ИСО 9001

ADDRESSABLE DOUBLE-INPUT MODULE
S2000-AR2 Rev.02

User's Manual

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This user's manual explains operating principles and rules of operation of S2000-AR2 Rev.02 Addressable Double-Input Module with firmware version 1.02.

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

Abbreviations:

ADC : Analog-to-Digital Conversion;
ISS : Integrated Security System;
LED : Light Emitting Diode;
MC : Monitored Circuit;
PCB : Printed Circuit Board;
PL : Polling Loop.

1 Description and Operation

1.1 Product Designation

1.1.1 S2000-AR2 Rev.02 Addressable Double-Input Module (hereinafter referred to as the module) is used with a polling loop controller such as S2000-KDL, S2000-KDL-2I, S2000-KDL-2I Rev.01, S2000-KDL-S in Orion integrated security systems. It is designed to connect non-addressable dry contact detectors into the polling loop of a polling loop controller as well as to monitor fire protection systems (voice announcement systems, smoke control systems, fire protection dampers, etc.) and other control and auxiliary systems with dry contact outputs.

1.1.2 Product application:

- Standalone or centralized protection of buildings and facilities (offices, stores, banks, warehouses, residential houses, institutions, enterprises) against unauthorized intrusion and fire;
- Monitoring of control and auxiliary systems.

1.1.3 The functions of the module are:

- Monitors conditions of the monitored circuits;
- Monitors conditions of the enclosure;
- Sends messages to the polling loop controller;
- Indicates conditions of monitored circuits by means of its built-in LED;
- Stores addresses for communicating data over the polling loop in its non-volatile memory.

1.1.4 The module is designed for round-the-clock operation.

1.1.5 The module is a reparable and regularly maintained product.

1.2 Specifications

Table 1.2.1

№	Parameter	Value
1.2.1	Power supply voltage (PL voltage), V	- 8 through 11
1.2.2	Average consumed current, mA	- 1.0 max
1.2.3	Power input	- 1
1.2.4	Start-up time, s	- 15 max
1.2.5	Monitored circuits (device loops)	- 2
1.2.6	Ingress Protection Rating as per GOST 14254-2015	- IP41
1.2.7	Immunity to mechanical exposure as per OST 25 1099-83	- Arrangement Category III
1.2.8	Vibration exposure: - Frequency range, Hz - Max acceleration	 - 1-35; - 0.5g;
1.2.9	Climatic version as per OST 25 1099-83	- O3
1.2.10	Operating temperatures, °C	- Minus 30 to +55
1.2.11	Relative humidity, %	- Up to 93 at +40°C
1.2.12	Weight, kg	- 0.04 max
1.2.13	Overall dimensions, mm	- 56 x 38 x 20 max
1.2.14	Non-stop operation	- 24/7
1.2.15	MTBF in quiescent mode, hours	- 80000
1.2.16	Survival probability	- 0.98758
1.2.17	Average service life, years	- 10

1.2.18 The module passes the standards of industrial radio disturbance prescribed for Class B equipment as per GOST 30805.22.

1.2.19 The module withstands electrostatic discharge of Test Severity Level III as per GOST 30804.4.2.

1.2.20 The module withstands radio-frequency electromagnetic field in 80 through 100 MHz range as per GOST 30804.4.3.

1.2.21 In terms of immunity to industrial radio disturbance, the module meets the requirements of Test Severity Level III as per GOST R 50009.

1.3 Standard Delivery

Table 1.3.1 represents the content of S2000-AR2 Rev.02 standard delivery.

Table 1.3.1

Item	Quantity
S2000-AR2 Rev.02 Addressable Double-Input Module	10 pcs.
Accessory Kit:	
Resistor MF 1/4W-10k-5% Woodscrew 1-3x25.016 GOST 1144-80 Wall Plug 6x30	20 pcs. 20 pcs. 20 pcs.
Documentation	
S2000-AR2 Rev.02 Addressable Double-Input Module. Operations Manual	1 pc.

1.4 Arrangement and Operation

1.4.1 An S2000-AR2 Rev.02 features two monitored (supervised) circuits each providing connection of non-addressable fire and intrusion detectors, control appliances, and auxiliary devices with dry contact outputs. Both normally closed detectors and normally open detectors are connectable. The schematic for connecting detectors is shown in Figure 2.2.2. Triggering of the connected non-addressable detector results in a change in the monitoring circuit resistance which is detected by means of the ADC. The relationship between resistance of a monitored circuit and relevant states and ADC values is represented in Table 3.4.1.

1.4.2 A unique address for communicating data over the polling loop is assigned to each monitored circuit of the module. Each address is stored in the non-volatile memory and allows sending messages about conditions at the relevant address point in response to a request of the polling loop controller.

1.4.3 The module is powered and communicates data over the polling loop of the polling loop controller. The module supports the polling loop protocol DPLS_v2.xx and provides getting polling loop voltage values at the point where it is connected.

1.4.4 The module provides monitoring of the conditions of its enclosure. A message about module's entering to the Open state is generated just after the cover has been open. The module considers its enclosure to be in the Closed state after its cover has been closed for at least 15 s.

1.4.5 The module can be in one of three operation modes:

- *Quiescent Mode*: The resistance of each monitored circuit is in the normal range;
- *Alarm*: The resistance of at least one monitored circuit has been out of normal range;
- *Programming with Address*: A *Set New Address* command has been received from the polling loop controller over the polling loop, and an activity to confirm setting the address is being expected (see Section 2.2.5.2).

1.5 Measuring Instruments, Tools, and Accessories

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

Table 1.5.1

Instruments	Specifications
Digital multimeter	Measures AC/DC voltage up to 500 V, current up to 5A, resistance up to 2 MOhm
Flat head screwdriver	3.0 x 50 mm
Cross slot screwdriver	2 x 100 mm
Side-cutting pliers	160 mm
Pliers	160 mm
S2000-APA	Standalone addressable device programmer (optional)

1.6 Marking and Sealing

1.6.1 Each S2000-AR2 Rev.02 carries a marking placed on the rear side of its enclosure.

1.6.2 The marking contains: the name of the product, the factory number, the year and the quarter of production.

1.6.3 Sealing the S2000-AR2 Rev.02 is not provided.

1.7 Packaging

S2000-AR2 Rev.02 modules along with their accessory kits and Operations Manual are packed in the cardboard box.

2 Intended Use

2.1 Operating Restrictions

The design of the S2000-AR2 Rev.02 doesn't provide its operation in aggressive and dusty environments and in ex-hazardous premises.

2.2 Preparing for Use

2.2.1 Safety Precautions

- The design of the module 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;
- There are no potential hazard circuits within the module;
- Do SHUT OFF power from the module before mounting, installing, and maintaining this one;
- Mounting and maintenance of the module shall be carried out by persons with the second or higher electric safety qualification level.

2.2.2 Design

Figure 2.2.1 shows the appearance and overall and mounting dimensions of the S2000-AR2 Rev.02.

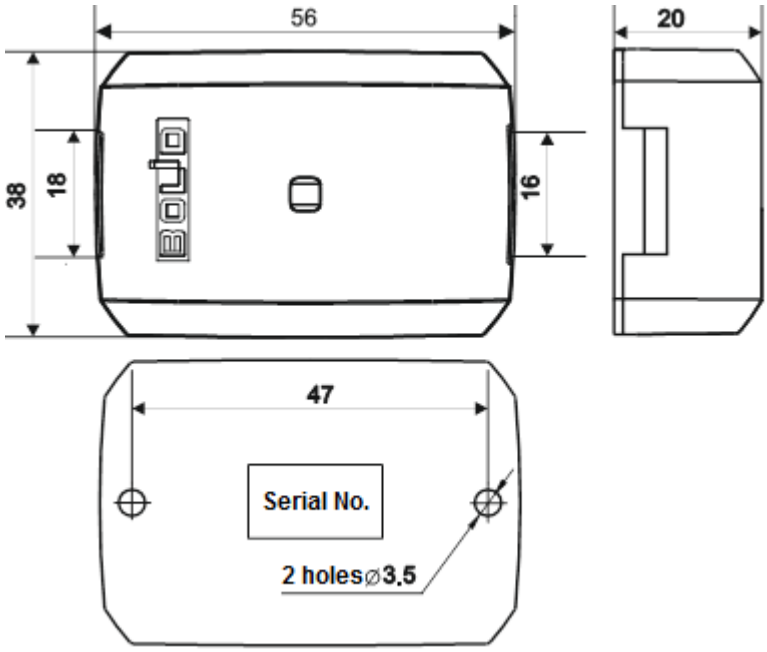


Figure 2.2.1 Overall and Mounting Dimensions of the S2000-AR2 Rev.02

2.2.3 Mounting the Module

The S2000-AR2 Rev.02 is to be installed on walls or within cabinets closely to equipment to be monitored by the module at places protected against atmospheric precipitations, mechanical damage, and unauthorized access.

Mounting the module shall be performed in line with requirements of Russian Regulatory Document РД 78.145-92 "Rules for Performance and Acceptance of Works. Fire and Intrusion Alarm Installations". The module should be attached at a height suitable for operating and maintenance. If

the S2000-AR2 Rev.02 is housed in unwatched premises it should be at least 2.2 m higher than the floor level.

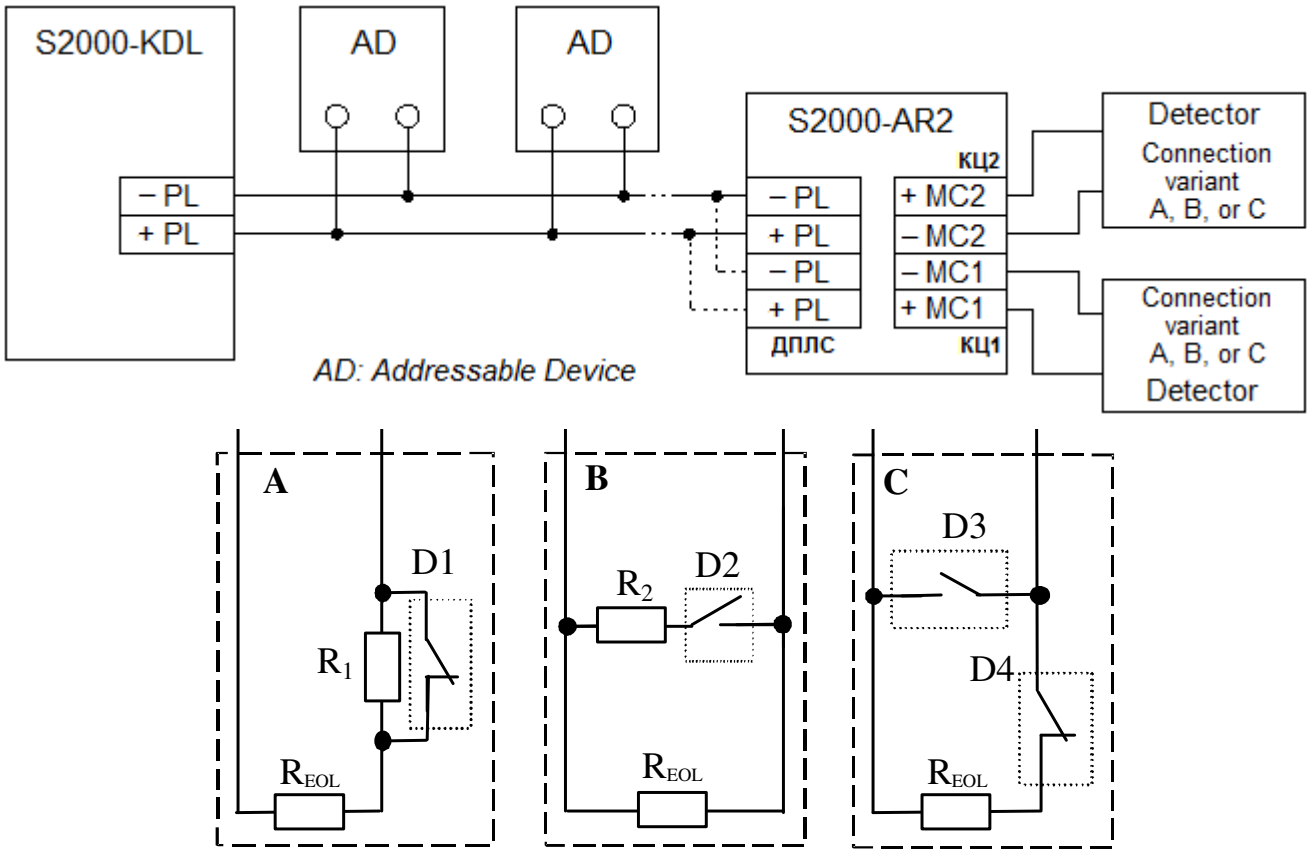
The module design implies attaching to a flat surface (a wall) using the woodscrews provided.

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

The procedure of fastening the module is described in its Installation Manual available online on https://bolid.ru in the section PRODUCTS at the page of S2000-AR2 Rev.02.

2.2.4 Connecting the Module

Figure 2.2.2 shows a standard schematic for connecting S2000-AR2 Rev.02 with the polling loop controller and standard variants for connecting non-addressable devices to the module.



Variant A: Connecting NC fire detectors
Variant B: Connecting NO fire detectors
Variant C: Connecting intrusion detectors with NO or NC contacts

D1: NC fire detectors
D2: NO fire detectors
D3: NO intrusion detectors
D4: NC intrusion detectors

R_{EOL}: Termination resistor MF1/4W - 10K ±5%
R_1: Additional resistor MF 1/4W - 20K±5%
R_2: Additional resistor MF 1/4W - 4K7 ±5%

Figure 2.2.2 External Connection Diagram

Resistance of the monitored circuit wires shall not exceed 100 Ohm, while leakage resistance shall be at least 50 kOhm. Monitored circuits are connected to the contacts of alarm and signal outputs of detectors. Depending on the connection variant, a 10 kOhm termination resistor and/or an additional resistance shall be brought into a monitored circuit.

2.2.5 Settings

2.2.5.1 Configuring

Variants A and B (see Figure 2.2.2) provide connecting fire detectors with recognizing such states of monitored circuits as Norm, Fire Alarm, Open Circuit, and Short Circuit for the inputs with Input Type **2: Combined Fire**.

For operating intrusion detectors Input Type is to be defined as **4: Intrusion**, **5: Intrusion and Tamper**, **6: Auxiliary**, **7: Lobby**, or **11: Panic**; these detectors are connected as shown in Variant C.

The module enclosure being open, a Tamper Alarm message is generated for all the monitored circuits except for the one for which *4: Intrusion* Input Type is given.

To monitor various systems, the Input Type in the polling loop controller configuration is to be set to the value **6: Auxiliary.** In case when the circuits should be monitored for faults, use the connection variants A and B; otherwise, the connection variant C is suitable.

To get more information about inputs and ways to define them, please refer to operating documentation on the polling loop controller and UProg.

2.2.5.2 Setting Address

S2000-AR2 Rev.02 provides storing addresses of both monitored circuit to communicate data over the polling loop in the non-volatile memory. The addresses are adjacent: the address of MC2 always exceeds the address of MC1 by one; for example, the address of MC1 is 126 while the address of MC2 is 127 (the factory configuration). To assign addresses you should send the polling loop controller one of the following commands from the network controller:

- **Set New Address**;
- **Edit Address**.

By using the *Set New Address* command you can assign addresses to the module regardless of which ones are assigned to it at the moment. This can be used when identical addresses are incorrectly assigned to two or more addressable devices. To do this, give this command from the network controller and specify the number of the address to be assigned to MC1 as the command parameters. The LED shall start flashing four times once per four seconds. Then within no longer than 5 minutes open the module enclosure and perform the combination of three long presses (each between 1 s and 3 s) and one quick press (shorter than 0.5 s) on the tamper switch. The network controller shall display messages about loss of communication with the module on the old addresses and restoring communications with it on the set addresses. In the situation when two or more addressable devices were incorrectly programmed with the same address there will be no messages about loss of communications on the old addresses.

If you need to change module addresses which are known then use the *Edit Address* command. For doing so, give this command from the network controller and define the current address and the new address of the MC1 (for MC2 every address will automatically be incremented by one). The network controller will display messages about loss of communication with the module on the old addresses and restoring communications with it on the set addresses.

To assign addresses to the module, you also can use an S2000-APA standalone addressable device programmer.

2.3 Usage

To be admitted to work with the module the personnel are obliged to have studied this manual and to have a certificate of verification of knowledge of safety regulations.

The S2000-AR2 Rev.02 is used with the polling loop controller within an Orion ISS. To get more information about operation of the system, please refer to the documentation on the C2000M panel, Orion Pro, Sirius panel, and the polling loop controller.

Modes of operation of the S2000-AR2 Rev.02 and the relevant indication patterns are shown in Table 2.3.1

Table 2.3.1

Operation Mode of S2000-AR2 Rev.02	**Description**	**LED Indication**
Quiescent Mode	Resistance of both monitored circuits is in the normal range	Flashes once every 4 s
Alarm	At least one MC is detected to be out of norm	Flashes doubly every 4 s
Programming with Address	A *Set New Address* command has been received from the network controller	Four flashes every 4 s

2.3.1 Functional Testing

Perform functional testing as described in Section 3.4 of this manual.

2.3.2 Extreme Situation Actions

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

2.3.3 Troubleshooting

Table 2.3.3.1

Fault	**Possible Cause**	**Solution**
LED does not illuminate	No power applied	Check if voltage is present on the module contacts “+PL”
No communications over the polling loop	No communications between the module and the controller	Check integrity of the cable and connections
	The module is too far from the controller	Reduce the length of the polling loop to the module. Use a cable suitable for the required length of the polling loop (refer to the polling loop controller operation documentation)
	Two or more addressable devices have the same address	Check the accuracy of addressing the devices
No alarms upon tripping of a non-addressable detector	No connection between the monitored circuit of the module and the detector	Check integrity of the cable and connections

3 Maintenance

3.1 General

The maintenance works for the module should be performed according to a scheduled-preventive system which provides annual service.

3.2 Safety Precautions

The equipment should be maintained by personnel with Safety Qualification Level II of higher.

3.3 Maintenance Procedures

The maintenance works include:

- Inspecting exterior conditions of the module;
- Ensuring the module is fastened properly and its connecting wires and contact joints have good conditions;
- Testing operability in line with Section 3.4 of this manual.

Maintenance works are to be performed using the technical guide "Maintenance of fire alarm systems and public address and general alarm systems of types 1-2 in Orion ISS" which is available on the website bolid.ru.

WARNING
Removing the PCB from the module housing automatically voids the manufacturer's warranty

3.4 Performance Testing

3.4.1 For the time the module is tested, please disconnect outputs of control and indicating units (devices) and appliances controlling automatic fire suppression equipment. Notify the proper authorities that the system is ungergoig maintenance.

3.4.2 By means of the network controller arm the detector with the address assigned to the MC1 device circuit of the module.

3.4.3 Simulate an alarm response of the detector connected to MC1. Ensure the module LED double flashes once per four seconds while the network controller indicates a Fire Alarm or Intrusion Alarm message on the address assigned to MC1 of the module. Place the detector into the quiescent mode and ensure it starts flashing once per four seconds. By means of the network controller issue a command to reset alarm from the detector related to MC1. When one monitored circuit is being tested the other circuit shall be in norm.

3.4.4 Repeat procedures described in 3.4.2 and 3.4.3 for the monitored circuit MC2.

3.4.5 If the monitored circuits of the module are assigned with input types that imply monitoring tampering with the module enclosure, then, in addition, operability of the tamper switch is to be tested. For doing so, by means of the network controller give a command to disable inputs used in the S2000-AR2 Rev.02, and then open the module enclosure and close it again in some time. Ensure Tamper Alarm followed by Tamper Restored messages for the required addresses appear.

3.4.6 Network controller's not receiving messages *Tamper Alarm*, *Tamper Restores*, *Intrusion Alarm*, or *Fire Alarm* means that the S2000-AR2 Rev.02 is defective and must be replaced.

To get more information about module's light indication while using an S2000-KDL polling loop controller (of version 1.30 and higher) refer to the operation documentation on S2000-KDL.

3.4.7 In addition the monitored circuit parameters can be checked by measuring ADC values indicated monitored circuit status.

Table 3.4.1. Relationship between MC Resistance and ADC and MC Status

	Short Circuit or D3 Response (Variant C)	**D2 Response (Variant B)**	**Norm**	**D1 Response (Variant A)**	**Open Circuit or D4 Response (Variant C)**
Resistance, kOhm	0…1.9	2.5…6	6.5…14	15…46	50…∞
ADC Value	0…10	12…29	31…58	63…121	125…230

All the equipment used in testing must be known functioning!

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 Routine Repair

4.1 Routine repair of defective equipment is to be performed by the manufacturer or in authorized repair centers. The product shall be sent for repair in line with established procedures.

ATTENTION
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.

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

4.3 Claims shall be submitted to the following address: NVP Bolid, #4 Pionerskaya Str., Korolyov, Moscow Region, 141070, Russia. Tel./fax: +7 (495) 775-71-55 (PBX). E-mail: info@bolid.ru

4.4 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.

5 Storage

5.1 In a transport container the equipment can be stored at ambient temperatures -50°C through +50°C and relative humidity up to 95% at +35°C.

5.2 In the consumer package the equipment can be stored only in heated premises at temperatures +5°C through +40°C and relative humidity up to 80% at +20°C.

6 Transporting

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

7 Disposal

7.1 The equipment is disposed of considering that it contains no toxic components.

7.2 The content of precious materials: does not require accountability for storage, retirement and disposal (Clause 1.2 of GOST 2.608-78).

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

8 Manufacturer Warranty

8.1 The manufacturer guaranties this product meets with technical requirements specified in the manuals if the user follows the instructions for transportation, storage, installation, and usage.

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

9 Certification Information

9.1. S2000-AR2 Rev.02 meets the requirements of Technical Regulations of Custom Union TR CU 020/2011 and is covered by Declaration of Conformity ЕАЭС N RU Д-RU.HP15.B.06633/20.

9.2. S2000-AR2 Rev.02 is part of fire alarm and intrusion alarm system АЦДР.425200.015 ТУ covered by Conformity Certificate No. МВД РФ.03.000036.

9.3. S2000-AR2 Rev.02 is part of access control system АЦДР.425710.015 ТУ covered by Conformity Certificate No. МВД РФ.03.000037.

9.4. Production of S2000-AR2 Rev.02 is covered by Conformity Certificate ГОСТ Р ИСО 9001 - 2015 which can be found online at **https://bolid.ru** in Section ABOUT.