

FPA Operation Manual

1 Danger and warning

For personnel and product safety please read the contents of this operating manual carefully before installation. The manufacturer shall not be held responsible for failure to comply with the instructions in this manual.

Check the following points as soon as you receive the FPA package:

- the packing is in good condition;
- the product has not been damaged during transit;

Disclaimer: actual product appearance may vary in accordance with latest design modification, that does not anyhow influence product performance.

Risk of electrocution, burns or explosion:

- the device must be installed and serviced only by qualified personnel;
- prior to any work on or in the device, switch off the power supply. The product needs to be mounted offline;
- always use an appropriate voltage detection device to confirm the absence of voltage;

Risk of false triggering:

- It is necessary to turn off the system before paintwork

2 Technical data

FPA sensor is designed to detect the threshold concentration of the signal gas, as well as the products of thermal decomposition of the insulation in the volume of the protected object. The sensor is addressable.

Parameter	FPA/0.1/0.3/1	FPA(4S)
Supply voltage	12-28V DC (24 V DC is nominal)	
For electrical panel with volume of, m ³ :	0.1/0.3/1	>1
Current consumption, not more than	50 mA	200 mA
Maximum number of corded sensors	-	4
Maximum cable length of the corded sensors	-	7 meters
Type of sensitive element	metal-oxide semiconductor heated sensor	
Interfaces	RS-485 communication line discrete dry contact output "ALARM"	
RS-485 communication line data exchange rate	9600 bps	
Service interfaces	UART	
Mounting	DIN rail	
Mass, not more than	90 g	300 g
Operating temperature	-10 °C ... +60 °C	
Storage temperature	-15 °C ... +60 °C	
Housing material	ABS plastic	
Service life, not less than	10 years	

Notes:

FPA is not a measuring tool, it does not require metrological verification or calibration procedures

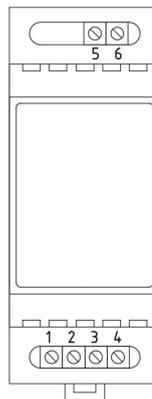
FPA has reverse polarity protection

FPA self-calibrates when turning on and in the process of operation

FPA is not intended for outdoor electric equipment or electrical panel with forced ventilation

The data exchange between the FPA sensors and the Fire Prevention Concentrator of the FIPRES system is carried out via the digital communication line.

FPA/0.1/0.3/1



- 1 – RS-485 (A)
- 2 – RS-485 (B)
- 3 – power supply 24 V (-)
- 4 – power supply 24 V (+)
- 5, 6 – discrete output (dry contact)

FPA(4S)



- 1,2,3 - remote gas sensor 1 (-, signal (S), +)
- 4,5,6 - remote gas sensor 2 (-, signal (S), +)
- 7,8,9 - remote gas sensor 3 (-, signal (S), +)
- 10,11,12 - remote gas sensor 4 (-, signal (S), +)
- 13, 14 - dry contact output
- 15,18 - power supply 24 V (+,-)
- 16,17 - communication line RS-485 (A,B)

Corded sensor

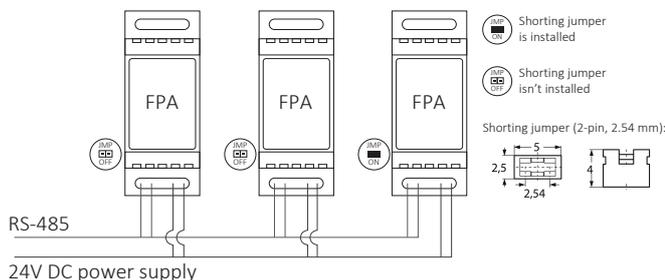


If you have no 24V DC power supply, using additional power supply unit is required:
 Input: 110-220V AC
 Output: 24V DC
 Rated power: based on the fact that FPA24/X consumes 1W, FPA(4S) with 4 corded sensors consumes 5W
 Mounting: on DIN-rail

3 Installation

FPA sensor is installed in the object of protection together with the rFPT (in the same volume). In the volume of the protected object, one FPA is installed. If possible, the FPA sensor should be placed in close proximity to the accumulation sites of the installed rFPT. Preferably, the FPA is mounted in the upper part of the protected switchgear compartment so that its optical indicators are accessible for visual inspection.

The FPA is mounted on a galvanized steel or aluminum DIN rail of TN35 type in accordance with IEC 60715. During the installation work, ensure that the mounted elements of the sensor do not damage vital elements.



For communication lines and power supply of FPA sensors it is allowed to use combined cable of U / UTP, FTP or STP type according to ISO / IEC 11801 or separate cables with copper conductors with a section of not less than 0.125 mm². When using multiwire cables, cable lugs should be used. It is allowed to use cables with non-twisted conductors with a communication line length of only up to 50 m. The sensor terminal block of power supply is designed for connecting conductors with a cross section of up to 0.5 mm².

When using a twisted pair cable, it is recommended to comply with the following scheme of the color coding:

- blue + white-blue - 24V power supply "-"
- orange + white-orange - 24V supply "+"
- green - RS-485 (A)
- white-green - RS-485 (B)

The FPA sensor, which is the most remote from the control unit, should be equipped with a terminating resistor.

When arranging communication lines, it is not allowed to apply the star topology. On a practical level separate branches with a branch length of not more than 40 meters are allowed. Terminating (matching) resistors on such separate branches are not required.

In case of laying the communication line on objects with a heavy electromagnetic environment (determined in accordance with the product passport), shielded twisted pair cable should be used. In this case the shield should be grounded at one point.

Use RS-485 repeater in case of the required length of the communication line exceeds 700 meters.

4 First start

Before the first start measurement of supply voltage is needed. Measurements shall meet the requirements 12-28V DC (24V DC is nominal).

During the initial power supply, the procedure of self-calibration and warming up of the FPA sensor takes place, the duration of which is up to 5 minutes. In the warm-up and self-calibration mode, the optical indicator (OI) of the FPA sensor flashes in green with a period of 0.5 s. After the warm-up and self-calibration procedure, the FPA sensor goes into a standby mode, which is characterized by an even glow of green light with a periodic interruption of the glow for 50 ms at the time of receiving a request over the communication line (the period depends on the interrogation frequency of the communication line).

The alarm mode is characterized by a steady glow of the OI in red with a periodic interruption of the glow for 50 ms at the time of receiving a request over the communication line (the period depends on the frequency of polling over the communication line).

The initial start-up of the FIPRES system after installation provides for self-calibration of the system with subsequent verification of sensor registration data.

Options for changing the sensor address are as follows:

- A:** manually using the button (BTN) located on the FPA board next to the screw terminals of the dry contact;

- B:** via RS-485 network using the commands given in the specification for the Modbus protocol for the sensor;
- C:** dropping to the default address.

A: To change the FPA address manually, follow these steps:

- 1) in standby state of the sensor (steady green light), press and hold the button on the sensor board for at least 10 seconds;
- 2) after changing the color of the OI to red, a pause of 5 seconds will be performed, after which the OI of the sensor will display the current address of the FPA with the equivalent number of flashes;
- 3) after indicating the current address, immediately after the OI has completely gone out, to press the button for the number of times that is equal to the newly set address within 10 seconds;
- 4) after this procedure, the OI of the sensor will repeat the indication of the new current address and the sensor will go into a standby mode.

The control check of the FPA operation is carried out using a canister with the test mixture (supplied on request), followed by checking the addressing of the response.

B: To change the FPA address via Modbus, you need to connect to FPA and write the value of the address (0 ... 127) in the 7777 register.

C: To drop the FPA address to default (1) you need to press and hold the button BTN immediately after power up. At the same time, the sensor OI will turn red for 3 seconds (at this moment the button can be released).

«BTN» button is intended for use during installation and commissioning; the use of the button during the current operation of the sensors (normal operation) is not provided. Access to the BTN button requires removal of the sensor housing.

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5 Integration into external systems

The integration of the FIPRES system into external systems can be carried out at three levels:

- A. At the level of each FPA (through the built-in discrete output "ALARM" (dry contact));
- B. At the level of all sensors connected to the RS-485 communication line;
- C. At the level of Fire Prevention Concentrator FPC.

A. The discrete output is a normally open electromechanical relay, which closes when the FPA goes into alarm mode and opens when the FPA returns to the standby mode (READY).

Discrete output "ALARM" can be used to integrate the FPA in the fire alarm system, circuit breaker or any equipment with a discrete input. The connection diagram in this case is determined by the operational and technical documentation for the technical means to which the FPA is connected.

B. For integration at the level of all sensors connected to this RS-485 communication line, Fire Prevention Concentrator (FPC) is excluded from this communication line and replaced by another device acting as a master device in the RS-485 network. The table of Modbus registers is given in Appendix A.

C. Integration at the FPC level is carried out using additional modules that are installed in the FPC case. Installation of modules is carried out on the basis of the order, on the manufacturing site of the manufacturer. In some cases, by agreement, it can be installed on the FPC mounted on the object.

You can find more detailed instructions in FPC Operating Manual or contact the manufacturer.

6 System operation

The normal mode of the system operation is the standby mode (READY). Any other modes (ERROR or ALARM) require intervention by the duty or maintenance personnel.

In standby mode, the FPC monitors the status of the sensors at a predetermined frequency (the polling period is from 100 to 500 ms). If the FPA sensor detects a signal gas or products of thermal insulation instruction in a controlled volume, it switches to the alarm mode and generates an alarm message to be transmitted to the FPC or external system via RS-485 or/and discrete output.

FPA provides the following indication in various modes of operation:

READY: optical indicator glows of green

ALARM: optical indicator glows of red

ERROR: optical indicator flashes of red with a flashing characteristic of 500/500 ms

SETTING UP (self-calibration): optical indicator flashes of green with a frequency of 500/500 ms

PROGRAMMING MODE - depending on the current programming stage, the optical indicator display is only red.

In "READY" and "ALARM" modes, optical indicator intermittent flashes once a 50 ms indicating a connectivity with master device via RS-485.

7 Possible faults and troubleshooting

The FPA sensors can generate false actuation alarms in some cases for the following reasons:

- high concentration of methane in a controlled volume (for example, in case of leaks from the fuel lines of gas piston generators or leaks from process lines);
- paint and varnish works using paint materials based on organic solvents;
- fire near the object of protection.

It is recommended to temporarily disable the system or individual sensors of the system during the production of large-scale repair and construction and painting works.

If the system does not operate correctly, the system should be restarted (by removing the supply voltage from the electronic components of the system), and then the following checks should be performed:

- check the value of the power supply voltage of the FPC and the FPA for compliance with the permissible ranges;
- check the sensitive elements of the FPA for heating- in good condition, they are heated to a temperature of about +60 °C (it is permissible to check by tactile after removing the supply voltage from the FPA sensors, after removing the possible static charge)

8 Appendix A. List of Modbus registers

Register no.	Actions	Register name	Value range	
98	reading only	sensor type	10 – FPA 24/X	FPA 24/X
99	reading only	current state	13 – READY 18 – ALARM 23 – ERROR	
100	reading only	current value of the concentration of the signal gas (arb. units)	0...1000	
104	reading only	threshold value (arb. units)	250 – FPA 24/0.1 200 – FPA 24/0.3 150 – FPA 24/1	
7777	record only	network device address	1...127	
98	reading only	sensor type	15 – FPA 24/X	FPA 24(4S)
99	reading only	current state	13 – READY 18 – ALARM 23 – ERROR	
100	reading only	Current value of the concentration of the signal gas (arb. units) from remote sensor number 1	0...1000	
101	reading only	Current value of the concentration of the signal gas (arb. units) from remote sensor number 2	0...1000	
102	reading only	Current value of the concentration of the signal gas (arb. units) from remote sensor number 3	0...1000	
103	reading only	Current value of the concentration of the signal gas (arb. units) from remote sensor number 4	0...1000	
104	reading only	threshold value (arb. units)	200 – corded sensor	
7777	record only	network device address	1...127	

9 Appendix B. Contact rating of dry contact output

Contact capacity (resistive load)	0.5 A 125 V AC 1 A 30 V DC 0.3 A 60 V DC
Min. permissible load	1 mA at 5 V DC
Rated carrying current	1A
Max. allowable voltage	125 V AC 60 V DC
Max. allowable current	1A
Max. allowable power force	62.5 VA 30W

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