ДОБРОВОЛЬНОЙ СЕРТИФИКАЦИИ

Система добровольной сертификации в области сейсмостойкости, виброустойчивости, вибропрочности, стойкости к климатическим воздействующим факторам

119119, г. Москва, Ленинский проспект, дом 42, корпус 1-2-3, комната 15-22

СЕРТИФИКАТ СООТВЕТСТВИЯ

Серия 001 № 1026

Выдан

Общество с ограниченной ответственностью «МИРАКС».
Адрес: 617764, Пермский край, г Чайковский, ул Ленина, д. 61а, офис 501.
Фактический адрес: 617764, Пермский край, г Чайковский, ул Ленина, д. 61а, офис 501.
Телефон: +7 (342) 259 88 55, e-mail: info@mirax-safety.com.
(наименование организации, получившей сертификат)

Настоящий сертификат удостоверяет, что продукция
Газоанализаторы стационарные АХІОМ, выпускаемые по ТУ 26.51.53-002-24060426-2021.

(наименование продукции)

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ГОСТ
(наименование нормативного документа)

ГОСТ 30546.1-98, ГОСТ 30546.2-98, ГОСТ 30546.3-98,
(исполнение сейсмостойкости 9 баллов по шкале MSK-64)

НА ОСНОВАНИИ
(наименование протокола испытаний, актов проверок)
Протокола испытаний № 08-23/01 от 11.01.2023 года, выданного Испытательным центром электротехнических изделий «Строймонтаж», регистрационный № РОСС RU.31297.04ЖТУ0.004.

Орган по сертификации: **Общество с ограниченной ответственностью «Центр сертификации «ВЕЛЕС»**
Фактический адрес: **195009, г. Санкт-Петербург, ул. Академика Лебедева, д. 12, корп. 2, лит. А, эт. 2, комн. 26**
Регистрационный номер: **СБ.ОС.011**
Дата регистрации: **12.01.2023**
Срок действия сертификата: **11.01.2026**

Руководитель органа по сертификации: Родзивон Г.А.
(ФИО) (подпись)

М.П.

Санкт-Петербург

Appendix E

SIL 2 Conformity Certificate

ДОБРОВОЛЬНАЯ СЕРТИФИКАЦИЯ ПРОДУКЦИИ

Система добровольной сертификации в области промышленной и экологической безопасности "Промышленный эксперт"
Зарегистрирована Федеральным агентством по техническому регулированию и метрологии 11.04.2016 г.,
регистрационный №РОСС RU.31485.04ИДЮ0

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ 04ИДЮ101.RU.C04317

Срок действия **с** 27.10.2022 **по** 26.10.2025

№ 1305758

ОРГАН ПО СЕРТИФИКАЦИИ Общества с ограниченной ответственностью «СамараТест». Место нахождения (адрес юридического лица): 443030, РОССИЯ, Самарская область, город Самара, улица Урицкого, дом 19. Адрес места осуществления деятельности: 443030, РОССИЯ, Самарская обл, г Самара, Железнодорожный район, ул. Урицкого, д. 19, комн. 46, 48, 49. Телефон: +7(846)206-03-79. Адрес электронной почты: info@samarasert.ru. Свидетельство о признании компетентности органа по сертификации № РОСС RU.31485.04ИДЮ0.101 от 20.05.2021 года.

ПРОДУКЦИЯ Газоанализаторы стационарные АХІОМ
Продукция изготовлена в соответствии с ТУ 26.51.53-002-24060426-2021 «Газоанализаторы стационарные АХІОМ»
Серийный выпуск

код ОК 034-2014 (КПЕС 2008) 26.51.53

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ НОРМАТИВНЫХ ДОКУМЕНТОВ
ГОСТ Р МЭК 61508-1-2012, ГОСТ Р МЭК 61508-2-2012, ГОСТ IEC 61508-3-2018
Уровень полноты безопасности УПБ2 (SIL2) при ОАС (HFT) = 0.

код ТН ВЭД 9027101000

ИЗГОТОВИТЕЛЬ Общество с ограниченной ответственностью «Миракс»
Юридический адрес: 617764, Пермский край, г. Чайковский, ул. Ленина, д. 61А, офис 501
ИНН: 5920040229

СЕРТИФИКАТ ВЫДАН Общество с ограниченной ответственностью «Миракс»
Юридический адрес: 617764, Пермский край, г. Чайковский, ул. Ленина, д. 61А, офис 501
Телефон: +7 (342) 259 – 88 – 55. E-mail: info@mirax-safety.com
ИНН: 5920040229

НА ОСНОВАНИИ протокола испытаний № 249-22/10 от 26.10.2022 года, выданного испытательным центром Электротехнических изделий «Строймонтаж» Закрытого акционерного общества Научно-производственный центр «СТРОЙМОНТАЖ»

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ Схема сертификации: 3с

М.П.

Руководитель органа Подпись **А.М. Кузнецов** инициалы, фамилия

Эксперт Подпись **Ф.Ю. Зубков** инициалы, фамилия

Revision Record Sheet

Revision Record Sheet									
Rev.	Sheet numbers				Total sheets in the doc.	Document No.	Reference No. of accompanying document and date	Sign.	Date
	Revised	replaced	new	canceled					