RUBETEK

MANUAL

ADDRESSABLE OPTICAL SMOKE DETECTOR
SD-1 «RUBETEK»

Table of contents

Introduction

This User Manual is intended to describe the operating principle, configuration, installation and operation of the addressable optical smoke detector SD-1 «RUBETEK» (hereinafter detector).

You must read the instructions in the Manual before linking, configuring, operating or maintaining the detector.

Installation and operation of the detector must be carried out by technical personnel after reading this Manual.

List of abbreviations used:
- Base - detector base DB-1 «RUBETEK»;
- CP - addressable fire alarm control panel;
- CW - commissioning works;
- DEVs - alarm and notification devices;
- FA - fire alarm;
- Fire 1 - first alarm state;
- Fire 2 - confirmation alarm signal;
- PLC - power line communication;
- SCI - short circuit isolator module;
- SD, detector - addressable optical smoke detector SD-1 «RUBETEK».

1. Description and operation

1.1. Function

Addressable optical smoke detector SD-1 «RUBETEK», is designed for early detection of fires accompanied by smoke in a protected area by measuring the specific absorbance of the medium and transmission of the measured value to addressable fire alarm control panel «RUBETEK» using power line communication.

The detector operates as part of the automatic Rubetek fire alarm, controlled by an addressable fire alarm control panel CP-1 (hereinafter CP).

Functionality of the detector:
- early detection of fire;
- generation of «Fire» and «Fault» alarms;
- automatic device detection in the system;
- testing of the detector from the CP menu;
- monitoring of the functionality;
- dust control;
- monitoring of the current smoke concentration;
- status light indication;
- PLC voltage measurement at the installation site;
- setting in the service mode, without interruption of the link and configuration;
- easy circular attachment to the base;
- protective cover;
- modern design.

1.2. Technical data

Table 1 - The main parameters of the detector

Parameter	Value
Link interface	PLC
Number of occupied address slots	1
Power supply	via PLC
Current consumption, mA	- max 0,17 in Standby mode - max 0,18 in «Fire» mode
Response level, dB/m	from 0,05 to 0,2
Operation temperature range, °C	from - 25 to + 55
Relative air humidity	up to 93% at + 40°C
The degree of protection for the case	IP20
Dimensions, mm	Ø 92 × 42
Weight, g, max	84
Average lifetime, years	10

Average time between failures, h	60000

1.3. Apprearance of the detector

1 - Case cover
2 - LED indicator
3 - Smoke chamber
4 - «Test» button
5 - Device case
6 - Base
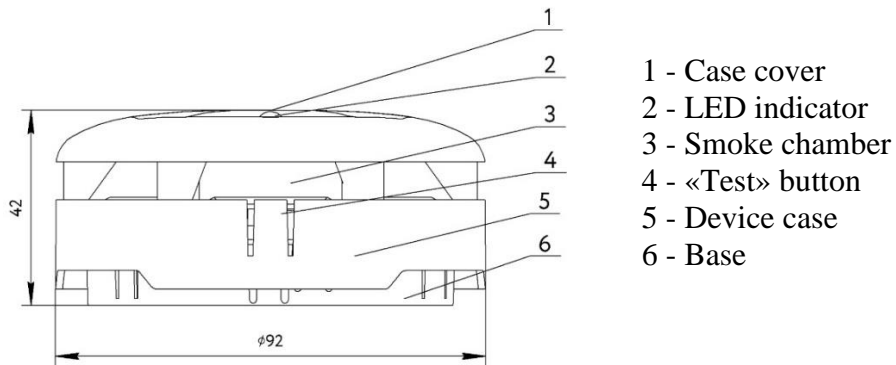
Figure 1 - Appearance of the detector (side view)

1 - Detector case
2 - Detector contacts
3 - Base
4 - Terminals to connect to PLC
5 - Mounting holes
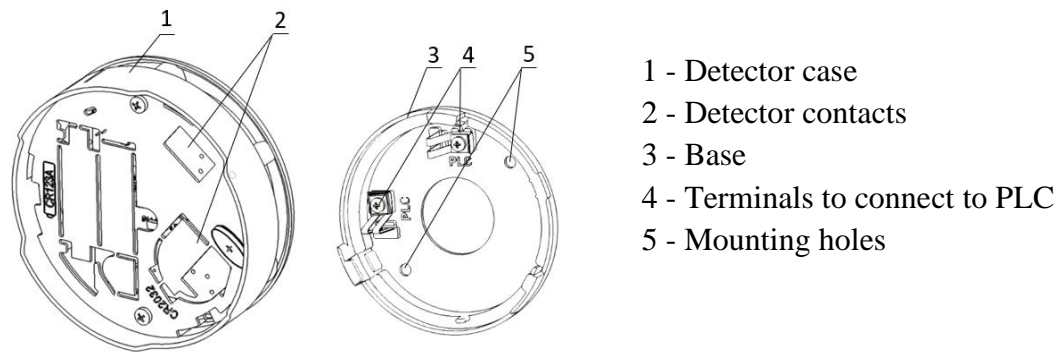
Figure 2 - Appearance of the detector (back view)

1.4. Internal design of the detector

1 - Terminals to connect to PLC
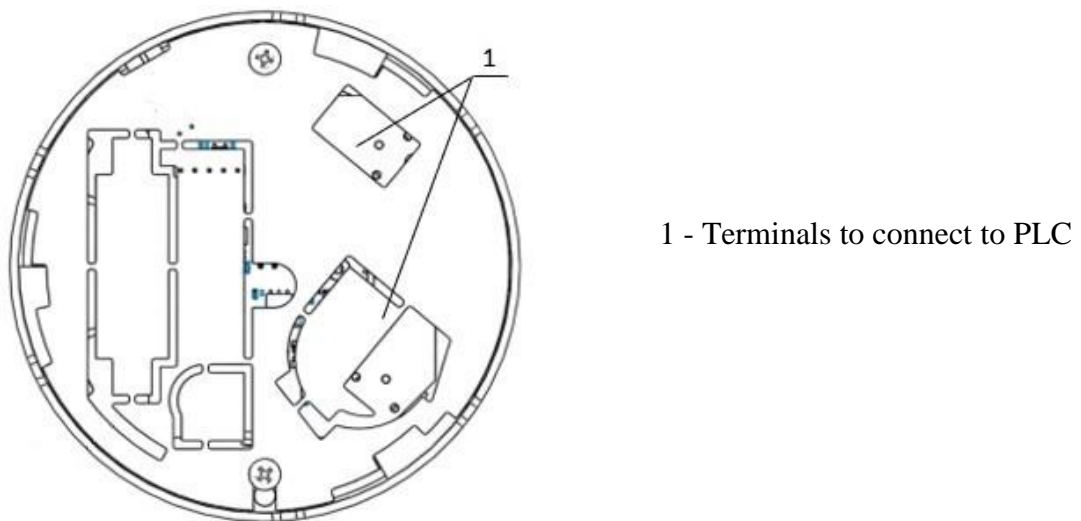
Figure 3 - Internal design of the detector

1.5.   Complete set

Table 2 - Complete set of the detector

Item	Quantity, pcs.	Remarks
Addressable optical smoke detector SD-1 «RUBETEK»	1	
Detector base DB-1 «RUBETEK»	1	Installed on detector
Protective cover	1	Installed on detector
Mounting kit	1	
Individual packing	1	
Datasheet	1*	
Group packaging	1*	

Per shipping lot.

2.   Intended use

2.1.   Preparation for use

⚠ **ATTENTION!** *If the detector was in conditions of negative temperature, keep it at least 4 hours at room temperature (25 ± 10 ºC) to prevent moisture condensation.*

Open the package, make sure that the completeness of the detector corresponds to table 2.
Conduct an external visual inspection, make sure that there are no visible mechanical damages (chips, cracks, dents) and traces of moisture.
Prepare CP for operation (you may find the complete connection algorithm in the User Manual for CP).

2.2.   Detector location

Do not install a detector:
● outdoors, in places where there is a possibility of water getting on the detector case;
● in a room with a high content of dust, suspensions of building materials in the air, vapors and aerosols that cause corrosion;
● in places with high air currents (for example, near fans, radiators and ventilation ducts);
● near high-frequency communications, power cables, routes.

Basic requirements for the organization of PLC and power lines:

● cable lines must be made with using fire-resistant cables with copper cores, flame retardant for group laying, low-smoke fire-resistant (LSFR) or halogen-free (HFFR);
● the maximum length of the PLC from the CP to the final device shall not exceed 800 meters with a nominal wire cross-section of 0.35 to 1 mm^2;
● nominal wire cross-section of the power line from 0,75 mm^2 to 1,5 mm^2.

2.3. Installation

! **ATTENTION!** *All PLC lines are connected prior to equipment installation.*

- Open the case of the detector. To do this, turn the base of the detector counterclockwise, and with a little effort pull the base of the detector.

- Attach the device base to the selected installation location and mark the mounting holes with a pencil.
- Drill 2 holes.
- Terminate the PLC line at the base mounting location, ensuring the possibility of connecting the PLC to the detector terminals.
- Fasten the detector base to the surface of the PLC line using the mounting kit from the accessory kit.
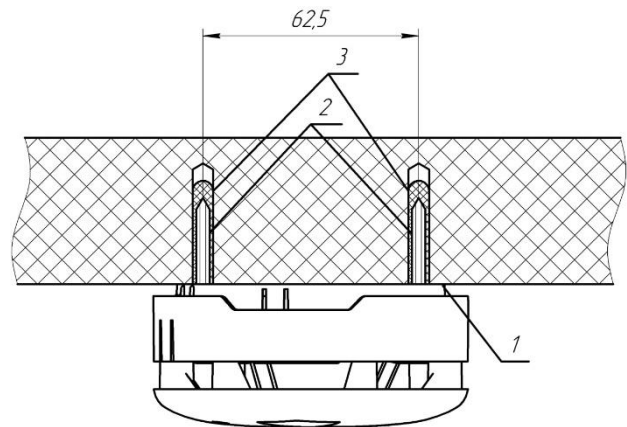
1 - Base
2 - Screw
3 - Dowel

- Connect the detector to PLC line in any sequence of input terminals.

    ! **ATTENTION!** *Install the detector on the base only after switching the CP to the mode of searching for available devices (see. paragraph 2.4).*

Input terminals
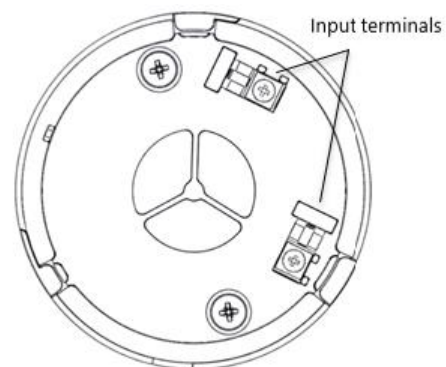
- Install the detector on the base, aligning the projections of the case with the recesses on the base.

- Rotate the detector clockwise.
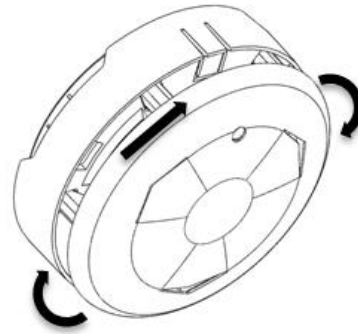
2.4. Detector connection to CP

The connection can be carried out by the «tree» or «ring» topology. When connected by the «tree» topology within one protected zone, the detectors are connected sequentially within the «branch», branching is carried out thanks to the «connector box» (see Figure 4). When connecting by the «tree» topology within several protected zones and by the «ring» topology, an SCI-1 short circuit isolator module connection is required (see Figure 5 and Figure 6).
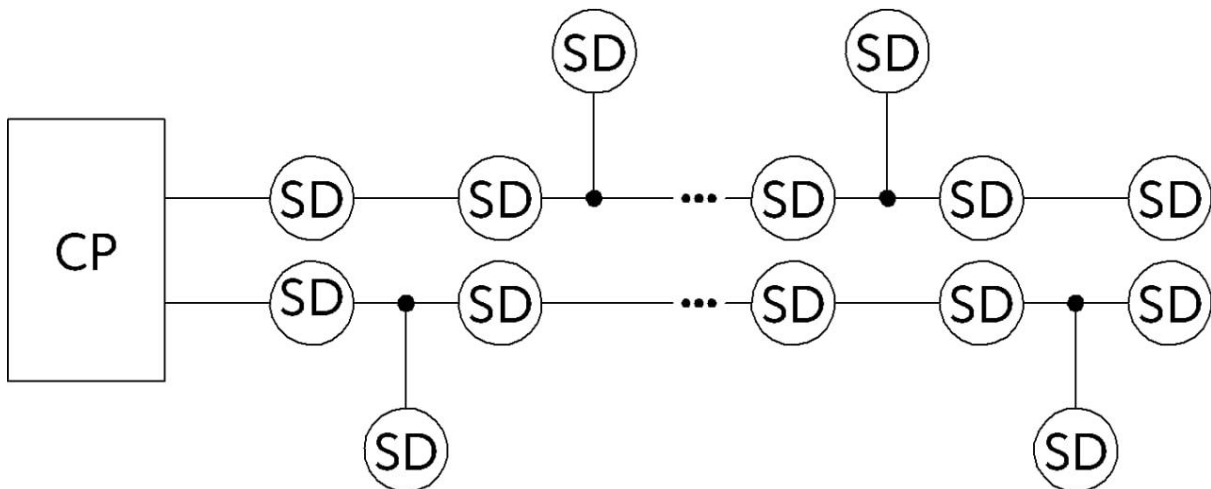

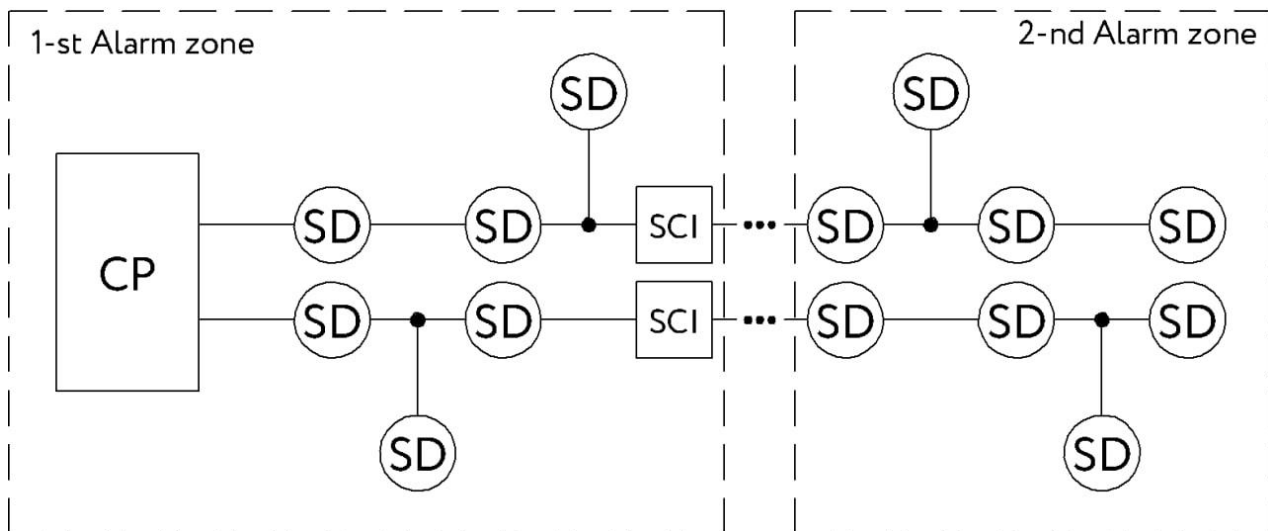Figure 4 - Connection diagram by the «tree» topology for one alarm zone

Figure 5 - Connection diagram by the «tree» topology for several alarm zone
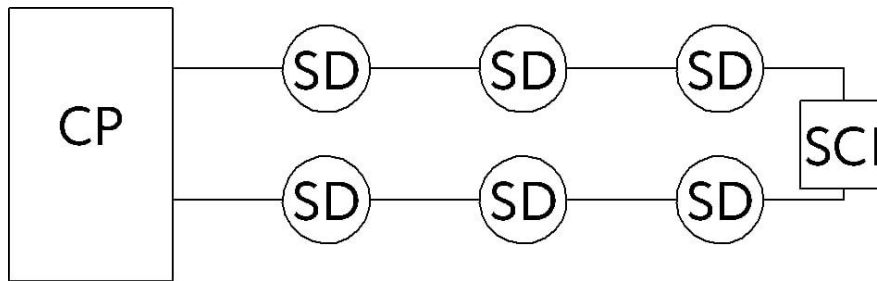
Figure 6 - Connection diagram by the «ring» topology

The detector operates under the CP control, all detector configurations are made through the device software.

When connecting wired devices, it is necessary to take into account the maximum length of the PLC from the CP to the end device, which should not exceed 800 meters.

ATTENTION! Binding of wired devices is carried out in turn, that is, it is necessary to install one detector on the base, then connected this device on the CP and only then proceed to installing the next detector on the base and its binding.
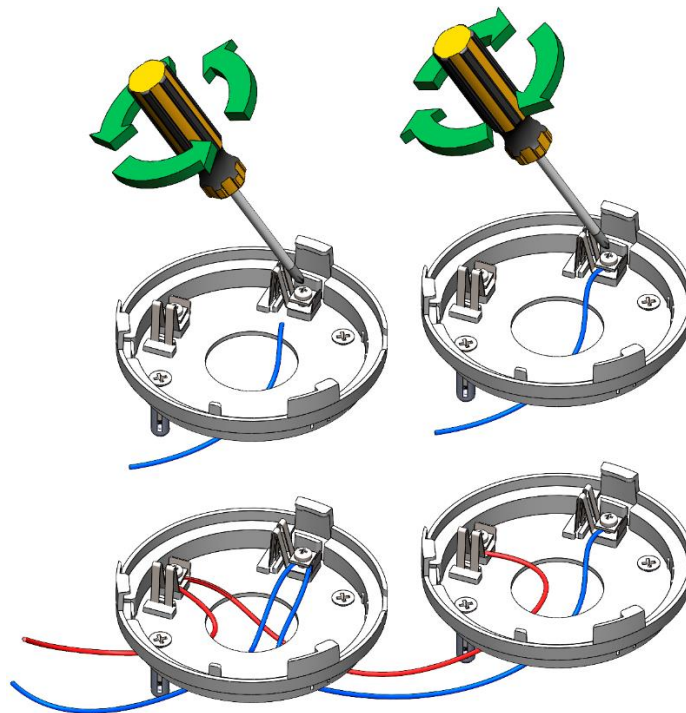
Figure 7 - Detectors connection diagram

ATTENTION! Before pairing the devices, all PLC lines and device bases must be installed.

Open the **Fire Alarm Network** menu on the **CP** screen by pressing the «**P**» button on the keyboard. Select item **1.Browse network** and press the **OK** button. Select the required **CP**. Press the **OK** button.

Fire Alarm Network	Browse network
1.Browse network	[122] CP-1
2.Active alarms	96 faults
3.Alarm causes	
4.Faults	
5.Bypassed DEVs	

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In the Main menu of CP select **3.DEVs** and press **Ок**
- select **3.Device pairing** in the submenu. Press **Ок**.
- select **1.Wired DEVs** in the submenu. Press **Ок**.
CP will go to automatic devices search.
After the search is completed, the CP will display a list of found devices.
Select the required device. Press **OK**. The name of the device is followed by its serial number.
The CP automatically pairs a new wired device to the first free slot.
The device configuration menu will open.
After making all the configurations, press **OK**.

Main menu	DEV
1.Information	1.Devices list
2.Configuration	2.Device zones
3.DEVs	3.Device pairing
4.Events and reactions	4.Configuration
5.Firefighting	5.PLC status:

Device pairing	Processing query
1.Wired DEVs	Please wait.
2.Wireless DEVs	Remote CP query is in progress.

Binding PLC devices
1. 12345 AB-1

Device configuration

If you are making configurations for a previously paired and configured device, you must:
- select item **3.DEVs** and press **OK**
- select submenu **1.Devices list**. Press **OK**.
- select submenu **2.By number**. Press **OK**.
- select the desired slot. Press **OK**.
If configurations are made during pairing, the configuration menu will be available immediately.

Main menu	DEV
1.Information	1.Devices list
2.Configuration	2.Device zones
3.DEVs	3.Device pairing
4.Events and reactions	4.Configuration
5.Firefighting	5.PLC status:

Devices list	Devices list
1.By zone	1.pls-type-1 (#1)
2.By number	2.pls-type-2 (#2)
	3.pls-type-3 (#3)
	4.pls-type-20 (#4)
	5.pls-type-21 (#5)

The following options are available in the list that opens.
- **Name** - device name;
- **Zone** - will allow you to combine devices of one fire zone. There are 32 protected zones on the CP;
- **Device type*** - determined automatically;
- **Status*** - current status of the detector (normal, Fire 1, Fire 2, link fault);
- **Bypass mode -** bypass mode no/bypass;
- **Smoke sensor*** - the value of the current optical density of the smoke chamber;
- **Link*** - time since last link;
- **PLC line*** - PLC line voltage;
- **Serial number*** - device serial number;

DEV #2	DEV #2
Name:	Smoke detector
SD 1	Status:
Zone:	link fault
No zone	Bypass mode:
Device type:	no

DEV #1	DEV #2
no	PLC line:
Smoke sensor:	0.0 V
0	Serial number:
Link:	123401
T:8371s H:0 Q:0/0	Firmware version:

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- **Firmware version*** - device firmware version;
- **Device menu** - device submenu;
  - **Device configuration** - advanced device configuration (inactive for SD);
  - **Reaction configuration** - device reaction configuration;
  - **Send test** - sending test command to device.
- **Delete** - device deleting from CP.
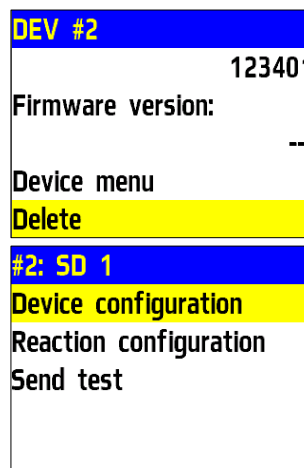
> ⚠ **ATTENTION!** *Options marked with * are not configurable and are for informational purposes only.*

You may set reactions for detector in the **Reaction configuration** menu on the CP keyboard. After the required reactions are set press **Ок** to save changes.
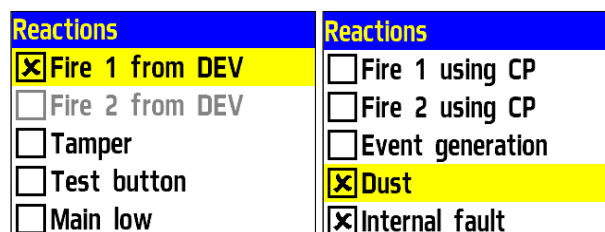
> ⚠ **ATTENTION!** *List of required active reactions:*

- **Fire1 from DEV** - delivery of a message to the CP when the chamber is filled with smoke with saving it in the archive.
- **Test button** - delivery of a message to the CP when pressing the «Test» button with saving it in the archive.
- **Dust** - delivery of a message to the CP when there's high dust concentration in the detector with saving it in the archive.
- **Internal fault** - delivery of a message to the CP when there's internal fault of the detector with saving it in the archive.

After making all the configurations, press **OK**.
Device configuration completed.

Check the detector pairing to CP. Activate **TEST** mode on the device by the command **Send Test** from the **Device menu** or by pressing the «**Test**» button on the detector housing.
A message about testing the device will appear on the CP within 3 seconds, indicating the slot to which it is paired, and the ID (name) of the detector.
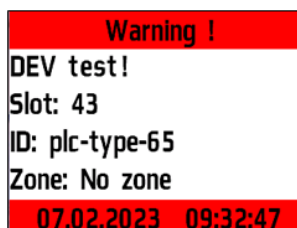
> ⚠ **ATTENTION!** *During and after installation, a protective cap must be installed on the detector to prevent dusting of the chamber and false alarms of the system. The protective cap is removed from the detectors after the system is commissioned to the operating company.*

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! **ATTENTION!** *After the installation of the entire FA system, its functional test is checked according to the technical documentation for the CP.*

2.5. Detector LED indication

To control the connection process and the status of the device, use the detector LED indication.

The status of the device is controlled by the number of light pulses, the duration of the light pulse is 1 ms.

Table 3 - Detector LED indication

Detector status	Red indicator
Standby mode (Normal)	1 pulse Repetition period 10 s.
Alarm mode /Fire/Test	1 pulse Repetition period 1 s.

2.6. Detector deactivation

When performing installation and maintenance work, it is recommended to switch the detector to the deactivation mode. At the same time, device pairing to the CP is preserved, but all reactions of the detector become inactive, including the alarm signals «Fire1» and «Fire2» from this detector.

This mode is used to single disable detectors. To disable all Devices linked to this CP, use the bypass mode described in paragraph 2.7.

Open the **Fire Alarm Network** menu on the **CP** screen by pressing the «**P**» button on the keyboard. Select item **1.Browse network** and press the **OK** button. Select the required **CP**. Press the **OK** button.

```
Fire Alarm Network
1.Browse network
2.Active alarms
3.Alarm causes
4.Faults
5.Bypassed DEVs
```

```
Browse network
[122] CP-1
                96 faults
```
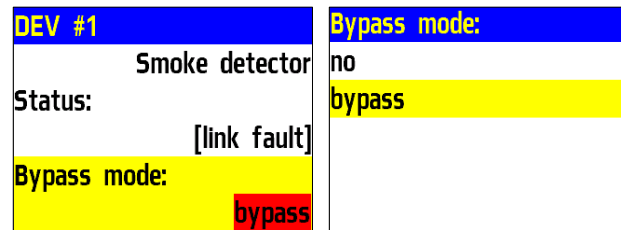
To deactivate the device, do the following:
- select **3.DEVs** in the main menu**.** Press **Ок**.
- select **1.Devices list** in the submenu. Press **Ок**.
- select **2.By number**. Press **Ок**.

```
Main menu
 1.Information
 2.Configuration
 3.DEVs
 4.Events and reactions
 5.Firefighting
```

```
DEV
1.Devices list
2.Device zones
3.Device pairing
4.Configuration
5.PLC status:
```

! **ATTENTION!** *Only «occupied» slots are displayed in the devices list. For quick access to a specific slot, press the «0» button on the keyboard and enter the slot number.*

```
Devices list
1.By zone
2.By number
```

```
Devices list
 1.pls-type-1 (#1)
 2.pls-type-2 (#2)
 3.pls-type-3 (#3)
 4.pls-type-20 (#4)
 5.pls-type-21 (#5)
```

- select the right device. Press **Ок**.
- select **Bypass mode.** Press **Ок**.
- set **bypass**.

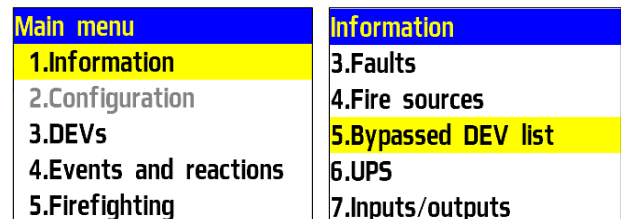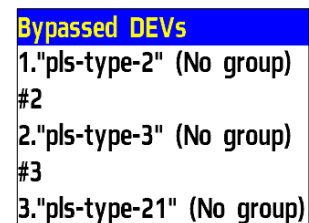| DEV #1		Bypass mode:
Smoke detector		no
Status:		bypass
[link fault]		
Bypass mode:		
bypass		

Press **Ок** to save.
To activate device, set the value to **no**.

To view the list of deactivated wired DEVS on the CP, do the following:
- select **1.Information** in the main menu. Press **Ок**.
- select **5.Bypassed DEV list**. Press **Ок**.

Main menu	Information
1.Information	3.Faults
2.Configuration	4.Fire sources
3.DEVs	5.Bypassed DEV list
4.Events and reactions	6.UPS
5.Firefighting	7.Inputs/outputs

After that you can see the list of wired DEVs which are deactivated on the system with their slot number **#X**.

| Bypassed DEVs |
|---|
| 1."pls-type-2" (No group) #2 |
| 2."pls-type-3" (No group) #3 |
| 3."pls-type-21" (No group) |

2.7. CP bypass mode

Bypass mode is used to simultaneously disable all DEVs linked to a given CP. At the same time, pairing and the devices configurations are preserved. Reactions of disconnected devices are not displayed on the CP and do not trigger events. Alarm signals «Fire1» and «Fire2» from detectors are transmitted, but are inactive on the CP.

(!) *ATTENTION! On the CP home screen, a quick bypass transfer of «in-fire» devices is available by entering a pin code. PIN code is set by the administrator.*

To configure the «sensor bypass» mode on the CP during the CW stage, do the following:

- In DEV **Main menu** select **7.Mode** and press **Ок**.
- In the list that opens, select the mode: **sensors bypass** - this mode allows the CP to ignore alarms from detectors. Press **OK**.
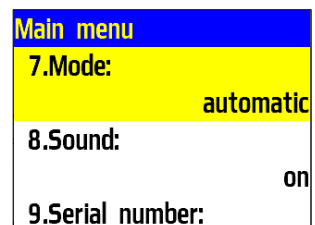
(!) *ATTENTION! In this mode, the «Automation off» indicator flashes, and the «Sensor off» indicator glows yellow.*

To return to automatic mode, In the Main menu on the CP select **7.Mode**, press **Ок**, select **Automatic** in the submenu**.**

Main menu
7.Mode: automatic
8.Sound: on
9.Serial number:

Mode:
automatic
manual
sensors bypass
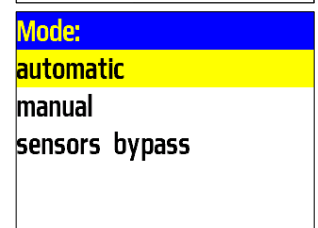
2.8.   «Fire 2» confirmation alarm signal configuration

The CP is configured for the «Fire 2» confirmation alarm signal from one of the detectors by default. The following algorithm is implemented: when the camera of one of the detector smokes, the «Fire 1» First alarm state is sent to the CP, after 60 seconds, if the status of this detector is unchanged or repeated, the «Fire 2» alarm signal is triggered on the CP, the fire alarm and the configured events are triggered.

> **ATTENTION!** *With this configuration, if two or more devices of one zone are triggered with an interval of no more than 60 seconds, the CP will automatically start «Fire 2» confirmation alarm signal.*

For «Fire 2» confirmation alarm signal activation configuration from only two or more detectors of one zone:

Open the **Fire Alarm Network** menu on the **CP** screen by pressing the «**P**» button on the keyboard. Select item **1.Browse network** and press the **OK** button. Select the required **CP**. Press the **OK** button.

- In the Main menu select **3.DEVs**. Press **Ок**.
- Select **2.Device zones**. Press **Ок**.
- Select the right **Zone**. Press **Ок**.
- Select **Fire 2 by single det.** Press **Ок**.
- Set time **0000**. Press **Ок**.
- Make sure that for **Fire 2 by two and more**: **on** is selected**.**

```
Fire Alarm Network
1.Browse network
2.Active alarms
3.Alarm causes
4.Faults
5.Bypassed DEVs
```

```
Main menu
 1.Information
 2.Configuration
 3.DEVs
 4.Events and reactions
 5.Firefighting
```

```
Main menu
 1.Information
 2.Configuration
 3.DEVs
 4.Events and reactions
 5.Firefighting
```

```
DEV
1.Devices list
2.Device zones
3.Device pairing
4.Configuration
5.PLC status:
```

```
Zones configuration
Default zone
Zone 1
Zone 2
Zone 3
Zone 4
```

```
Zone configuration
                Zone 1
Fire 2 by single det.:
              0000 sec
Fire 2 by two and more:
                    on
```

```
Fire 2 by single det.:



        0000
```

3.   Maintenance

3.1.   Safety precautions

3.1.1.   During the repair work in the room where the detector is installed, protection against mechanical damage and ingress of building materials (whitewash, paint, dust, etc.) must be provided.

3.2.   Functional test

3.2.1. Detector functional test should be carried out during scheduled or other functional checks of the detector, but at least once every 6 months.

3.2.2. Functional test includes:

● detectors status test for CP:

Open the **Fire Alarm Network** menu on the **CP** screen by pressing the «**P**» button on the keyboard. Select item **1.Browse network** and press the **OK** button. Select the required **CP**. Press the **OK** button.

Fire Alarm Network	Main menu
1.Browse network	1.Information
2.Active alarms	2.Configuration
3.Alarm causes	3.DEVs
4.Faults	4.Events and reactions
5.Bypassed DEVs	5.Firefighting

Open the Main menu on the CP.
Select **3.DEVs** in the main menu. Press **Ок**.
Select **1.Devices list** submenu. Press **Ок**.
Select **2.By number** submenu. Press **Ок**.
Select detector from the list and press **Ок**.
In the menu **DEV #X** that opens select **Status**.
If the detector has faults, they will be displayed

Main menu	DEV
1.Information	1.Devices list
2.Configuration	2.Device zones
3.DEVs	3.Device pairing
4.Events and reactions	4.Configuration
5.Firefighting	5.PLC status:

Devices list	Bypass mode:
1.By zone	no
2.By number	bypass

DEV #1
Smoke detector
Status:
link fault
Bypass mode:
no

● external inspection of the detector for traces of moisture and mechanical damage;
● checking the indication of the detector: «Standby mode» according to table 3;
● external examination of the smoke chamber of the detector for dust. If there is dust on the smoke chamber, blow the smoke chamber with a pneumatic cleaner with compressed air;
● PLC line check:

Open the main menu of CP.
Select **3.DEVs** and press **Ок**.
Select **1.Devices list** in the submenu. Press **Ок**.
Select **2.By number** in the submenu. Press **Ок**.
Select detector from the list and press **Ок**.
In the opened menu **DEVs #X**, select **PLC line**.

Main menu	DEV
1.Information	1.Devices list
2.Configuration	2.Device zones
3.DEVs	3.Device pairing
4.Events and reactions	4.Configuration
5.Firefighting	5.PLC status:

ATTENTION! *If the value of 15V or less is displayed in the «PLC line» field, this indicates a drop in the power supply voltage and the need to carry out:*
- visual check of the detector for the absence of traces of mechanical damage;
- visual check of PLC wires and their connections;
- voltage measurement on PLC CP terminals.

If the value is less than 12V, the device stops operating. System operation prohibited.

4. Storage

4.1.   Store the detector on racks in a packaged form.
4.2.   The distance from the walls and floor of the storage to the detector packages must be at least 0.1 m.
4.3.   The distance between the heaters and the detector packages must be at least 0.5 m.
4.4.   The room must be free of vapors of aggressive substances and conductive dust.

5. Transportation

5.1.   The packaged detector can be transported by all means of transport in covered vehicles and in pressurized aircraft compartments.
5.2.   The conditions of transportation must comply with the following conditions:
- ambient air temperature from minus 50 °C to plus 50 °C;
- relative air humidity up to 95% at a temperature of plus 40 °C.
5.3.   The period of transportation and intermediate storage should not exceed 3 months. It is allowed to increase the period of transportation and intermediate storage of the detector during transportation due to the storability time in stationary conditions.

6. Disposal

6.1.   The detector is disposed when there are no toxic components in it.
6.2.   The content of precious materials does not require record during storage, issue, disposal.

7. Manufacturer's warranty

7.1. The manufacturer guarantees the compliance of the detector with the technical specifications, provided that the consumer observes the rules of transportation, storage, installation and operation.

7.2. Warranty period of operation is 12 months from the date of commissioning, but not more than 24 months from the date of manufacture.

7.3. During the warranty period, the replacement of failed detectors is carried out by the manufacturer free of charge, provided that the consumer observes the instructions for installation and operation.

7.4. When sending the detector for repair, it must be accompanied by an act describing the malfunctions of the detector.

7.5. The warranty does not take effect in the following cases:
- non-compliance with this User Manual;
- mechanical damage of the detector;
- repair of the detector by a person other than Manufacturer.

7.6. The warranty applies only to the detector. All third-party equipment used in conjunction with the detector is covered by their own warranties.

8. Claims

8.1. Warranty claims are made to the supplier in case the defects and malfunctions are detected which lead to the failure of the detector within the warranty period.

8.2. In the certificate of defect indicate: device type, defects and malfunctions, conditions under which they were detected, time since the start of operation of the detector.

8.3. A copy of the payment document for the detector must be attached to the act.

9. Certification

9.1. Addressable optical smoke detector SD-1 «RUBETEK» complies with the European standard EN 54-7 «Fire detection and fire alarm systems. Part 7: Smoke detectors - Point detectors using scattered light, transmitted light or ionization».

10. Manufacturer

10.1. Name of the manufacturer's organization: DEVICE FACTORY L.L.C

10.2. Legal address: 302020, Ippodromny ln 9/24, Orel, Russian Federation

10.3. Phone: +7 (4862) 51-10-91

10.4. Email: info@zavodpriborov.com

CE