COMMISSIONING METHODOLOGY FOR ADDRESSABLE SYSTEM

CONTENTS

Acronyms used in text

AFD – addressable fire detector CV1511, CV1512, CV1513;
IO-A – addressable input/output unit CV1514;
ALU – addressable loop unit CV1510;
VRA – peripheral cabinet with remote units;
FSD-A – addressable fire and smoke detector CV1511;
HFD-A – addressable handheld fire detector CV1513;
HEFD-A – addressable heat fire detector CV1512;
SC – short circuit;
FASC – fire alarm signaling controller;
PCB-A – addressable process control board;
AL – alarm loop (addressable).

1. INTRODUCTION

Commissioning works assume preparation and commissioning of equipment.

The sequence of system start corresponds to the structure of this methodology. It is recommended to start the system in the sequence shown below.

Please note that after the Customer receives equipment, it is in functional condition and passed the required process pre-aging and is ready for use. Failure during commissioning works is possible due to incorrect actions of staff.

Before you start any works, please **learn** the operation manuals (RE) for all applicable components, addressable system building principle, component connection rules, and programming guidelines.

Please follow design documents (DD) during works.

The methodology discussed below is intended only for work with equipment and addressable components of SKB Elektronmash production.

2 INSTALLATION

In order to save cable products and increase the reliability, loop units CV1510, input/output units CV1514, DC and AC keys and other actuation equipment may be installed remotely over the object and be placed in VRA cabinets.

The main device CV1500 and peripheral cabinets shall be delivered to their installation site according to DD and fixed on bearing surfaces.

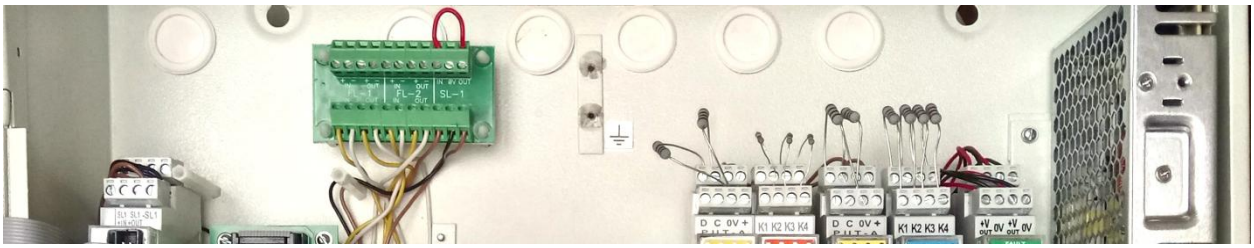
System decentralization on physical level is ensured by remote installation of loops (CV1510 units) beyond the main casing.

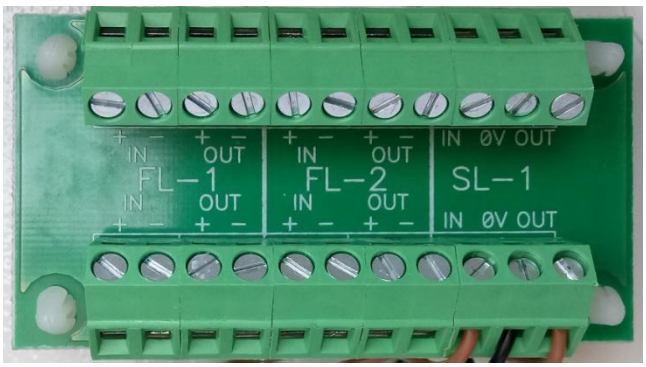
This is done using a system internal interface SL1.

Then it is required to connect all system units located in the VRA cabinets (CV1510) over SL1 interface.

Output (SL_1Out) of the interface located at the cross unit CV1502 in the device is connected to the SL_1In input on loop units CV1510. The next loop unit's input SL_1In is connected to the SL_1Out output of the previous loop unit. The SL_1Out output of the last unit is returned to the SL_1In input of the cross unit CV1502, closing the loop and ensuring access to all loops at single break of system bus (see Fig. 1). Zero wire (0V, COM) is the second wire in the interface.

For connection convenience, a UI unit is installed in every cabinet where all internal connections are manufactured at the plant. Connections going out of the cabinet are connected to SL1 and FL terminals.





<u>Communication between units</u> in the system is effected using a wire with a section of at least **<u>0.75 mm².</u>**

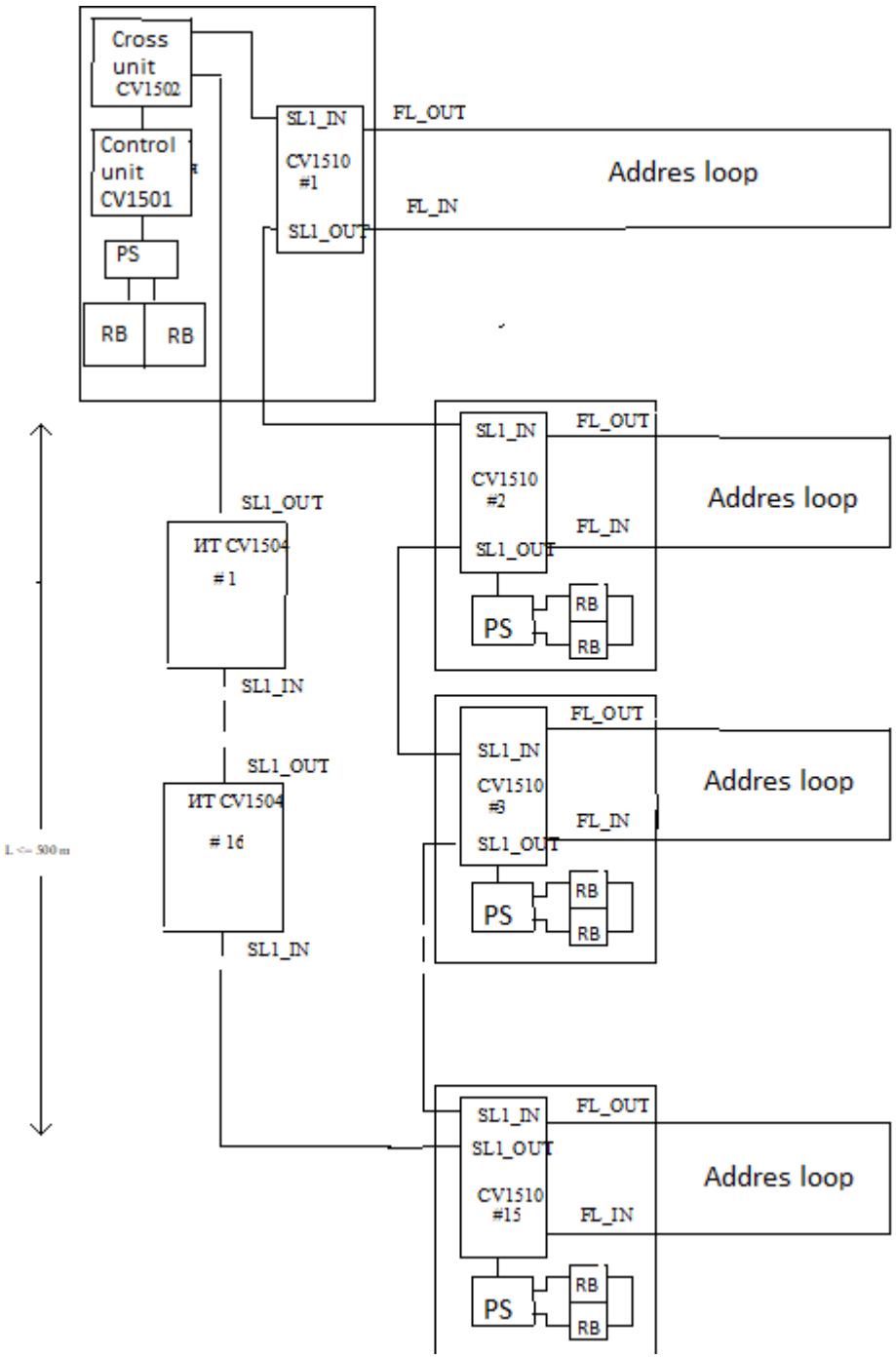


Fig. 1

The next step is installation of fire alarm (FL) loop (ring).

The **length** of an addressable loop is **determined by its resistance**. Loop resistance **shall not exceed 50+2 Ohm.** Instrument wire is selected considering its resistance per unit length.

It is due to the fact that detectors have an embedded short circuit isolator, which opens power on —. The **+FL_out** output is connected in series to “1” contacts of all detectors. **-FL_out** is connected to “4” contact (input) and passed from “3” contact (output) to “4” contact of the next detector.

In handheld detectors and input/output units, connection is done to terminals **+FL_in, -FL_in:**, and from **+FL_out and -FL_out"** the line goes to the next detector or input/output unit taking into account polarity.

The loop is closed on the loop unit CV1510 with a connection to terminals **FL_in**.

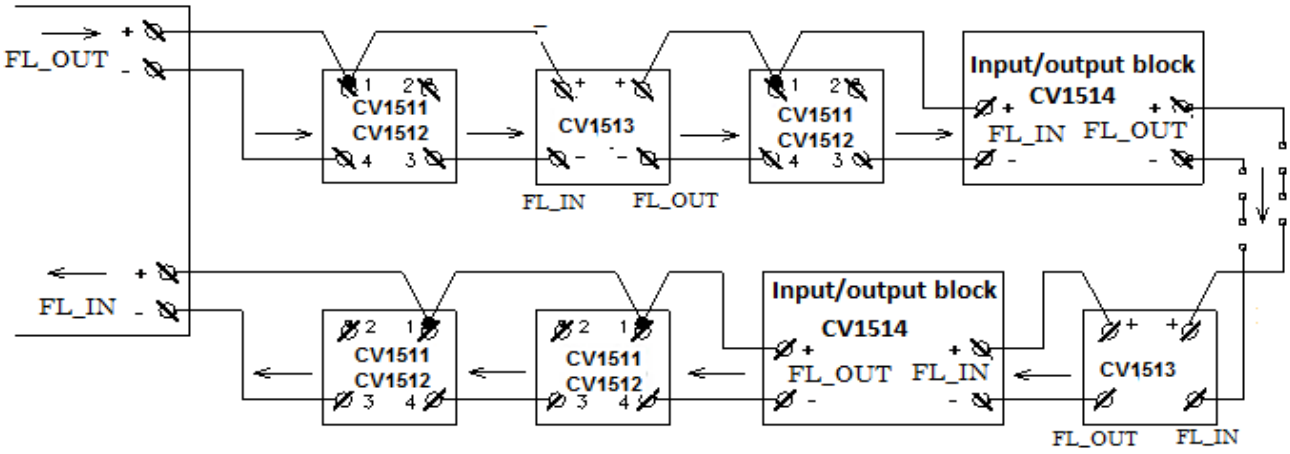
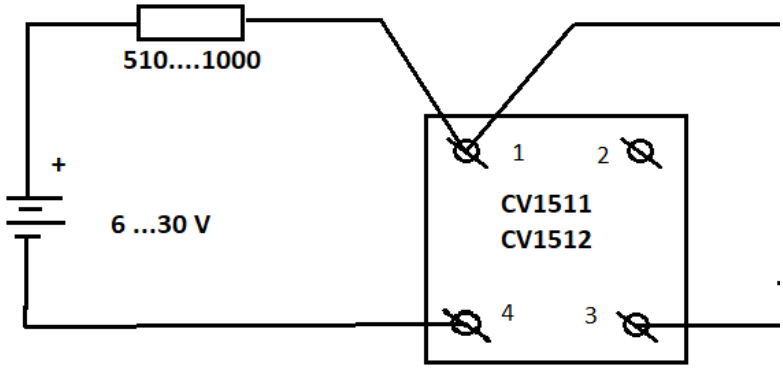


Fig. 2

<u>WARNING!</u> Correct connection of components guarantees passage of automatic addressing procedure.

During installation, to check correspondence of loop connection to sockets of automated detectors, it is recommended to use the indicator of addressable loop installation IM-LA. When working with IM-LA, connect a 6...30 V DC voltage supply to the “start” of the loop (where addressing of detectors from the 1st address is assumed according to the project; loop will be connected to AL_Out ALU) through a 510...1000 Ohm to the loop.

AL_Out. ALU



Addr. “1”

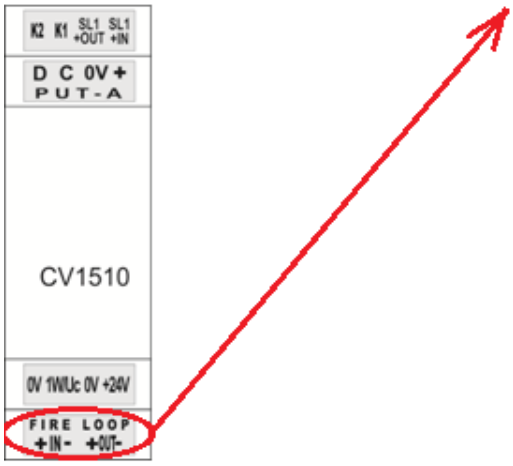
After connection of serial socket of automated detector to the loop, insert IM-LA into it. At the same time, if the loop is connected to the socket correctly, a LED will light on IM-LA; if it is connected incorrectly, the LED will not light. In

case of incorrect connection of the loop to the socket, eliminate the installation error and perform re-check using IM-LA. If HFD-A or IO-A are installed in the loop, **close the -AL-Out and -AL-In terminals between each other (for the time of system installation to ensure functionality** of loop connection check methodology using IM-LA). After loop installation, remove such jumpers before start.

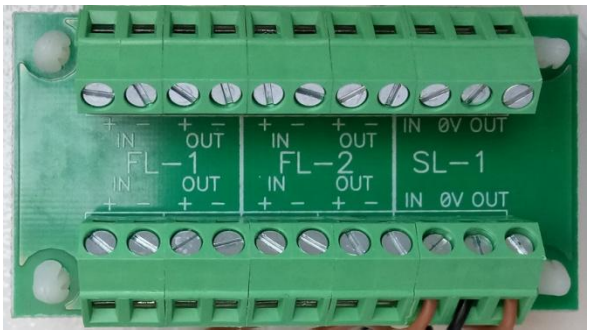
<u>WARNING!</u> The sequence of detector placement in the loop shall strict adhere to the project! Later this will significantly save time during identification.

Connect the mounted ring to the addressable loop unit CV1210 to terminals **+FL_in, -FL_in**, **+FL_out, -FL_out.** (see Fig. 2)

The detector connected to terminals **FL_out** during addressing will be assigned the address No. 1, and the detector connected to **FL_in** will be assigned the last address, depending on the total number of detectors written for this loop (describe the cross board).

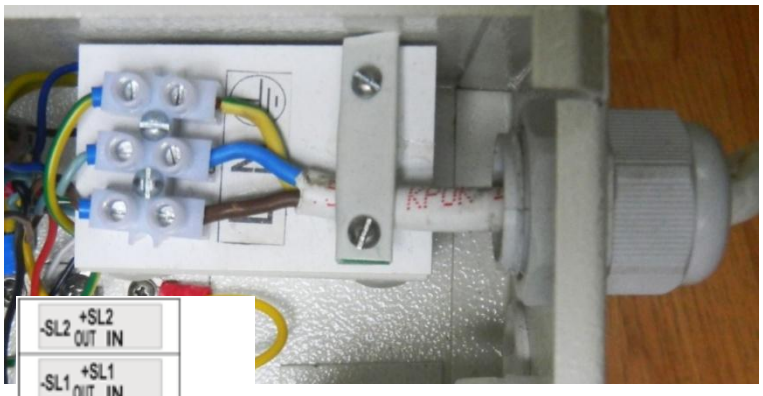


It should be reminded: a UI unit is installed in every cabinet where all internal connections are manufactured at the plant. Connections going out of the cabinet are connected to SL1 and FL terminals.



The rest of loops (rings) of fire alarm shall be installed similarly.

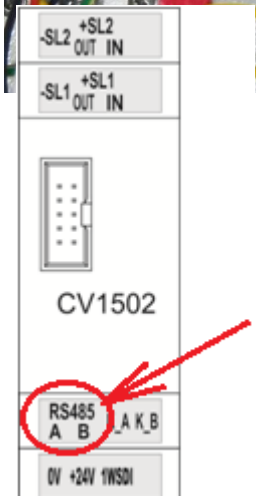
3. POWER CONNECTION.



Following phasing, connect network wires and grounding wire in all cabinets (main device, VRA cabinets, remote information boards).

Otherwise, a failure signal will be formed in the charging device, and the device will go to the Failure status

To configure the device, parameters of alarm loops, input/output channels, program operation algorithms, write identifiers, connect a PC to the device. The USB-RS485 adapter which is included in the accessories set is used for this purpose.



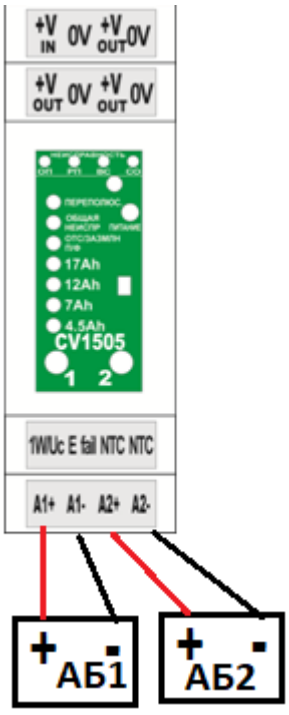
RS485 connection terminals.

Install batteries in the devices. Connect.

Warning! Batteries shall be connected only with the device switched off.

Supply the mains power.

Set the capacity of the applied battery on each charging device.



Battery capacity setting procedure.

CCD menu is accessed by pressing the 2 button (about 5 sec). Then the following indication is observed on CCD:

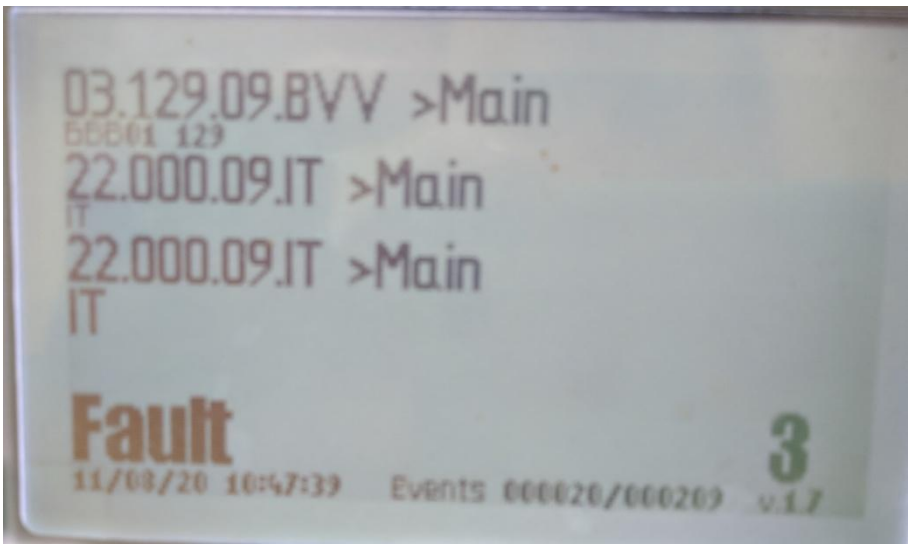
- Power LED flashes with the frequency of about 0.2 Hz;
- OP LED flashes with the frequency of about 0.5 Hz

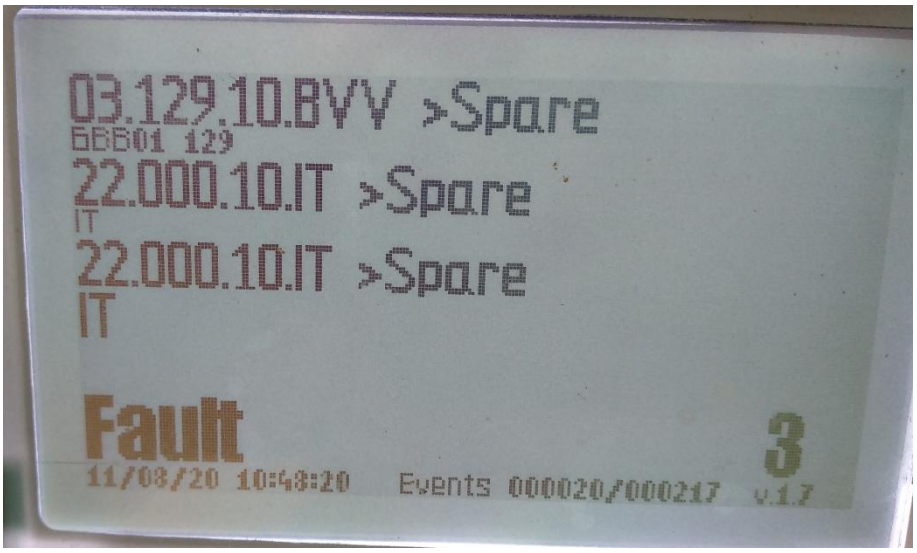
Battery capacity (17, 12, 7 or 4.5 A·h) is selected by pressing the 1 button.

Exit from the menu is automatic, 50 sec after the last pressing of any button on the CCD.

Power failures.

Occur in case of lack of main or backup power (as well as battery failure). Displayed on FASC screen:





Displayed number of power failures.

Power failures are determined by the charging device CV1505 and transfered to all components (cross unit CU CV1502, addressable loop unit CV1510, addressable input/output unit CV1514, input signal unit CV1503, and information board (IB) CV1504) installed in the main device or remote VRA cabinets.

If 7 specified units are located in the cabinet, the display will show 7 failures, if failure is present in two or more cabinets, the total number of failures will be displayed.

4. Setting addresses on CV1510 and CV1514

According to design documents, addresses shall be set on all loop units CV1510 and input/output units CV1514.

All addresses shall be different, identical addresses or 0 address in the system are not allowed.
Addresses for CV1510 – from 1 to 15.
Addresses for CV1514 – start from address 129 in every loop

Address programming for CV1510

To switch ALU to addressing mode, it is required to:

- press and hold 1 button, green and red LEDs K1, K2 will flash;
- after red and green LEDs K4 light and current ALU address, release the 1 button;
- press and hold the 2 button
- red and green LEDs on K1 and K2 flash, and light continuously on K3, and ALU will start address recalculation in the range from 1 to 15;
- when the required address is displayed, release the 2 button;
- ALU will automatically save the selected address and switch to the duty mode in the time period up to 30 s.
- address of CV1510 and the LED status corresponding to them are presented in the following table.

Table 1. Address of CV1510 and corresponding LED status

Address	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	☼		☼		☼		☼		☼		☼		☼		☼
2		☼	☼			☼	☼			☼	☼			☼	☼
4				☼	☼	☼	☼					☼	☼	☼	☼
8								☼	☼	☼	☼	☼	☼	☼	☼

Address programming for CV1514

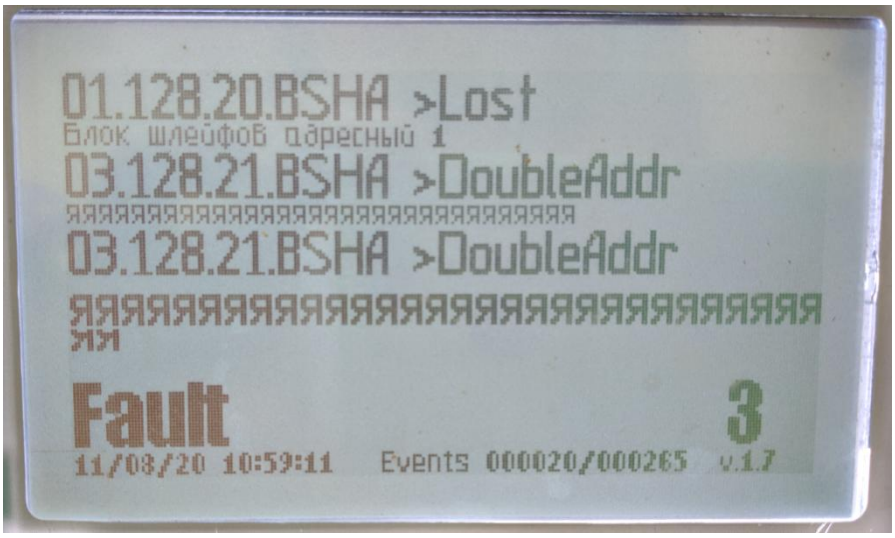
Addresses are set by using the 1 and 2 buttons and indicated by LEDs “1, 2, 4, 8, 16, 32, 64” on CV1514 front panel.

To enter the addressing mode, press and hold the 1 button. At the same time, K1 and K2 LEDs will flash frequently. Continue holding the 1 button up to the moment when red K4 LED lights, which means that the unit switched to addressing mode.

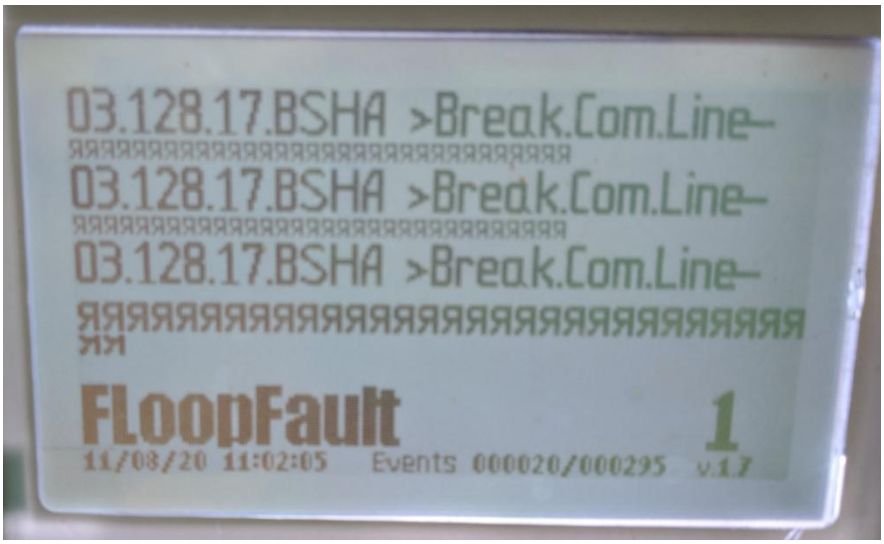
After entering addressing mode, release the 1 button.

The 1 button sets the digits “1, 2, 4, 8”, with K4 lighting, and the 2 button sets “16, 32, 64”, with K3 lighting. Set the required addresses by holding these buttons in sequence. After address is set, the unit will automatically exit the addressing mode after some time.

Check for double addresses in ALU (identical address was set on two and more ALUs by error). In this case, the following approximate information will be shown on the screen:

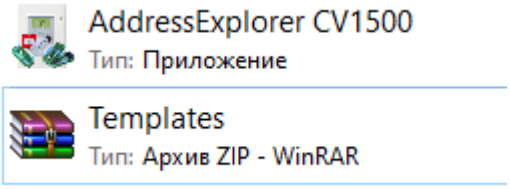


If there are FL loop breaks, the following information will be shown on the screen:



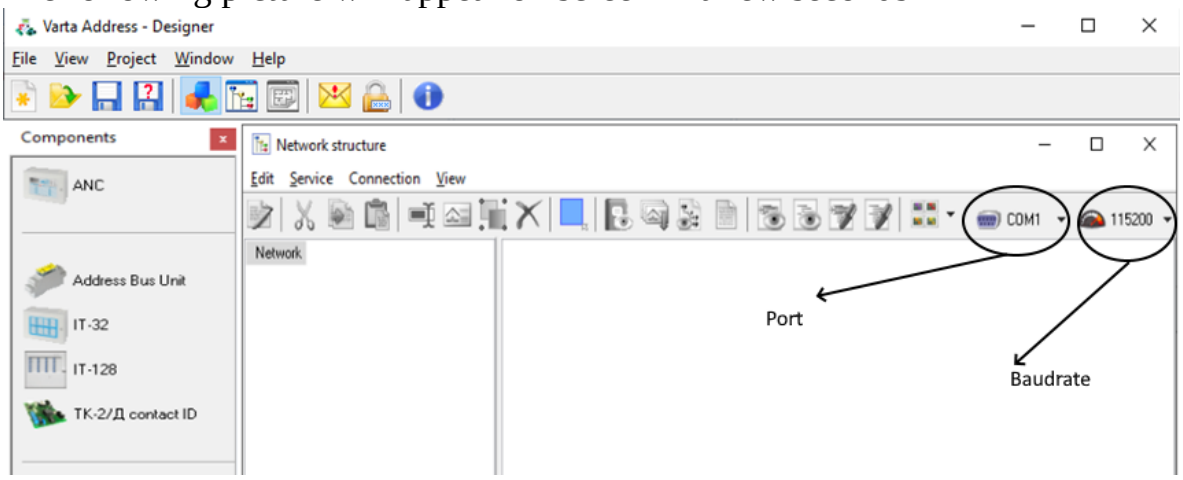
5. Preparation for programming.

Create a separate folder on PC, copy two file from the supplied carrier into it.



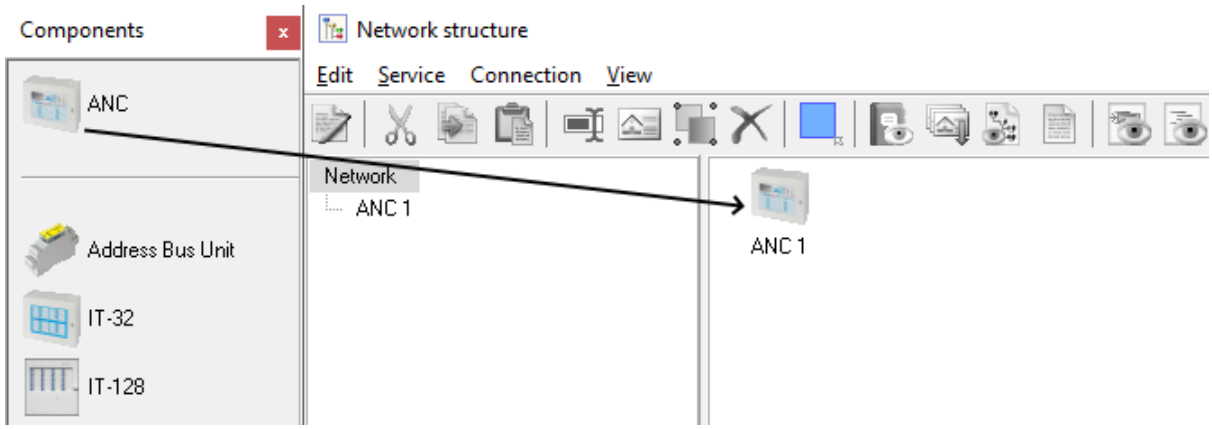
Open the AddressExplorer file.

The following picture will appear on screen in a few seconds

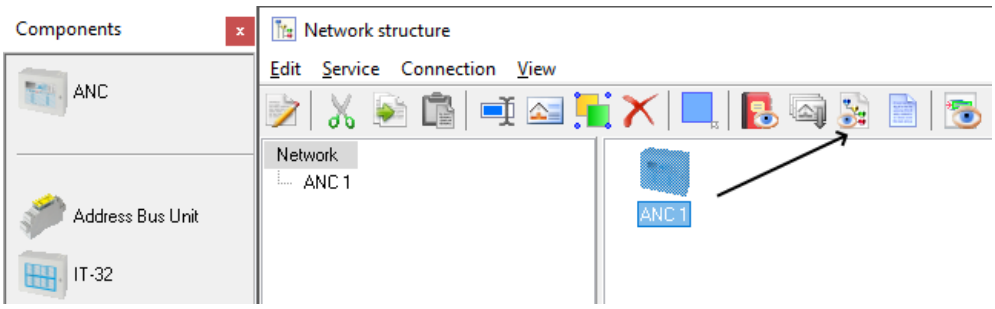


Then: connect the USB-RS485 adapter, select the address of the COM-port, set the baudrate (115,200 is recommended)

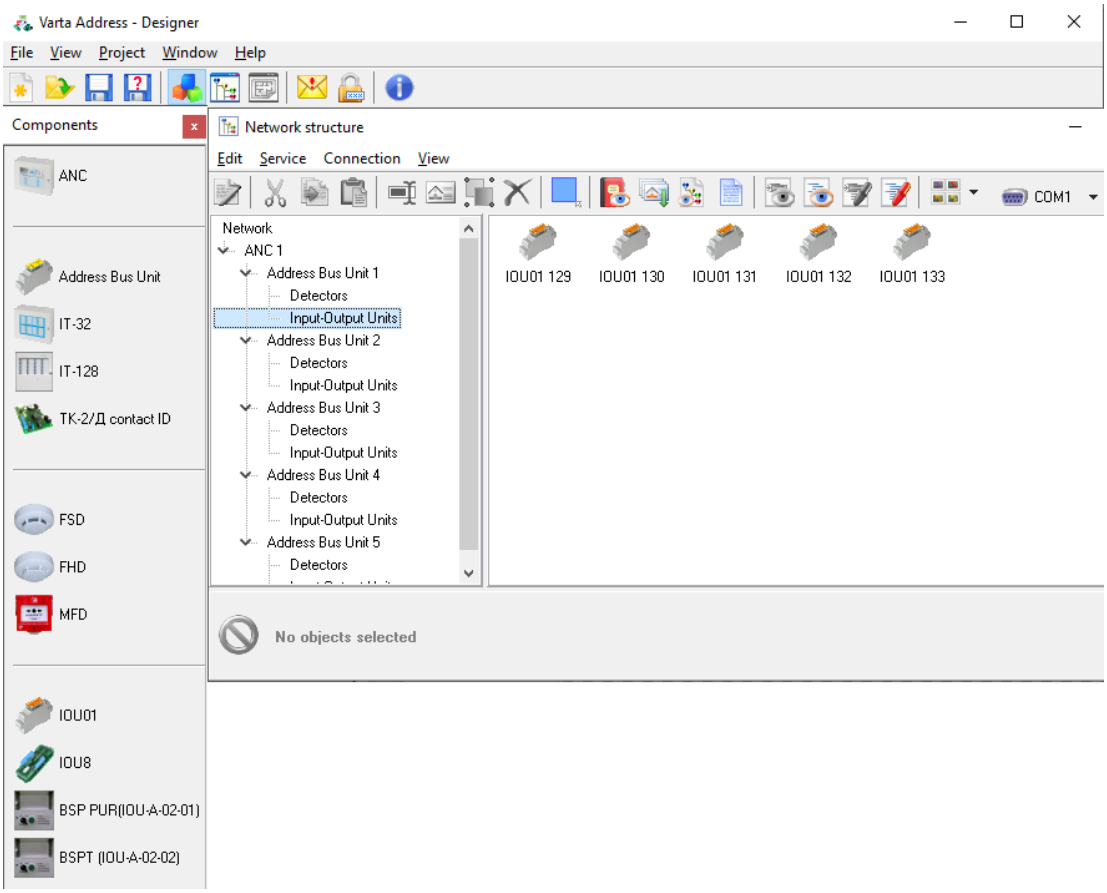
By clicking and holding the left mouse button, drag the ACS from the component window to the main window.



After activating the ACS in the main window, press the Read simplified topology icon.



Read simplified topology



The result of this operation will be display of system structure as seen by the device.

Then you need to check whether all loop units (ALUs) CV1510, input/output units (IO) CV1514 are seen by the device.

Check the number of loop units and their numbering in the left part of the window. The device may not see some loop units. Possible reasons of their absence in the system: power fail in cabinet where these ALUs are installed; addresses on ALUs are not set; SL are not connected to the communication line (installation errors).

After activating the I/O units in sequence, check the number and addresses of units in each loop and their correspondence to design documents.Possible rea-

sons of non-conformity: incorrect address setting, FL line installation errors (+FL_in, -FL_in, +FL_out, -FL_out).

Do not forget connecting real loads or imitators to all output keys (resistors from the supply scope). Otherwise, this channel (key) will report a failure.

Eliminate the detected failures in SL and FL loops and, if required, correct the addresses. Then repeat the sequence of procedures for reading of simplified topology.

This stage of commissioning works ends when conformity of simplified topology with design documents is reached.

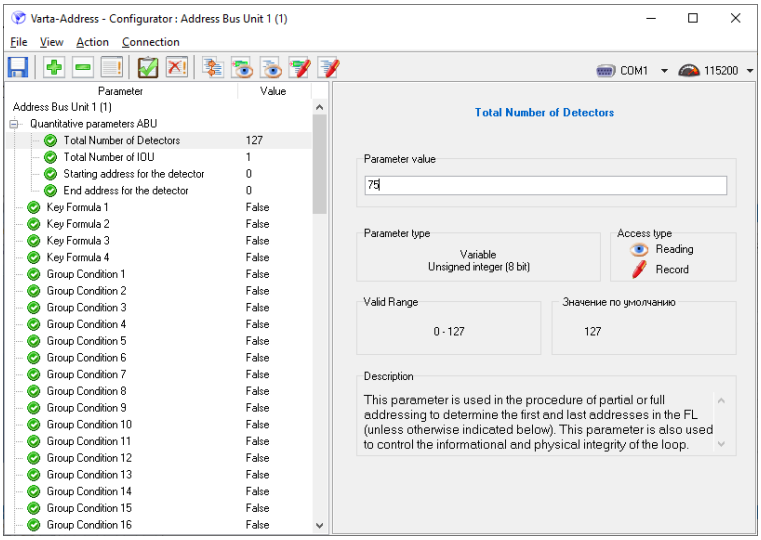
6 DEVICE CONFIGURATION PROGRAMMING.

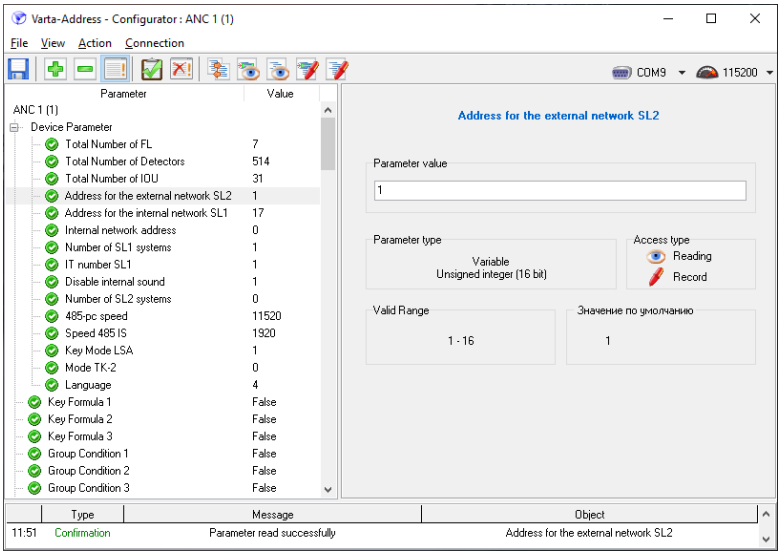
To perform this operation, first of all, in each ALU write the number of detectors connected to that ALU.

To do this, click the ACS line in the left part of the Network Structure window. Icons of all ALUs will be shown in the right part.

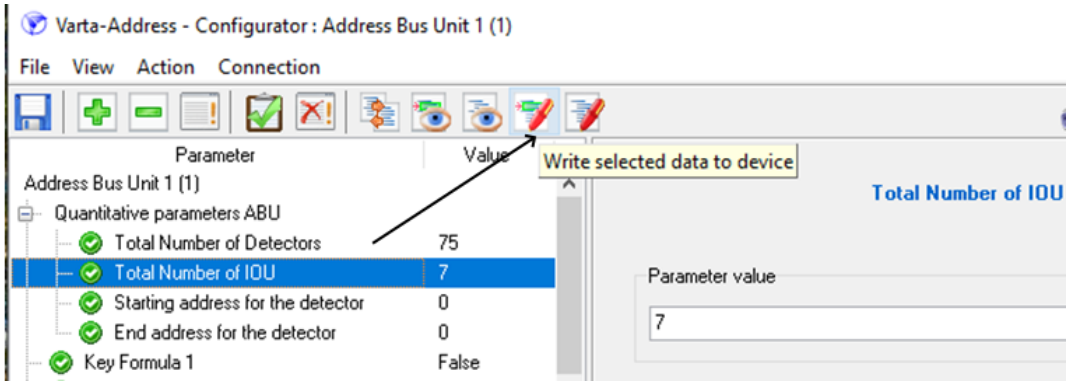
Let us start in order and open the Addressable loop 1.

A window will open

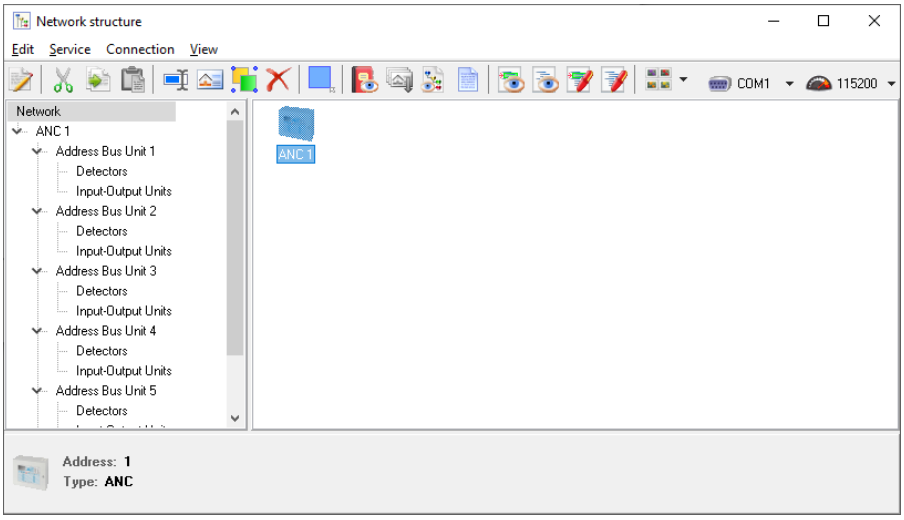




Enter the number of detectors (let there be 75) and the number of IO (7) and write the selected data to the device. The number of components is set as an example.

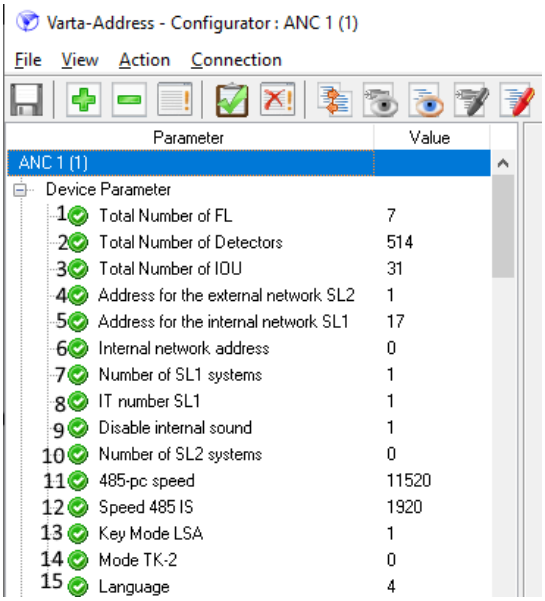


Repeat the procedure for all ALUs.



Then activate the ACS icon in the right part of the Network Structure window.

Enter the quantitative system parameters in the open window.



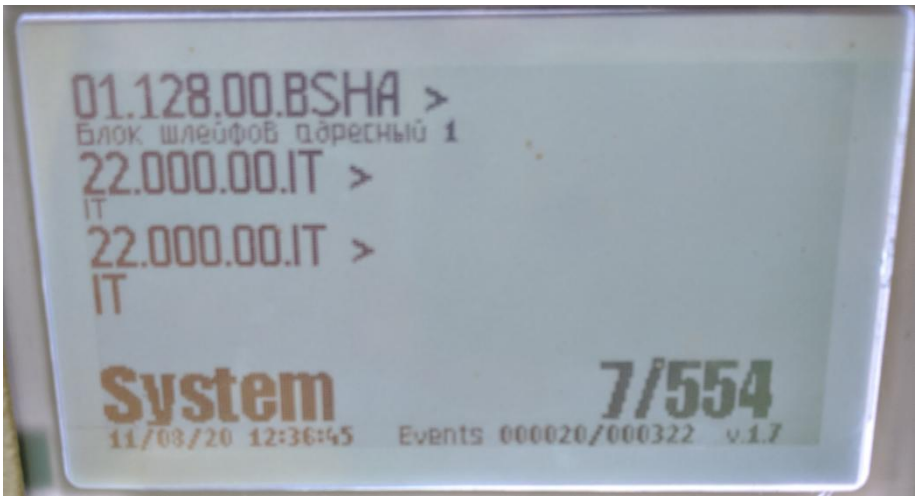
1 – number of ALUs in the device
2 – total number of detectors in the device

3 – total number of IO in the device
4 – if the device is used autonomously, address 1 is set, if there are multiple devices (hierarchic system) – for the first (main) device – 1, for the second device – 2, etc.
5 – always 17
6 – always 0
7 – always 1
8 – number of information boards in the device (according to the project), but at least 1
9 – switching off of the internal device sound – 0 off, 1 – connected
10 – if the device is used autonomously – 0, if there are multiple devices – 1 less than the number of devices
11 – data baudrate with PC. See section Preparation for programming.
12 – baudrate with telephone communicator, if it is connected to RS-485.
13 – SZO key operation mode
14 – TK-2D operation mode
15 – device interface language. Selected in the device menu.

After input of required data, write the selected data to the device (similarly to ALU).

7 DEVICE MENU

After you press any button on the device, the display will be activated (backlight will turn on). The following approximate information will be displayed on the screen:



Total number of active components “visible” by system (IB, OSU, ALU, IO, detectors).

Number of active components according to the project written in the previous stage.

Enter the password input procedure by pressing the ↵ button.

There are three access levels for the user (see CV1500. Operation manual. Sections Default passwords and Access levels). Use access level 3 during commissioning in order to have access to all functions (after commissioning, all passwords can and should be changed).

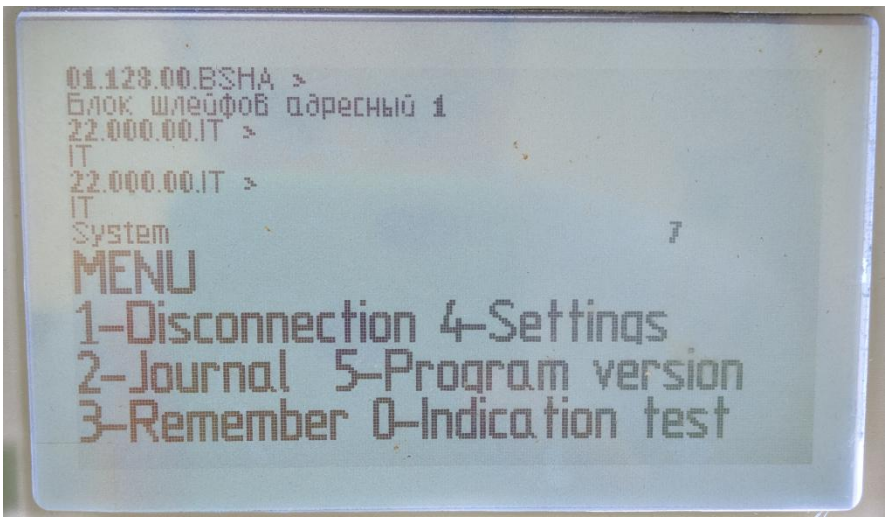
Enter:

user number 7;

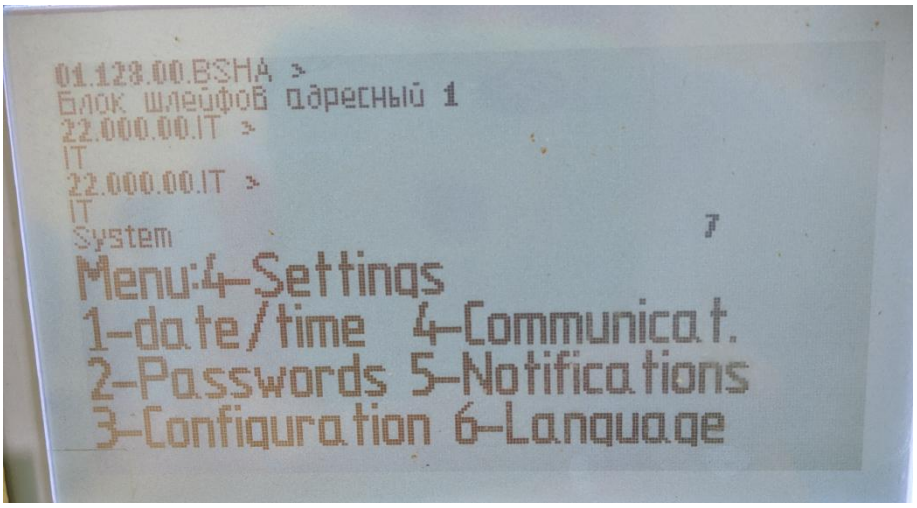
password 777;

#

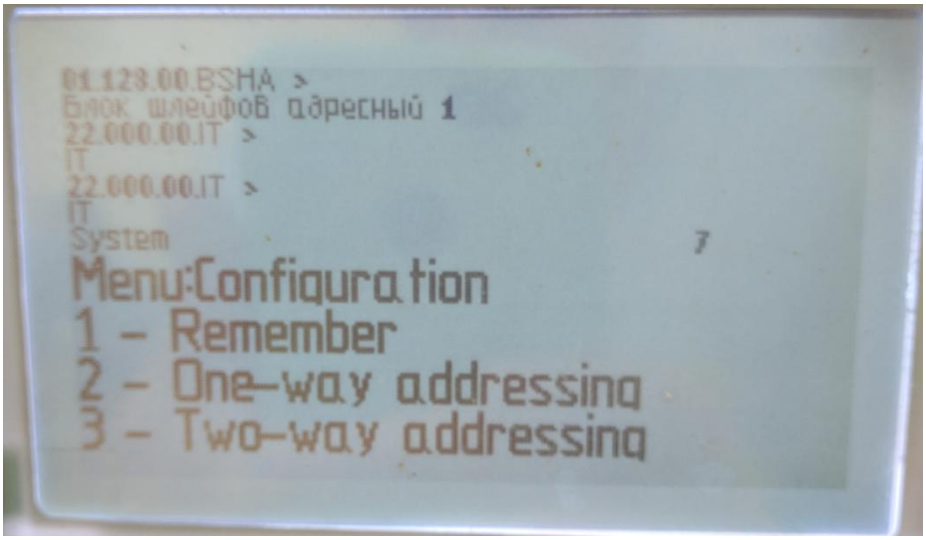
Enter the main menu.



Press one of the numbers (0...5) to enter the corresponding submenu.
Enter 4. Go to settings menu.



Enter 3. Go to Configuration mode.



8 DETECTOR ADDRESSING

There are two ways of addressing – automated and manual.

It is recommended to use automated addressing and detect loop and detector installation defects.

Manual addressing is used to address branched detectors and detectors to be replaced in addressed loop.

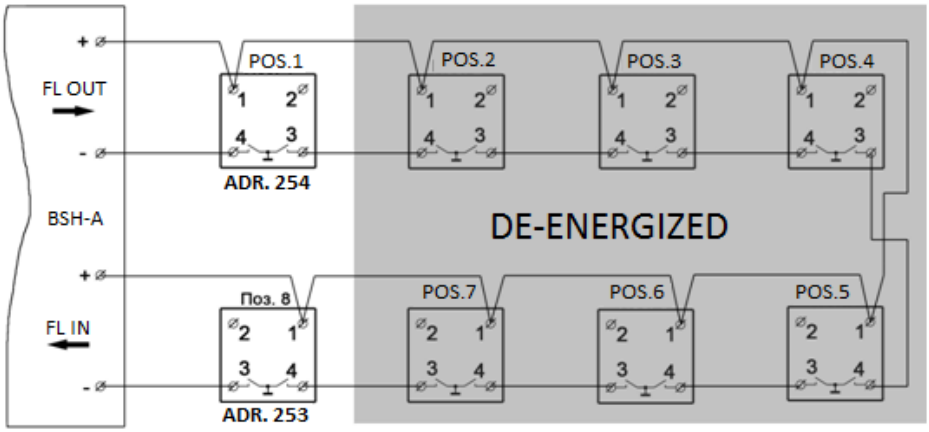
Automated addressing may be one-way and two-way.

8.1 In case of two-way addressing, addresses 1, 2, 3 (etc.) will be assigned in sequence in the ring loop to the detectors connected to AL-out output. Addresses N, N-1, N-2 (etc.) will be assigned in sequence to the detectors connected to the AL in output. Where N is the total number of detectors in this loop programmed for each ALU (see section 6).

"Small" loop with 8 detectors is specified as an example.

Start loop addressing after starting all detectors and ALU configuration. Detectors will accept addressing command, reset their old address and switch to "addressing mode".

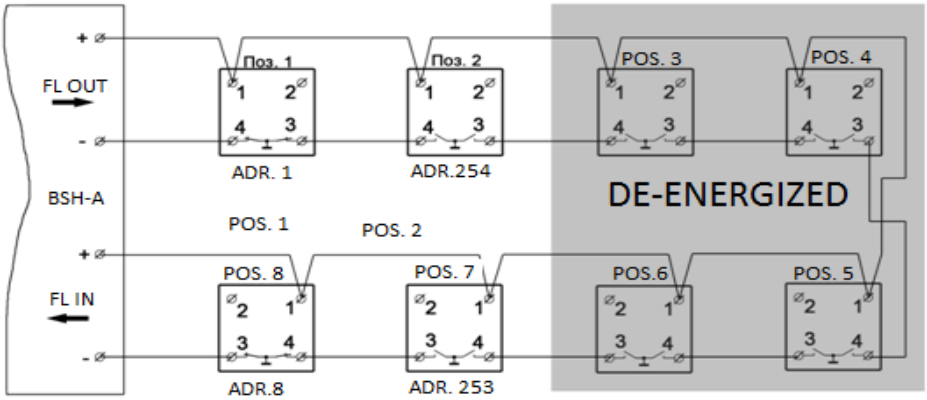
In the addressing mode, the detector has open short circuit isolators (we have loop circuit break on "-" between contacts 3 and 4 or in/out – AL in handheld detectors). That is, ALU powers only outer detectors in the loop:



Outer detectors in the loop Pos. 1 and Pos. 8 assume process addresses 254 or 253, depending on which contact received the voltage in the loop via AL. If at 4 (– In AL for HFD-A) there is Pos. 1, such detector assumes a temporary (process) address 254, if at 3 (– Out AL for HFD-A) there is Pos. 8, then such detector assumes a temporary (process) address 254.

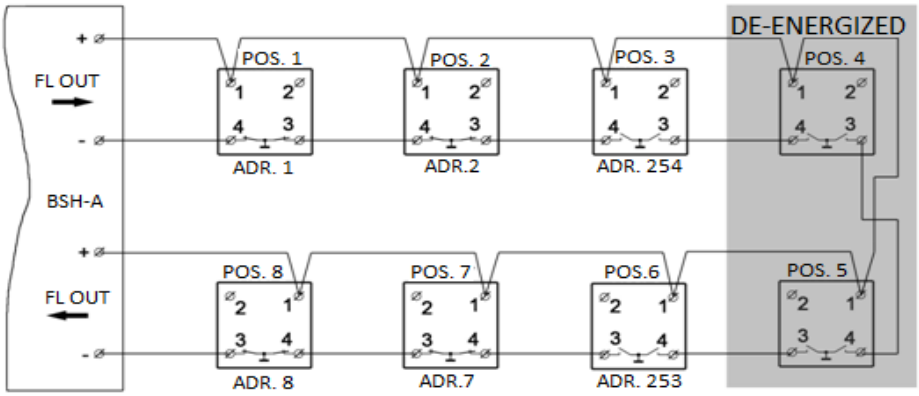
ALU gives out command to the detector with the temporary (process) address 254 (Pos. 1/AL start) to address (assume/memorize) the address "1", and to the detector with the temporary (process) address 253 (Pos. 8/AL end) – to address (assume/memorize) the address "8", respectively.

Detectors accept the command to address, address and open short circuit isolators (pass the power – AL further to the next detector):



Loop power will go to detectors pos. 2 and pos. 7, and depending on the contact it will be "seen" on – ALs will assume temporary (process) addresses: pos. 2 – 254; pos. 7 – 253.

The ALU remembers that detectors with addresses "1" and "8" were already addressed, and addresses "2" and "7" are in sequence for addressing. Respectively, the detector pos. 2 (from AL start) is addressed with the address "2", and detector pos. 7 (from AL end) is addressed with the address "7".



Detectors pos. 3 – address 3 and pos. 6 – address 6 are addressed in a similar fashion.

8.2 One-way (diagnostic) addressing.

The algorithm is similar to the two-way addressing, except that addressing is effected only from the loop start, and detectors are assigned with addresses 1, 2, 3... in sequence. N-2, N-1,N.

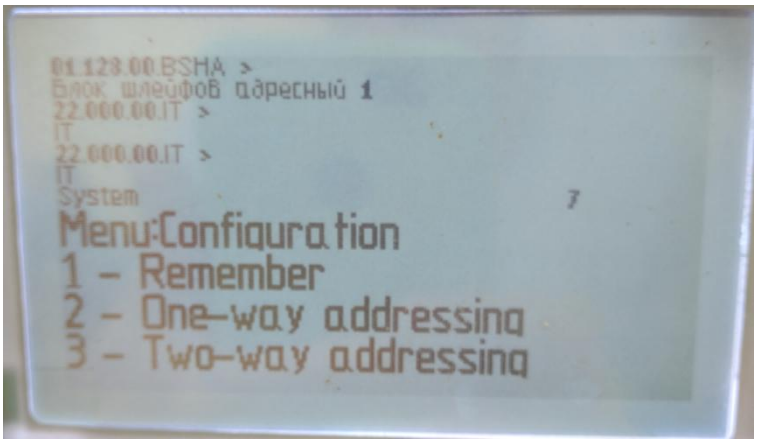
Naturally, one-way addressing is two times slower than two-way addressing.

Addressing shall start from the device or **using the process control board PCB-A.**

Operation procedure is described in AKPI.468234.01RE.

8.3 Starting addressing from the device.

We stopped at device Configuration mode.



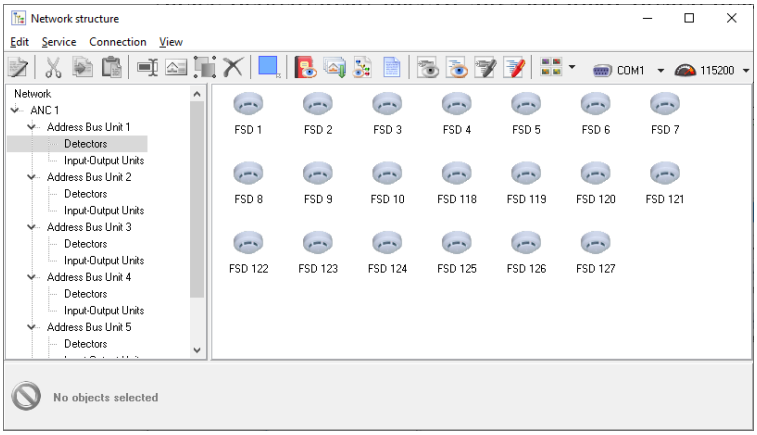
Press “2” to start one-way addressing.

Press “3” to start two-way addressing.

Then enter the two-digit loop number (01...15) and press Enter (↵).

Respective addressing starts after that.

You can control addressing progress by periodic checking of the Detectors window of a corresponding loop.



8.4 Addressing using PCB.

PCB connection socket.

PCB, through the adapter from the supply scope, shall be connected to the ALU unit (CV1510).

Then, following AKPI.468234.01RE, perform the required actions.

Addressing of the whole loop from the board is started using 3B button from zero address. The display in this mode will look like this:

009	004	000	002
003	094	000	000

009 – addressing cycle count, in case of lack of non-addressed detectors, exit from addressing mode and reset of detectors from addressing mode takes place after counting to 074.
004 – number of addressed detectors;
000 – insignificant positions**;**
002 – number of detectors ready (seen, non-addressed) for addressing

003 – address from loop "start" which the detector will assume (address in sequence);
094 – address from loop "end", which the detector will assume (address in sequence**);**
000 – insignificant positions.

8.5 Manual addressing.

As it was mentioned above, if required, use the manual addressing board (see MANUAL ADDRESSING BOARD, MAB-2, Operation manual AKPI.421242.003RE)

Using PCB from the device board, address all loops this way.

As a result, no failures shall be indicated, the number of active components "visible" by system shall match the programmed number of components.

Annex A

Process control board PCB-A AKPI.468234.015

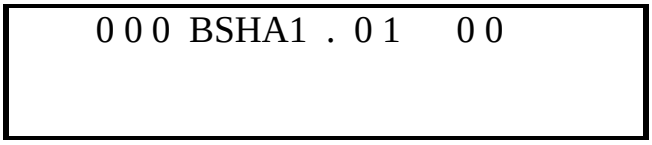
PCB-A process control board (hereinafter – "board") is intended for:
–display of statuses of addressable components in the addressable loop (AL);
–individual and general reset of addressable components in AL;
–manual and automated addressing of addressable fire detectors;
–sending of address request for component indication with its status indicator.

Board connection

The board is connected to ALU with a loop to POWER CONTROL X8 connector (follow the position according to keys on sockets),

Board use

When power is supplied to ALU after initialization, the following information will be shown on the board display:



Where upper line 000 BSHA1 . 01 00 is interpreted as:

000 – component address in the loop, if 000, then statuses of all components are displayed;

BSHA1 – ALU address (1 in this case) is set by jumpers on ALU;

01 – set of requested data (set as 01 by default after initialization).

Symbol **a** may be displayed in the upper right line indicating the duplicated address failure. Displayed only if the loop has two or more components with the same address.

Address ranges are stated in the table below:

Component type	Address range
FSD-A	001…127
HEFD-A	
HFD-A	
IO-A (-01)	129…229
IO-A-02 (fire)	
BSP-A	

Statuses are displayed in the lower line as symbols:

f – general failure symbol;

A – detectors in addressing mode;
F – Fire;
a – Attention;
P – power failure;
L – loop (loop voltage) failure;
g – short circuit on AL input (contact 1, 4 on the detector);
G – short circuit on AL output (contact 1, 3 on the detector);
S – blocking (on IO-A);

Quantitative information on components in AL is displayed in the "second" screen. The second screen is switched using the 4(←), and 6(→) buttons.

```
000 BSHA1 . 01   00
096  012  000  000
```

Where the lower line "096 012 000 000" is interpreted as:
096 – number of addressable detectors in the loop (displays the number of available detector addresses, i.e., if there are duplicated addresses, the physical number of detectors will not be shown, 96 is used as an example).

012 – number of input/output units IO-A and device agreement units BSP-A (96 is used as an example).

To display the parameters of a specific addressable component, set the component address. To do this, press the 8(↑) and 2(↓) buttons (address change to 1, larger/smaller) or 3(F2) and 1(F1) buttons (address change to 10, larger/smaller).
For example:

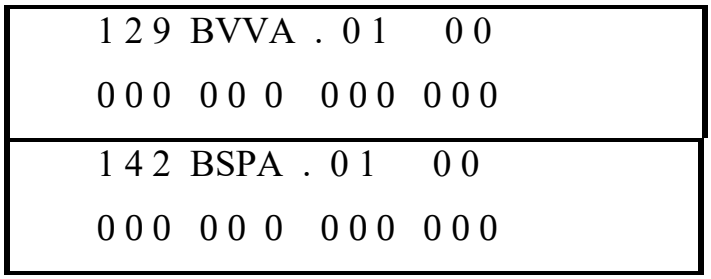
```
003 IPDA . 01   00
031  000  000  000
```

Where component address and type are displayed in the first line (addressable smoke FSD-A with an address "003" stated as an example), and smoke concentration is displayed in the second line (in conditional units, 031 is stated as an example). In case of heat detector HEFD-A, temperature measured in °C by the detector is displayed in the second line. In case of handheld detector, the result of measurement of microswitch switching circuit is displayed in the second line.

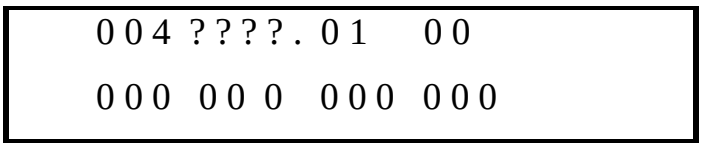
Address fields are distributed the following way:

Component type. Functional purpose.	Address range.
Common failure display address, common reset of detectors, common “flashing” of detectors.	000
FSD-A, HEFD-A, HFD-A	001…127
Common reset address, IO-A “flashing”, addressing process display address.	128
IO-A, BSP-A	129…229

For IO-A and BSP-A, the second display screen will look like this:

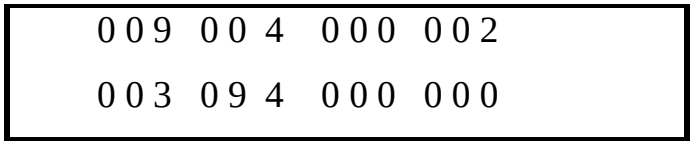


If the loop has no component with any tone address in its address field, ???? symbols will be displayed in the identifier area, for example:



Addressing

Addressing from the board is launched using the 3B button. At the same time, automated switch on board display to the component address 128 takes place, the display in this mode will look like this:



Where the first line "**009 004 000 002**" means:

009 – addressing cycle count, in case of lack of non-addressed detectors, exit from addressing mode and reset of detectors from addressing mode takes place after counting to 074.

004 – number of addressed detectors;

000 – insignificant positions;

002 – number of detectors ready (seen, non-addressed) for addressing.

Where the second line "**003 094 000 000**" means:

003 – address from loop "start" which the detector will assume (address in sequence);

094 – address from loop "end", which the detector will assume (address in sequence);

000 – insignificant positions.

If necessary to terminate addressing, press 3B one more time.

During addressing process, one can switch on any addresses, reset components and send commands for indication with the status LED, etc. To return to the addressing window, return to address 128 on the board.

After exiting from addressing, the display at address 128 will look the following way:

```
128 ????.01  00
000 000 0  000 000
```

When addressing starts, detectors reset their "old" addresses and accept "process" addresses after reset and power supply:

- if the detector is installed in the loop "start" (loop voltage came to it to contacts 1, 4 or to HFD-A to "input"), then it will assume the temporary "process" address 253;
- if the detector is installed in the loop "end" (loop voltage came to it to contacts 1, 3 or to HFD-A to "output"), it will assume the temporary "process" address 254;
- if the detector is installed in the loop "middle" (loop voltage came to it to contacts 1, 4 and 1, 3 or to HFD-A to the input and output), it will assume the temporary "process" address 255. This address may also be assumed by the detector if it receives voltage from any side, and the opposite side of the detector is not loaded (by the loop), "hangs" in the air (break or poorly connected detector).

Such detectors reveal themselves in their addresses 253, 254, 255 before, during and after addressing. During addressing, the board can memorize previous ("artifact") addresses, and after exiting addressing (or in the process) display them. In

order to reset them, go to display address 000 (can be done by 0 button – fast switch button to address 000) and press reset using the Reset Fire button (general reset takes place in display address 000), after which all data will be cleared and only “real” data will appear.

Manual addressing

If there are non-addressed detectors in the loop (A symbol is displayed in the first display or there are detectors under addresses 253, 254, 255), and ALU does not address the AL (no addressing process display mentioned above under address 128), then such detectors can be addressed manually. To do this, switch to a free address in the range of address field of detectors 001...127 (with ????symbols after component identifier) on the board and press Sound Reset. Detector addressing will take place and it will appear in this address spot in the board. If there are more, they shall be addressed, and the process shall be repeated.

At the end of such manual addressing, reset all addressed detectors from the addressing mode (in the addressing mode (letter A in the first display), detectors do not switch to Fire mode).

Optical differentiation of component

If it is required to determine the location of detector with a defined address (by LED flashing), set the address of the required detector in the board and press 5(l). The detector will be sent a flash command for the status LED, and it will give a series of flashes about 2 seconds with the frequency of about 2 Hz. If you hold the 5(l) button, the detector with this address will “flash” continuously.

Indication by status LED can be effected in a similar way on IO-A and BSP-A.