ИСО 9001

ADDRESSABLE EIGHT-INPUT MODULE
S2000-AR8

User's Manual

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This user's manual explains operating principles and rules of operation of S2000-AR8 Addressable Eight-Input Module of firmware version 1.10.

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-AR8 Addressable Eight-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 (aka supervised circuits);
- Monitors conditions of its enclosure;
- Sends messages to the polling loop controller;
- Indicates conditions of the 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

No.	Parameter	Value
1.2.1	Power supply voltage (PL voltage), V	- 8 through 11
1.2.2	Average consumed current, mA	- 4.0 max
1.2.3	Start-up time, s	- 15 max
1.2.4	Monitored circuits (device loops)	- 8
1.2.5	Ingress Protection Rating as per GOST 14254-2015	- IP40
1.2.6	Immunity to mechanical exposure as per OST 25 1099-83	- Arrangement Category III
1.2.7	Vibration exposure: - Frequency range, Hz - Max acceleration	 - 1-35; - 0.5g
1.2.8	Climatic version as per OST 25 1099-83	- O3
1.2.9	Operating temperatures, °C	- Minus 30 to +50
1.2.10	Relative humidity, %	- Up to 93 at +40°C
1.2.11	Weight, kg	- 0.3 max
1.2.12	Overall dimensions, mm	- 156 × 107 × 39 max
1.2.13	Non-stop operation	- 24/7
1.2.14	MTBF in quiescent mode, hours	- 80000
1.2.15	Survival probability	- 0.98758
1.2.16	Average service life, years	- 10

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

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

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

1.2.20 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-AR8 standard delivery.

Table 1.3.1

Item	Quantity
S2000-AR8 Addressable Eight-Input Module	1 pc.
Accessory Kit:	
Resistor C2-33H-0.25-10k ±5% GOST R ISO 7049 - ST2,9x9,5-St-C-H-A1A Tapping Screw Woodscrew 1-3x25.016 GOST 1144-80 Wall Plug 6x30	8 pcs. 2 pcs. 3 pcs. 3 pcs.
Documentation	
S2000-AR8 Addressable Eight-Input Module. Operations Manual	1 pc.

1.4 Arrangement and Operation

1.4.1 S2000-AR8 features eight monitored circuits (or supervised circuits, or device loops) 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 via 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 of the module 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 via and communicates data over the polling loop of the polling loop controller.

1.4.4 The module provides monitoring of the conditions of its enclosure. A message about module enclosure'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 S2000-AR8 can be in one of the three operation modes:

- Quiescent Mode: The value of resistance is within the normal range for all the monitored circuits;
- Alarm Mode: 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 × 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-AR8 carries a marking placed on the rear side of its enclosure.

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

1.6.3 The fastening screw is factory-sealed with paint.

1.6.4 Tampering with the seal automatically voids all warranties.

1.7 Packaging

S2000-AR8 with accessories kit and operations manual are packaged into a separate cardboard box.

2 Intended Use

2.1 Operating Restrictions

The design of the module doesn't provide operating it in aggressive and dusty environments and in explosion hazardous premises.

2.2 Preparing for Use

2.2.1 Safety Precautions

- The design of the S2000-AR8 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 S2000-AR8;
- Do SHUT OFF power from the S2000-AR8 before mounting, installing, and maintaining this one;
- Mounting and maintenance of the S2000-AR8 shall be carried out by persons with the second or higher electric safety qualification level.

2.2.2 Design

Figure 2.2.1 presents the appearance and overall and mounting dimensions of S2000-AR8.

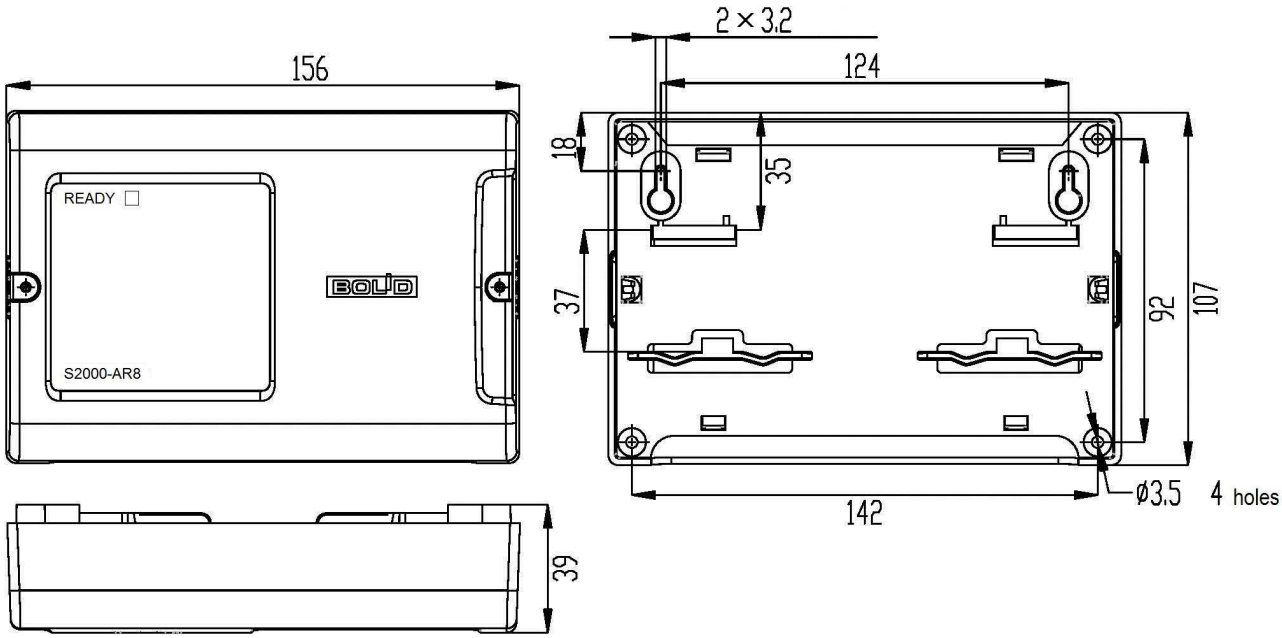


Figure 2.2.1 Overall and Mounting Dimensions of S2000-AR8

2.2.3 Mounting

The S2000-AR8 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-AR8 is housed in unwatched premises it should be at least 2.2 m higher than the floor level.

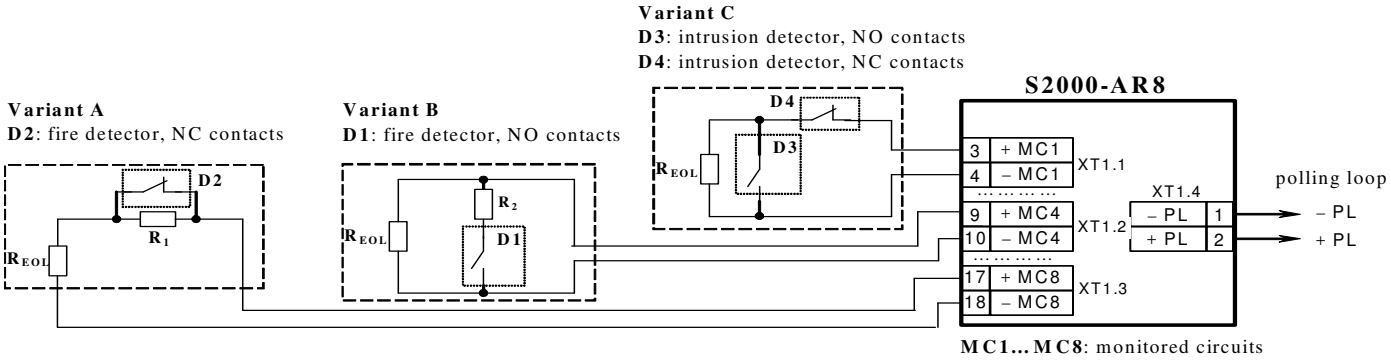
The module design provides installing it either on a flat surface using the woodscrews provided or onto a DIN-rail.

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 S2000-AR8 is described in its Installation Manual available online on https://bolid.ru in the section PRODUCTS at the page of S2000-AR8.

2.2.4 Connecting the Module

Figure 2.2.2 shows a standard schematic for connecting S2000-AR8 with the polling loop controller and standard variants for connecting non-addressable detectors to the module.



R_{EOL} : Termination resistor C2-33H-0.25-10 k±5%;

R_1 : Additional resistor C2-33H-0.25-20 k±5%;
R_2 : Additional resistor C2-33H-0.25-4.7 k±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. The monitored circuits are connected to the contacts of alarm and signal outputs of detectors. Every monitored circuit of the module shall contain a 10 kOhm termination resistor and, depending on the connection variant, can contain a relevant additional resistor.

2.2.5 Settings

2.2.5.1 Configuring

Variants A and B 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**, and the detectors are connected as shown in Variant C.

The module enclosure 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-AR8 provides storing addresses of the monitored circuits to communicate data over the polling loop in the non-volatile memory. The factory address of an S2000-AR8 is 120, with this address matching to the address of MC1. The addresses of the other monitored circuits are calculated based on the address of MC1 by incrementing the address of every following circuit by 1.

To assign addresses, you should use the S2000M control panel or the UProg software utility to send the polling loop controller one of the following commands:

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

By using the **Set New Address** command you can assign the first address to the module regardless of which one is assigned to it at the moment. This can be used when identical addresses are incorrectly assigned to two or more addressable devices in the polling loop. For doing so, issue this command from the control panel or PC specifying the required address as the parameter. The module 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 (longer than 1 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 communication with it on the set addresses. If the old address was occupied by two or more devices, then no messages about loss of communication on the old addresses are given.

If you need to change module addresses which are known, use the **Edit Address** command. Give this command from the control panel or PC specifying the old address and the new address. The control panel or PC shall display events of loss of communication with the module on the old addresses and restoring communication with it on the assigned addresses.

To assign the address 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.

S2000-AR8 operates under a polling loop controller within an Orion ISS. To get more information about operation of the system, please refer to the documentation on the S2000M panel, Orion Pro, Sirius panel, and the polling loop controller.

Modes of operation of S2000-AR8 and the relevant indication patterns are shown in Table 2.3.1

Table 2.3.1

Operation Mode of S2000-AR8	Description	LED Indication
Quiescent Mode	Resistance of all the monitored circuits is in the normal range	Flashes once every 4 s
Alarm Mode	At least one monitored circuit is detected to have an abnormal conditions	Flashes doubly every 4 s
Programming with Address	A *Set New Address* command has been received	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
READY LED does not illuminate	No power applied	Check if voltage is present on the module contact 2 of the XT1 block
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

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 or higher.

3.3 Maintenance Procedures

The scheduled maintenance works include:

- Inspecting exterior conditions of the S2000-AR8;
- Ensuring the S2000-AR8 is fastened properly and its connection wires and contact joints are in 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 enclosure 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 ungergoing maintenance.

3.4.2 By means of the control panel or PC arm the monitored circuits assigned with the relevant group of addresses.

3.4.3 Simulate an alarm response of the detector connected to an MC. Ensure the S2000-AR8 LED is double flashing once per four seconds while the network controller is indicating a Fire Alarm or Intrusion Alarm message on the address assigned to this MC of the module. Place the detector into the normal state and ensure the S2000-AR8 LED starts flashing once per four seconds. By means of the network controller issue a command to reset alarm from the detector related to the MC. While one monitored circuit is being tested the other circuits shall be in norm.

3.4.4 Repeat procedures described in 3.4.3 for the other monitored circuits of the S2000-AR8.

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 by the S2000-AR8 and then open the S2000-AR8 enclosure and close it again. Ensure Tamper Alarm followed by Tamper Restored messages for the required addresses appear.

3.4.6 Network controller's not receiving messages *Intrusion Alarm* or *Fire Alarm* means that the S2000-AR8 is defective and must be replaced.

3.4.7 In addition, the monitored circuit parameters can be checked by measuring ADC values indicating monitored circuit status (see Table 3.4.1).

Table 3.4.1 Relationship between MC Resistance and ADC and MC Status

	Short Circuit or D3 Response (Variant C)	D1 Response (Variant B)	Norm	D2 Response (Variant A)	Open Circuit or D4 Response (Variant C)
Resistance, kOhm	0…2.1	2.4…6.2	6.6…15	16…40	50…∞
ADC Value	220…205	200…180	177…140	137…85	80…0

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 shall not be a reason for claims and warranty repair.

4.3 Claims should 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-AR8 Addressable Eight-Input Module meets the requirements of Technical Regulations of Custom Union TR CU 020/2011 and is covered by Declaration of Conformity ЕАЭС № RU Д-RU.HP15.B.06633/20.

9.2 S2000-AR8 Addressable Eight-Input Module is covered by the certificates of conformity of transport safety technical arrangements with their functional properties No. МВД РФ.03.000036, No. МВД РФ.03.000037.

9.3 Production of S2000-AR8 Addressable Eight-Input Module is covered by Conformity Certificate ГОСТ Р ИСО 9001, which can be found online at https://bolid.ru in Section ABOUT.