

**FIRE DETECTOR COMBINED SMOKE-THERMAL MAXIMUM-DIFFERENTIAL IP 212/101-12K-A2R "DOKA - ST"**  
Passport БИПЮ 01.439.00.000 IIC (Revision 01.21.RU)

**3. DESIGN AND OPERATING PRINCIPLE**

The detector is an automatic optoelectronic device. Analysis of the optical density inside the measuring chamber by measuring the level of the reflected signal from the surface of the smoke particles and digital processing of the received one. Analysis of the ambient temperature by measuring the resistance of the thermistor located inside the detector, with the first processing of the obtained data. The software algorithm analyzes the digitized data and estimates the level of smoke.

If there is no smoke in sensing chamber, the smoke detector, connected to FCP, will be in "Normal Operation" state. At the same time periodic single red flashes of light indicator should be seen and there should be no signal "Fault / Loop Break Alarm" on FCP.

When measuring smoke appears in the detector chamber and / or the ambient temperature exceeds the threshold value, the electronic circuit generates a "Fire" signal by abrupt change in the detector's current consumption. In the "Fire" state, the indicator light is permanently red (when the detector is connected to a constant current loop) or blinks (when connected to an alternating loop with a frequency determined by FCP). The choice of the value of the current consumption by the detector in the "Fire" state is made by a combination of jumpers 1 and 2 and does not require the installation of an additional resistor. The detector remains in the "Fire" state after the end of exposure to smoke. The detector returns to "Normal mode" when the power is turned off for more than 2 s.

The smoke detector has its own self-testing system to control of operability of its main blocks. The detector continuously analyzes the optical medium inside the sensing chamber and makes compensation of its dust pollution. If the permissible dust pollution level is exceeded, the smoke detector transmits once a day to FCP a short-term notices about dust pollution as a "Fault / Loop Break Alarm" by breaking the loop between contacts "3" and "4" for a period of 4 seconds and keeps light indication of the "Dust in Chamber" state until the sensing chamber is cleaned. At the same time, the smoke detector continues to operate as usual to form and transmit "Fire" signal. After cleaning the sensitive chamber from dust, the transition time of the smoke detector to the "Normal mode" state does not exceed 1 minute.

When diagnosing other types of faults, the smoke detector in the same way transmits to FCP every day a periodic short-term notification of malfunctions as "Fault / Loop Break Alarm" and keeps a light indication of the "Fault" state until its repair is made.

Any transitions of the smoke detector to the "Fire", "Fault" and "Dust in Chamber" states are recorded in the detector's memory. If these states are reset then the presence of an event in the detector's memory is indicated by a light indication of the state "Event in Memory". This state differs from the "Normal Operation" state only by indication. To erase an event from the detector's memory, you need to press the "Test" button for more than 8 seconds, and then release it.

In case of loss of operability there will be no light indication. The circuit between the "3" and "4" contacts of the detector will break, which will cause the alarm loop break.

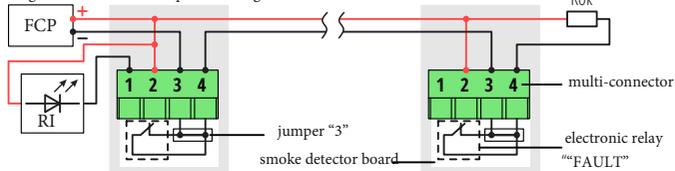
**Forced testing** of the "Fire" and "Fault" states is performed using the "Test" button.

The smoke detector housing is made of shockproof ABS plastic and forms a protective shell

In the front part of the housing there is a chamber with compartments for trapping dust from getting into the optoelectronic system, which allows the smoke detector to be used even in industrial conditions.

The smoke detector is shielded from static electricity and electromagnetic interference. The base is used to install and connect the smoke detector. The smoke detector is removed and pushed into the base without the use of a special tool.

The smoke detector is connected to external circuits via a multi-connector according to the wiring diagram\*. It has electrical protection against incorrect connection.



\* - This wiring diagram is standard. For detailed connection instructions visit [www.dokasensors.by](http://www.dokasensors.by)

**4. INDICATION AND INTERACTIVITY**

DOKA-CT		Interactive mode*	
State	Indicator	DOKA - CT Contacts "3" - "4"	FCP AL state
Normal mode	1 flash every 8 sec.±2 sec.	Closed	Normal
Fire	Is on all the time	Closed	Attention / Fire
Fault	2 flashes every 4 ± 1 sec.	Open for 4 sec. (no more than 1 time per day)	Fault
Dust in chamber	3 flashes every 4 ± 1 sec.	Open for 4 sec. (no more than 1 time per day)	Fault
Event in memory (there were states "Fire" and / or "Fault", but were reset)	1 flash every 4 ± 1 sec.	Closed	Normal
Loss of operability	No indication	Ambiguous	One of three

\* - the interactive mode is activated by removing the jumper "3" and is possible if it is correctly connected to FCP according to the instructions on the DOKASENSORS.by website  
If jumper "3" is installed, then "DOKA-CT" works with FCP as a normal detector.

**1. IMPORTANT INFORMATION**

**INTRODUCTION**

This document contains information on the principle of operation, design and technical characteristics of the fire detector combined smoke and heat maximum differential IP 212/101-12K-A2R "DOKA-ST" (hereinafter - the detector).

The document contains instructions necessary for correct installation, connection, operation, technical maintenance, storage and transportation of the product, reliable manufacturer's guarantees.

The detector meets all the requirements of TY BY 10016872.099-2020, ГОСТ P 53325.

The principles of operation and design solutions of the detector are the intellectual property of ZAVOD SPECAVTOMATIKA JSC.

The following abbreviations are used in this document:

EOSD - external optical signaling device;

IR - infrared; AL - alarm loop;

FCP - a fire control panel; SW - software.

**APPLICATION**

The detector is installed in closed rooms for continuous round-the-clock detection of fires accompanied by the appearance of smoke and / or exceeding the threshold temperature value, as well as when the rate of rise of the ambient temperature exceeds the set threshold value, followed by transmission of the "Fire" and "Fault" signals to the FCP via a two-wire AL.

The detector provides:

- automatic smoke detection by analyzing the optical density of the environment in the protected premises up to 85 m<sup>3</sup>;
- automatic detection when the ambient temperature reaches 54 ~ 70 ° C;
- constant testing of their own performance;
- control and compensation of dustiness in the measuring chamber;
- light indication of their states: "Standby mode", "Fire", "Malfunction", "Dust", "Event in memory";
- confirmation of the specified states for any FCP using standard functions of work with two-wire loop ("Norm", "Attention and / or Fire", "Fault / AL break") \*;
- the ability to quickly identify a faulty detector by events on the FCP and light indication on this detector and / or on the EOSD.

\* - turns on and off on each detector.

**SAFETY**

The design of the detector complies with the general safety requirements in accordance with GOST 12.2.003 and does not contain elements that have a harmful effect on human health and environment.

According to the method of protecting from electric shock, the detector belongs to class III products according to GOST 12.2.007.0 and does not have internal and external electrical circuits with voltages above 42V.

**2.SMOKE DETECTOR INTRODUCTION**

**2.1. Open the package**

! If the detector was in conditions of negative temperatures, keep it for at least 4 hours at the temperature of the heated room

**2.2. Disconnect the smoke detector from base and check the package contents:**



Package contents includes:

- Detector IP 212/101-12K-A2R "DOKA-ST"
- Technical Instruction
- Package
- Wall dowel and screw

psc.T

1

1\*

1\*

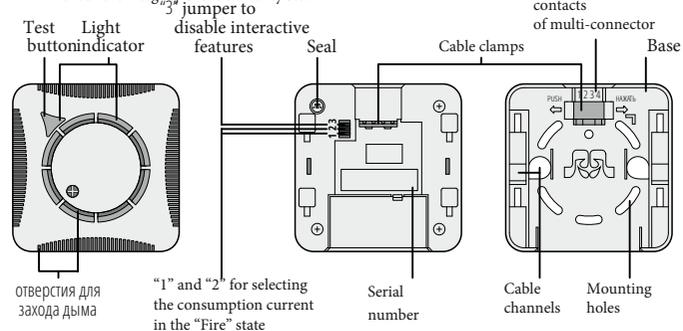
2\*\*

\* - 1 pc is allowed for 5 detectors;

\*\* - at the request of the customer.

**2.3. Read and understand the design of the smoke detector**

- compare the serial number and date of manufacture on the label with the characteristics in the passport;
- make sure there are no visible mechanical damages (cracks, chips, dents);
- check the integrity of the warranty seal.



**"Normal mode" state**

One flash of the light indicator every 8 ± 2 seconds means proper operation of the smoke detector. Also, in the event log on FCP there should be no messages about the breakdown of AL to which this smoke detector is connected.

**"Fire" state**

The indicator light is constantly on when the detector is connected to a constant current loop or blinks when it is connected to an AL with a frequency determined by FCP.

**"Fault" state**

- There are 2 flashes of the light indicator every 4 ± 1 seconds
- FCP generates a signal "Fault / Break Loop Alarm" once a day for a time of about 4 seconds as the "Fault" relay between the contacts "3" and "4" of the faulty smoke detector opens for this time. Then the relay closes, and the message that this AL is in "Normal" mode is displayed on FCP. The faulty smoke detector must be repaired!

**"Dust in Chamber" state**

- There are 3 flashes of the light indicator every 4 ± 1 seconds
- FCP once a day gives a signal "Fault / Break Loop Alarm" for about 4 seconds, and then switches to "Normal mode". The detector requires cleaning (blowing with compressed air) of the measuring chamber because in this state, the probability of a false transition of the detector to the "Fire" state increases!

**"Event in Memory" state**

- There are 1 flash of the light indicator every 4 ± 1 seconds.
  - differs from the "Normal mode" state only by indication.
- !! If there is no any indication the smoke detector is subject to repair as soon as possible

**5. INSTALLATION AND CONNECTION**

**5.1. Placement**

The placement of detectors should be carried out in accordance with the project, taking into account the requirements of TKP 45-2.02-190 "Fire automation of buildings and structures" and the following recommendations:

- Install as far as possible from sources of electromagnetic interference (electrical wiring, fluorescent lamps, etc.) and IR radiation (thermal devices)
- There should be no emission of gases, vapors and aerosols at the installation sites that can cause corrosion and false alarms of the detector.

- Eliminate the possibility of water entering the housing and its flowing into the base

**5.2. Wiring**

Carry out the wiring, taking into account the connection diagram and the design features of the detector. All types and brands of cables and wires may be used with a maximum cross-sectional area of 1.5 mm<sup>2</sup>.

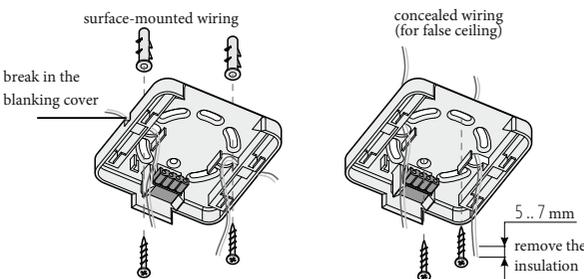
Leave the necessary supply of wires to connect the base.

When laying the cable at the points of connection to the base, add a mark (marker) to the cable, which will designate that part of the loop that goes in the direction from FCP ("Entrance" of the loop) \*.

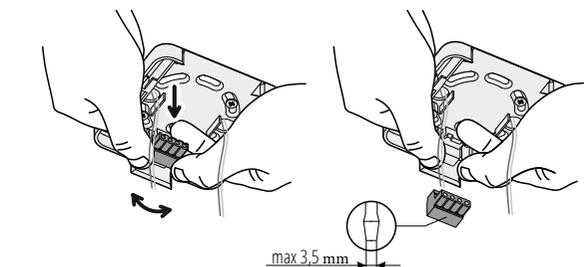
\* - makes sense only when using the detector in interactive mode.

**5.3. Base installation**

Depending on the method of cable installation, select the holes in the base for the wires, as shown in the figures. Attach the base to the installation site and mark the location of any two opposite mounting holes. Make holes and fix the base on a flat surface (if the surface is not even, the base may deform and the detector will not slide into the base).



To connect the base to the AL, disconnect the multi-connector as shown in the figure. Connect the wires according to the diagram using a screwdriver.



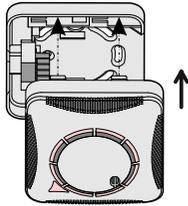
After connecting insert the multi-connector into the base and lay all the wires carefully

#### 5.4. The smoke detector installation

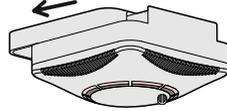
Set the current consumption by the detector in the "FIRE" state with jumpers "1" and "2". See the website [www.dokasensors.by](http://www.dokasensors.by) for personal recommendations on setting up for different FCP.

Consumption in "Fire" state, mA	6±1	10±1	15±1	19±2
Jumper "1"	-	+	-	+
Jumper "2"	-	-	+	+

Align the detector with the base



Slide the smoke detector with a low force to the till the complete connection with the base is done.



- !! If the smoke detector is not snapped in base, then control if
- wires interfere;
  - multi-connector inserted incorrectly;
  - the base is deformed due to installation on an uneven surface

! During the construction process, it is necessary to protect the smoke detector from building materials and dust.

#### 5.5. Functionality test

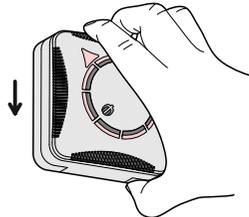
The relay between the "3" and "4" contacts of the detector closes only if a power supply is supplied from FCP or from any power source with voltage 9...24 V. Therefore, to check the continuity of AL connect it to FCP or power supply and visually check that the smoke detectors have a light indication of the "Normal Operation" state.

The operation of all smoke detector states is checked using the "Test" button:

- Press the "Test" button for the period of no more than 2 seconds and release. The smoke detector switches to the "Fire" state. Make sure that FCP will generate a "Fire" and "Attention" signal.
- Press the "Test" button for more than 3 seconds and release. The smoke detector switches to the "Fault" state. Make sure that FCP will generate a "Fault / Break Loop Alarm" signal. In about 8 seconds, the smoke detector will return to "Normal Operation" state, and FCP will display the message that AL is "Normal"

**5.6. Pay an attention on how it is more convenient to remove the smoke detector from the base when the base is already fixed**

Position your hand as shown in the figure or in a similar way and pull the smoke detector, resting your thumb against the base.



#### 6. MAINTENANCE OPERATIONS

Event log on FCP	Indicator	Summary of Actions*
There are no "Fault / Break Loop Alarm" messages	1 flash every 8 ± 2sec.	No maintenance required.
One or more messages in the event log on FCP about breaks in AL for a period of about 4 seconds, followed by the return of AL to "Normal"	2 flashes every 4 ± 1 sec.	Replace the detector. Send defective for repair.
	3 flashes every 4 ± 1 c	Clean the sensing chamber or replace the detector. After cleaning, the smoke detector switches to the "Normal Operation" state after about 1 minute.
False alarm message	1 flash every 4 ± 1 sec.	The smoke detector diagnosed its own fault. This state was reset, but the event and type of fault were recorded in the detector's memory. This smoke detector is subject to repair
	1 flash every 4 ± 1 sec.	The smoke detector switched to the "Fire" state. This state was reset, but the event was recorded in the detector's memory. Replace the detector if you are sure that it was a false alarm. Otherwise, delete the event from the detector's memory by holding the "Test" button for more than 8 seconds
AL at break constantly	No indication	Find the first smoke detector in AL that has no indication and disconnect it from the base. Check for power on the multi-connector. If there is no voltage, then replace the previous smoke detector in this AL. Make sure voltage appears. Slide the smoke detector into the base and check the indication of the "Normal Operation" state on all detectors in this AL. Make sure that there are no fault signals on FCP.

\* - the scope of these works is advisory. The manufacturer guarantees the performance of all interactive functions of the detector with the jumper "3" removed, correct connection and visual control of the presence of the "Normal mode" status indication in accordance with the regulated work schedule.

#### Sensing chamber cleaning

Blow through the smoke inlet holes for 1 minute from all sides with compressed air (0.5 ... 3 kg / cm<sup>2</sup>).

If the purge did not solve the problem, then clean the sensing chamber by disassembling the smoke detector according to the video instruction on the website

! In case of false transitions to the "Fire" state, it is necessary to carry out an unscheduled cleaning of the measuring chamber of the detector from dust or send it for repair.

! After carrying out maintenance and (or) removing / installing the detector, perform its testing (see 5.5. Functional check).

! When carrying out construction work, the detectors must be protected from the ingress of building materials and dust.

#### 7. TRANSPORTATION AND STORAGE

- The smoke detectors should be transported in a package by any type of transport in accordance with the shipping rules applicable to this type of transport.
- During loading, unloading and transportation the smoke detectors should not be exposed to sharp shocks and precipitation.
- Installation and fixing of the smoke detectors on the vehicle must exclude their movement.

- Transportation conditions must comply with storage conditions 5 GOST 15150.
- The detectors must be stored in packages in a heated and ventilated storage areas on the racks at temperatures from +5 °C to +40 °C and relative humidity of not more than 80% at 25 °C (storage conditions 1 according to GOST 15150).
- Warranty storage period is 12 months from the date of manufacture.

#### 8. MANUFACTURER WARRANTY

- The manufacturer guarantees the compliance of the detectors with the requirements of the technical conditions, provided that the consumer observes the conditions of transportation, storage, installation, operation.
- The warranty operation period is 18 months from the date of commissioning of the smoke detector.
- The warranty storage period is 12 months from the date of manufacture, if the conditions of section 7 are met.
- Smoke detectors that have a discrepancy with the technical specifications during the warranty period shall be restored at the manufacturer's expense.
- Detectors that have no mechanical impact and that have undamaged warranty seal shall be subject to warranty.

#### 9. DISPOSAL CONSIDERATIONS

The detector does not pose a danger to life, health of people and environment. After the end of its service life, the detector is disposed of without any special environmental protection measures. In case of separate collection of solid waste, dispose of with plastic waste.

#### 10. DETECTOR OPERATION TIME WHEN THE TEMPERATURE INCREASES

Temperature increase rate, °C / min	Response time, seconds	
	Minimum	Maximum
5	120	500
10	60	242
20	30	130
30	20	100

#### 11. TECHNICAL SPECIFICATIONS

Method of connection to FCP:

- two-wire AL;
- the maximum cross-sectional area of the cable core is 1.5 mm<sup>2</sup>.

Method of interaction with FCP:

- interactive (jumper "3" must be removed);
- standard, with only the "Fire" signal being sent to FCP (jumper "3" is installed).

Characteristic	Unit	Value
Detector sensitivity	dB/m	0.05 - 0.20
Inertia of the detector's transition to the "Fire" state	seconds	≤ 5
Average area controlled by one smoke detector (when height of protected room is less than 3,5 m)	m <sup>2</sup>	≤ 85
Response temperature	°C	54-70
Distance from mounting plane to detector sensing element	mm	> 25
Power supply range*	V	9 ... 24
Nominal supply voltage*	V	12
Consumption current in "Normal mode"	mkA	≤ 65 **
Consumption current in the "Fire" state (set by the position of jumpers "1" and "2")	mA	6±1, 10±1, 15±1, 19±2
Supply disconnection time for "Fire" state reset	seconds	> 2
The smoke detector readiness time after power supply	seconds	5
Resistance value between contacts "3" and "4"	Ohm	≤ 2
Maximum current between contacts "1" and "2"	mA	13
Permissible level of exposure from background illumination	Lx	12000
Protection degree of detector measuring chamber GOST 14254	-	IP40
Operating temperature range	°C	-30 ... +55
Relative air humidity at a temperature of +40 ± 2 °C	%	93 ± 3
Climatic version according to GOST 15150	-	УХЛ 3.1
Resistance to electromagnetic interference	Hardness	3
Detector weight with base	kg	≤ 0.14
Dimensions, no more	mm	90 x 90 x 45
Average service life	years	≥ 10
Mean time between failures	h	≥ 60000

\* - it is allowed to disconnect or reverse the polarity of the supply voltage with a duration of no more than 100 ms with a frequency of no more than 1.5 Hz.

\*\* - an abrupt increase in current of 10 ms duration is allowed synchronously with the flash of the indicator light. Does not affect work with FCP.

! The detector does not contain precious metals.

#### 12. CERTIFICATE OF ACCEPTANCE

Detector IP 212 / 101-12K-A2R "DOKA-ST"

serial no. \_\_\_\_\_, no. \_\_\_\_\_, no. \_\_\_\_\_, no. \_\_\_\_\_,  
No \_\_\_\_\_, corresponds to the technical conditions TY BY 100016872.099-2020 and is recognized as suitable for operation.

Input and technical control was carried out:

Head of Quality Control Department \_\_\_\_\_

Seal, surname, date

#### 13. CONTACTS

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