

**ICO 9001**



**ADDRESSABLE TWO OUTPUT ALARM ACTUATING UNIT  
S2000-SP2 Rev.02**

User's Manual

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The purpose of this User's Manual is to provide a basic understanding of principles and rules of operation of S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit.

Only the personnel who have studied this manual are allowed to operation activities. All activities on mounting, start-up, programming, and testing shall be performed in compliance with the requirements of the regulatory documentation in force at the place of operation.

Abbreviations:

- CIE: Control and Indicating Equipment;
- ISS: Integrated Security System;
- PL: Multiplex Addressable Polling Loop.

# 1 Description and Operation

## 1.1 Purpose

S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit (hereinafter referred to as SP2.02 or the unit) is intended to:

- Control executive appliances (light and sound alarms etc.) and automated fire protection equipment in public address systems and smoke control systems;
- Control clean agent suppression systems and fire-fighting equipment in water-based fire suppression systems, foam extinguishing systems, gas fire-fighting systems, dry powder fire-fighting systems, and aerosol fire-fighting systems;
- Generate control signals for engineering equipment and other devices involved in fire safety providing;
- Control other appliances (light and sound alarms, cameras, EM locks and so on) in intrusion alarm systems, panic alarm systems, process signaling systems, and access control systems.

The unit is used with an S2000-KDL or S2000-KDL-2I polling loop controller under an S2000M control panel, or Sirius Fire Alarm Control Panel, or one of their modifications as a component of modular control and indicating equipment in such system as a fire / intrusion / panic alarm system, a voice fire alarm and evacuation system, a fire suppression and smoke control system, an access control system, a CCTV, or building automation system.

The unit controls actuating devices by switching voltage from its own contacts  $U_{main}$  and  $U_{backup}$  to the output terminals. Connecting external power supplies to the terminals of the outputs is prohibited and can cause malfunctions of the unit.

The unit is intended for round-the-clock operation.

The unit is classed as a restorable and regularly maintainable item.

The design of the unit doesn't provide its operating in aggressive and / or dusty environments as well as in explosion hazardous and flammable premises.

The unit appearance and overall and mounting dimensions are shown in 2.2.2.

## 1.2 Specifications

**Table 1.2.1**

Parameter	Value
Power inputs	2
Power input voltage - for executive elements - for receive/transmit part	10.2 through 28.4 V dc via PL, 8 through 12 V
Consumed Current - for executive elements - for receive/transmit part	60 mA max(w/o regard to outputs' current) 1 mA max
Start-up time	15 s
PL/executive part insulation voltage	500 V
Number of outputs	2
Maximum commuting current per a single output	3 A
Maximum total commuting current for the unit	4 A
Circuit operability monitoring current, max	1.5 mA
Circuit operability monitoring voltage	5 V
Commuting Voltage	10.2 through 28.4 V from the power supply of the executive part
Enclosure Protection Degree as per GOST 14254-2015	IP40
Resistance to mechanical exposure as per OST 25 1099-83	Arrangement Category III
Vibration exposure: - Frequency range - Max acceleration	1-35 Hz (for Category III) 0.5 g (for Category III)
Environmental category as per OST 25 1099-83	O3
Operating temperatures	Minus 30 through + 55 °C
Weight	0.2 kg max
Overall dimensions	102×107×39 mm
Non-stop operation	24/7
MTBF in the quiescent mode	80,000 hours min
Survival probability (after 1000 h)	0.98758
Expected lifetime	10 years

As to immunity to man-made radio disturbance, the unit meets the requirements for Test Severity Level III of the relevant standards listed in Appendix 'B' of GOST R 53325-2012.

The unit passes the man-made radio disturbance standards prescribed for Class 'B' equipment as per GOST R 30805.22.

### 1.3 Standard Delivery

The standard delivery for the unit is shown in Table 1.3.1.

**Table 1.3.1**

Item		Quantity
S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit		1 pc.
Accessory Kit:		
	Woodscrew 1-3x25.016 GOST 1144-80	3 pcs.
	Wall Plug 6x30	3 pcs.
	DIN 7982 Flat Head Tapping Screw with Cross Drive 2.2x6.5	1 pc.
	MPN Load Connection Module	2 pcs.
Documentation:		
S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit Operations Manual		1 pc.

### 1.4 Arrangement and Operation

#### 1.4.1 Outputs

The unit controls actuating devices by switching voltage from its own contacts  $U_{main}$  and  $U_{backup}$  to the output terminals. Connecting external power supplies to the output terminals is prohibited and can cause a unit fault.

The unit provides switching outputs (on, off, on and off alternately) under the given program in accordance with control commands received via the polling loop as well as monitoring control outputs and circuits connected to them.

Status of a switched off monitored circuit is defined by the value of voltage at the positive output terminal relatively to the 0V terminal:

- Normal: between minus 0.15 V and minus 1.125 V;
- Open-Circuit Fault: less than minus 1.125 V;
- Short-Circuit Fault: higher than minus 0.15 V.

Status of a switched on monitored circuit is defined by the value of monitored circuit current:

- Normal: between 5 mA and 3 A;
- Open-Circuit Fault: less than 5 mA;
- Short-Circuit Fault: higher than 3 A.

**Note:** If an output while being switched on is in the short circuit condition then it will not be switched on. The output can be switched on in 15 seconds after the failure is repaired.

On detecting a short or open circuit failure in a monitored circuit, the unit sends an Output Open or Output Short message respectively over the interface bus. When the monitored circuit returns into the Normal status the unit sends an Output Restored message over the interface bus.

Conditions of the actuating outputs and the monitored circuits connected to them in the quiescent mode are indicated by the “1” and “2” LEDs as shown in Table 1.4.1.

**Table 1.4.1. Output Status Indication**

Circuit Condition	Output Status	Indicator Performance
Norm	On	Illuminates steady with green
	Off	Off
Open-Circuit Fault	On	Flashes doubly with amber once per 4 sec
	Off	
Short-Circuit Fault	On	Flashes with amber once per 4 sec
	Off	

### 1.4.2 Polling Loop

The unit receives control commands and sends states of monitored parameters via the digital multiplex addressable polling loop.

Current status of communications with the polling loop controller is indicated by the READY indicator as shown in Table 1.4.2. The indicator also indicates conditions of communications with the executive part of the unit.

**Table 1.4.2.**

<b>Polling Loop Status</b>	<b>Indicator Performance</b>
PL is starting to operate. This lasts from the moment the power is applied to the PL terminals of the unit and up to the first request of the polling loop controller to the unit	Illuminates steady with green
Quiescent mode	Flashes with green once per 4 sec
No communications with the executive part of the unit	Flashes doubly with green once per 4 sec
Setting an address	Flashes four times with green once per 4 sec

### 1.5 Measuring Instruments, Tools, and Accessories

While mounting, commissioning, and maintaining the equipment, one should use the instruments, tools, and accessories shown in Table 1.5.1.

**Table 1.5.1**

<b>Instrument</b>	<b>Specifications</b>
Digital multimeter	AC/DC voltage up to 500 V, AC/DC current up to 5 A, resistance up to 2 MOhm
Flat head insulated screwdriver	ZUBR ELECTRO-EXPERT SL 3.0x75 mm
Cross slot insulated screwdriver	ZUBR ELECTRO-EXPERT PH 2x100 mm
Side-cutting pliers	ZUBR ELECTRIC 160 mm
Pliers	ZUBR EXPERT 160 mm
To assign the PL address to the unit, one can also use an S2000-APA standalone addressable device programmer.	
<i>Note: One can use other instruments, tools, and accessories with similar characteristics</i>	

### 1.6 Marking and Sealing

Every unit has a marking applied to the back of its enclosure.

The marking contains the name of the unit, its decimal number, factory number, the year and quarter of production, and conformity marks.

### 1.7 Packaging

The unit along with its accessory kit and operation documentation is packed in a separate cardboard box.

## 2 Intended Use

### 2.1 Operating Restrictions

The design of the unit doesn't provide its operation in aggressive and / or dusty environments as well as in explosion hazardous and flammable premises.

Correct performance of the unit cannot be guaranteed if electromagnetic environment does not meet the requirements defined in Section 1.2 of this manual.

### 2.2 Preparing for Use

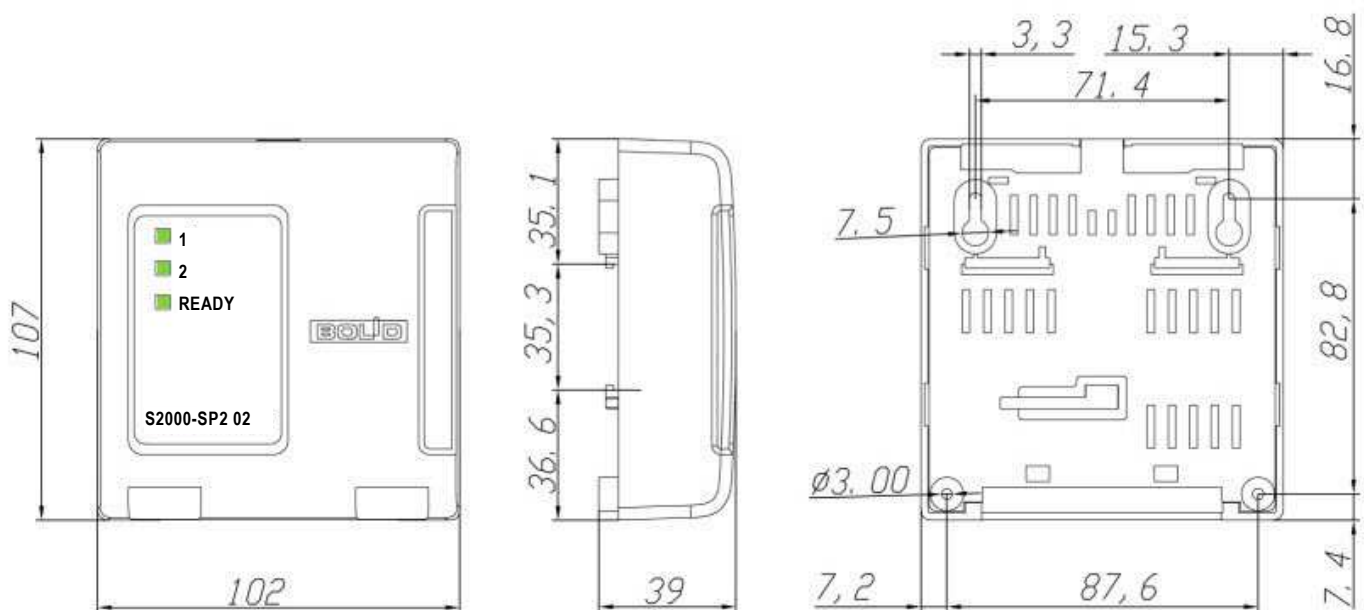
#### 2.2.1 Safety Precautions

- The design of the unit meets the requirements of electric and fire safety including emergency operation in accordance with Russian standards GOST 12.2.007.0-75 and GOST 12.1.004-91;
- The unit has no circuits under a hazardous voltage;
- Do SHUT OFF power from the equipment before mounting, installing, and maintaining this one;
- Installation and maintenance of the unit shall be carried out by professionals qualified for Accident Prevention of Class II or higher.

#### 2.2.2 Design

The unit is composed of a PC board and an enclosure, which is assembled from a plastic base and a cover.

The view of the unit along with its overall and mounting dimensions is shown in Figure 2.2.1.



**Figure 2.2.1.** The Unit's View along with Overall and Mounting Dimensions



### 2.2.3 Mounting the Unit

Prior to mounting the unit, this one shall be assigned with a unique range of addresses within the polling loop. These addresses shall not coincide with addresses of any devices connected to the same polling loop the unit is connected to. To get more detailed information on changing the unit addresses please see 2.2.5 in this manual.

The unit shall be installed inside the premises to be protected.

The unit can be installed within mounting enclosures (fire and intrusion alarm cabinets, boxes, etc.) on walls, behind suspended ceilings, or on other structures near the actuating appliances in the premises protected against exposure to atmospheric precipitations and mechanical damage.

In case when various devices are arranged adjacently, vertical and horizontal distances between them shall be at least 10 mm each.

The design of the unit doesn't provide its operation in aggressive and / or dusty environments as well as in explosion hazardous and flammable premises.

The unit shall be installed at a height suitable for operating and maintenance.

Installation and maintenance of the unit shall be carried out by professionals qualified for Accident Prevention of Class II or higher.

Figure 2.2.2 shows how to remove the unit cover.

Figure 2.2.3 shows how to mount the unit on a DIN rail.

Figure 2.2.4 shows the template for drilling holes to mount the unit on a wall.

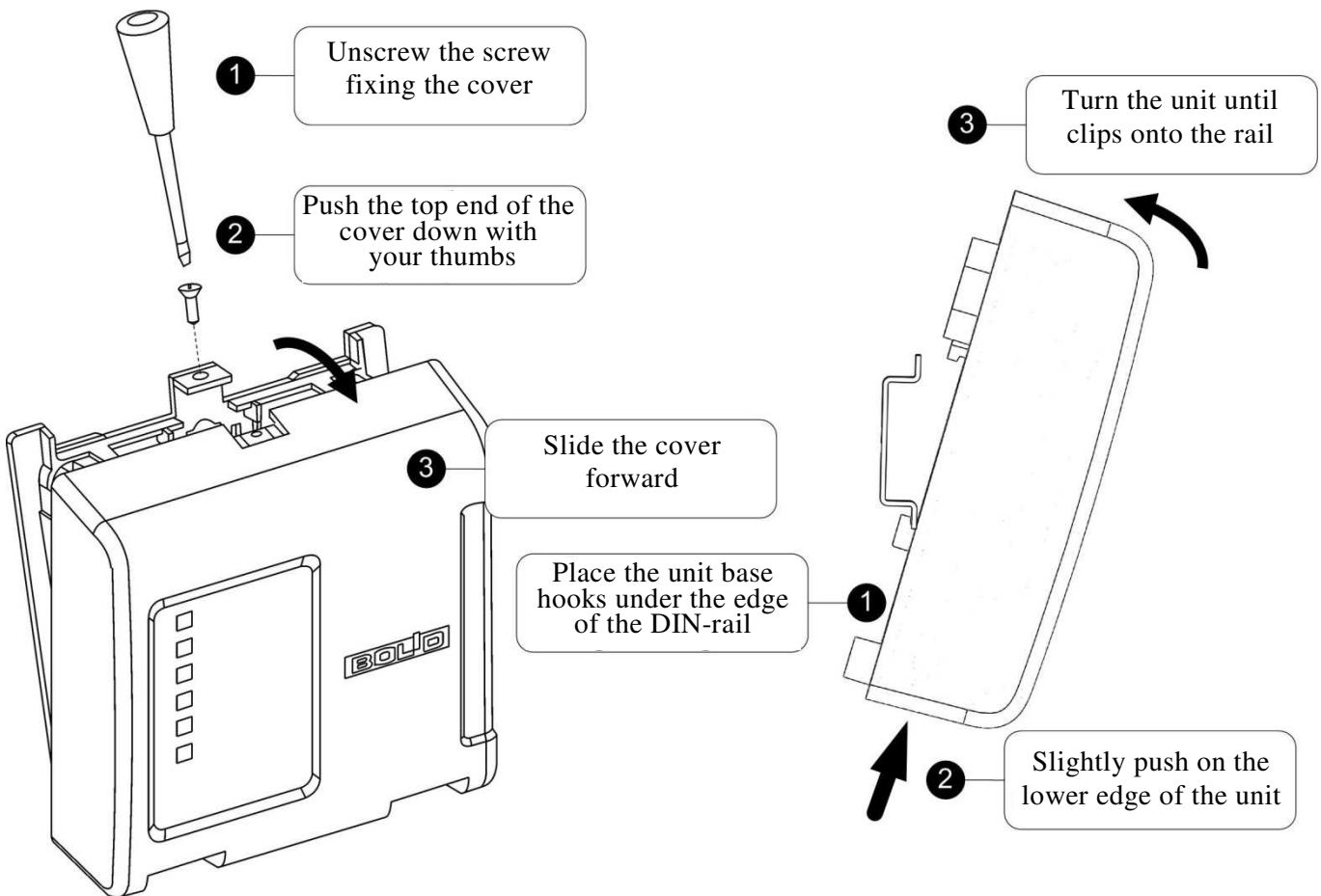
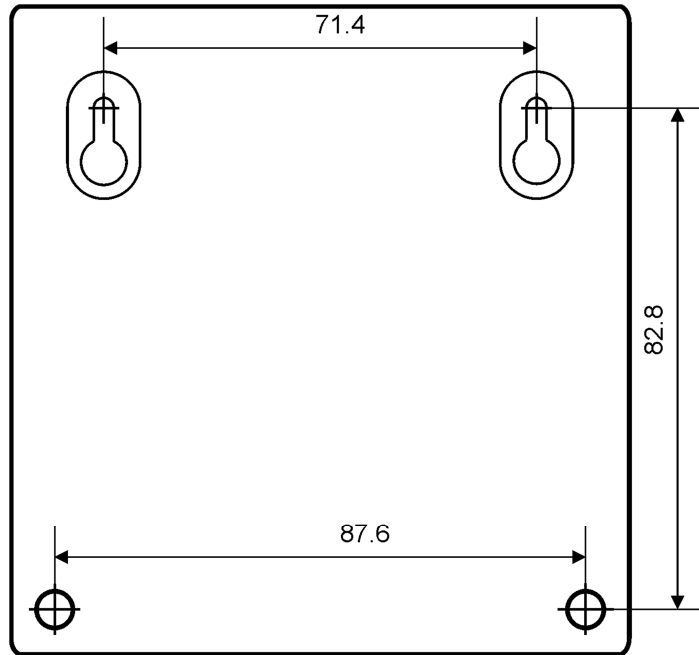


Figure 2.2.2. Removing the Unit Cover

Figure 2.2.3. DIN Rail Mounting



**Figure 2.2.4. Drilling Template**

**Mounting on a Wall:**

- Please ensure that the wall the unit is to be mounted onto is solid, flat, clean, and dry;
- Drill three holes in the wall: two upper ones and a lower one;
- Insert wall plugs to the holes and screw provided woodscrews into the two upper holes so that distances between a screw head and the wall is about 7 mm;
- Remove the cover from the unit;
- Hang the unit on the two screws. Screw the third screw into the lower mounting hole and fasten the unit to the wall;
- Connect electric wires to the unit as per the project design documentation and the connection diagram;
- Close the unit with its cover;
- To dismantle the unit, please follow all the steps in the reverse order.

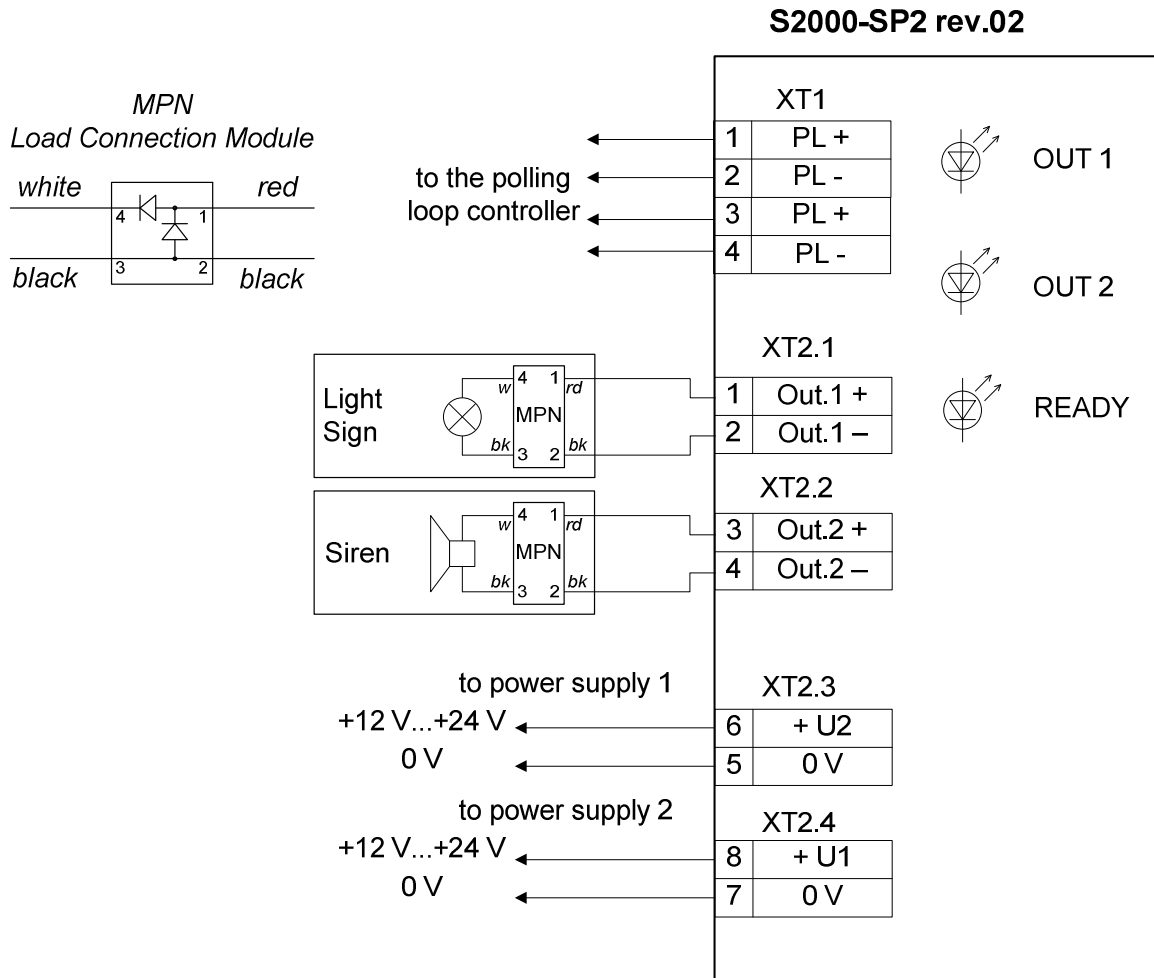
**Mounting on a DIN-rail:**

- Install the unit on the DIN rail;
- Remove the cover from the unit;
- Connect electric wires to the unit as per the project design documentation and the connection diagram;
- Close the unit with its cover;
- To dismantle the unit, please follow all the steps in the reverse order.

It is acceptable to use mounting enclosures (cabinets, boxes, etc.) for installation. If the unit and other units are arranged adjacently then vertical and horizontal distances between them shall be at least 10 mm each.

### 2.2.4 Wiring the Unit

Figure 2.2.5 shows the general schematic for wiring the unit.

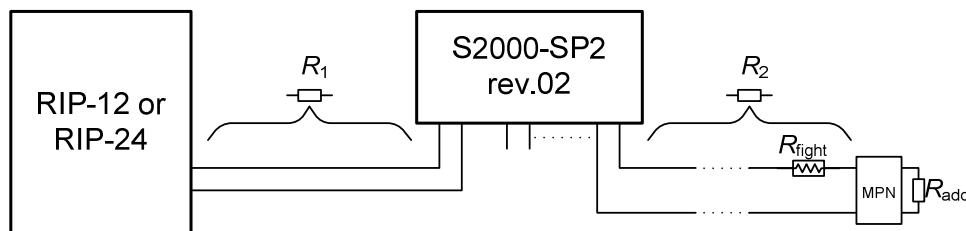


**Notes:**

1. The kinds of actuating devices being connected to the outputs are defined by user and can differ from the ones specified above.
2. Load connection modules (MPN) shall be installed inside the actuating appliances (except for starting circuits of fixed fire extinguishing systems).
3. In case of connecting starting circuits of fire-fighting systems or equipment in explosion protected housing, load connection modules can be installed in close vicinity from them.
4. If an output is not in use, one can replace load connection module with a 510 Ohm – 1/2W resistor.

**Figure 2.2.5.** General Schematic for Connecting the Unit

Connecting to fixed fire-fighting systems should be conducted in accordance with the schematic in Figure 2.2.6. The length of wires used to connect a fire-fighting systems and the resistance of the additional resistance shall be such that the required squib activation current will be provided.



**Figure 2.2.6.** Preferable Diagram for Connecting a Discharge Circuit

The nominal value of the additional resistance  $R_{add}$  should be estimated using the formula below:

$$R_{add} = \frac{U_{min} - 1}{I} - (R_2 + R_1 + R_{fight})$$

where:

$U_{min}$  is for the minimum voltage of the power supply (10 V for an RIP-12 or 20 V for an RIP-24);

$I$  is for the required current of activation, [A];

$R_1$  is for the resistance of the wires between the power supply and the unit, [Ohm];

$R_2$  is for the resistance of the wires between the S2000-SP2 rev.02 and the fixed fire-fighting system, [Ohm];

$R_{fight}$  is for the effective resistance of the explosive squib (bridgewire), [Ohm].

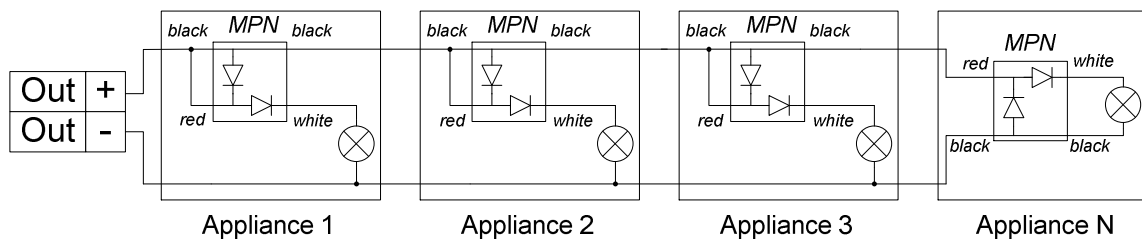
The preferred value for the current-limiting resistor  $R_{add}$  is to be selected as the nearest smaller value in E24 series.

The  $R_{add}$  resistor must be of enough power, especially if the activation time exceeds one second.

For example, when the unit is fed by a 24 V power supply, the resistance of connecting wires is less than 0.3 Ohm, the squib resistance is 6 Ohm, and the squib operating current is 0.1 A, then the resistance of the additional resistor is selected as 160 Ohm.

Several appliances (light signs, sirens and so on) can be connected in parallel across a single output if the following requirements are met:

- In the quiescent mode the appliances are turned off;
- The total current per the output doesn't exceed the maximum allowed one (3 A);
- Mounting is conducted in accordance with the schematic shown in Figure 2.2.7.



**Figure 2.2.7.** The Diagram for Connecting Several Normally Turned Off Sirens or Light Signs to a Single Output

## 2.2.5 Programming the Unit

Setting an address:

Prior to operating the unit, please assign it with a unique address in the PL. This address shall not be the same as any device connected to the same PL may have.

The unit occupies two addresses in the PL address space and provides storing them in the non-volatile memory.

The addresses are adjacent, that is the unit occupies two addresses in series.

The unit comes with addresses 126, 127.

To set the addresses, please send one of the following commands for the polling loop controller in use from the S2000M control panel or a PC with installed UProg Configuration Tool:

- *Set Device Address;*
- *Change Device Address.*

A Set Device Address command assigns an address to the unit without regard to what address this one is assigned to at the time. This option can be used when the same address is erroneously

assigned to two or more devices. To set the unit address, send a relevant command from the network controller specifying an address to be assigned to the first relay. Then within 5 min perform the following combination of presses on the unit tamper switch: three long ones (> 1 sec) and one short press. The network controller shall display events about loss of communication with the device with the old addresses and connecting with devices with the new addresses. For the case of two or more devices which have the same addresses, there will be no messages about missing the devices with old addresses.

If you need to change the unit addresses which are known, send the Change Device Address command from the control panel or the PC specifying the current address and the new address as the parameters. The network controller shall display messages about disconnecting the devices with the old addresses followed by messages about detecting the devices with newly set addresses.

**Note!** If the unit is assigned to the address 127, then the second relay (address) fails to be used because 127 is the maximum value of address in the system.

Defining parameters:

Configuration parameters of the unit are stored in the memory of the polling loop controller; they are to be defined on the Outputs tab of UProg Configuration Tool. The list of the configuration parameters is presented in Table 2.2.1.

Specific values of the configuration parameters to be defined are to be selected depending on the type of the actuating devices connected to the unit and the requirements for their operation in scope of the specific project.

To have more details on the purpose and assigning configuration parameters of the unit, please refer to the polling loop controller operation documentation.

**Table 2.2.1 – Configuration Parameters of the Unit**

Parameter	Description	Range	Default Value
Control Program	Defines how the <i>output</i> is to be operated	0 – 53	0
Operation Time	The time for a time-limited program to operate for	0...8160 s (up to 2 h 16 min) with 0.125s increment (8160 s: Always On)	60 s
Activation Delay	The time after which the related control program shall be run. Used in the programs 1...8, 11, 12, 17...53	0...8160 s (up to 2 h 16 min) with 0.125s increment	0
AND / OR Logic	Condition for turning the programs <b>36</b> and <b>37</b> on (off) when the <i>output</i> is related to several <i>inputs</i> of Type <b>10</b> or Type <b>15</b>	0 – OR 1 – AND	0 (OR)
Temperature Increased Threshold	The temperature value on reaching which the <i>output</i> is to be <b>turned on (off)</b> for the control program <b>36 (37)</b>	Minus 55...+125°C	22
Temperature Decreased Threshold	The temperature value at which the <i>output</i> is <b>turned off (on)</b> for the control program <b>36 (37)</b>	Minus 55...+125 °C	20

Parameter	Description	Range	Default Value
Humidity Increased Threshold	The value of relative humidity on reaching which the <i>output</i> is to be <b>turned on (off)</b> for the control program <b>36 (37)</b>	0...100 %	70
Humidity Decreased Threshold	The value of relative humidity at which the <i>output</i> is <b>turned off (on)</b> for the control program <b>36 (37)</b>	0...100 %	60
Gas Increased Threshold	The value of gas concentration in ppm at which the <i>output</i> is to be <b>turned on (off)</b> for the control program <b>36 (37)</b>	0 ... 100	40
Gas Decreased Threshold	The value of gas concentration in ppm at which the <i>output</i> is to be <b>turned off (on)</b> for the control program <b>36 (37)</b>	0 ... 100	0
Report If Relay Status Changed	Enables or disables generating messages about changes in the output status	Yes No	No
Backup Power Input Monitoring	Generating events upon a change in conditions of the backup battery or the second power input of the addressable device	On / Off	On



### Warning!

To change configuration parameters, please use UProg utility v.4.1.0.26+

## 2.2.6 Usage

The unit is operated under an S2000-KDL polling loop controller and S2000M control panel or Sirius fire alarm control panel.

All operating conditions (control program, time to operate, delay before operating the output) are defined by configuration parameters of the equipment mentioned above. To get information how to define an addressable device type and configuration parameters, please refer to operation documentation for the polling loop controller, S2000M, Sirius, and Orion Pro Suite.

While selecting power supply for the unit, one should ensure that it is able to provide a current sufficient for powering all actuating appliances connected to the unit.

The power supply should be located at such distance from the unit that the resistance of wires between the power supply and the unit meets the following condition:

- While being powered by a **12 V** power supply:  $R \leq 0.25$  Ohm;
- While being powered by a **24 V** power supply:  $R \leq 0.34$  Ohm.

## 2.2.7 Testing Operability

Testing operability is conducted as described in Clause 3.4 of this manual.

## 2.2.8 Extreme Situation Actions



### **Warning!**

If sparks, fire, smoke, or smell of burning is found at the installation site of the product, the product must be de-energized and sent for repair

## 2.2.9 Troubleshooting

**Table 2.2.9.1**

<b>Fault</b>	<b>Possible Cause</b>	<b>Solution</b>
The unit fails to control outputs	Polling loop failure	Check the polling loop for open or short circuit failure
	Unit address failure or error	Change the unit address for or set it to the required value in the range of 1 – 123
	Unit failure	Replace the unit for a healthy one following the instructions of this manual
	No power for executive part of the unit	Check the power voltage at the unit power inputs
The unit address is not shown in the UProg utility	Collision of addresses of various addressable devices in the polling loop	Set the unit address to another value, the value should be between 1 and 123

## 3 Maintenance

### 3.1 General

The unit is to be maintained under the following schedule:

**Table 3.1**

Task Description	Frequency
Visual checking	Once a year
Check for operability	Once a year

### 3.2 Safety Precautions

The unit shall be maintained by personnel qualified for Accident Prevention of Level II or higher.

### 3.3 Maintenance Procedures

3.3.1 Visual checking of the unit includes checks for no mechanical damages, fastening reliability, and proper condition of connecting wires and contact joints.

3.3.2 To verify the unit operates properly, please follow the instructions of Section 3.4 of this manual.



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**Warning!**

Removing the unit's PC board from its housing automatically voids the manufacturer's warranty

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### 3.4 Testing Operability

Be sure that the unit configuration and wiring are consistent with this manual and the system design documentation.

While the unit is being tested, all monitored circuits coupled with automated fire-fighting equipment shall be disconnected from the outputs of the unit and be replaced with the simulators similar in the load current.

After applying power to the unit, the built-in indicator READY start lighting steady until the moment the polling loop controller polls the given address. Then the indicator goes to flash slowly.

Remove the cover from the unit and ensure that a tamper alarm message has been received by the network controller S2000M, Orion Pro, or Sirius (a message on having restored the tamper will come on elapsing 15 seconds after closing the unit cover).

Further checking of the unit is conducted within the system by sending the unit commands to control its outputs.

### 3.5 Technical Examination

Technical examination is not applicable for this equipment.

### 3.6 Preservation (Depreservation, Represervation)

Preservation is not applicable for this equipment.



## 4 Repair

Repair of faulty equipment is to be conducted by the manufacturer or in authorized repair centers. The product shall be sent for repair in compliance with Company Standard QMS 8.5.3-2015, which can be found online at our website <https://bolid.ru/support/remont/>.

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### Warning!



The equipment shall be submitted for repair being assembled and clean and along with all the parts listed in the documentation.

Claims are accepted only if a reclamation report describing the failure is applied to the submitted equipment.

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An equipment fault resulted from consumer's not observing rules of mounting and operation is not a reason for claims and warranty repair.

Claims shall be submitted to the following address:

NVP BOLID, #4 Pionerskaya Str., Korolyov, Moscow Region, 141070, Russia

Phone: +7 (495) 775-71-55, E-mail: [info@bolid.ru](mailto:info@bolid.ru).

In case of any issue related to use of the product, please contact the technical support: +7 (495) 775-71-55 or e-mail [support@bolid.ru](mailto:support@bolid.ru).

## 5 Storage

Storage in a transport container is permitted at ambient temperatures minus 50 through + 55 °C and relative humidity up to 95% at + 35 °C.

Storage in the consumer package is permitted only in heated premises at temperatures +5 through +40 °C and relative humidity up to 80% at + 20 °C.

## 6 Transporting

The units can be transported in a transport container at ambient temperatures minus 50 up to + 55 °C and relative humidity up to 95% at + 35 °C.

## 7 Disposal

The unit can be disposed of considering that there are no toxic components in it.

The content of precious materials: doesn't require accountability for storage, retirement, and disposal (Clause 1.2 of GOST 2.608-78).

The content of non-ferrous metals: does not require accountability for retirement and further disposal.

## 8 Manufacturer Warranty

The manufacturer guarantees the product meets with technical requirements stated in the manuals if the user follows the instructions for transportation, storage, installation, and usage.

The warranty period is 18 months since putting the product into operation but no more than 24 months from the manufacturer's date of production.

## 9 Certification Information

S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit meets the requirements of Technical Regulations of Eurasian Economic Union TR EAEU 043/2017 'On Requirements for Fire

Safety and Fire Extinguishing Equipment’ and is covered by the conformity certificate EAЭC RU C-RU.ПБ68.B.00382/21 issued by the certification body ‘Fire Certification Company’.

S2000-SP2 Rev.02 Addressable Two Output Alarm Actuating Unit meets the requirements of Technical Regulations of Custom Union ‘Electromagnetic Compatibility of Technical Equipment’ (TR CU 020/2011). It is covered by the conformity declaration EAЭC No. RU Д-RU.HP15.B.06633/20.

Production of S2000-SP2 rev.02 is awarded with the conformity certificate GOST R ISO 9001. The certificate can be found online at the website <http://bolid.ru> in the section ABOUT COMPANY.