ASTRA-BPA

Addressable relay unit

User Guide

This operating manual is intended to study the principle of operation, proper use, storage and maintenance of the Astra-BPA addressable relay unit.
The manufacturer reserves the right to make changes to the design, software, circuit solutions and product packaging that do not worsen its technical characteristics, do not violate mandatory regulatory requirements, without prior notice to the consumer.
The technical features of the product not specified in the instruction manual in terms of design, software and circuit solutions are standard for the product, if they do not worsen the declared technical characteristics.

Abbreviations:

SLC – Signaling Line Circuit;
Addressable devices – Astra-42A smoke fire detectors, Astra-43A heat fire detectors, Astra-45A manual fire manual call point, Astra-BRA relay unit, Astra-MA addressable mark;
BPA – Addressable relay unit;
Tutorial – tutorial built into the PKM Astra Pro Configuration Module, or Astra-812 Pro Configuration Instructions from the keypad (available on the website www.teko.biz);
Control Panel – fire alarm Control Panel "Astra-812 Pro or Astra-8945 Pro with firmware version v5_5 and higher;
PKM Astra Pro – Astra Pro control/configuration software package (see on the website www.teko.biz);
FW – Firmware;
RPA – extender wired address Astra-A RPA with software version v5_5 and higher;
LP – Laser Pointer Astra-942;
AL – Alarm loop (wired zone)

1 FUNCTION

1.1 BPA is designed for:
– control the communication line and managing devices of the alerting system and control evacuation of people in case of fire;
– control and start of automation control cabinets (signals "Failure", "Emergency", "Automatics disabled" and " smoke exhaust Fan (pump, lock) activated);
– control and service fire automatics powered by 12 V or 24 V;
– transmission of signals through an intermediate relay device to the inputs of elevator controllers, voice alerting units, etc.);
– control through the built-in two AL (Zone 1 – Zone 4) of addressable fire detectors, intrusion, technological devices (including those powered by AL) and transmission of notifications via SLC through RPA to the Control Panel.

1.2 BPA is designed to operate in SLC formed by RPA.

1.3 The number of BPAs registered in the Control Panel is up to **96 units.**

1.4 BPA provides protection of control outputs **OUT1, OUT2** against overloads, polarity reversal, voltage surges.

1.5 In the initial state, reverse polarity voltage is applied to the outputs of the BPA, it is necessary to protect the connected load sensitive to polarity from reverse voltage.

1.6 The outputs **OUT1, OUT2** can be operated with or without control of the integrity of the line (depending on the configuration).
When outputs are operated with line **integrity control**, it is necessary to connect the **terminal elements** of the output from the delivery set to the terminals **OUT1, OUT2**.

1.7 BPA provides:
a) control of the power supply at the **inputs U1, GND, U2, "+", "-";**
b) switching the input voltage from 10.5 to 28.7 V from inputs U1, U2 to outputs **OUT1** and **OUT2** with switching current of each output up to **1.25 A**;
c) control of the load line of the outputs **OUT1** and **OUT2**, separately for open and short circuits, and transfer to the Control Panel information about the integrity of the load line;
d) control of the state of **4 alarm loops** of the following types: security, fire thermal with double actuation, fire smoke with double actuation, fire combined with single actuation and technological with short circuit (Open circuit) control;
e) light indication of the BPA operation, the status of the outputs, SLC and AL.

1.8 The power supply of the **address** part of the BPA is carried out **only** from the RPA via the SLC power line (terminals "**+**", "**-**").

1.9 The power supply of the **outputs and AL** of the part (outputs, AL) is carried out **only** from an external power supply of 12 V or 24 V D.C.

1.10 The BPA has two independent power inputs (main and backup) (terminals U1, GND, U2) and automatically switches from the main input to the backup and back in case of a voltage drop or no voltage at one of the inputs.

1.11 There is galvanic isolation between the address and signal-starting parts. When powering the BPA and RPA from different power sources, it is not allowed to combine their zeros, except for the case when the BPA and RPA are powered from one set of main and backup power sources.

1.12 The BPA provides operation with the length of the communication line of the **SLC** interface up to **1000 m.**

1.13 Recommended wires for **SLC**: cable with two pairs of twisted cores (pairs arranged in parallel), core cross section (single-wire class 1 or stranded at least class 3, from 0.35 to 2.5 sq. mm.
The recommended wire type to ensure maximum range for SLC in fire systems is FRLS (FRHF, FRLSLtx), 2×2×0.5.
For security systems, it is permissible to use a UTP 4×2×0.5 cable.

2 SPECIFICATIONS

General Technical Parameters

Power supply, V ..... from 10.5 to 28.7
Average current consumption* (AL1-AL4 is off.) at 12 (24) V, mA:
- without line control (OUT1, OUT2 off) 14 (15)
- with line control:
- OUT1, OUT2 off 16 (17)
- OUT1 on, OUT2 off 19 (20)
- OUT1 off, OUT2 on 19 (20)
- OUT1, OUT2 on 23 (24)

Inherent control current (reverse polarity)* of outputs OUT1, OUT2 in the "Off" state (current consumption of terminal output element) at voltage 12 (24) V, mA 1 (3)
Connecting each loop increases the average current consumption at voltage 12 (24) V, mA:
- Standby mode ..... for 7 (10)
- Fire mode ..... for 12 (16)

Max. current consumption voltage 12 (24) V, mA, no more 73 (94)
Max. current consumption with connected load, A, no more 2.6
Max. cable cross section for connection to terminal, mm2, no more than 2.5
Current consumption on the SLC supply line, mA, max 1
Threshold for the beginning of indication of a power failure, V:
- from an external power supply 12(24) V ..... 10.2 -0.2
- through the power line from SLC RPA ..... 8.5 -0.1

AL Parameters (Zone1 – Zone 4):

Voltage at the inputs of the AL in the standby mode, V ..... from 8.5 to 27.6
Effective voltage value of pulsations on AL terminals, mV, no more 50
Short circuit current at AL inputs, mA, no more 30
Integration time, msec ..... 300 ± 30
Resistance of wires connected to AL inputs (excluding external element), Ohm, not more 150
Leakage resistance between AL input wires or each wire and "Ground", kOhm, min. 50
Short circuit current at AL inputs, mA, not more 30

OUT1, OUT2 parameters:

Maximum switching voltage, V 28.4
Maximum switched output current, A ..... 1.25 ± 0.01 (in total no more (2.50 ± 0.02) A)

Boot time, sec., no more 10
Overall dimensions, mm, not more ..... 135 × 85 × 39
Weight, kg, not more 0.35

Operating conditions

Temperature range, °C ..... from -30 to +55
Relative humidity, % ..... up to 93 at +40 °C
Without moisture condensation

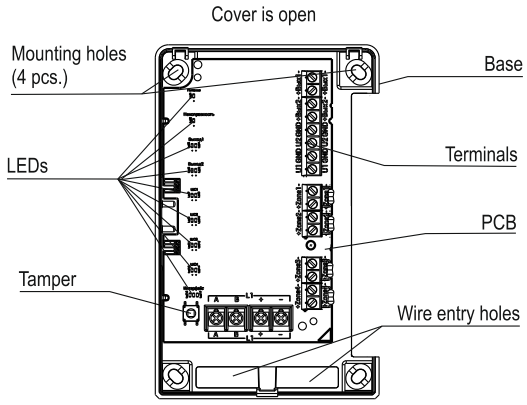
3 DELIVERY SET

Astra-BPA ..... 1 pc.
Resistor 3.9 kOhm ..... 4 pcs.
DIN rail mounting bracket ..... 2 pcs.
Exit element terminal ..... 2 pcs.
Screw ..... 8 pcs.
Dowel ..... 4 pcs.

** Without taking into account the power supply of the external load and detectors on the loop.*

4 DESIGN

4.1 The BPA is made in the form of a module, consisting of a base and a removable cover. The PCB with radio elements is mounted inside the device (Pic. 2).



Picture 2

4.2 The PCB has 9 LEDs:

- **POWER** – power supply status led
- **FAILURE** – failures led
- **INTERFACE** – SLC status led
- **OUTPUT1, OUTPUT2** – to display respectively the status of control outputs OUT1, OUT2
- **ZONE1 - ZONE4** – state display

4.3 There is a tamper switch on the PCB to control opening of the cover

4.4 The PCB has screw terminal blocks, the function of terminal described in Table 1.

Table 1

Name	Terminal function
U1, GND	Main external power supply connection
U2, GND	Connecting a backup external power supply
+OUT1- +OUT2-	Load connection
Zone1 – Zone4 (AL1-AL4)	Connection of addressable detectors (devices) for fire, security (including those powered by AL)
A, B	Connection to SLC information line from RPA
+, –	Connection to SLC power line from RPA

4.5 The design of the BPA provides the posibility to install and use the BPA inside control cabinets.

5 AL OPERATING MODES

BPA distinguishes the following AL states:
- double-event smoke (Fire)
- double event heat (Fire)
- fire single event (Fire)
- alarm
- emergency
- emergency with short circuit control (Open circuit).

The AL state is determined by the parameters according to table 2.

Table 2

AL Type	Alarm Loop resistance, kOhm				
	0–1.5	from 1.5 to 3.0	from 3.0 to 5.0	from 5.0 to 12.0	more 12.0
Fire smoke double-event	Fire	Fire danger	Norm	Fire	Open circuit
Fire heat double event	Short Cicuit	Norm	Fire danger	Fire	Open circuit
Fire single event	Short Cicuit	Fire	Norm	Fire	Open circuit
Alarm	Alarm	Alarm	Norm	Alarm	Alarm
Emergency	Alarm	Alarm	Norm	Alarm	Alarm
Emergency short circuit (Open circuit) control	Short Cicuit	Alarm	Norm	Alarm	Open circuit

6 INDICATION

TEST led is generated when the power supply is turned on via any of the inputs U1 or U2, or by the CONTROL PANEL command, once the indication is turned on for 1 sec in turn on all leds of the BPA: POWER - green, FAILURE - yellow, OUT1 - red/yellow, OUT2 - red/ yellow, AL1 - AL4 - red/yellow, INTERFACE - green/red/yellow.

Table 3 - **POWER LED** notifications and CONTROL PANEL

Notification	LED POWER	CONTROL PANEL
External power normal	Green	+
Failure of the main (or back-up) power supply (lower or no voltage at the inputs U1 or U2, GND)	x1 green flashes every sec.	+
Recovery of the main (or backup) power supply (voltage recovery at inputs U1 or U2, GND)	Green	+
Generic Failure (lack of power at both inputs U1 and U2, GND)	Off	+
Recovery from a general Failure (both inputs U1 and U2, GND energized)	Steady on or flashing green x1/sec (according to current power status)	
«+» - notification is transmitted to Control Panel *«-» - notification is not transmitted to Control Panel*		

Table 4 - Notifications to the **FAILURE LED** and Control Panel

Notification	LED FAILURE	CONTROL PANEL
No Failures	Off	-
Failure (any)	Yellow	+
«+» - notification is transmitted to CONTROL PANEL *«-» - notification is not transmitted to CONTROL PANEL*		

Table 5 - Notifications to **LEDs OUTPUT1, OUTPUT2** and Control Panel

Notification	LED OUTPUT 1, OUTPUT2	CONTROL PANEL
Output on (Integrity contol) (straight polarity applied)	Red	-
Output on (no integrity control) (straight polarity voltage applied)		-
Output off (Integrity control) (reverse polarity voltage applied)	Off	-
Output off (no integrity control) (straight polarity de-energized)		-
Output interruption (with output integrity control enabled)	x1 yellow flashes every 2 sec.	+
Output short circuit (with output integrity control enabled)	x2 yellow flashes every 2 sec.	
Output short circuit recovered	Solid red or off. (*depending on the current state of the output - whether the output is enabled or disabled*)	+
Output open circuit recovery		
«+» - notification is transmitted to CONTROL PANEL, *«-» - notification is not transmitted to CONTROL PANEL*		

Table 6 - Notifications for leds ZONE1-ZONE4 and Control Panel

Notification	LED ZONE1-ZONE4	CONTROL PANEL
Fire	Red	+
Attention	x1 red flash every sec.	+
Alarm	x1 red flash every 2 sec.	+
Zone Open circuit	x1 yellow flash every 2 sec.	+
AL Short circuit	x2 yellow flashes every 2 sec.	+
Norm	Off	+
«+» - notification is transmitted to CONTROL PANEL, «-» - notification is not transmitted to CONTROL PANEL		

Table 7 - Notifications on the **INTERFACE LED** and CONTROL PANEL

Notification	LED INTERFACE	CONTROL PANEL
BPA not registered	Off	-
SLC Norm	x1 green flash with a period of 8 sec.	+
Power failure (SLC)	x3 yellow flashes with a period of 25 sec.	+
SLC loss of connection	Off	-
Registration (via Laser Pointer) *	x1 red LED for 2 sec.	-
Test (via Laser Pointer) *	x1 red LED for 5 sec.	+
Firmware update*	x1 yellow flash every sec.	-
«» - service indication used during commissioning and service of BPA, «-» - notification is not transmitted to CONTROL PANEL, «+» - notification is transmitted to CONTROL PANEL*		

7 PREPARING FOR OPERATION

7.1 BPA after transportation under conditions other than operating conditions, keep unpacked in operating conditions for at least 4 hours.
7.2 BPA must be previously reset or with a correctly remote address (see 7.4). Otherwise, rewriting the address is possible only with the laser pointer Astra-942.

7.3 BPA registration

1) Check the correspondence between the RPA and CONTROL PANEL firmware version (v5_5 and higher), if necessary, change the firmware according to the method of p. 8.
2) Connect RPA to CONTROL PANEL via RS-485 interface.
3) Add RPA to the CONTROL PANEL according to User Guide.
4) Connect BPA to the power supply 12 (24) V.
5) Connect BPA to the power line (terminals "+", "-") and the interface line (terminals A and B) of the RPA, connect with the power off.
6) Turn on the external power supply (12 or 24 V) of the BPA, RPA and CONTROL PANEL (if it was turned off).
7) Start CONTROL PANEL the mode of Registering devices in the RPA with a command through the PKM menu, or the CONTROL PANEL interface "Astra-812 Pro" in accordance with the User guide. The mode starts for 60 seconds to register a device.
8) Start the registration mode on the BPA by lighting the BPA INTERFACE led from the button of the Astra-942 laser tester for at least 1 sec.

Attention!
Simultaneous launch of the registration procedure on several addressable devices is prohibited.

9) Check in the PKM Configuration Module how the registration passed:
- in case of successful registration, the abbreviated name "BPA" or the message: "BPAxxx registered" will appear on the screen;
- in case of unsuccessful registration, it is necessary to repeat the registration procedure (p. 7-9).

10) The procedure is accompanied with messages: "In progress", "Completed" or "Not completed".
11) Once registered, the BPA LEDS will display the current power and load status as shown in Tables 2-7.

***Notice** – BPA registration in RPA is possible by turning on the power supply (from the SLC power line) during initial registration or after correct removal of the BPA from the RPA, where the BPA was previously registered, for which:*

- connect and register RPA in CONTROL PANEL,
- connect Data line SLC BPA to RPA by connecting terminals A, B of the same name (do not connect SLC power line from RPA to BPA),
- perform action 7),
- turn on the power supply of the BPA by connecting the terminals of the same name "+", "-" of the BPA and RPA,
- perform action 9).

If the registration procedure is unsuccessful, it is necessary to repeat the registration procedure using Astra-942 LP.

Attention!
Do not turn off the power to the CONTROL PANEL, RPA and BPA until the registration and configuration of all devices in the system are completed!

At the end of the registration, if it is necessary to store the BPA for a long time before using it at the facility, it is allowed to turn off its power. When the power is turned on, re-registration in the same CONTROL PANEL is not required if BPA has not been forcibly removed from the CONTROL PANEL according to p. 7.4.

7.4 Removing the BPA

Removing BPA from the CONTROL PANEL memory is performed using the Configuration Module of the PKM Astra Pro or from the CONTROL PANEL Astra-812 Pro menu.

8 FIRMWARE UPDATE

Firmware update is performed on the installed system with connected and registered BPA.

Action order:

1) connect CONTROL PANEL to PC via USB;
2) run the FW update module from the PKM Astra Pro;
3) select the firmware file with the required version and start firmware update procedure;
4) after completing the firmware update procedure, close the FW update module on the PC**.**

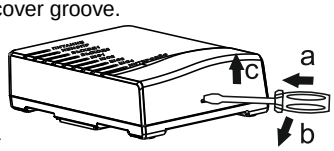
9 INSTALLATION

9.1 During installation it is allowed to use mounting devices (cabinets, boxes, etc.)
9.2 Wires or power and SLC BPA wires must be located **at least 0.6 m** from high-power and high-frequency cables.

9.3 Installation order

Methods of installation:
a) directly on the wall (steps **1, 2, 4-6**),
b) on a din rail (steps 1, 3 - 6).

1 Push the base latch out of the cover groove.

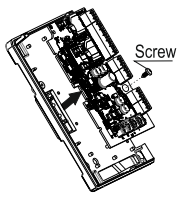


Remove the cover

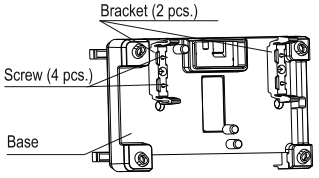
2 Wall Mounting:
1) make markings at the attachment point, using the BPA base as a stencil.
2) pass the wires of the power supply and the address line of communication through the holes for the input of wires in the base of the BPA.
3) fix the base in the place chosen for this.
4) go to step 4

3 DIN rail installation:

1) remove the PCB by unscrewing the screw securing the PCB to the base

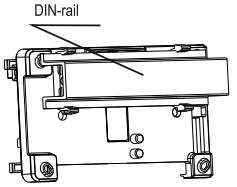


2) fasten two brackets from the delivery set with screws on the outside of the base

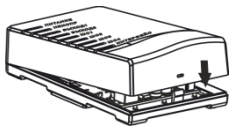


3) install the PCB

4) install BPA on din rail



5) close the case cover until it clicks



4 Connect the wires to the terminals in accordance with Table 1

5 Register BPA in the CONTROL PANEL accordance with p.7.3

10 TEST

1) Press and release the opening button on the BPA, control in PKM Astra Pro or on the CONTROL PANEL screen of Astra-812 Pro the notifications "Opening" / "Restoring the opening".

2) On the loop, initiate the state "Fire", "Alarm" or "Alarm" (depending on the type of loop). Control the corresponding indication on the leds ZONE1-ZONE4 of the BPA (see table 6), in the CONTROL PANEL "Astra-812 Pro", in the PKM Astra Pro the corresponding notification.

3) Irradiate for 1-2 sec using the upper LP button the BPA led "INTERFACE". Control in the CONTROL PANEL "Astra-812 Pro" the message "TST", in the PKM Astra Pro - the notification "Test fire / alarm" (the outputs are not activated in this case).

4) Through PKM Astra Pro, CONTROL PANEL menu "Astra-812 Pro" in the settings of the BPA, enable line integrity control (if control was disabled).

5) Check the indication of the BPA (see Table 5) and the transmission of notifications to the CONTROL PANEL "Astra-812 Pro", PKM Astra Pro, performing actions on the outputs OUT1, OUT2 (in turn) in the following order:

- disconnect the line with actuators and terminal element from the output;
- connect the line with actuators and terminal element to the output;
- close the output element with a piece of wire (jumper);
- clear the short.

6) Upon completion of the test, restore the original connections and BPA settings.

11 WARRANTY

The operation warranty period is 5 years from the date of operation start-up, but no longer than 5 years 6 months from the date of manufacturing subject to the requirements of User guide.

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