BOLID
SECURITY SYSTEMS

SIGNAL-20P

Intrusion&Fire Alarm
Addressable 20-Loop Control Device

Installer’s and User’s manual

ATTENTION!

To modify configuration parameters use the program

“uprog.exe” of version **4.0.0.904** or higher.

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This Installer's and User's manual is intended to help for studying operability principles and maintenance of SIGNAL-20P Intrusion&Fire Alarm Addressable 20-Loop Control Device version 2.05.

Please read the instructions completely before connecting, operating or adjusting this product.

1 DESCRIPTION

The multi-purpose Intrusion&Fire Alarm Addressable 20-Loop Control Device SIGNAL-20P (hereinafter referred to as device) is designated for usage as a part of integrated safety system to protect shops, pay-offices, banks, establishments, plants and other objects from fire and intrusion threats.

As the part of security system Orion headed either by S2000/S2000M console or ARM Orion PC the device is intended to:

- ✓ monitor up to 20 zones of burglary, fire, manual or auxiliary alarming
- ✓ receive signals from auto and manual fire and burglary detectors both powerless and loop supplied along with 4-Wired detectors regardless of being normally opened or closed
- ✓ control audible and visible alarms
- ✓ communicate with net controller via RS-485 interface receiving commands and transmitting the event messages
- ✓ transmit the "Fire Alarm" and "Fire Trouble" messages to the Central Fire Station
- ✓ transmit alarming to the Central Surveillance Console
- ✓ read the electronic identifiers with 1-Wire (μ-LAN) output interface, e.g. Touch Memory identifiers

The device provides:

- ✓ arming and disarming of specified alarm loops and some loop groups by means of net controller commands
- ✓ output relay local or centralized controlling
- ✓ relay 4 (K4) and relay 5 (K5) connected line open and short failures controlling
- ✓ backup power supplying through the additional input
- ✓ identifier code transmitting to the net controller for centralized partition controlling
- ✓ indicating the partition status by facial LED

The device is supplied by one uninterruptible or one main and one backup direct power sources with voltage from 10.2 to 28V. It is recom-

mended to use RIP-12 or RIP-24 uninterruptible power supplies manufactured by NVP BOLID Company.

The device is to be mounted inside the premises and is destined for clock round duration.

The device must not be used in aggressive medium or dust condition, or in dangerous space. The device construction design provides the ingress protection rating in accordance with IP20.

The device is intended to be used under the following ambient conditions:

- operating temperatures from 243 to 323 K (from – 30 to +50 °C)
- relative humidity up to 98% non-condensing
- vibration load from 1 to 35 Hz, with maximum acceleration 0,5 g

The weight is no more than 0,5 kg, with overall dimensions being equal to 370×190×38 mm.

The device average mean life is 20 000 hours.

The average operating life is 10 years.

The device uptime after power-on does not exceed 3 seconds provided at least one device input is supplied by no less than 11V.

2 SPECIFICATIONS

The maximum number of the alarm loops to be connected to the device is 20.

The number of switching circuits is 5.

The number of input circuits is 26 (see the Appendix C) among them

- alarm loop circuits from 1 to 20
- identifier reader circuit
- RS-485 interface (A and B leads)
- relay 4 and relay 5 controlled output circuits
- power supply inputs

The number of outputs is 7 (see the Appendix C) including

- 3 relay outputs (relay 1, relay 2, relay 3) of “dry contact” type for switching with the maximum voltage and current up to 28V/2 A or up to 80V/50 mA
- relay 4 and relay 5 outputs with open and short failure control and the maximum voltage/current up to 28V/0,5 A
- “Инд.К” and “Инд.З” outputs for external dichromatic reader indicator control, with directly connected LED current being restricted up to 10 mA. The quit options for LED are 5V/10mA.

The device would generate messages and transmit them to the net controller through the RS-485 interface for some events listed below, with data transfer rate being equal to 9600 bps and transmission type being half-duplex:

“ARMED”	- Detector status monitoring has been turned on
“ARM FAILED”	- Arming has failed due to the actuated status of detector
“FIRE SIGNAL”	- Fire conditions have been detected
“FIRE PREALARM”	- Fire signal has been received and fire is probable
“FIRE ALARM”	- Fire alarm
“LOOP TRBL OPEN”	- Open-circuit failure in the alarm loop
“RELAY TRBL OPEN”	- Open-circuit failure of relay output load circuit
“LOOP TRBL SHORT”	- Short circuit in the alarm loop
“RELAY TRBL SHORT”	- Short-circuit failure of relay output load circuit
“TAMPER ALARM”	- Device or detector case is opened
“TAMPER RESTORE”	- Device or detector case is closed
“RELAY RESTORE”	- Relay output load circuit has been restored
“MANUAL TESTING”	- The device diagnostic mode has been run
“ARM DELAY”	- The delay is counting after the arming command having been received
“DISARMED”	- The detector status is not monitored
“DEVICE RESTART”	- The device has been restarted
“ALARM RESET”	- Fire alarm has been canceled, the detectors being monitoring
“POWER FAILED”	- Device power supply is out of range
“POWER RESTORE”	- Device power supply is restored after failure
“AUX ZONE RESTORY”	- Auxiliary loop restored
“AUX ZONE ALARM”	- Auxiliary loop alarm
“SILENT ALARM”	- Silent zone alarm
“ENTRY ALARM”	- Entry zone alarm
“READY TO ARM”	- Zone disarmed. Ready for arming
“NOT READY TO ARM”	- Zone disarmed. Arming is impossible due to the actuated detector
“INTRUSION ALARM”	- Intrusion alarm

If the computer is used as net controller then the device has to communicate with it through the RS-232/RS-485 converter (such as PI-GR, S2000-PI or S2000-USB) or S2000/S2000M console manufactured by NVP BOLID.

If the device has disconnected from the net controller during message generation the event report would be stored in the device non-volatile memory. When the connection has recovered the message is transmitted to the net controller with the date and time of its origin being noted. The event buffer storage of the device non-volatile memory is sized to 62 events.

The two device's power supply inputs are unrelated allowing all device components uninterruptible power supplying when one line open or short trouble has occurred or one voltage source has failed. Any input voltage supply having dropped to 10 V, the device transits to the "Power Failed" status. When voltage supply has exceeded 11 V the device returns to the operating mode (see section 4.3.1). If both main and backup power supplies have dropped below 9 V the device has shut down.

The typical consumed current values in various operating modes don't exceed those shown in Table 1.

Table 1: Consumed current in different modes

Device configuration	Mode	Power voltage	
		12 V	24 V
There are no detectors being power supplied by loops (all detectors are contacting) All loops are armed	Norm	400 mA	200 mA
	Alarm	400 mA	200 mA
All loops are armed All detectors are power supplied by loops, with consumed current being equal 3 mA in each loop (60 mA total)	Norm	600 mA	300 mA
	Fire	650 mA	330 mA

***Note**: If the device is supplied by both power sources simultaneously then presented value is referred to the maximum from input voltage values.*

If device loops are loaded incompletely and the common current value through detectors is less than maximum one then the device current

can be considered as linearly increasing together with the detector consumed current increments.

So the device useful current can be calculated in accordance with the formulas:

The supply voltage being equal to 12 V,

I = 3,33×i + 400 [мА]

The supply voltage being equal to 24 V,

I = 1,67×i + 200 [мА]

where **I** is the common device consumed current (without regard to external notification devices) expressed in мА

i is the consumed current of active detectors included into the device alarm loops expressed in мА

The common reserve time is calculated by formula

T = 1000 × W/I hours

W is the accumulator capacity in А·ч

I is the device consumed current in мА

The device in operating mode supplies loop inputs by from 19 to 22 V DC voltage provided the terminal resistance is equal to 4,7 kOhm ±5% and the detector consumed current doesn't exceed 3 mA. This voltage level is kept even in case of short circuit failure in one of the alarm loops. More then 4 loop short failures together are not allowed. The short closed loop current is restricted by 26,5 mA.

The ripple voltage effective value does not exceed 20 mV.

If burglary detectors are included into the alarm loop (burglary alarm loop) the device provides in operating mode:

- the value of loop resistance being equal no more than 1 kOhm without regard to external element;
- the value of leakage resistance between wires or between any wire and ground being equal no less than 20 kOhm.

If fire detectors are included into the alarm loop (fire alarm loop) the device provides in operating mode:

- the value of the loop resistance being equal to value no more than 100 Ohm without regard to external element;
- the value of leakage resistance between wires or between any wire and ground being equal no less than 50 kOhm.

The device's loops are resistant to electromagnetic effects being harmonic electromagnetic pickup with 50 Hz frequency and 1 V effective voltage.

3 DELIVERY SET

Following is the list of the SIGNAL-20P accessories included in standard delivery:

- ✓ The SIGNAL-20P Intrusion&Fire Alarm Addressable 20-Loop Control Device itself
- ✓ This Installer's and User's Manual
- ✓ The component set including:
  - 20 resistances С2-33Н-0,5-4,7 кОнм±5%
  - 3 woodscrews
  - 3 wallplugs 6x30
  - 2 diodes 1N5400
  - 2 diodes 1N4148

4 DESIGN AND OPERATING PRINCIPLES

The device view along with its overall and mounting dimensions are demonstrated by Appendix A.

There is "Ready" LED, indicating the device operating modes on the device cover. On the device base there is the radioelement printed-circuit board along with external connection terminals and tamper.

The device block scheme diagram is shown in the Appendix B.

The basic device components are:

- power supply inputs
- 27 V voltage converter
- 5 V voltage converter
- circuit switch
- light indicator
- relays
- loop power dump unit
- RS-485 interface converter
- nonvolatile memory
- tamper

The voltage is delivered from the alarm loop metering circuits to the circuit switch. Controlling the switch, the processor subsequently connects in-built analogue digital converter input to the alarm loops. In such a process the loop resistance and loop status are estimated.

The 27 V voltage converter shapes stabilized loop supply voltage, the 5 V voltage converter shaping stabilized one for digital subcircuit.

The processor controls device operating as whole:

- subsequently requests alarm loops and monitors their statuses measuring their resistances
- controls the internal light indicators, relay and loop power dump unit
- receives the commands from net controller and transmits messages to this one via RS-485 interface

In order to accord with the 2-lined RS-485 the interface converter is used.

The nonvolatile memory is designed to story the event messages along with the time and date of their origins.

4.1 Alarm loops

The device monitors twenty alarm loops and depending on their statuses generates the alarm and service messages transmitting them to the net controller (either ARM Orion or S2000/S2000M console), and controls five in-built relays.

The alarm loop status is defined by its type, its resistance and by its logical state that is armed or disarmed.

All DC voltage detectors both burglary and fire can be included into alarm loops, with internal detector resistance in “Fire” mode being:

- no more than 2,7 kOhm for normally opened detectors
- no more than 3,2 kOhm for normally closed detectors

4.1.1 The loop configuration parameters

The alarm loop control algorithm can be changed by varying the loop configuration parameters that can be viewed in Table 2.

Table 2: Loop configuration parameters

Parameter name	Description	Range
Loop Type	Determines the control algorithm, available types of detectors to be connected and potential statuses	1 - Fire Smoke 2 - Fire Combined 3 – Fire Heat 4 – Burglary 5 - Burglary with Tamper Check 6 – Auxiliary 7 – Entering 11 - Alarming 12 – Programmable Auxiliary

Parameter name	Description	Range
Intrusion/ Fire Delay	The delay for transitions from “ENTRY ALARM” to “INTRUSION ALARM” or from “FIRE PREALARM” to “FIRE ALARM”	from 0 to 254 s 255 means Off (don’t transit “Fire Alarm” or “Intrusion Alarm” after one detector having actuated)
Arming Delay	The time interval between having received arming command and loop transition to the “Armed” status	from 0 to 255 s
Loop Analysis Delay after Reset	The pause before alarm loop analysis having begun after power dump; it is necessary for transient completion	from 1 to 63 s
Relay 1 Control Delay	Relay switching on/off delay after a particular loop status having changed	from 0 to 255 sec
Relay 2 Control Delay		
Relay 3 Control Delay		
Relay 4 Control Delay		
Relay 5 Control Delay		
Non-disarming	The loop cannot be disarmed by any way	On/Off
Auto Rearming When Disarmed	Auto transition from “ARM FAILED” to “ARMED” when loop having recovered	On/Off
Auto Rearming When Fire/Alarm	Auto transition from “FIRE”, “INTRUSION ALARM” or “SILENT ALARM” to “ARM DELAY” when loop having recovered. The recovering time is equal to the “Intrusion/Fire Delay” parameter multiplied by 15	On/Off
Disarmed Loop Control	To monitor and transmit the disarmed loop resistance changes (is its normal or not) via RS-485	On/Off
Fire Loop requery blocking	Don’t repeat the 1 or 2 fire loop type status request	On/Off

Parameter name	Description	Range
300 ms Integration	Burglary alarm loop transits into “Intrusion Alarm” mode when it has been broken for more than 300 ms	On/Off
10% Deviation Blocking	Burglary alarm loop doesn’t transit into “Intrusion Alarm” mode when its resistance has changed more than 10% within 255 s	On/Off
Relay 1 Control	Assign relay controlling to the particular loop	On/Off
Relay 2 Control		
Relay 3 Control		
Relay 4 Control		
Relay 5 Control		

4.1.1.1 Loop Type

The fundamental configuration parameter identifying the loop control method and types of detectors to be included is represented by “**Loop Type**”. The device supports nine alarm loop types.

The type 1 is the fire smoke loop with double actuation recognition.

The fire smoke (normally opened) detectors are included into the alarm loop. The alarm loop statuses can be:

“Armed” – the alarm loop is monitored and its resistance is in normal range.

“Disarmed” - the alarm loop is not monitored.

“Arm delay” – the arming delay has not yet been elapsed.

“Fire prealarm” – the single detector actuation has been fixed.

“Fire alarm” - actuating more than one detector has been fixed, or after first detector actuation the Intrusion/Fire delay has expired.

“Loop trbl short” – the alarm loop resistance is less than 100 Ohm.

“Loop trbl open” - the alarm loop resistance is more than 6 KOhm.

“Arm Failed” – the alarm loop was broken when arming.

When detector has actuated the device generates the “Fire Signal” message and de-energizes the alarm loop for a 3 s. If within 55 seconds after de-energizing the detector connected to this loop repeats actuation

this loop enters the “Fire Prealarm” status. If the second actuating has not occurred within 55 seconds the alarm loop returns to the “Armed” status. From the “Fire Prealarm” mode the device can transit to the “Fire alarm” mode if the second detector has been actuated or “Intrusion/Fire Delay” has expired at this loop. If “Intrusion/Fire Delay” was given as 0 then the transition from “Fire prealarm” to “Fire alarm” mode would happen instantly. If “Intrusion/Fire Delay” was given as maximum value 255 then the transition from “Fire prealarm” to “Fire alarm” would be able only after actuating of the second detector at the same loop.

The type 1 alarm loop resolving time is determined in accordance with the requirements of the section 4.1.2.

The coupling between the alarm loop resistances and statuses can be shown in Table 3.

The diagram of connection the fire smoke (normally opened) detectors to the type 1 alarm loop is contained into the Appendix E.

The type 2 is the fire combined alarm loop.

The fire smoke (normally opened) and heat (normally closed) detectors are included into the alarm loop. The alarm loop statuses can be:

“Armed” – the alarm loop is monitored and the resistance is in normal range.

“Disarmed” - the alarm loop is not monitored.

“Arm delay” – the arming delay has not yet been elapsed.

“Fire prealarm” – the heat detector actuation or second smoke detector actuation has been fixed.

“Fire alarm” - after detector actuation the “Intrusion/Fire Delay” has expired.

“Loop trbl short” – the alarm loop resistance is less than 100 Ohm.

“Loop trbl open” - the alarm loop resistance is more than 16 KOhm.

“Arm Failed” – the alarm loop was broken when arming.

When heat detector has actuated the device enters the “Fire Prealarm” mode. When smoke detector has actuated the device generates “Fire Signal” message and repeatedly requests the alarm loop status (see type 1). If within 55 seconds after de-energizing the detector connected to this loop repeats actuating the device enter the “Fire Prealarm” mode.

From the “Fire Prealarm” mode the device can transit to the “Fire alarm” mode if “Intrusion/Fire Delay” has expired. If “Intrusion/Fire Delay” was given as 0 then the transition from “Fire prealarm” to “Fire alarm” mode would happen instantly. If “Intrusion/Fire Delay” was given as maximum value 255 then the transition from “Fire prealarm” to “Fire alarm” would be impossible.

The type 2 alarm loop resolving time is determined in accordance with the requirements of the section 4.1.2.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection the fire smoke (normally opened) and heat (normally closed) detectors to the type 2 alarm loop is contained into the Appendix E.

The type 3 is the fire heat loop with double actuation recognition.

The fire heat (normally closed) detectors are included into the alarm loop. The alarm loop statuses can be:

“Armed” – the alarm loop is monitored and the resistance is in normal range.

“Disarmed” - the alarm loop is not monitored.

“Arm delay” – the arming delay has not yet been elapsed.

“Fire prealarm” – the one detector actuation has been fixed.

“Fire alarm” - actuating more than one detector has been fixed, or the Intrusion/Fire delay has expired after single detector actuation.

“Loop trbl short” – the alarm loop resistance is less than 2 KOhm.

“Loop trbl open” - the alarm loop resistance is more than 25 KOhm.

“Arm Failed” – the alarm loop was broken when arming.

When the detector in such alarm loop has actuated the device enters the “Fire Prealarm” mode. The device enters the “Fire Alarm” mode from “Fire Prealarm” if the second detector has been activated at this loop or “Intrusion/Fire Delay” has been expired. If “Intrusion/Fire Delay” was given as 0 then the transition from “Fire prealarm” to “Fire alarm” mode would happen instantly. If “Intrusion/Fire Delay” was given as maximum value 255 then the transition from “Fire prealarm” to “Fire alarm” would be able only if the second detector in this loop has actuated.

The type 3 alarm loop resolving time is determined in accordance with the requirements of the section 4.1.2.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection the heat (normally closed) detectors to the type 3 alarm loop is contained into the Appendix E.

The type 4 is the burglary alarm loop.

The alarm loop includes burglary detectors of all types, including normally closed, normally opened, powerless, supplied via alarm loop or separately.

The alarm loop statuses can be:

"Armed" – the alarm loop is monitored and its resistance is in normal range.

"Disarmed" - the alarm loop is not monitored.

"Arm delay" – the arming delay has not yet been elapsed.

"Intrusion alarm" – the detector breaking has been fixed.

"Arm Failed" – the alarm loop was broken when arming.

The intrusion alarm loop is considered as broken if its resistance has been out of 2…6 KOhm range or skipped more then 10% (refer to "10% Deviation Blocking" parameter). The breaking of the armed loop leads the loop to the "Intrusion Alarm" status.

The type 4 alarm loop resolving time is 70 ms or 300 ms depending on "300 ms Integration" parameter value.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection burglary detector to the type 4 alarm loop is contained into the Appendix E.

The type 5 is the burglary alarm loop with tamper check.

The alarm loop includes burglary detector with normally closed contacts and tamper detector.

The alarm loop statuses can be:

"Armed" – the alarm loop is monitored and the resistance is in normal range.

"Disarmed" - the alarm loop is not monitored.

"Arm Delay" – the arming delay has not yet been elapsed.

"Intrusion Alarm" – the detector breaking has been fixed.

"Arm Failed" – the alarm loop was broken when arming.

"Tamper Alarm" – the loop being disarmed, the tamper has actuated.

"Loop Trbl Short" - the loop being disarmed, its resistance is less then 100 Ohm.

When alarm loop is armed then more than 10% hopping, or the detector actuation (opening of its burglary contact), or tamper actuation switches the loop to the "Intrusion Alarm" mode. When alarm loop is not armed (being in statuses "Disarmed", "Arm delay" or "Arm failed") tamper actuation switches the loop to the "Tamper Alarm" status. The loop short failure is the cause of "Loop Trbl Short" status.

The type 5 alarm loop resolving time is 70 ms or 300 ms depending on "300 ms Integration" parameter value.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection burglary detector with tamper check to the type 5 alarm loop is contained into the Appendix E.

The type 6 is the auxiliary alarm loop.

The auxiliary alarm loop is intended to control the status, actuations and operability of extinguishing equipment and to control the detectors or other equipment independent from burglary or fire alarming. The detectors or devices with “dry contact” output (normally opened or closed), or with “open collector” output are included in alarm loop of this type.

The alarm loop statuses can be:

“Aux Zone Alarm”;

“Aux Zone Restore”.

If the alarm loop resistance has come out of 2…6 kOhm range for more than 300 ms the loop has entered the “Aux Zone Alarm” status. The loop resistance having been within 2…6 kOhm range for more than “Arming Delay” sec, the loop enters the “Aux Zone Restore” status.

The auxiliary alarm loop is impossible to disarm, it is monitored permanently. Having received the arming/disarming command the device generates the current loop status message.

Alarm loop status having been changed, the corresponding messages are sent to the net controller (S2000/S2000-M console or ARM Orion). These messages are not storied in nonvolatile device memory. So if during net controller disconnection several status changes had occurred then when connection has recovered either only one message would be sent to the net controller or no messages would be sent if the current status is equal the last sent one.

Auxiliary alarm loop being associated with a relay, its failure blocks up the switching of relays assigning to the 1-8 (general purpose), 11 (ASPT), 12 (Siren), 33 (ASPT-1), 34 (ASPT-A) and 35 (ASPT-A1) programs (see Table 5). This feature can be used, for example, in order to block the automatically starting of a gas fire extinguishing system if the door to the protected premises is opened.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The connection of normally opened or normally closed detectors and other controlled “dry contact” circuits to the type 6 alarm loop is identical to the connection of burglary detectors to type 4 loop (see Appendix E).

The type 7 is the entering alarm loop.

All types of burglary detectors including opening or closing, powerless or power supplied via alarm loop or separately are to be connected to the type 7 alarm loop.

The alarm loop statuses can be:

"Armed" – the alarm loop is monitored and the resistance is in normal range.

"Disarmed" - the alarm loop is not monitored.

"Arm Delay" – the arming delay has not yet been elapsed.

"Entry Alarm" – the loop breaking has been fixed.

"Intrusion Alarm" – after having entered "Entry Alarm" status the "Intrusion/Fire Delay" period has expired.

"Arm Failed" – the alarm loop was broken when arming.

The performance and parameters of entering alarm loop are identical to those of type 4 burglary alarm loop, except that breaking of armed loop switches it at first to the "Entry Alarm". If within the "Intrusion/Fire Delay" period no arming or disarming of the alarm loop has occurred the loop would enter to the "Intrusion Alarm" status.

While the alarm loop is in the "Entry Alarm" status the relay switching by means of executive general purpose programs 1 – 8 or SIREN program 12 does not perform.

This type alarm loop resolving time is 70 ms or 300 ms depending on "300 ms Integration" parameter value.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection burglary detectors to the type 7 alarm loop is identical to type 4 loop connection diagram and is contained into the Appendix E.

The type 11 is the alarming loop.

The alarming loop includes normally opened and normally closed alarm devices (call points, footboards and so on).

The alarm loop statuses can be:

"Armed" – the alarm loop is monitored and its resistance is in normal range.

"Disarmed" - the alarm loop is not monitored.

"Arm Delay" – the arming delay has not yet been elapsed.

"Silent Alarm" – attack, the alarm loop breaking has been detected.

"Arm Failed" – the alarm loop was broken when arming.

The operating and parameter settings of the alarming loop are similar to those of type 4 loop except that breaking of the armed alarming loop leads it to the "Silent alarm" status.

This status impacts only the relay controlled by means of 10 program (Alarm output 1) or 16 program (Alarm output 2) with relay being opened. The external audible and visible alarms controlled by LAMP (9) and SIREN (12) programs don't change their statuses.

This type alarm loop resolving time is 70 ms or 300 ms depending on “300 ms Integration” parameter value.

The compatibility of loop resistance and the corresponding status can be shown at the Table 3.

The diagram of connection call points and other alarms to the type 11 alarm loop is similar to the type 4 loop connecting diagram and is contained into the Appendix E.

The type 12 is the programmable auxiliary alarm loop.

This alarm loop type can be used to control the variety of equipment, among them the devices not dealing with burglary or fire alarming. The detectors or devices with “dry contact” output (normally opened or closed), or with “open collector” output are included in alarm loop of this type.

The programmable auxiliary alarm loop can have up to 5 various statuses that are defined by loop resistance. One can program both statuses and the corresponding threshold resistance values. In so manner the equipment having several statuses and several associated output contact groups can be monitored via one alarm loop by means of including the contact groups into alarm loop complemented with additional or shunt resistances. Moreover one can control short or open failures of this loop.

Audible and light alarming and the influence of this loop on the relay are defined by the statuses this alarms can have.

Status changing of the programmable auxiliary alarm loop depends only on the alarm loop resistance changing and is not defined by any loop parameters or arming/disarming commands.

The resolving time in case of status changing is equal to 300 ms. If alarm loop is entering “Armed”, “Disarmed”, “Aux Zone Restore” or one of recovering statuses then the transition has been considered as completed after "Arming Delay" seconds.

The programmable auxiliary alarm loop is impossible to disarm, it is monitored permanently. Having received the programmable auxiliary loop arming/disarming command the device generates the current loop status message.

Programmable auxiliary alarm loop status having been changed, the corresponding messages are sent to the net controller (S2000/S2000-M console or ARM Orion). These messages are not storied in nonvolatile device memory. So if during net controller disconnection several status changes have occurred then when connection is recovered either only one message would be sent to the net controller or no messages would be sent if the current status is equal the last sent one.

4.1.1.2 Arming Delay

The parameter "**Arming Delay**" defines the number of seconds you want the device to wait before arming the alarm loop after having received the corresponding command. Nonzero "Arming Delay" is normally used for entering alarm loop when after entering arming command it should be possible for some time to break this loop without alarm going off. If before loop arming it is necessary to switch relay on (the executive program 17 “Turn on for a given time before arming”) then the “Arming delay” loop parameter has to be set to a nonzero value. Otherwise the relay will not switch on because of the switching time for this program must not exceed the “Arming delay” loop parameter.

4.1.1.3 Intrusion/Fire Delay

For entering alarm loop (type 7) the “**Intrusion/Fire Delay**” parameter means the transition delay from “Entry Alarm” to “Intrusion Alarm” status and is considered as “entering duration”. “Intrusion/Fire Delay” is given to make it possible to disarm alarm loop after entering loop breaking.

For entering alarm loop (types 1, 2, 3) the “Intrusion/Fire Delay” parameter means the period of loop transition from “Fire prealarm” to “Fire alarm” status. Alarm loops with double actuation recognition (types 1 and 3) can transit to the “Fire alarm” status when second fire detector in this loop has actuated. If “Intrusion/Fire Delay” is set to 255 s it means unlimited delay when the device does not enter to the “Fire Prealarm” status due to the time conditions. In this case type 1 or 3 alarm loop can enter the “Fire Alarm” status only together with second loop detector actuation, but type 2 alarm loop can not enter the “Fire Alarm” status under any conditions.

4.1.1.4 Loop Analysis Delay after Reset

If the resistance of arming loop is less than lower threshold, for example, as a result of smoke fire detector having actuated, then the device automatically reset alarm loop shutting off its power voltage for 3 s. The “**Loop Analysis Delay after Reset**” parameter for any type loop is the duration of pause after power shutting off before loop status analysis. This delay allows including the detectors with long warm-up time (or long reading time) in the alarm loop. If the loop power supplied detectors enters to the operating mode (and requires higher current consumption) during long time after loop resetting then it is necessary to set the “Loop Analysis Delay After Reset” parameter to the value just over maximum warm-up time of loop included detectors.

The minimum operating delay amounts to 1 s. The value of “Loop Analysis Delay After Reset” parameter can vary from 1 up to 63 s.

4.1.1.5 Non-disarming

The parameter **"Non disarming"** prohibits loop disarming. This parameter is used to prevent fire or alarming loop incident disarming, e.g. by net controller command. If alarm loop is entering “Intrusion Alarm”, “Silent Alarm”, “Fire Prealarm”, “Fire Alarm” or “Arm Failed” statuses then arming and disarming of the alarm loop will lead to the attempt to arm this loop (“Alarm Reset”). As a result the alarm loop will enter the “Armed” status again (the loop resistance is within the normal range) or the “Arm Failed” status (the alarm loop is broken).

4.1.1.6 Auto Rearming When Disarmed

When the alarm loop has entered the “Arm Failed” status (the loop was broken when arming) and if the parameter “**Auto Rearming When Disarmed**” is set on for this alarm loop then the alarm loop will automatically enter the “Armed” status when it resistance has been in normal range within 3 s.

4.1.1.7 Auto Rearming when Fire/Alarm

When the alarm loop has entered the “Intrusion Alarm”, “Silent Alarm” or “Fire Alarm” statuses and the parameter “**Auto Rearming When Fire/Alarm**” is set on then the alarm loop will automatically enter the “Armed” status when it resistance will be in normal range during “Intrusion/Fire Delay” period multiplied by 15.

4.1.1.8 To Control When Disarmed

The parameter “**To Control When Disarmed**” makes the device to control alarm loops in all statuses including “Disarmed”. If the alarm loop resistance is in normal range the message “Ready to Arm” is sent for the net controller, if not the device sends the “Not Ready to Arm” message for the net controller. The resolving time for “Not Ready to Arm” is 300 ms and for “Ready to Arm” is equal to the “Intrusion/Fire Delay”.

4.1.1.9 Relay 1…5 Control

The parameters “**Relay 1…5 Control**” are associated the alarm loops with the device relays. If any relay must be controlled depending the alarm loop status then the corresponding parameter must be set on otherwise it must be turned off. If any relay must be centralized controlled (by net command from S2000/S2000M or ARM Orion) the parameters in questions have to be set off for all loops assigned with this relay.

4.1.1.10 Relay 1…5 Control Delays

If the alarm loop status changing has to lead to the relay switching in accordance with the executive relay programs then switching relays on (off) takes place not at once but after some “**Relay … Control Delay**” pe-

riod given for this alarm loop. For the executive programs 9 (LAMP), 10 (Alarm output 1), 13 (Fire output), 14 (Output FAULT), 15 (Fire LAMP) and 16 (Alarm output 2) that are documented in Table 5 these parameters are ignored and relays switch straight after the alarm loop status having been changed.

4.1.1.11 Fire Loop Requery Blocking

This parameter allows disabling the function of requery of type 1 and 2 loop statuses when single detector has actuated. If the parameter in question is set on then single detector actuating changes the loop over the "Fire Prealarm" status.

4.1.1.12 300 ms Integration

This parameter allows giving the resolving time for burglary loops (types 4, 5, 7, 11). The "switched on" value is corresponded by resolving time of 300 ms while the "switched off" one is corresponded by those of 70 ms. In order to increase the performance reliability and to decrease the number of false alarms it is recommended to avoid giving the resolving time to the 70 s value and to set the parameter under question on.

4.1.1.13 10% Deviation Blocking

This parameter allows disabling the analysis of loop resistance hops (more than 10% of steady-state value) if they has not yet come out of normal range for burglary loops (types 4, 5, 7, 11). It is recommended to set this parameter on if the loop connected detectors generate significant voltage ripples at the alarm loop.

Table 3: Loop parameters depending on its status

<table>
<tr><th>Loop type</th><th colspan="5">Alarm loop statuses</th></tr>
<tr><td rowspan="3">1
Fire Smoke</td><td>Loop trbl short
(alarm loop short circuit)</td><td>Fire alarm
(Actuation of two or more smoke detectors)</td><td>Fire prealarm
(Actuation of one smoke detector)</td><td>Loop trbl rst
(Loop has been restored after any failure)</td><td>Loop trbl open
(alarm loop open circuit)</td></tr>
<tr><td rowspan="2">less then 100 Ohм</td><td>from 150 Ohм to 1,56* kOhм</td><td>from 1,1* to 1,8 kOhм</td><td rowspan="2">from 2,2 to 5,4 kOhм</td><td rowspan="2">above 6,6 kOhм</td></tr>
<tr><td colspan="2">* Depending on detector load consumed current</td></tr>
</table>

Loop type	Alarm loop statuses				
2 Fire Combined	**Loop trbl short** (alarm loop short circuit)	**Fire alarm** (actuation of smoke detector)	**Loop trbl rst** (loop has been restored after any failure)	**Fire prealarm** (Actuation of heat detector)	**Loop trbl open** (alarm loop open circuit)
	less then 100 Ohм	from 150 Ohм to 1,8 kOhм	from 2,2 to 5,4 kOhм	from 6,6 to 14,4 kOhм	more than 16 kOhм
3 Fire Heat	**Loop trbl short** (alarm loop short circuit)	**Loop trbl rst** (Loop has been restored after any failure)	**Fire prealarm** (Actuation of one heat detector)	**Fire alarm** (Actuation of two or more heat detectors)	**Loop trbl open** (alarm loop open circuit)
	less 1,8 kOhм	from 2,2 to 5,4 kOhм	from 6,6 to 11 kOhм	from 12,5 to 22 kOhм	more than 25 кOhм
4 Burglary	**Loop trbl rst**		**Intrusion alarm**		
	from 2,2 to 10 kOhм		less than 1,8 kOhм, or more than 12 kOhм, or more than 10 % hop off		
5 Burglary with tamper check	**Loop trbl rst**	**Intrusion alarm**	**Tamper alarm**	**Loop trbl short**	
	from 2,2 to 5,4 кhOм	less than 1,8 kOhм, or more than 6,6 kOhм (in "Armed" status)	from 6,6 kOhм to 9,0 kOhм or more than 20 kOhм(in "Armed", "Arm delay" or "Arm failed" statuses)	less than 100 Ohm	
6 Auxiliary	**Aux zone restore**		**Aux zone alarm**		
	from 2,2 to 5,4 kOhм		less then 1,8 kOhм or more than 6,6 kOhм		
7 Entering	**Loop trbl rst**		**Entry alarm**		
	from 2,2 to 5,4 kOhм		less then 1,8 kOhм or more than 6,6 kOhм, or more than 10 % hop off		

<table>
<tr><th>Loop type</th><th colspan="5">Alarm loop statuses</th></tr>
<tr><td rowspan="2">11
Alarming</td><td colspan="2">Loop trbl rst</td><td colspan="3">Silent alarm (attack)</td></tr>
<tr><td colspan="2">from 2,2 to 5,4 kOhм</td><td colspan="3">less then 1,8 kOhм or more than 6,6 kOhм</td></tr>
<tr><td rowspan="3">12
Auxiliary
Program-
mable</td><td>Status 1*</td><td>Status 2*</td><td>Status 3*</td><td>Status 4*</td><td>Status 5*</td></tr>
<tr><td>less then R1*</td><td>from R1* to R2*</td><td>from R2* to R3*</td><td>from R3* to R4*</td><td>more than R4*</td></tr>
<tr><td colspan="5">* - alarm loop statuses and threshold resistances are programmable – see 5.4.2 section</td></tr>
</table>

4.1.2 Resolving time

The resolving time is a time of device assuming the alarming status.

Short-life breakings of alarm loop, which are:

- less than 50 ms for burglary loops provided the “300 ms Integration” parameter is set off
- less than 250 ms for all other loops and burglary loops if the “300 ms Integration” parameter is set on

don’t cause the device transition to the alarm statuses.

The device transits into alarm statuses if the breaking period has exceeded:

- 70 ms for burglary loops provided the “300 ms Integration” parameter is set off
- 300 ms for and burglary loops and 12 loop type if the “300 ms Integration” parameter is set on.

The resolving time for 1, 2, 3 loop types can be equal from 300 ms to 3 s depending on transient process specifity. If the detectors with large internal capacity are included into alarm loop the resolving time in case of breaking changes in inverse proportion with the transient rate. The minimum rate of loop voltage changing with the resolving time having reached the maximum is 0,5 V/s.

4.1.3 The number of detectors to be connected

The device enables voltage supplying of 2-Wire burglary and fire detectors via alarm loops.

The number of detectors to be included into single alarm loop is calculated by formula

N = Im / I,

where: **N** is the number of detectors

Im is the maximum load current

Im = 3 mA for loops of 1, 4, 6, 7, 11 and 12 types

Im = 1,2 mA for loops of 2 type

I is the current consumed by detector in operating mode

If the type 1 loop is in use (that is fire smoke loop with double actuation recognition) then detectors have to keep their operability when the voltage has dropped to 12 V.

4.2 Relays

The device's relays can be controlled by one of the following ways:

- Local control in accordance with the assigned executive programs depending on the connected alarm loop status
- Centralized control by means of commands sent by net controller

4.2.1 Relay local control

To control the N-th relay depending on connected alarm loop status:

- Set the "Relay N Control" loop parameters on to assign the relay with the corresponding loops
- Give the "Relay N Control Delay" loop parameters
- Give the "Relay Control Program" relay parameter
- Give the "Relay Control Time" relay parameter

The "Relay Control Program" parameter defines the relay behavior depending on the related loop statuses. All available executive programs are represented in Table 5.

The "Relay Control Time" parameter gives the time period of switching relay on (off) required by executive programs with the limited duration.

Except the programs (see Table 5) №№ 9 (LAMP), 10 (Alarm output 1), 13 (Fire output), 14 (Output FAULT), 15 (Fire LAMP), 16 (Alarm output 2) all other programs support the delayed relay turning on/off for time interval given by "Relay … Control Delay" parameter for the corresponding loop. So different alarm loops associated with the same relay can be given by different starting delays.

For executive programs (see Table 5) from 1 to 8 (general purpose programs), 11 (ASPT), 12 (SIREN), 33 (ASPT-1), 34 (ASPT-A), 35 (ASPT-A1) the relay assigned auxiliary loop (type 6) breaking blocks up the relay switching on. If auxiliary loop has been recovered but the switching on condition depending on the other loops are retained then for the programs 1, 2, 5, 6, 12 and 33 the relay switching on will be resumed, but for the programs 3, 4, 7, 8, 34 and 35 the switching will not be on. Thus, the auxiliary loop breaking holds the time unlimited general purpose programs along with programs 11 and 33 and cancels time restricted programs along with programs 12, 34 and 35.

If the device loops are assigned with the relays then control commands via RS-485 interface will be ignored and the local relay control will be in use. In such a manner the relay local control has priority over the centralized control.

4.2.2 Relay centralized control

To control the relays by centralized commands via RS-485 interface:

- Set off the “Relay 1…5 Control” parameters for all the loops breaking the association between the loops and relays
- Give any executive program with the corresponding initial relay status (switched on or off)
- Assign this relays with the corresponding partition in the net controller configuration, define the executive program, give the control delay and the control time

In case of relays being not assigned with the loops the “Relay Control Program” parameter defines only the initial status of relay, that is, the status which relay is set to after the power start up. Usually for relay to be controlled on-line the programs with “turned off” initial statuses are used, for example, the program 1 “Turn on”. After power starting up and until the first centralized command switching the relay to the loops depending status has been received some time can expire. So if the on-line executive program supposing “turned on” initial status is in use then it is reasonable to turn the relay on right after the power up. To do this it is necessary for the device to give any executive program with “turned on” initial status, for example, the program 2 “Turn off”.

4.2.3 The relay configuration parameters

Table 4: Relay configuration parameters

Parameter name	Description	Available range
Relay Control Program	Defines the relay control method depending on the related loop statuses and the initial relay status	0…37
Relay Control Time	The switching on or off period for the executive programs with restricted operating time	from 1 to 8192 s in increments of 1/8 s
Circuit Check Type	Defines the outer circuit check method for relay outputs "relay 4" (K4) and "relay 5" (K5)	1 – without check 2 – open failure check 3 – short failure check 4 – both open and short failure check

The “**Relay Control Program**” parameter defines the relay control method realized via alarm loops (in case of local control) or initial relay status from power start up moment until the receiving of the first control command via RS-485 interface (in case of centralized control). All available executive programs are shown in the Table 5.

The “**Relay Control Time**” parameter gives the switching on or switching off period for the executive programs requiring the limited operating time. The maximum value is 65535 intervals, each one being equal to 0,125 s.

The “**Circuit Check Type**” parameter for relay outputs "relay 4" (K4) and "relay 5" (K5) defines monitoring method of the connected external alarms circuit failures. The outer circuit failures are monitored apart from outputs having switched on or off. The failure statuses are defined by the output minus lead voltage value in accordance with the Table 6.

Table 5: Relay executive programs

№	Program name	Program description	Initial status
0	‘No control’	The relay control conditions are absent	Off
1	‘On’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ turns output ON	OFF
2	‘Off’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ turns output OFF	ON
3	‘On for a time’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ turns output ON for a given time	OFF
4	‘Off for a time’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ turns output OFF for a given time	ON
5	‘Blinking. Normal state OFF’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ switches the output in interrupted mode (0,5 s ON, 0,5 s OFF)	OFF
6	‘Blinking. Normal state ON’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ switches the output in interrupted mode (0,5 s ON, 0,5 s OFF)	ON
7	‘Blinking for a time. Normal state OFF’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ switches the output in interrupted mode during given time (0,5 s ON, 0,5 s OFF)	OFF
8	‘Blinking for a time. Normal state ON’	In case of ‘Intrusion alarm’ or ‘Fire alarm’ switches the output in interrupted mode during given time (0,5 s ON, 0,5 s OFF)	ON
9	‘LAMP’	If ‘Fire alarm’ switches in interrupted mode (0,25 s ON and 0,25 s OFF)	*

№	Program name	Program description	Initial status
		If 'Fire prealarm' switches in interrupted mode (0,25 s ON and 0,75 s OFF) If 'Intrusion alarm', 'Entry alarm' or 'Arm failed' switches in interrupted mode (0,5 s ON and 0,5 s OFF) If "Fire trouble" switches in interrupted mode (0,25 s ON and 1,75 s OFF) If there is at least one armed loop turns relay ON If all loops are disarmed turns relay OFF	
10	'Alarm output 1'	If all relay assigned loops are armed then turns ON (close outputs) else turns OFF (open output)	*
11	'ASPT'	If at least two relay assigned loops have entered the 'Fire alarm' status and there are no broken auxiliary loops turns the relay ON for a given time The breaking of an auxiliary loop blocks switching on If the auxiliary loop has broken during the relay control delay then when recovering the output will be turned ON for a given time (the auxiliary loop breaking holds the turning on delay counting)	OFF
12	'SIREN'	In case of 'Fire alarm' switches in interrupted mode for given time (1,5 s ON and 0,5 s OFF) In case of 'Fire prealarm' switches in interrupted mode for given time (0,5 s ON and 1,5 s OFF) In case of 'Intrusion alarm' switches the relay ON for a given time	OFF
13	'Fire output'	In cases of 'Fire alarm' or 'Fire prealarm' switches ON (closes) output else OFF (opened) output	*
14	'Output FAULT'	If there are loops having the statuses "Fire trouble", "Disarmed" or "Arm failed" then switches output OFF (opens) else ON (closed output)	*

№	Program name	Program description	Initial status
15	'Fire LAMP'	In case of 'Fire alarm' switches in interrupted mode (0,25 s ON and 0,25 s OFF) In case of 'Fire prealarm' switches in interrupted mode (0,25 s ON and 0,75 s OFF) In cases of 'Intrusion alarm', 'Entry alarm' or "Arm failed" switches in interrupted mode (0,5 s ON and 0,5 s OFF) In case of 'Fire trouble' switches in interrupted mode (0,25 s ON and 1,75 s OFF) If all associated loops are armed switches output ON else OFF	*
16	'Alarm output 2'	If all associated loops are armed or disarmed then turns output ON else turns OFF	*
17	'Turn on for a given time before arming'	Turns ON for a given time during arming delay period	OFF
18	'Turn off for a given time before arming'	Turns OFF for a given time during arming delay period	ON
19	'Turn on for a given time when arming'	If at least one loop is armed switches the relay ON for a given time	OFF
20	'Turn off for a given time when arming'	If at least one loop is armed switches the relay OFF for a given time	ON
21	'Turn on for a given time when disarming'	If at least one loop is disarmed switches the relay ON for a given time	OFF
22	'Turn off for a given time when disarming'	If at least one loop is disarmed switches the relay OFF for a given time	ON
23	'Turn on for a given time if arming has failed'	If at least one loop is in the state 'Arm has failed' switches the relay ON for a given time	OFF
24	'Turn off for a given time if arming has failed'	If at least one loop is in the state 'Arm has failed' switches the relay OFF for a given time	ON
25	'Turn on for a given time when auxiliary alarm'	If at least one loop is in the state 'Auxiliary alarm' switches the relay ON for a given time	OFF

№	Program name	Program description	Initial status
26	‘Turn off for a given time when auxiliary alarm’	If at least one loop is in the state ‘Auxiliary alarm’ switches the relay OFF for a given time	ON
27	‘Turn on when disarmed’	Turn the relay ON if at least one assigned alarm loop is disarmed	OFF
28	‘Turn off when disarmed’	Turn the relay OFF if at least one assigned alarm loop is disarmed	ON
29	‘Turn on when armed’	Turn the relay ON if at least one assigned alarm loop is armed	OFF
30	‘Turn off when armed’	Turn the relay OFF if at least one assigned alarm loop is armed	ON
31	‘Turn on when auxiliary alarm’	In case of ‘Auxiliary alarm’ turns the relay ON	OFF
32	‘Turn off when auxiliary alarm’	In case of ‘Auxiliary alarm’ turns the relay OFF	ON
33	‘ASPT-1’	If the alarm loop has entered the ‘Fire alarm’ status and there are no broken auxiliary loops then switches the relay ON for a given time If an auxiliary loop has broken during the relay control delay then when recovering the output will be turned ON for a given time (the auxiliary loop breaking holds the turning on delay counting)	OFF
34	‘ASPT-A’	If at least two assigned alarm loops have entered the ‘Fire alarm’ status and there are no broken auxiliary loops then switches the relay ON for a given time In case of broken auxiliary loop the switching has blocked and the relay has remained OFF even after loop recovering	OFF
35	‘ASPT-A1’	If there is alarm loop having ‘Fire alarm’ status and there are no broken auxiliary loops then switches the relay ON for a given time In case of broken auxiliary loop the switching has blocked and the relay has remained OFF even after loop recovering	OFF

№	Program name	Program description	Initial status
36	"Turn on with temperature increasing"	If an alarm loop has entered “High temperature” status**, that is, the temperature has exceeded "temperature high" threshold then switches ON	OFF
37	"Turn on with temperature decreasing"	If an alarm loop has entered “Low temperature” status**, that is, the temperature has exceeded "temperature low" threshold then switches the relay ON	OFF

Remarks:

* - The relay status is defined by the statuses of assigned loops

** - Only programmable auxiliary alarm loop (type 12) can enter the statuses “Temperature High” or “Temperature Low” and only if these statuses are programmed for this loop

Table 6: The correspondence between the output minus lead voltage and the status of the outer circuit

Norm	Open failure		Short failure	
The output voltage is within the range from 0,35V to 4,0V	Output is on	Output is off	Output is on	Output is off
	less then 0,05 V	more than 4,1 V	more than 4,5 V	less then 0,3 V

4.3 Settings

The device settings specify its operating in whole and give the net settings when operating in network mode as the part of the Orion safety system. They are presented by the Table 8.

Table 7: The device settings

Parameter	Description	Range
Voltage Analysis	Defines the method of the transition to the “Power Failed” mode in case of one or two input power supplies having been out of range	On / Off
Net Address	Gives the net device address when connecting to the RS-485 interface	1…127

Parameter	Description	Range
Interface Response Delay	Defines the value of delay for the device to response for the net controller request that has been received through the interface RS-485	From 1,5 ms to 500 ms in increments of 1/8 s

4.3.1 Voltage Analysis

The parameter "**Voltage Analysis**" defines the condition for device transition the “Power Failed” mode, whether this condition deals with any one input voltage trouble or both.

If this parameter is set on the device transits the “Power Failed” mode when any input voltage has fallen below 10 V and returns back to the operating mode when both input voltages have exceeded 11 V.

If this parameter is set off the device keeps the operating mode until both input voltage had fallen below 10 V. In such a case the device transits the “Power Failed” mode and returns back to the operating mode when at least one input voltage has exceeded 11 V.

4.3.2 Net Address

The “**Net Address**” parameter is intended to uniquely identify the device when operating as a part of “Orion” safety system. In such operation mode the device can transmit messages and receive the commands from the net controller, being addressed only by means of this unique network number.

4.3.3 Interface Response Delay

The “**Interface Response Delay**” parameter is used in case of complicated net configuration taking place when the data transmission can be delayed, e.g. in case of RS-485 interface conversion to the other interface types designed for local network, fiber-optic or radio communications.

The current values of “**Net Address**” and “**Interface Response Delay**” parameters can be reset to default ones by means of three long and one short tamper pressings. Long pressing means holding during no less then 1,5 s. Short pressing means holding duration from 0,1 to 0,5 s. Pause between pressings shall stretch from 0,1 up to 0,5 s.

To adjust the device for the specific application and for it more effective operating any parameter (such as loop or relay one or device setting) can be changed by means of "UPROG.EXE" program or ARM Orion Database Administrator program (see section 5.1.4).

4.4 Device operation modes

The device is designed to operate in following available modes:

- Technical readiness mode
- Operating mode
- "Power Failed" mode
- Diagnostic mode
- "Device Failed" mode

The device "Ready" indicator statuses corresponding to various device operation modes are shown by the Table 8.

4.4.1 Technical readiness mode

The device enters the technical readiness mode when voltage has just supplied to the device power terminals. The duration of this mode is not to exceed 3 seconds provided at least one device input is supplied by no less than 11V.

4.4.2 Operating mode

After technical readiness mode having been finished the device enters the operating mode, that is, monitors and analyses the alarm loop statuses, controls the relays, transmits messages and receives commands from the net controller.

The operating mode is accompanied by lit "Ready" indicator.

4.4.3 "Power Failed" mode

The device enters the "Power Failed" mode if one or both (see section 4.3.1) input voltages have fallen below 10 V. In such a mode the device performs its operations and besides produces the "Ready" indicator signal and generates the "Power failed" message.

Both input supply voltages having fallen below 9 V, the device cuts off. The input supply voltages (any or both – see section 4.3.1) having exceeded 11 V, the device automatically transits from "Power Failed" mode to the operating mode generating the "Power Restore" message.

4.4.4 Diagnostic mode

The device transits from the operating mode to the diagnostic mode if the tamper code pattern has been pressed. Refer to the section 6.1.2 for more detailed discussions.

4.4.5 "Device Failed" mode

The device enters the "Device Failed" mode if the microcontroller memory test has failed. The microcontroller memory test is carried out each time the device power has been up. In such a mode the device

doesn’t response to the queries of the net controller which displays the “FAIL RS485 LINE” message.

If the device has entered the “Device Failed” mode the “Ready” indicator switches in the interrupted mode with high frequency (8Hz).

In case of entering the “Device Failed” mode it is necessary to update the microcontroller embedded software. To do this:

1. Send the query-by-mail to the NPV BOLID specifying the true device version.
2. Receive from the NPV BOLID the "ORION_PROG.EXE" loading program and embedding software e-file.
3. Connect the device to the personal computer by means of interface converter PI-GR or S2000-PI manufactured by NPV BOLID.
4. Run the program "ORION_PROG.EXE" and then switch on the device power supply.
5. Following the loader directives wait until the embedded software update has been finished. After update has completed the device is to transit the technical readiness mode.

Table 8: “READY” indicator lights

Device operation mode	The indicators behavior
Technical readiness mode	Light indicator is off
Operating mode	Indicator is lit in case of being connected to the net controller, or blinks with the 1 Hz frequency otherwise
“Power Failed” mode	Indicator switches in interrupted mode with 0,125 s ON and 0,875 s OFF
Diagnostic mode	Indicator blinks with the 2 Hz frequency
“Device Failed” mode	Indicator blinks with the 8 Hz frequency

5 APPLICATION

5.1 Preparation

5.1.1 Protective measures

There are no dangerous voltage circuits within the device.

The mounting and maintaining of the device shall be executed under power–off conditions.

5.1.2 Device mounting

The device can be mounted to the wall or to other places on premises being protected from atmospheric fallouts and mechanical damages.

The installation procedure is as follows:

a) Attach the device to the wall in any convenient place. If the device is housed at unwatched premises place it at least 2,2 m higher from the floor level

b) Attach the connecting wires in accordance with the connecting diagram presented in Appendix C

c) *Connect the isolating diodes for "K4" and "K5" outputs as close to the visible or audible alarm terminals as possible.* If these outputs are not in use stub its by 1 kOhm/0,25 W resistor

5.1.3 RS-485 interface wiring

To connect the device to the net controller via RS-485 highway interface execute the following steps:

a) Connect the A and B lines of RS-485 highway interface to the "A" and "B" terminals of device

b) Connect the device circuit "0B" to the similar circuits of preceding and following RS-485 connected devices (it is not obligatory if the devices are connected to the same power supply)

c) If the device is neither first nor last one into the interface line then delete the jumper being located closely to the "A" and the "B" terminals of the device and connecting the 620 Ohm terminal resistor to the interface line.

When wiring the RS-485 interface it should connect the devices in series (into the bus configuration). If it is necessary to make long RS-485 interface branch (longer than 50 m), for example, to reduce the cable length, it is recommended to use the interface repeater S2000-PI. One can use no more than 10 repeaters (no more than 10 interface branches) in one RS-

485 interface segment. The number of in-series S2000-PI repeaters (the number of segments) is not restricted.

5.1.4 Changing the device default settings

In Orion networking operation mode the device has to be assigned with the unique net address in the range from 1 to 127. To do this, connect the device to the net controller, with other devices being disconnected from the RS-485 interface. If the device is connected to the S2000/S2000M console the net address can be changed from the console directly. The device being connected to the computer, the net address can be changed with the help of “UPROG.EXE”.

To adjust the device for particular application and to increase its effective functionality it may be necessary to change some configuration parameters. The default values of parameters (when the device has been delivered from the manufacturer) are represented by the Table 9, Table 10 and Table 11.

Table 9: Default device settings

Parameter	The default value
Voltage Analysis	OFF
Net Address	127
Interface Response Delay	1,5 ms

Table 10: Default Loop Parameters

	Loop Configuration Parameters (see Notes)																				
Alarm Loops	**№**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	1	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	+	-	-	-	-
	2	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	+	-	-	-	-
	3	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	+	-	-	-	-
	4	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	+	-	-	-	-
	5	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	+	-	-	-	-
	6	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	+	-	-	-
	7	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	+	-	-	-
	8	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	+	-	-	-
	9	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	+	-	-	-
	10	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	+	-	-	-
	11	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	12	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	13	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-

	Loop Configuration Parameters (see Notes)																				
	14	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	15	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	16	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	17	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	18	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	19	4	0	1	0	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-
	20	7	60	1	30	0	0	0	0	0	-	+	-	-	-	+	-	-	-	+	-	-

Notes

а) Following are parameters denotes by digits:

1 - Loop Type
2 - Arming Delay
3 - Loop Analysis Delay after Reset
4 - Intrusion/Fire Delay
5 - Relay 1 Control Delay
6 - Relay 2 Control Delay
7 - Relay 3 Control Delay
8 - Relay 4 Control Delay
9 - Relay 5 Control Delay
10 - Non-Disarming
11 - Auto Rearming when Disarmed
12 - Auto Rearming when Fire/Alarm
13 - To Control when Disarmed
14 - Fire Loop Requery Blocking
15 - 300 ms Integration
16 - 10% Deviation Blocking
17 - Relay 1 Control
18 - Relay 2 Control
19 - Relay 3 Control
20 - Relay 4 Control
21 - Relay 5 Control

б) Symbol "+" means ON while "-" one means OFF.

Table 11: Default Relay Parameters

Parameter name	**Relay number**				
	1	2	3	4	5
Relay Control Program	10	10	10	9	12

Parameter name	Relay number				
	1	2	3	4	5
Relay Control Time	8192	8192	8192	8192	120
Circuit Check Type	1	1	1	4	4

ATTENTION! The parameter changes have come into effect after device power reset. The power reset is not necessary for Net Address and Interface Response Delay changing.

5.2 Fire alarm operations

The device performs the fire alarm functions if at least one alarm loop is assigned with the types 1, 2, or 3. If so the device provides the loop operation at following statuses:

- "Armed"
- "Disarmed"
- "Arm Delay"
- "Arm Failed"
- "Fire Signal"
- "Fire Prealarm"
- "Fire Alarm"
- "Fire Trouble"

The alarm loop enters the "Armed" status if it has been just armed and it resistance is within the normal range. Short-run disturbances less than 250 ms don't lead to the status changing.

If during arming the alarm loop parameter "Arming Delay" differs from zero the loop enters the "Arm Delay" status and its breaking doesn't lead to the alarm.

After arming delay period having been elapsed if the loop resistance is within normal range the loop transits the "Armed" status otherwise "Arm Failed" status.

If "Auto Rearming when Disarmed" loop parameter is set on then this loop has automatically been armed and switched from "Arm Failed" to the "Armed" status if its resistance has been within normal range for more than 3 s.

If the loop resistance has been out of normal range for 300 ms the device has registered the loop breaking and switched its into the one of the following statuses:

- "Fire Signal" if one smoke (normally opened) detector included into the type 1 or type 2 alarm loop has actuated
- "Fire Prealarm" if one heat (normally closed) detector included into the type 2 or type 3 alarm loop has actuated
- "Fire Alarm" if both smoke or both heat detectors included into the type 1 or type 3 alarm loop has actuated
- "Fire Trouble" in case of short or open failure of alarm loop

Alarm loops of type 1 and type 2 transits from “Armed” to the “Fire Signal” status if one smoke (normally opened) detector has actuated. In such a case the device requeries the alarm loop status, that is, resets the actuated detector and waits for it second actuating. If within 1 min the detector has actuated again the device switches the loop into the ”Fire Prealarm” status otherwise the loop enters the “Armed” status. If the parameter “Fire Loop Requery Blocking” is set on for loop in question the device switches the loop into the ”Fire Prealarm” status at once after first detector actuation.

Fire loops enter the “Fire Prealarm” status after single detector actuation. The duration of “Fire Prealarm” status is determined by “Intrusion/Fire Delay” allowing to study the situation and to avoid the automatically starting of fire equipment in case of false detector actuation.

The “Fire Prealarm” status having been expired, the alarm loop transits the “Fire Alarm” status. In case of type 1 or 3 loops this transition can occur before delay having been elapsed in case of the second detector included into this loop having actuated.

If the “Intrusion/Fire Delay” value equals to 255 then type 1 or 3 loop enters the “Fire Alarm” status only if two or more detectors have actuated but 2 type loop keeps the “Fire Prealarm” status until the alarm has been reset.

The “Fire Prealarm” status is indicated by the device LED lit in interrupted mode with the double 0,125 s flashes.

The alarm loop transits the “Fire Alarm” status after double detector actuating at single type 1 or 3 loop of after “Fire Prealarm” status finishing. The loop transiting to the “Fire Alarm” status, the relays are controlled in accordance with the 1…8, 33 and 35 programs.

If “Auto Rearming when Fire/Alarm” loop parameter is set on then this loop is automatically armed and transits from “Fire Alarm” to the “Arm Delay” status after its resistance has been within normal range for 15-fold “Fire/Alarm Delay” sec.

The loop enters from “Armed” to “Fire Trouble” status in case of open or short loop failures. After loop recovering and its resistance having been within normal range for 3 s the loop is automatically armed and enters the “Armed” status.

5.3 Burglary alarm operations

Depending on alarm loop type the device enables several burglary alarm modes:

- Burglary alarm (the loop type 4)
- Burglary alarm with tamper check (the loop type 5)
- Entering alarm
- Alarming

5.3.1 Burglary alarm mode

The device performs the burglary alarm functions if at least one connected loop type is set to 4. The supplied statuses are as follows:

- "Armed"
- "Disarmed"
- "Arm Delay"
- "Arm Failed"
- "Intrusion Alarm"

"Armed", "Arm Delay" and "Arm Failed" statuses are similarly to the corresponding statuses of the fire loops as mentioned above in section 5.2. The duration of short-run disturbances don't leading to the status changing is equal to 50 ms in case of "Integrating 300 ms" parameter being set off and 250 ms otherwise.

The loop transits from "Armed" to "Intrusion Alarm" status in case of:

- Loop breaking duration has exceed 70 ms and "Integrating 300 ms" parameter is set off
- Loop breaking duration has exceed 300 ms and "Integrating 300 ms" parameter is set on
- Loop resistance has skipped more than 10% of its value, "10% Deviation Blocking" parameter being set off

During "Intrusion Alarm" transition the relay control is activating in according with the 1…8 programs.

If "Auto Rearming when Fire/Alarm" loop parameter is set on then this loop is automatically armed and transits from "Intrusion Alarm" to the "Arm Delay" status after its resistance has been within normal range for 15-fold "Fire/Alarm Delay" sec.

5.3.2 Burglary alarm with tamper check

The device performs the burglary alarm functions with tamper check if at least one connected loop type is set to 5. The supplied statuses are as follows:

- "Armed"
- "Disarmed"
- "Arm Delay"
- "Arm Failed"

- "Intrusion Alarm"
- “Loop Trbl Short”
- “Tamper Alarm”

"Armed", "Arm Delay", "Arm Failed" and “Intrusion Alarm” statuses are similarly to the corresponding statuses of the type 4 loop as mentioned above in 5.3.1 section.

Alarm loop transits from “Disarmed” to “Intrusion Alarm” mode for at least 300 ms when detector tamper contacts have opened. When the device case has closed the alarm loop returns the “Disarmed” status, the recovering time being equal to 15 s (tamper contacts have to be closed).

Alarm loop transits from “Disarmed” to “Loop Trbl Short” mode for at least 300 ms in case of loop short failure. After short failure elimination the alarm loop returns the “Disarmed” status, with the recovering time being equal to 3 s (the loop resistance has to be within normal range).

5.3.3 Entering alarm mode

The device operates in entering alarm mode is any loop type is set to 7. The supplied statuses are as follows:

- "Armed"
- "Disarmed"
- "Arm Delay"
- "Arm Failed"
- "Entry Alarm"
- "Intrusion Alarm"

"Armed", "Arm Delay" and "Arm Failed" statuses are similarly to the corresponding statuses of the type 4 loop as mentioned above in 5.3.1 section.

The loop transits from “Armed” to “Entry Alarm” status in case of:

- Loop breaking duration has exceed 70 ms and “Integrating 300 ms” parameter is set off
- Loop breaking duration has exceed 300 ms and “Integrating 300 ms” parameter is set on
- Loop resistance has skipped more than 10% of its value, “10% Deviation Blocking” parameter being set off

The loop transits from “Entry Alarm” to “Intrusion Alarm” mode upon “Intrusion/Fire Delay” has expired.

The “Intrusion Alarm” status is identical to those described in 5.3.1 section.

5.3.4 Alarming mode

The device operates in alarming mode if any connected lop type is set to 11. The supplied statuses are as follows:

- "Armed"

- "Disarmed"
- "Arm Delay"
- "Arm Failed"
- "Silent Alarm"

"Armed", "Arm Delay" and "Arm Failed" statuses are similarly to the corresponding statuses of the type 4 loop as mentioned above in 5.3.1 section.

The loop transits from “Armed” to “Silent Alarm” status in case of:

- Loop breaking duration has exceed 70 ms and “Integrating 300 ms” parameter is set off
- Loop breaking duration has exceed 300 ms and “Integrating 300 ms” parameter is set on
- Loop resistance has skipped more than 10% of its value, “10% Deviation Blocking” parameter being set off

The ”Silent Alarm” status of the alarm loop influences only relays controlled by the programs Alarm output 1 (10) or Alarm output 2 programs (the relay is opening). The relays controlled by LAMP (9) and SIREN program retain its statuses.

If “Auto Rearming when Fire/Alarm” loop parameter is set on then this loop is automatically armed and transits from “Intrusion Alarm” to the “Arm Delay” status after its resistance has been within normal range for 15-fold “Fire/Alarm Delay” sec.

5.4 Auxiliary alarm application

The device allows controlling and transmitting to the net controller the status information of various auxiliary circuits not dealing with burglary or fire alarming, for example, fire auto extinguishing system blocking vehicles contacts, mass, flow, temperature or pressure detectors, throttle valves and so on. The types 6 and 12 alarm loops can be used for this purposes. These loops cannot be armed or disarmed. They are permanently monitored by the device.

5.4.1 Type 6 auxiliary alarm loops

Type 6 auxiliary alarm loops can be in one of the two possible statuses which are “Aux Zone Alarm” and “Aux Zone Restore”. The loop transits from “Aux Zone Restore” to the “Aux Zone Alarm” status if the breaking time has exceeded 300 ms.

The reverse transition from “Aux Zone Alarm” into “Aux Zone Restore” status takes place automatically when loop resistance has come into the normal range for more then “Arming Delay” period.

Following are the executive programs which are blocked in case of auxiliary loop breaking:

- general purpose programs 1…8

- 11 (ASPT)
- 12 (SIREN)
- 33 (ASPT-1)
- 34 (ASPT-A)
- 35 (ASPT-A1

Blocking of the relay control in case of auxiliary loop breaking implicates that

- the relay doesn't switch on in accordance with given tactics if the loop has already broken
- if the breaking has happened when the relay was controlled it will be returned to the initial status for given program

The relays controlled in accordance with programs 1…8, 11 and 33 will switch on when auxiliary loop has recovered but relays controlled in accordance with programs 34 and 35 will keep switched off.

5.4.2 Type 12 auxiliary alarm loops

Type 12 auxiliary alarm loop five possible statuses are determined by loop resistance threshold values, these values being shown below.

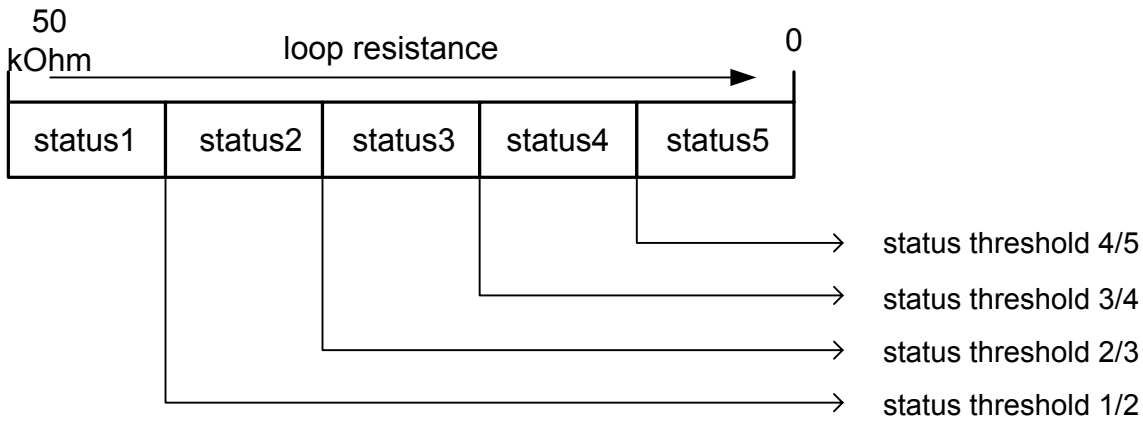


Figure 1. Statuses and status thresholds of programmable auxiliary loop

The loop resistance threshold values giving the boundary lines between statuses and status codes are user programmable. So the equipment having several statuses and correspondingly several output contact groups can be controlled by means of single loop including contact groups into the alarm loops with additional resistances. These loops also can be short or open failure monitored.

The device sound and light alarm and relay controlling are defined by statuses this loop to enter. The programmable auxiliary loop status changing depends only on loop resistance changes and is not impacted by any other factors or net controller commands. The resolving time when the status is changing amounts 300 ms.

The alarm loop entering into the “Armed”, “Disarmed”, “Aux Zone Restore” or any “Restore…” status, this status resolving time (recovery time) is equal to the “Arming Delay” period.

The programmable auxiliary alarm loop status codes are enumerated in Table 12.

Table 12: Programmable auxiliary loop status codes

Status code	Status	Message
1	AC power has been restored	AC POWER RESTORE
2	AC power has been lost	AC POWER FAILED
3	Intrusion alarm	INTRUSION ALARM
17	Arming has failed due to the activated status of detector	ARM FAILED
24	Detector status monitoring has been switched on	ARMED
35	Auxiliary alarm loop has been restored	AUX ZONE RESTORE
36	Auxiliary loop alarm	AUX ZONE ALARM
37	Fire alarm	FIRE ALARM
38	Zone disarmed. Arming is impossible due to detector being in activated status	NOT READY TO ARM
39	Extinguishing equipment is fault-free	FIRE TRBL RST
41	Extinguishing equipment faults	FIRE TROUBLE
44	Fire signal has been received and fire alarm is probable	FIRE PREALARM
45	Open-circuit failure in the alarm loop	LOOP TRBL OPEN
58	Silent zone alarm	SILENT ALARM
71	The pressure or water level is falling	LEVEL LOW
72	The pressure or water level is in normal state	LEVEL NORMAL
74	The pressure or water level is rising	LEVEL HIGH
75	The pressure or water level has exceeded the emergency threshold	LEVEL TOO HIGH
76	Temperature has exceeded the maximum value	TEMPERATURE HIGH
77	The pressure or water level has fallen	LEVEL TOO LOW

Status code	Status	Message
	below the emergency threshold	
78	Temperature has normal value	TEMPERATURE NORM
82	The heat sensor failure has detected	HEAT SENSOR FAIL
109	The detector status is not monitored	DISARMED
118	Entry zone alarm	ENTRY ALARM
130	The pump has started	PUMP ON
131	The pump has cut out	PUMP OFF
149	Device or detector case is opened	TAMPER ALARM
152	Device or detector case is closed	TAMPER RESTORE
198	Device power supply is out of range	POWER FAILED
199	Device power supply is restored after failure	POWER RESTORE
200	Battery supply is restored	BATTERY RESTORED
202	Battery supply is out of range	BATTERY FAILED
204	The service is required for the detector (for example, the smoke chamber of DIP-34A detector is dusted)	SERVICE REQUIRED
206	Temperature has fallen below the minimum value	TEMPERATURE LOW
214	Short circuit in the alarm loop	LOOP TRBL SHORT
216	Fire conditions have been detected	FIRE SIGNAL
220	The pressure detector has signaled pressure rising	GAS PRESS SIGNAL
223	Time stamp is formed by the console after time changing	TIME STAMP

Programming type 12 loop status thresholds it is required to know the actually values of loop resistances. To estimate these values one can use the device metered digit value by formula

$$R_{\text{loop}} = \frac{270}{ADC} - 1, \text{ [kOhm]}$$

where R_{loop} is the alarm loop resistance

ACD is the device metered resistance in analogue-digital converter terms

This formula allows adequately calculating of loop resistance in range from 0,1 to 50 kOhm.

5.5 Alarm loop arming and disarming

The device enables any loop arming or disarming by means of net controller. This doesn't concern the auxiliary loops of 6 and 12 types and loops with "Non-Disarming" parameter being set on. Having received the auxiliary loop arming or disarming command the device sends the message about its current status. Plus the device responses by current status message after having received of the disarming command deal with loop with "Non-Disarming" parameter being set on.

The device enables the centralized control of partition arming and disarming by means of the net controller.

In case of centralized partition control the user identifier codes are recorded to the net controller database with appropriate authority levels.

The identifier having been read, its code is transmitted via interface. In this process the reader LED is flashing with red and green with 5 Hz frequency until the net controller answer has been received. It can take from fractions of a second up to several seconds depending on the number of devices connected to the RS-485 interface.

If the presented key has met the partition control authority level then the reader display indicates the current partition status in accordance with the Table 13. In case of repeated presenting of this key the partition is arming (if disarmed) or disarming (if armed). Each succeeding identifier presenting causes the action which is opposite to previous. If the identifier available control operations are restricted, for example, only arming is allowed then the repeated and all following presenting cause only enabled action (arming in our case) regardless of current partition status.

Table 13: Partition status light indicating

Partition status	Reader indicator mode	Light color
"Disarmed"	Off	-
"Armed"	On	Yellow (Green + Red)

Partition status	Reader indicator mode	Light color
"Intrusion Alarm", "Fire Alarm", "Fire Prealarm", "Arm Failed"	Blinks with 2 Hz frequency	Yellow
"Fire Trouble"	Blinks with 5 Hz frequency	Yellow

If the presented identifier is unknown or has low authority level the net controller denies the access and the device indicate this event by triple flashes and subsequent turning on with red light.

6 MAINTENANCE

To make sure that the device is in reliable working condition test it on receipt and once a year. The testing shall include:

- Visual inspection of the possible mechanical damage of the device case

- Inspection of the device mounting security and contacting wire and contact coupling statuses

- Functional testing of the device efficiency accordingly with the section 6.1 of this manual

6.1 Device testing

The purpose of this testing is the inspection of device operability when having received and once a year during performance. The test includes the functional check with the aim of showing up possible defects and their operability status estimation. If the device doesn't meet the requirements of the checking procedure described below then appeal to the manufacturer.

The device shall be tested under the following ambient conditions:

- Temperature - (25 $\pm$ 10) ^{o}C

- Relative humidity - (45 - 80) %

- Atmospheric pressure – (630 – 800) mm Hg

The device testing connection diagram is presented in the Appendix D. The operability status testing time is no more than 10 minutes.

Note! The wire connection or disconnection when testing is realized under power-off conditions.

6.1.1 Overall functional testing

a) Energize the device

b) Verify the indicator "Ready" being switched on

c) Verify the device useful current being not exceeded values presented by the Table 1.

d) Verify the S2000/S2000M console displaying the occurring events, such as:

- “RST RS485 LINE” in case of device has been detected
- “DEVICE RESTART” in case of device reset
- “TAMPER ALARM” when device case is opened

6.1.2 Testing in diagnostic mode

Before diagnostic **disconnect all relay load circuits**!

To run the diagnostic mode open the device cover and press tamper detector three times for short time (0,1-0,5 s) and once hold for a time at least 1,5 s. The pause between pressings shall be no more than 0,5 s.

The device being useful, the “Ready” indicator should enter the interrupted quick flashing light mode with the frequency of 2 Hz.

Then all relay outputs shall switch off and loop voltages shall cut out for 3 s.

After loop voltage having recovered the relays from 1 to 5 in turns shall switch on and off with the interval of 2 s.

As soon as relay 5 has been switched off the outputs “K” and “3” shall be supplied for 2 s.

After outputs “K” and “3” having been switched off the device automatically exits out of diagnostic mode and returns into the operating mode.

6.1.3 Alarm loop checking

a) The alarm loop being disconnected (terminal resistor being disconnected), measure the first alarm loop voltage. It shall be within the range from 26,5 to 27,5 V.

b) Connect the terminal resistor 4,7 kOhm to the “ШС1” and read the ADC value by means of S2000/S2000M as follows:

- Select the menu commands “Request INFO” and "Zone ADC" gradually
- Enter the device address (the default value is 127) or select the device descriptor from the list of connected devices with the help of "▲" and "▼" keys
- Enter the alarm loop number 1

The value given out shall be within the range from 46 to 50.

c) Repeat the steps from b) item for loops from 2 to 20.

7 STORAGE

There must not be any acids or alkalis vapor, aggressive gas or other noxious agent with corrosive effect on premises where the device is stored.

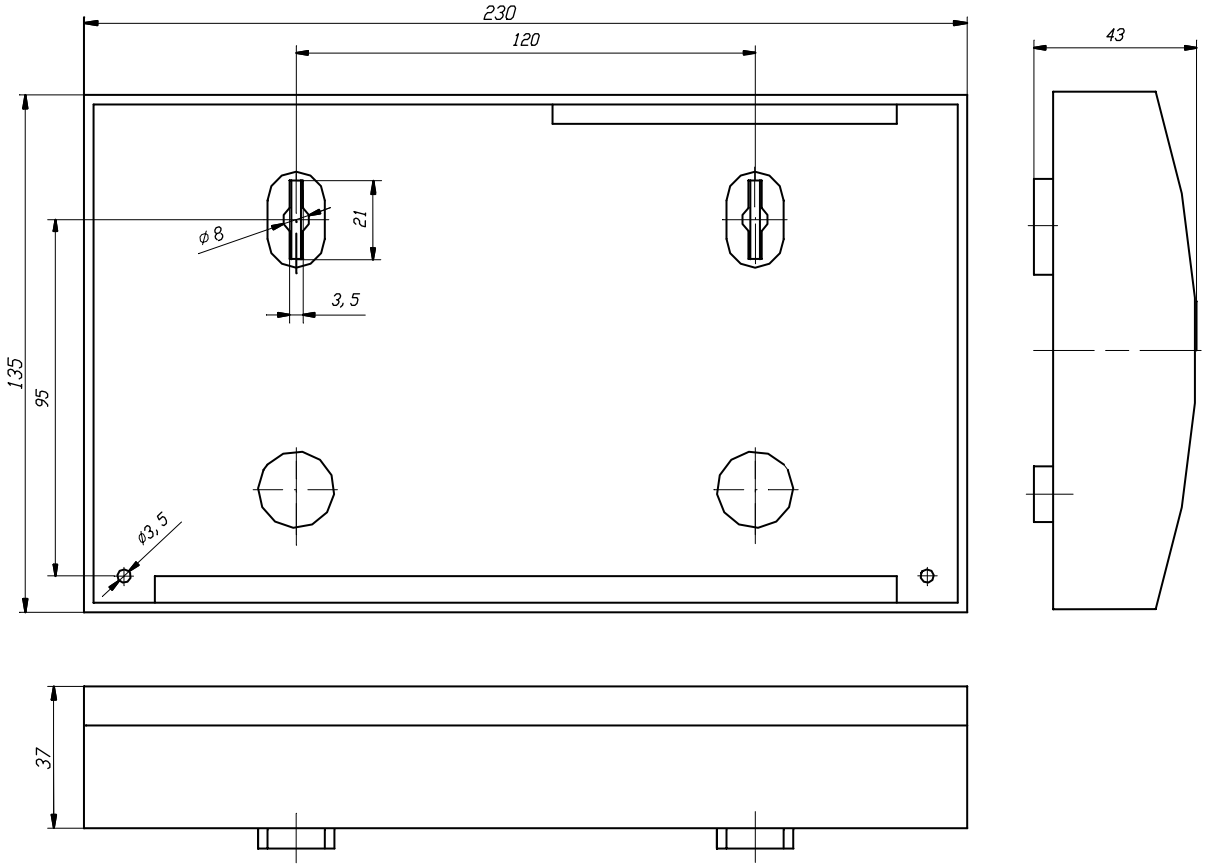
The device storage life in package has to be no more then 6 months.

8 MANUFACTURER DATA

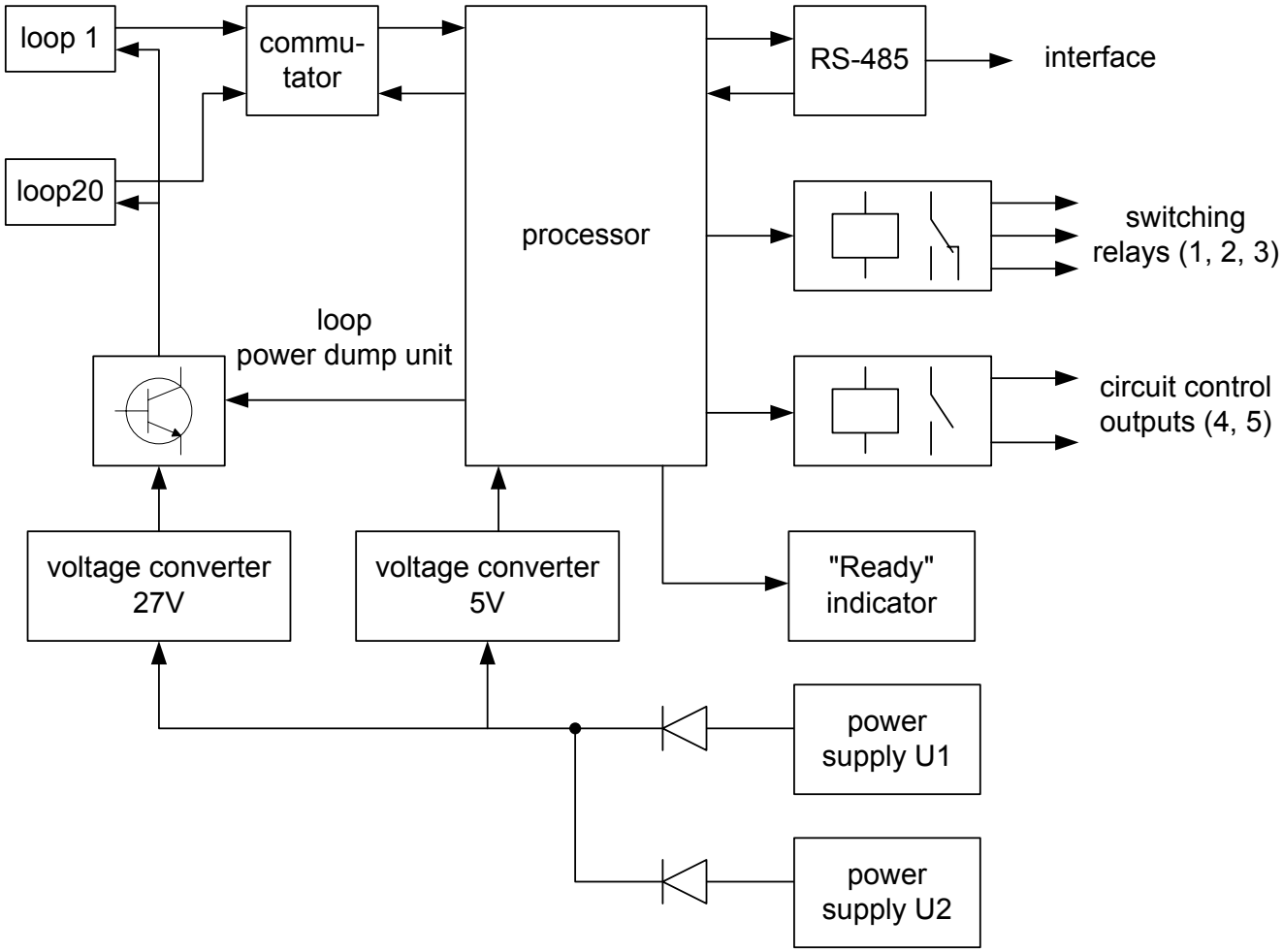
ZAO NVP BOLID
#4, Pionerskaya street, Korolyov, Moscow Region, Russia, 141070
Tel/fax: +7 495 777 40 20, +7 495 516 93 72
E-mail: **info@bolid.ru**
Web-site: **http://www.bolid.com**

Appendix A. SIGNAL-20P dimensions

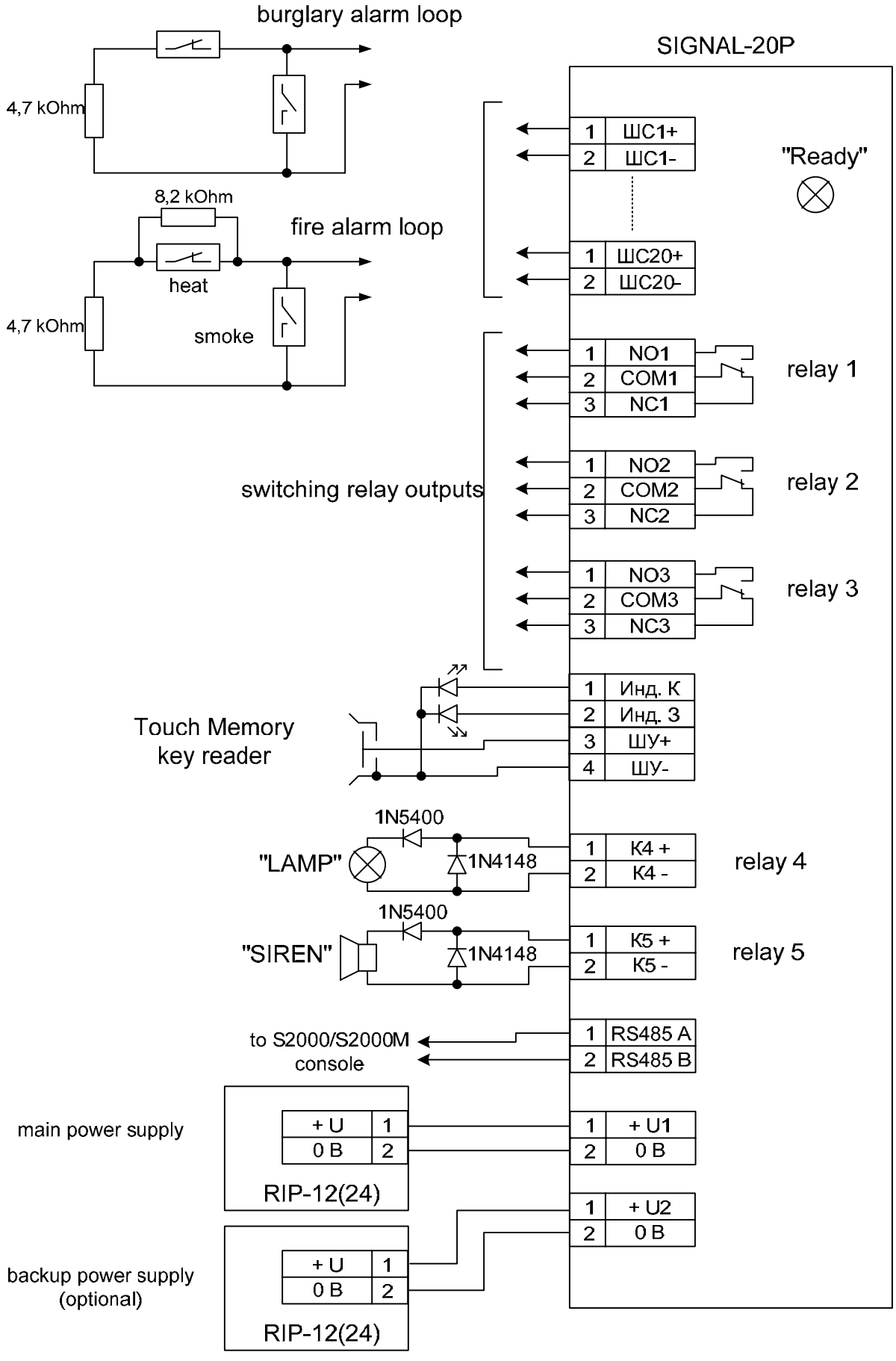
All dimensions are defined in millimeters.



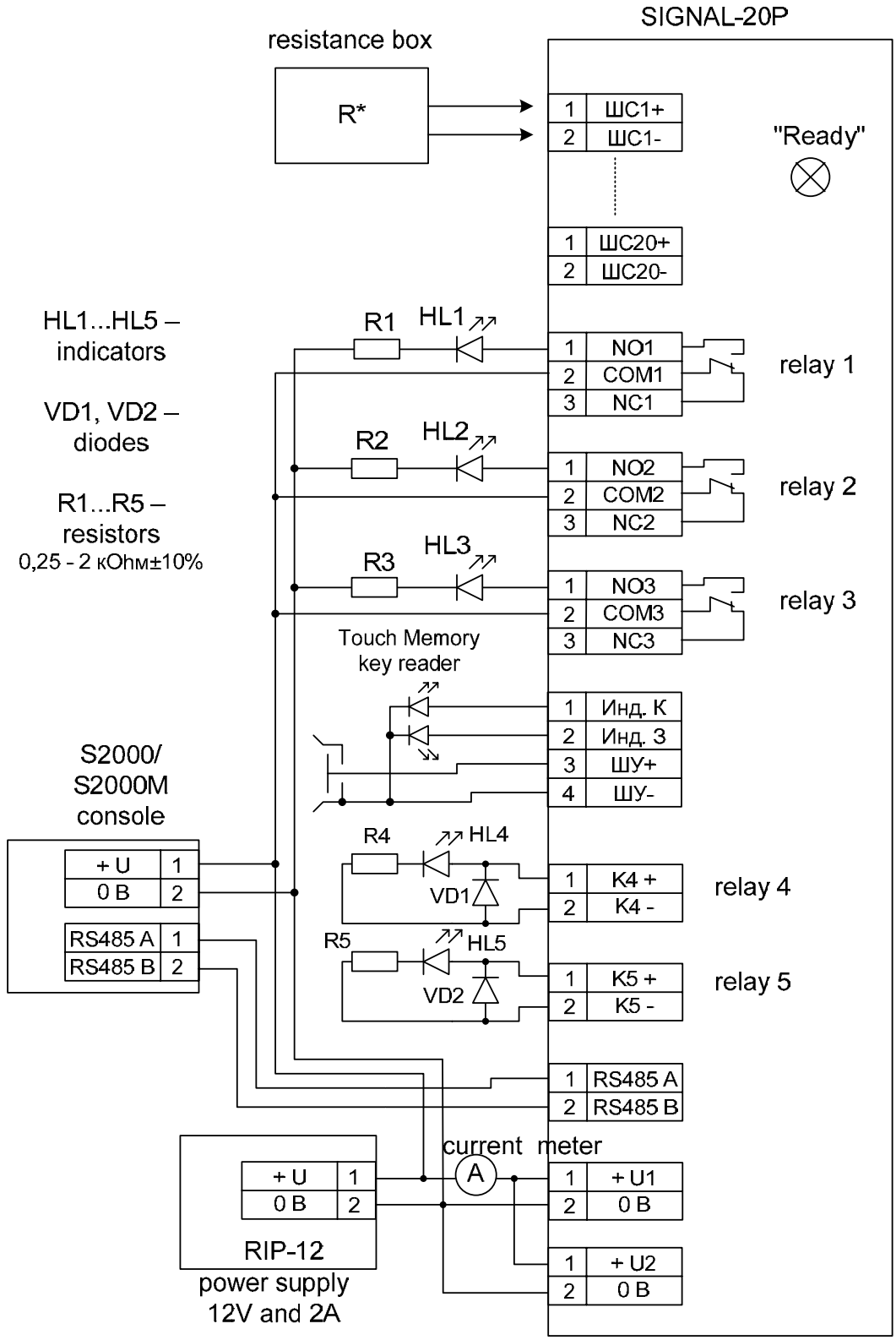
Appendix B. SIGNAL-20P block scheme



Appendix C. SIGNAL-20P connection diagram

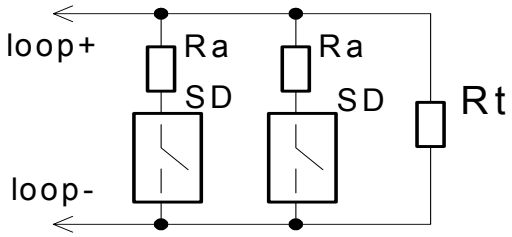


Appendix D. SIGNAL-20P testing connection diagram



Appendix E. Including the detectors into the loops

Type 1 (fire smoke alarm loop with double actuating recognition)



Rt – terminal resistor 4,7 kOhm

Ra – additional resistor

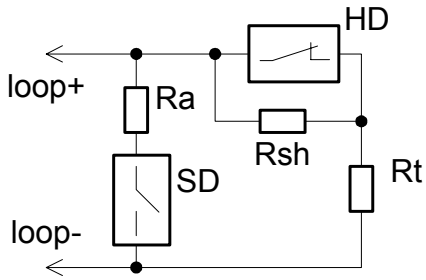
SD – fire smoke detector

Table 14: Additional resistance preferred values for various detectors

	IP212-3SU	IP212-26	IP212-41M	IP212-44	IP212-45	IP212-46	IP212-54T (5,5 мА)
Ra, kOhm	1,5	1,5	2,2	1,5	2,2	2,2	0
	IP212-58	IP212-78	2151E	2100	IP101-1A	Clean contact output detectors	
Ra, kOhm	1,5	2,2	2,2	2,2	2,4	3,0	

Note: It may be necessary to make the presented values more precise when device operating with specific detectors.

Type 2
(fire combined alarm loop)



SD – smoke detector

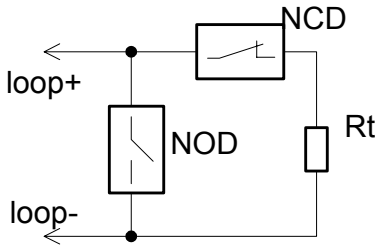
HD – heat detector

Ra = 0 for IP212-3SU, IP212-26 etc
510 Ohm for IP101-1A, IPR513-3

Rsh = 8,2 kOhm

Rt = 4,7 kOhm

Type 4
(burglary alarm loop)

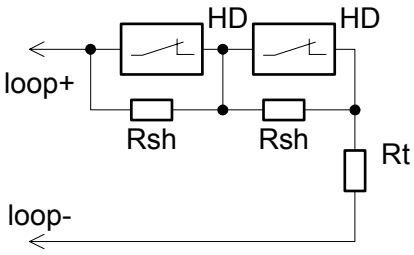


NOD – norm. opened burglary detector

NCD – norm. closed burglary detector

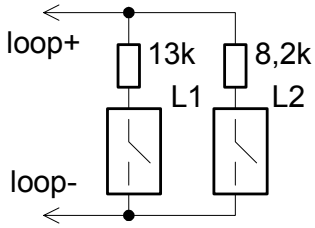
Rt = 4,7 kOhm

Type 3
(fire heat alarm loop with double actuating recognition)



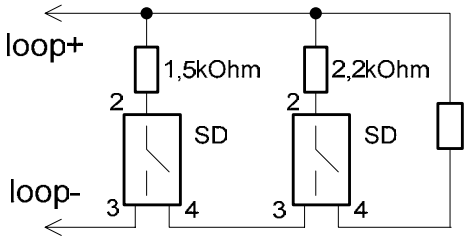
HD – heat detector
Rsh = 4,7 kOhm
Rt = 4,7 kOhm

Type 5
(burglary with tamper check)



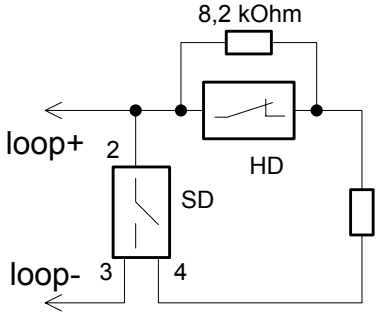
L1 – tamper lead
L2 – detector lead

Scheme of smoke detector connection, loop type 1

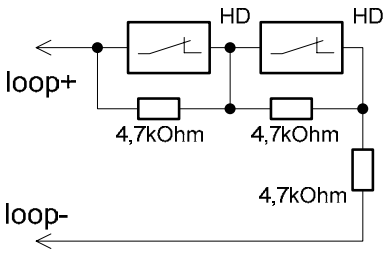


SD – smoke detectors (see Table 14)

Scheme of smoke and heat detector connection, loop type 2

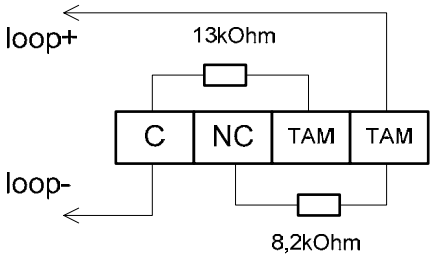


Scheme of heat detector connection, loop type 3

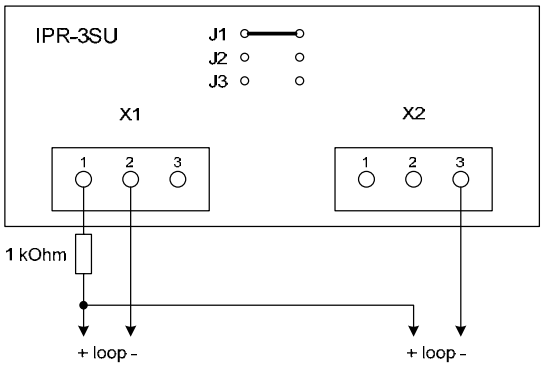


HD – smoke detectors
(IP103-5, IP109-1, IP103-4 etc)

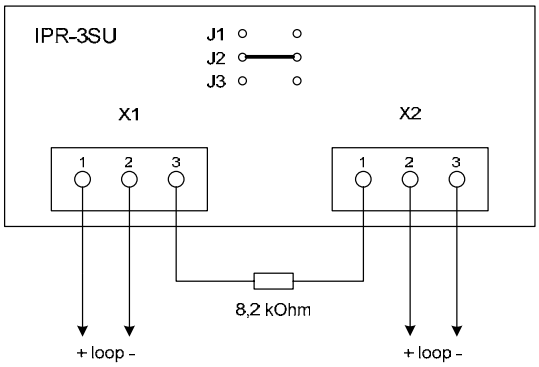
Scheme of burglary detector "Foton-SK" connection, loop type 5



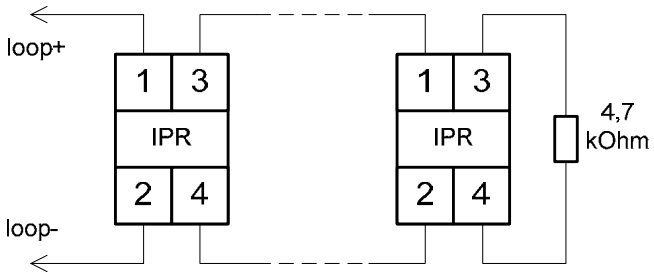
Smoke detector simulation



Heat detector simulation



IPR 513-3 detector connection



Warranty

Manufacturer warrants its product to be in conformance with specification under normal transportation, storage, mounting and maintenance.

Manufacturer warrants Signal-20P product to be free from defects in materials and workmanship for 18 months since putting in to operation, but no more then 24 months since production under normal use and service.

Signal-20P Device

_____

Product designation serial number

Produced, tested by quality control department in compliance with state standards and specifications, and packed by NVP 'BOLID' company.

Q.C.

STAMP _____ _____

Name Date