S2000-KPB

EXECUTIVE UNIT

Version 3.02

ИСО 9001

INSTRUCTION MANUAL

1 TECHNICAL DESCRIPTION

1.1 General

1.2 1. This Instruction Manual describes how to operate and maintain the S2000-KPB Executive Unit of version 3.02 (hereinafter referred to as the unit).

1.2 2. The unit is designed to be used with an S2000M panel, an S2000-ASPT fire alarm and extinguishing control unit, or a PC as a component of modular control and indicating equipment in such system as a fire / intrusion / panic alarm system, a voice alarm and evacuation system, a fire suppression system, an access control system, or a CCTV system.

1.2 3. The unit is designed to control executive devices (light panels, light alarms, sirens, video cameras, electromagnet locks etc.) as well as clean agent suppression systems and fire-fighting equipment in gas, dry powder, and aerosol fire-fighting systems. The unit controls executive devices by switching voltage from its power input terminals U_{main} and U_{back} to its output terminals. Connecting external power supplies to output terminals is prohibited and can damage the unit.

1.2 4. The unit is designed to be installed on a vertical surface inside the protected premises closely to the executive devices. The unit is designed for round-the-clock operation.

1.2 5. The unit must not be used in aggressive medium or dust condition, or in explosion-hazardous premises.

1.2 6. As to the resistance to mechanical stress, the unit falls in the placement category 03 of OCT 25 1099-83.

1.2 7. As to immunity to climate effects of environment, the unit corresponds to version 03 in accordance with OCT 25 1099-83 but for ambient temperatures from minus 30 to +55°C.

1.2 Specifications

1.2 1. Power Supply:	An external dc power supply with power voltage between 10.2 V dc and 28.4 V dc (RIP-12, RIP-24)
1.2 2. Power Inputs:	Two
1.2 3. Consumed Current (without executive devices):	100 mA max
1.2 4. Outputs:	Six
– Switching Voltage:	10.2 dc to 28.4 V dc (from the power supply of the unit) ;
– Switching Current:	5 mA ÷ 2.5 A;
– Circuit Failure Monitoring Current:	1.5 mA max
1.2 5. Max Total Switched Current of the Unit:	6 A
1.2 6. Inputs:	Two
1.2 7. Resistance of the loop wires without termination resistance:	100 Ohm max
1.2 8. Leakage resistance between the loop wires or each wire and ground:	At least 50 kOhm
1.2 9. Overall Dimensions:	156 mm × 107 mm × 39 mm max
1.2 10. Weight:	0.3 kg max

1.2 11. The unit remains functional under and after exposure to electromagnetic interference of the third severity level and higher in accordance with Russian Standards ГОСТ Р 51317.4.2, ГОСТ Р 51317.4.3. The quality of operation of the unit is not guaranteed if electromagnetic environment doesn't meet the operation conditions.

1.2 12. Industrial radio frequency interference from the unit meets the requirements of Grade Б ГОСТ Р 51318.22 (СИСПР22-2006) Clauses 5.1, 6.1.

1.2 13. Ingress Protection Rating (if wall mounted): IP30

1.2 14. Pre-Operation Time: 3 s max

1.2 15. The design of the unit provides its fire safety in emergency operation and under violation of operation rules in accordance with Russian Standard ГОСТ 12.1.004-91.

1.2 16. The content of precious materials: no need to account for the storage, disposal and recycling.

1.3 Standard Delivery

1)	S2000-KPB Executive Unit	– 1 pc.
2)	Instruction Manual	– 1 pc.
3)	DIN 7982 Flat Head Tapping Screw with Cross Drive 2.2×6.5	– 1 pc.
4)	Woodscrew	– 3 pcs.
5)	Wall Plug 6×30	– 3 pcs.
6)	Load Connection Module	– 6 pcs.
7)	Package	– 1 pc.

2 PERFORMANCE

The unit can operate in the following modes:

– Quiescent;
– Power Failed;
– Device Failed.

2.1 Quiescent Mode

The unit being in the quiescent mode, its READY LED is lit steady.

1.2 1. **Alarm Inputs of the Unit**

Each of the two inputs of the unit can be used independently to monitor conditions of fire protection equipment (for example, MASS or PRESSURE outputs), limit switches, detectors and alarms including those which are not directly related to fire and intrusion alarm systems. In this case an alarm loop should be connected to the unit's input.

The unit measures active (linear, ohmic) resistance in its alarm loops generating relevant information and service messages and sending them to the network controller.

Each input of the unit can be related with one of five different states depending on the value of the alarm loop resistance. These states and threshold values of resistance are programmable (see Section «Programming the Unit»). The layout of states and the positions of the threshold values between states relative to alarm loop resistance values are shown in Figure 1.

A state of an input is changed when the resistance of the alarm loop connected to the input appears to be in a range related with any state other than the current one within a given time.

For such "Restored" states as Auxiliary Input Restored, Battery Restored and so on the time of transition is defined by a configuration parameter Restore Time of the unit input.

For the Disarmed and Addressable Loop Parameter Error states the transition time is not applicable. An input proceeds to this states immediately.

For other states the time of transition (the integration time) is equal 300 ms.

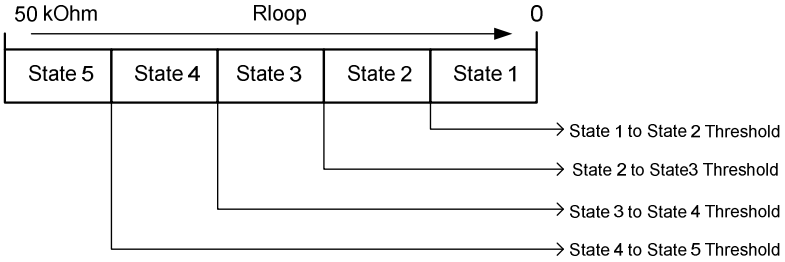


Figure 1. The States of the Inputs and the Threshold Values of Resistance

The current states of the first and the second inputs are indicated by the MASS and PRES indicators.

Table 1 demonstrates the states an input can enter, the indication patterns of the unit, and the times of transition.

Table 1. Indication of States of an Input

State	LED Color	Indicator Performance	Transition Time
AC Power Restored AC Power Failed Fire Equipment Restored Normal Level Normal Temperature Tamper Restored Battery Restored	□	Off	Is defined by the Restore Time configuration parameter
Auxiliary Input Alarm	Green	Pulses for 250 ms every 2 s	300 milliseconds
Low Level Pump On Low Temperature	Green	Pulses once per four seconds	
Pump Off High Level High Temperature	Green	Pulses once per two seconds	
Auxiliary Input Alarm 2 Service Required	Green	Double flashes for 250 ms every 2 s	
Tamper Alarm AC Power Failed Battery Failed Fire Equipment Fault Too High Level Too Low Level Heat Sensor Failed	Amber	Pulses for 250 ms every 4 s	
Input Open Failure	Amber	Double flashes for 250 ms every 2 s	
Input Short Failure	Amber	Pulses for 250 ms every 2 s	

State	LED Color	Indicator Performance	Transition Time
Addressable Loop Parameter Error	Amber	Four flashes for 125 ms every 2 s	Immediately (0 second)
Disarmed	Amber	Lit steady	

The unit provides disabling an input by a disarm command which should be given to the unit from the network controller with specifying the number of the input. In response to this command the unit switches the input to the Disarmed state. For this state of the input the unit doesn't generate messages when the resistance of the input circuit has changed.

To resume operation of the input an arm command with the number of the input should be given from the network controller to the unit. The relevant input shall enter a state related with the current resistance of the alarm loop connected to the input.

If an error has occurred in the configuration parameters of an input, the input proceeds to the Addressable Loop Parameter Error status. For this status the unit doesn't generate messages when the resistance of the alarm loop changes. The configuration of the input of the unit should be checked and corrected (see Section "Programming the Unit").

Figure 2 shows an example of the parameters of an input and the schematic when by means of a single alarm loop states of a normally closed and a normally open contacts along with open and short circuit failures can be monitored.

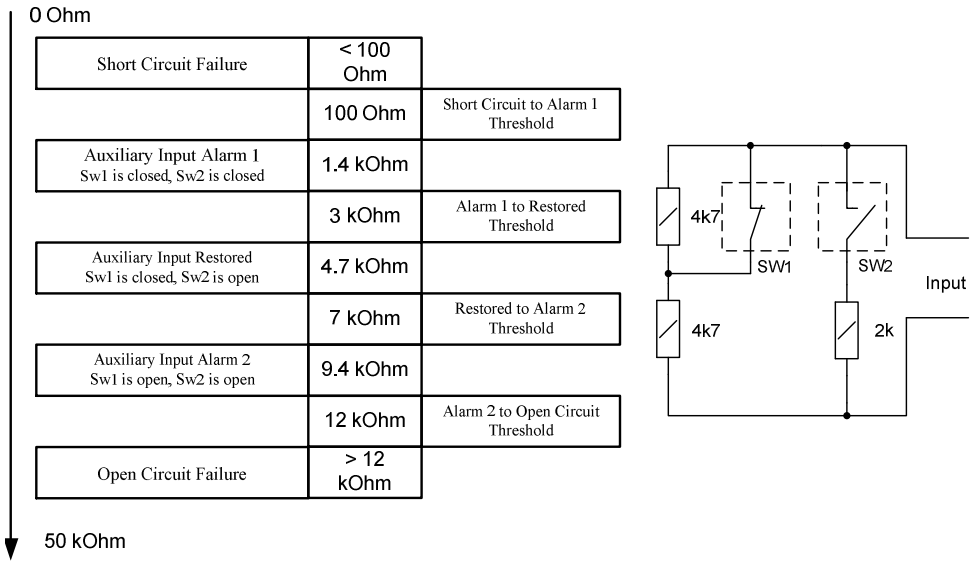


Figure 2. An Example of Parameters of an Input and Alarm Loop Schematic

1.2 2. **Outputs**

The S2000-KPB provides control for connected executive devices by switching power voltage from the unit's terminals U_{main} and U_{back} to the terminals of the outputs. Connecting external power supplies is prohibited and can damage the unit.

The S2000-KPB provides switching on (switching off, pulsing) for its outputs in accordance with assigned control programs on receiving control commands over the RS-485 interface. The unit also provides monitoring executive outputs and the monitored circuits connected to the outputs.

The available programs for executive outputs are shown in Table 2.

Table 2. Commands to Control Outputs

Program Number	Program Description	Final State
0	Return the output to the initial condition	–
1	Switch ON (until a new command is received)	–
2	Switch OFF (until a new command is received)	–
3	Switch ON for a given time, then switch OFF	Off
4	Switch OFF for a given time, then switch ON	On
5, 6	Switch ON/OFF (until a new command is received)	–
7	Switch ON/OFF for a given time, then switch OFF	Off
8	Switch ON/OFF for a given time, then switch ON	On
11	Discharge extinguishing agent	Off

Note: *The full list of output executive commands can be seen in the User's Manual for an S2000M panel. When the S2000-KPB is connected to the internal interface RS-485-2 of an S2000-ASPT unit, the first one is used to expand the discharge circuits of the last one. In this case the individual outputs of the unit cannot be controlled remotely from the S2000M panel.*

The output executive commands can comprise the Control Delay parameter. In such case the program starts running after expiration of the specified time period. The Control Delay parameter ranges from 0 to 8192 s (2 hours 16 minutes 32 s) in increments of 0.125 s. If Control Delay is missed or equal to zero, the program starts running just after receiving the command.

Output control commands with the programs #5, #6, #7, and #8 (Switch ON/OFF) can include detailed data defining a rate and pulse ration of switching the outputs. If these data are missed in a command, the output will be switched on and off with 1 Hz frequency and pulse ratio of 2.

Output control commands with the programs #3, #4, #7, #8 («Switch for a Given Time») contain the Control Time parameter. The Control Time can have a value from 0 to 8192 s (2 hours 16 minutes and 32 s) in the increments of 0.125 s.

If Control Time is missed in a command then the program will be executed within the time given in the unit's configuration parameter Discharge Time.

If Control Time in a command is equal to zero, the output will be switched to the initial status for the received command.

In case of an output control command with the program #11 the unit generates a discharge pulse for the relevant output (the output is switched on for a given time and then the output is switched off). If the command contains zero as the number of output, a discharge pulse will be generated for all outputs one-by-one.

If a command contains no Control Time or no Control Delay, the values for them will be taken from the unit's configuration.

The value of discharge interval time is given by the relevant configuration parameter.

The unit provides monitoring of lines of connection of executive devices (the monitored circuits) provided that termination elements - load connection modules are brought into the lines. The load connection modules are installed inside the executive device enclosures (except for the release circuit).

When release circuits or explosion protected devices are being connected to the S2000-KPB then the load connection modules can be located in the vicinity of the connected devices. An example of connection diagram is shown in Figure 3.

The monitored states of a monitored circuit are defined by the circuit failure detection type specified in the configuration parameters in accordance with Table 3.

Table 3. The Types of Monitored Circuits

Circuit Failure Detection Type	Monitored Conditions
1	No circuit condition is monitored
2	The circuit is monitored for open failures
3	The circuit is monitored for short failures
4	The circuit is monitored both for open and short failures

When a monitored circuit is switched off its conditions are defined by the voltage on the positive output terminal relative to the «0 V» terminal:

- «Open Circuit Failure»: less than minus 1.125 V;
- «Short Circuit Failure»: more than minus 0.15 V;
- «Norm»: between minus 0.15 V and minus 1.125 V;

When a monitored circuit is switched on its conditions are defined by the current carrying through the circuit:

- «Short Circuit Failure»: More than 2.5A;
- «Norm»: Less than 2.5 A but more than open-circuit current;
- «Open Circuit Failure»: The value of the open-circuit current is defined depending on the selected type of open-circuit failure monitoring in the unit configuration. The available variants are shown in the table below.

Table 4. The Types of Monitoring for a Switched-On Output

Type of Monitoring	The Types of Open-Circuit Failure Monitoring for a Switched-On Output
0	Disabled
1	Normal
2	Programmable Open-Circuit Threshold
3	Periodic Load Shutdown
4	Current Drop Monitoring

- For the Disabled monitoring type the S2000-KPB doesn't monitor the circuit for open failures when the output circuit is activated.
- For the Normal monitoring type the used minimum value of the output current is 5 mA.
- For the Programmable Open-Circuit Threshold monitoring type the minimum output current is equal to an Open-Circuit Failure Current parameter from the unit's configuration. The value of the parameter for each output can be set either while configuring the unit (see Section 3.3, Programming the Unit) or standalone without connecting to a personal computer. For doing so switch on the relevant outputs and ensure that all the connected executive devices operate properly. Then open the unit's cover and perform a combination of presses on the tamper switch: short, long, long, long (dot dash dash dash). A long press means holding the tamper switch pressed for 0.5 to 1.5 second while a short press means holding the tamper switch pressed for shorter than 0.5 s. If pressing the combination has succeeded than for each active output the unit generates a value of the Open-Circuit Failure Current parameter less by eighth than the current value of output current. Also the Type of Open-Circuit Failure Monitoring is changed for Programmable Open-Circuit Threshold while the indicators of the relevant outputs pulse within 4 second in the mode "On for 0.75 s and off for 0.25 s".

- For the Periodic Load Shutdown monitoring type the minimum current for the output is 5mA. Once per 30 seconds the unit will shut the load down for 125 ms when it will be inspecting integrity of the line up to the termination element (the load connection module) of the monitored circuit.
- For the Current Drop Monitoring type the unit, switching the output on, accumulates the average value of the current in the monitored circuit. When the operating current drops more than a quarter of the average value an open circuit failure in the monitored circuit is diagnosed. Smooth changes of the operating current in the monitored circuit due to changes in the supply voltage are taken into account in the accumulated average value.

The monitoring types other than Normal are recommended to be used when several load devices are connected into the monitored circuit, for example for several light and sound alarms in a single monitored circuit.

For example, for normally closed light alarm appliances the Periodic Load Shutdown monitoring type is preferable. This type provides monitoring the circuit along the entire length to the termination element (LCM) provided that the number of appliances is restricted only by the maximum current value. If an open circuit failure has happened and a part of the monitored circuit with the LCM is isolated then the unit, switching off the output once again, detects the open circuit and generates the relevant message. The connection diagram is shown in Figure 4.

If a load doesn't allow short-time shutting down, the Programmable Open-Circuit Threshold or Current Drop Monitoring monitoring types is suitable. When a part of the monitored circuit with several executive devices is isolated and as a consequence the operating current has dropped below a programmed threshold the unit generates an Open Circuit message.

Current Drop Monitoring is recommended to be used when no more than four executive devices with the same current consumption are connected to the output of the monitored circuit. Correct operation of this monitoring type with a larger number of executive devices is not guaranteed.

When a short or open failure of a monitored circuit is detected the unit transmits a Loop Short Circuit message or Loop Open Circuit message correspondently over the RS-485 interface. When the monitored circuit has returned to the Norm state, the unit sends the relevant recovery message over the RS-485 interface.

Note: If a short circuit failure has been detected while the output is activated then without regard to the circuit monitoring type the executing program will be aborted and will continue running in 10 s.

States of the control outputs and the monitored circuits connected to them in Quiescent Mode are indicated by "1" to 6" LEDs in accordance with Table 4.

Table 5. Indication of States of Outputs

Circuit's Condition	Output's Condition	Indicator Performance
Norm	On	Lit steady in green
	Off	Off
Open Failure	On	While lighting in green, double flashes in yellow once per two seconds
	Off	Double flashes in amber once per two seconds
Short Failure	On	Flashes in amber once per two seconds
	Off	

The unit monitors the total operating current of all the monitored circuits. If the total operating current has exceeded the maximum permitted value (6 Amperes) the unit generates an Overcurrent message and shuts off one-by-one the outputs with the maximum operating current. As soon as the total current doesn't exceed the maximum permitted value the unit generates a Power Restored message.

1.2 3. **Power Inputs**

While operating, the unit monitors the voltage at its power inputs U_{main} and U_{back}. When the power voltage has dropped at any input (if Both Power Inputs Monitoring is set on) or at both inputs (Both Power Inputs Monitoring is set off) down to 10 V and lower the unit sends a Power Failure message over the RS-485 interface.

When the power voltage has been restored for both inputs (if Both Power Inputs Monitoring is set on) or for any input (if Both Power Inputs Monitoring is set off) up to 11 V and higher, the unit transmits a Power Restored message over the RS-485 interface.

Power input conditions are indicated by READY LED as shown in the table below:

Table 6. Indication of Operation Modes of the Unit

Power Voltage	Both Power Inputs Monitoring	READY LED Performance
1. OK for both inputs	On	Lit steady
	Off	Lit steady
2. Below the normal range for an input	On	On for 0.25 s and off for 1.75 s
	Off	Lit steady
3. Below the normal range for both inputs	On	On for 0.25 s and off for 1.75 s
	Off	On for 0.25 s and off for 1.75 s

The internal circuits of the unit and output circuits are supplied with power by a power input with a higher voltage.

The values of the current consumed in various conditions are shown in the table below:

Table 7. Consumed Current

Conditions	Power Voltage	Max Consumed Current
All outputs are switched off and OK. All inputs are in open circuit conditions.	12	35 mA
	24	30 mA
All outputs are switched off and in open circuit conditions. All inputs are in open circuit conditions.	12	40 mA
	24	35 mA
All outputs are switched off and in short circuit conditions. All inputs are in short circuit conditions.	12	45 mA
	24	40 mA
One output is switched on and in open circuit conditions, Other outputs are switched off and OK. All inputs are in short circuit conditions.	12	75 mA
	24	55 mA
All outputs are switched on and in open circuit conditions. All inputs are in short circuit conditions.	12	100 mA
	24	75 mA

2.2 Device Failed Mode

The unit proceeds to the Device Failed mode when a fatal error has occurred on calculating the checksum of the program memory of the built-in microprocessor.

In the Device Failed mode READY and COM LEDs flash alternately while other indicators change color from green to amber synchronously.

If the unit enters the Device Failed mode on switching on, update its firmware as discussed in Section 3.4 or return the unit to the manufacturer.

2.3 Communicating Data Over the RS-485 Interface

The unit receives commands from and transmits messages to the network controller over the RS-485 interface. The status of communication is indicated by the COM LED as shown in the table below.

Table 8. Indication of Communication Condition

Communication Condition	Indicator Performance
1. Data are communicated over the RS-485 interface	Lit steady in green
2. Communication over the RS-485 interface has been lost	Off

The unit provides buffering of the events on their transmitting. The capacity of the buffer is 66 events.

3 OPERATIONAL DIRECTIVES

3.1 Safety Precautions

3.1.1. The unit's design meets the requirements of electrical and fire safety according to Russian Standards ГОСТ 12.2.007.0-75 and ГОСТ 12.1.004-91.

3.1.2. The unit has no circuits under hazardous voltage.

3.1.3. Do shut off the unit's power before mounting, installing, or maintaining this one.

3.1.4. Mounting and maintaining must be performed only by qualified staff with the second or higher safety certification level.

3.2 Preparations for Use

3.2.1 Before connecting the unit to the RS-485 interface, the unit must be assigned to a unique network address. This address must not be the same as the address of another device connected to the same interface RS-485.

3.2.2 If a wrong address is assigned to the unit it can be reset to 127 without disconnecting from the RS-485 interface and connecting to a PC. Remove the cover of the unit and perform the following combination of presses on the unit's tamper switch: long-long-long-short (dash, dash, dash, dot). A long press means pressing the tamper switch and holding it pressed for 0.5 to 1.5 second while a short press means pressing the tamper switch and holding it pressed for shorter than 0.5 s. If the action has succeeded then COM LED pulses four times per second for 4 seconds.

3.2.3 If necessary, change other configuration parameters of the unit to fit the unit's functions.

3.2.4 Attach the unit at any convenient place (the unit can be installed on walls, behind suspended ceilings and on other structures of the protected premises near executive devices at places protected against atmospheric fallouts, mechanical damage, and unauthorized access).

3.2.5 Mount and wire the unit as shown in Figure 3 in accordance with your applicable local standards, codes, regulations, and ordinances (РД 78.145-92 for Russia).

3.2.6 If a single power supply is in use (the configuration parameter Both Power Inputs Monitoring is set off), this one can be connected to any power input of the unit.

3.2.7 If the unit and the network controller are connected to different power supplies, their 0 V circuits should be coupled.

3.2.8 Unless the unit is the end (the first or the last) device in the interface bus, remove the jumper which is near the contacts "RS-485A" and "RS-485B".

3.3 Programming the Unit

To be adjusted for a specific way to use, the unit provides programming the following parameters which are stores in its non-volatile memory.

The configuration parameters are described in Table 9.

Table 9. Configuration Parameters

Parameter	Description	Value	Default Value
Parameters of Outputs			
Initial Output Status	The output control program to be started after powering up or resetting the unit as well as on receiving a Switch the Output to Initial Status command	ON / OFF	OFF
On/Off Events	Generating events on changing states of the output relay	ON / OFF	ON
Circuit Failure Detection Type	The value defining monitored conditions of the monitored circuit	Any value from Table 3	Open and Short Failures
Open-Circuit Failure Monitoring Type	Defines the tactics for the unit to monitor an activated output when an open circuit failure has occurred	Any value from Table 4	Normal
Open-Circuit Failure Current	The value of the minimum current in the monitored circuit for the monitoring type “Programmable Open-Circuit Threshold”	5 mA to 2.5 A	5 mA
Current Calibration Factor	The value for estimating the current at the output. This value is written to the memory of the unit at the factory during manufacturing and cannot be edited	–	–
Parameters of Inputs			
Code of State 1	Defines indication and messages transmitted to the network controller	Any value from Table 1	Loop Short Circuit
Code of State 2			Fire Equipment Failure
Code of State 3			Fire Equipment Restored
Code of State 4			Fire Equipment Failure
Code of State 5			Loop Open Circuit
Threshold 1-2	The resistance values of inputs which separates the states	0…50 kOhm	100 Ohm
Threshold 2-3			3 kOhm
Threshold 3-4			7 kOhm
Threshold 4-5			12 kOhm
Restore Time	The integral time for restore conditions	0…255 s	5 s

Parameter	Description	Value	Default Value
Others			
Discharge Delay	The duration of the discharge delay for Program #11 (if missed in the command)	0…1000 s	2 s
Start Interval	The time between issuing start pulses to adjacent outputs for Program #11	0…1000 s	7 s
Discharge Time	The time for which the output will be activated for Program #11	0…8000 s	5 s
Both Power Inputs Monitoring	Generating events for each power input individually	ON / OFF	ON

To change configuration parameters of the unit, an x86-compatible PC under Windows XP or higher and one of the Bolid manufactured interface converters (such as PI-GR, S2000-PI, S2000-USB etc.) are to be used. The configuration parameters are changed by means of **UProg** Configuration Tool of version 4.1.0.51 or higher.

The last version of UProg Configuration Tool along with some additional information about operating the unit can be found in the Internet at the address of **http://bolid.ru**.

The configuration of the unit can be reset to a factory value without using a PC. For doing so remove the unit's cover and perform the following combination of presses on the tamper switch: short – long – short – short (dot, dash, dot, dot). A long press means pressing the tamper switch and holding it pressed for 0.5 to 1.5 second while a short press means pressing the tamper switch and holding it pressed for shorter than 0.5 s. If pressing the combination has succeeded the unit resets with the base configuration and the address of 127.

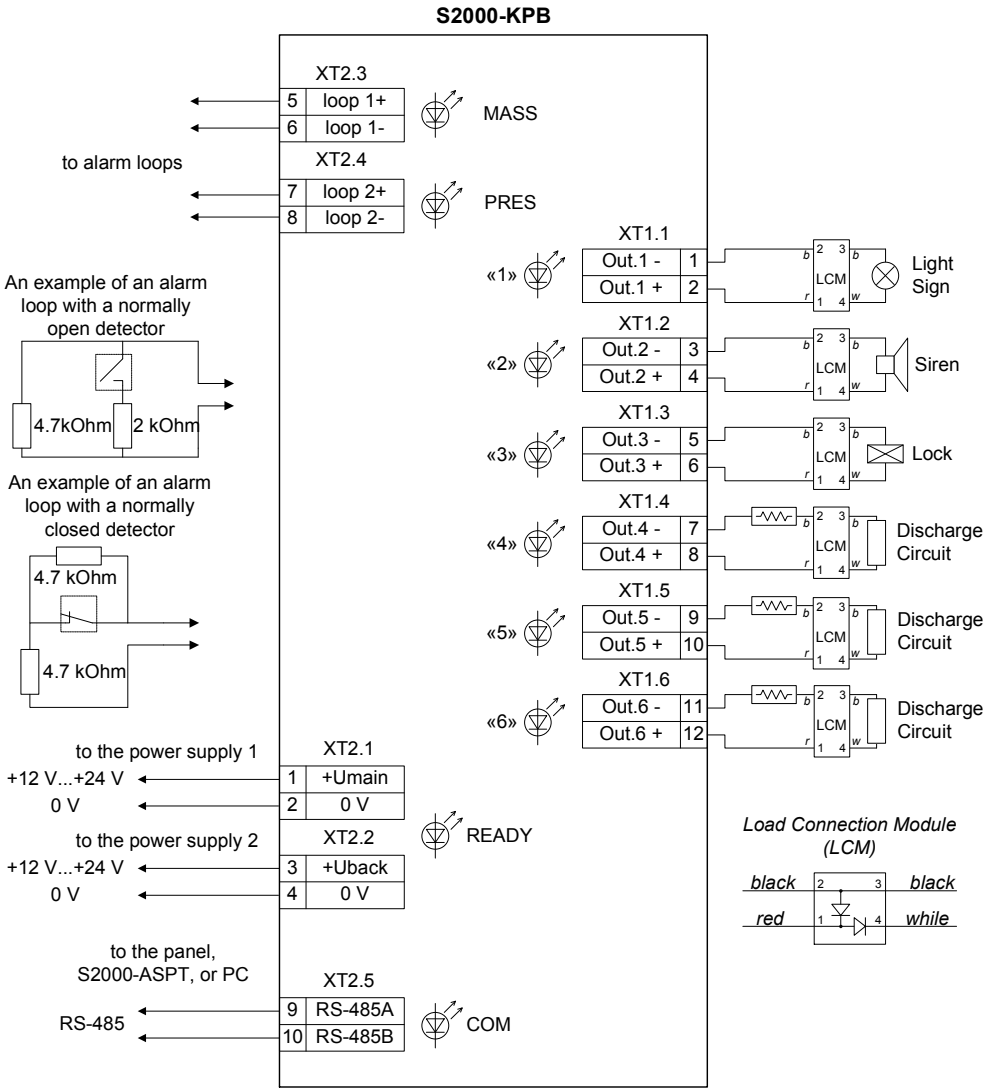
3.4 Updating Firmware

The unit supports updating its firmware. A new firmware version can expand the functionality of the unit or fix errors in the current version. A list of available firmware along with key features and recommended updates are available at the address of **http://bolid.ru** at the page of the S2000-KPB unit on the tab «Скачать».

Firmware is to be updated using the software utility Orion-Prog; the link for the actual version of the program can be found at the same page. The procedure of the update is described in the program Help.

Updating firmware can change the unit configuration, so please save the current configuration of the unit before updating by means of UProg software utility and load this stored configuration to the unit memory after updating.

Updating can take several minutes.



Notes:

1. The type of executive devices to be connected to the outputs is to be defined by user and can differ from the shown devices.
2. The load connection modules should be installed within the cases of executive devices (except for discharge circuits).
3. For discharge circuits and explosion-protected devices the load connection modules can be located in the proximity of them.
4. If an output is not in use, a 1kOhm - 0.5 W resistor can be used instead of the load connection module.
5. Normally open and normally closed detectors can be combined and brought into the same circuit if only one detector can be in activated status at the same time.

Figure 3. S2000-KPB Wiring Diagram

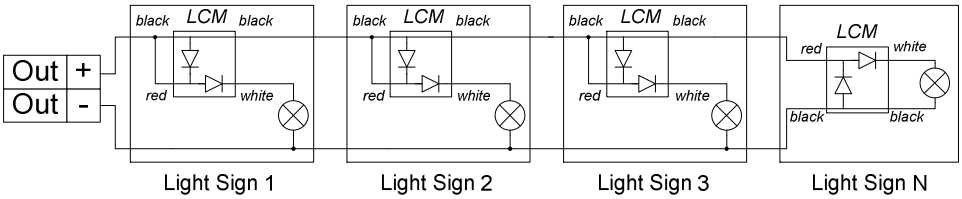


Figure 4. The Diagram for Connecting Several Light Signs to the Same Output

4 PERFORMANCE INSTRUCTIONS

4.1 When you select a power supply be sure it can provide the electric current enough to power all the executive devices connected to the unit.

4.2 The power supply should be located at such distance from the unit that the resistance R_1 of the wires between the power supply and the unit (see Figure 5) meets the following requirements:

– While powered by a **12 V** power supply, R1 ≤ 0.25 Ohm;

– While powered by a **24 V** power supply, R1 ≤ 0.34 Ohm.

The dependence between the resistance of a wire and its length for various cross sections is shown in Table 8.

Table 8. The Dependence between the Resistance of the Wire and its Length & Cross Section

Cross Section, mm²	Wire Resistance, Ω					
	L = 1 m	*L = 2 m*	*L = 4 m*	*L = 6 m*	*L = 8 m*	*L = 10 m*
0.2	0.0875	0.1750	0.3500	0.5250	0.7000	0.8750
0.5	0.0350	0.0700	0.1400	0.2100	0.2800	0.3500
0.75	0.0233	0.0467	0.0933	0.1400	0.1867	0.2333
1.0	0.0175	0.0350	0.0700	0.1050	0.1400	0.1750
1.5	0.0117	0.0233	0.0467	0.0700	0.0933	0.1167
2.0	0.0088	0.0175	0.0350	0.0525	0.0700	0.0875

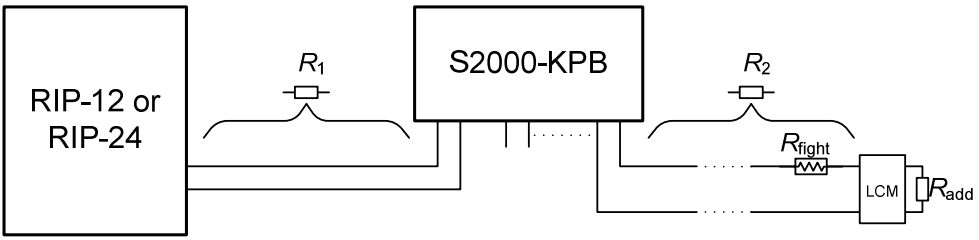


Figure 5

4.3 The length and cross section of the wires used to connect executive devices to the unit must provide the current load for executive devices.

4.4 Connect the fire-fighting system as shown in Figure 4. The length of wires used to connect the fire-fighting system and the resistance of the additional resistor must have the values which provide the required current of activation of the electric activator.

4.5 The required value of the additional resistance R_{add} is estimated using the formula below:

$$R_{add} = \frac{U\,\text{min} - 2}{I} - (R_2 + R_1 + R_{\text{fight}}),\ \text{where:}$$

$\boldsymbol{U_{min}}$ stands for the minimum voltage of the power supply (10 V for a RIP-12 or 20 V for a RIP-24);

$\boldsymbol{I}$ stands for the required current of activation, [A];

$\boldsymbol{R_1}$ stands for the resistance of wires between the power supply and the unit, [Ohm] (see Clause 4.2);

$\boldsymbol{R_2}$ stands for the resistance of wires between the S2000-KPB and the fixed fire-fighting system, [Ohm] (see Clause 4.2);

$\boldsymbol{R_{fight}}$ stands for the effective resistance of the exploder (bridgewire), [Ohm].

4.6 The standard resistance for R_{add} is to be selected from the E24 series as the nearest smaller value relative to the estimated value above.

4.7 The R_{add} resistor must have enough power, especially if the activation time exceeds one second.

4.8 For example, if the unit is powered by a 24 V power supply, the resistance of the connected wires doesn't exceed 0.3 Ohm, the resistance of the exploder is 6 Ohm, and the estimated current of the activation of the exploder is 0.1 A, then the resistance value of the additional resistance should be 160 Ohm.

4.9 If the circuit connected to an output is monitored neither for open circuit failure nor for short circuit failure (the first type of monitored circuits), no load connection module is necessary to install.

4.10 The conditions of the outputs #1 to #6 and the circuits connected to them can be monitored using the LEDs "1" to "6".

4.11 The conditions of the alarm loops can be monitored using "MASS" and "PRES" indication.

5 MAINTENANCE

5.1 General

The unit shall be maintained by electricians with electrical safety qualification level three and higher.

Connecting external circuits to the terminals of the unit use a screwdriver with a tip of PHILLIPS PH1 type; a screw torque must not exceed 0.25 Nm.

5.2 Annual Maintenance

5.2.1 Inspect the unit visually for mechanical damage.

5.2.2 Remove dust, debris, moisture (condensation) from the unit's surface.

5.2.3 Remove the unit's cover.

5.2.4 Switch off the battery backed power supplies connected to the unit or detach power circuits from the contacts "+U_{main}" and "+U_{back}".

5.2.5 Remove dust, debris, and corrosion from the surface of terminals and fuses.

5.2.6 Ensure the unit case and wire terminals are fastened properly.

5.2.7 Switch on the battery backed power supplies connected to the unit or connect the power circuits to the terminals "+U_{main}" and "+U_{back}".

5.2.8 Put the unit's cover on the place.

5.2.9 Ensure that the unit's LEDs display no troubles. READY LED shall show solid light, COM LED shall either show solid light or pulse, output's LEDs indicate the initial states of assigned control programs (see Table 2), MASS LED and PRES LED shall perform as defined by the programmed input configuration (see Table 1).

5.3 Inspecting Unit's Operability

5.3.1 In accordance with the engineering documentation, decide upon:

- The type of the system where the unit is used,
- The purpose of the unit,
- What network address is assigned to the unit in the system,
- Which power supply is connected to the unit,
- Which circuits and which devices the unit monitors via "loop1" and "loop2" inputs,
- Which devices are connected to the outputs "1", "2", "3", "4", "5", and "6" of the unit,
- Which network controller or device controls the unit over the RS-485 interface,
- Which control programs are assigned to each output in the configuration chart of the unit,
- Which events (or commands of the network controller) correspond to activation of the control program at each used unit's output,
- How to generate the command or call the event to activate the control command for each used output.

5.3.2 Open the cover of the S2000-KPB unit removing the tamper label if necessary.

5.3.3 **WARNING:** If the unit is connected to clean agent suppression modules or other executive devices which must not be activated during the inspection, carry out the steps 5.3.4 – 5.3.7.

5.3.4 Switch off the battery backed power supplies connected to the unit or disconnect the power circuits from the "+U_{main}" and "+U_{back}" contacts.

5.3.5 Disconnect discharge circuits from the "+" and "–" contacts of used outputs of the unit.

5.3.6 Connect discharge circuit simulators to the outputs as shown in Figure 5.

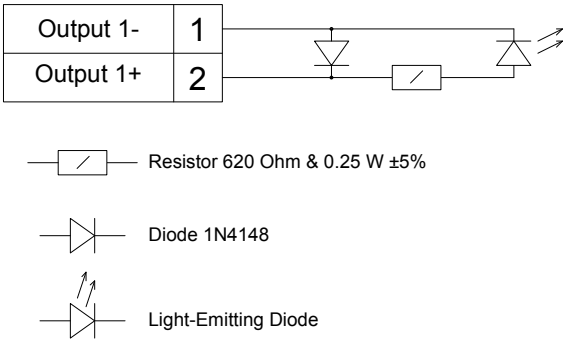


Figure 6. The Schematic of a Discharge Circuit Simulator

5.3.7 Switch on the battery backed power supplies connected to the unit or connect power circuits to the contacts "+U_{main}" and "+U_{back}".

5.3.8 Ensure the unit is in Quiescent Mode as the indicator shows. READY LED shall be lit steady, COM LED shall be lit steady or flash, indicators of outputs shall indicate the initial status of their control programs (see Table 2), MASS and PRESS LEDs shall operate in accordance with the programmed configuration of the alarm loops (see Table 1).

5.3.9 Generate a command or event to activate control programs for each executive output.

5.3.10 Ensure the executive devices connected to the unit respond (or light diodes of the simulators turns on in accordance with the given programs).

5.3.11 Ensure that indicators "1" to "6" double operation of the control program for each output.

5.3.12 One-by-one simulate a short circuit failure of the circuit of the used output "1", "2", "3", "4", "5", "6" of the unit for which the unit's configuration specifies the function of monitoring short circuit failures.

5.3.13 Ensure that on closing the circuit the relevant output status indicator flashes in amber once per two seconds.

5.3.14 Ensure that the control device (the network controller) displays the event of short circuit failure for the relevant address.

5.3.15 One-by-one, simulate open circuit failures for the used outputs "1", "2", "3", "4", "5', "6" of the unit for which the unit's configuration specifies the function of monitoring open circuit failures.

5.3.16 Ensure that on opening the circuit the status indicator of the relevant output double flashes in amber once per two seconds.

5.3.17 Ensure that the control device (the network controller) displays the event of open circuit failure for the relevant address.

5.3.18 One-by-one, connect to the "loop 1" and "loop 2" terminals the resistors nominal values of which are defined in the configuration of the S2000-KPB.

5.3.19 Ensure that the control device (the network controller) displays the events which correspond to each resistance value and MASS and PRES indicators operate as shown in Table 1.

5.3.20 Switch off the battery backed power supplies connected to the unit or disconnect the power circuits from the contacts "+U_{main}" and "+U_{back}".

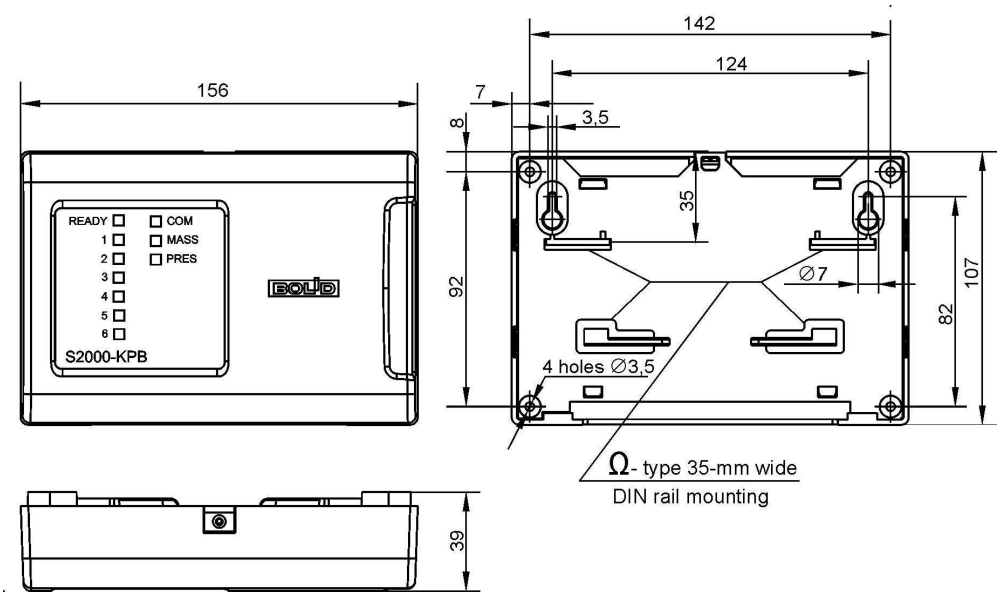
5.3.21 Connect the circuits to the outputs of the S2000-KPB unit as specified by the design documentation.

5.3.22 Switch on the battery backed power supplies connected to the unit or connect the power circuits to the contacts «+U_{main}» and «+U_{back}».

5.3.23 Close the cover of the unit and seal if necessary.

5.3.24 Ensure the unit LEDs indicates the unit's being in Quiescent Mode. READY LED shall be lit steady, COM LED shall be lit steady or flash, indicators of outputs shall indicate the initial status of the control program (Table 2), MASS and PRESS LEDs shall operate in accordance with the programmed configuration of the alarm loops (Table 1).

6 OVERALL AND MOUNTING DIMENSIONS



ZAO NVP Bolid, 4 Pionerskaya Str., Korolev 141070, Moscow Region, Russia
Phone/fax: +7 495 775-7155
Email: info@bolid.ru
Technical Support: support@bolid.ru
http://bolid.ru