

# **POLON 4900**

## **FIRE DETECTION AND ALARM**

### **ADDRESSABLE CONTROL PANEL**

POLON 4000 and POLON 6000 INTERACTIVE FIRE DETECTION AND ALARM SYSTEM

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## **OPERATION AND MAINTENANCE**

### **DOCUMENTATION**

**ID-E270-011GB**  
IIE Edition




The POLON 4900 addressable fire control and alarm control panel covered by the present manual, complies with the requirements of the following European Union Directives:

**CPD** 89/106/EWG on construction materials;  
**EMC** 2004/108/WE on electromagnetic compatibility  
**LVD** 2006/95/WE on low-voltage electric equipment.

The POLON 4900 control panel has been attested with the EC-Certificate of Conformity No. 1438/CPD/0148 issued by the Scientific and Research Centre for Fire Protection (CNBOP) Józefów, Poland, a EU notified authority No. 1438, confirming its compliance with the requirements of PN- EN 54-2:1997+A1:2006 standards.

The device has been also approved with the Allowance Certificate No. 0147/2008 issued by CNBOP.

The certificate may be downloaded from [www.polon-alfa.pl](http://www.polon-alfa.pl) web site.

 <b>1438</b>
Polon-Alfa Spółka z ograniczoną odpowiedzialnością Sp. k. 155, Glinki Street, PL 85-861 Bydgoszcz, POLAND 08 1438/CPD/0148
EN 54-2:1997+A1:2006 <b>POLON 4900 Fire Detection and Alarm Control Panel</b> Addressable, for indoor use. Provided options: - fire alarming devices output - output signal delays - interdependent alarming - testing mode - alarm counter - main controller redundancy - network operation and additional functions, inputs and outputs: see technical data contained in ID-E270-011GB manual.

Read the manual carefully before the detector assembling and commissioning.

Any nonconformity with the instructions contained in the manual may be harmful or may cause violation of the law in force

POLON-ALFA bears no responsibility for any damage resulting from usage inconsistent with the manual.

A waste product, unsuitable for further use, shall be passed to a waste electric and electronic equipment collection point.



NOTE: The manufacturer reserves the right to change specifications of products at any time without prior notice.

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## **1. INTRODUCTION**

### **1.1 DOCUMENTATION CONTENTS**

This Operation and Maintenance Documentation (OMD) presents the application, construction and operation of the POLON 4900 fire detection and alarm control panel, constituting a part of the POLON 4000 system. The Documentation contains information necessary in order to properly install, operate and utilise the control panel. It may also facilitate the process of designing fire alarm installations.

The Documentation does not include other POLON 4000 system elements which are described in separate technical documents. The Manual is complemented with the Programming Manual (PM) describing the control panel programming process. The line elements which interoperate with and may be installed in the POLON 4900 control panel detection lines are listed in Appendix A.

The Operation and Maintenance Documentation is delivered to a user together with the control panel; however, the Programming Manual is provided only for properly trained and authorised designing and installation companies.

### **1.2 CONTROL PANEL APPLICATION**

The POLON 4900 fire alarm is designed for:

- signalling sources of fire detected by interoperating (automatic and manual) fire warning devices;
- defining locations endangered with fire;
- activation of fire protection devices;
- passing a fire information to appropriate services, e.g. National Fire Service units.

The POLON 4900 control panels are intended to operate continuously in premises of low dust content, within the  $-5\text{ }^{\circ}\text{C}$  –  $+40\text{ }^{\circ}\text{C}$  temperature range and air relative humidity up to 80 % at  $+40\text{ }^{\circ}\text{C}$ .

### **1.3 SAFETY CONDITIONS**

#### **1.3.1 Electric shock protection**

The POLON 4000 system fire control panels are ranked as 1<sup>st</sup> protection class devices and can be used only in the case of application of additional protection against electric shocks, such as zeroing or protective grounding.

Insulation of the 230 V/50 Hz power circuits is reinforced and resists the test voltage of 2800 V. Insulation of low-voltage circuits (below 42 V) resists the test voltage of 700 V DC. After connecting the power network cabling, the network connection must be protected with a manufacturer's housing.

#### **1.3.2 Installation and equipment safety**

The wiring installation should be made of wires with the required fire resistance and it should be properly protected when crossing the fire zone borders. In order to prevent unwelcome effects, the distance between the low-voltage installation and the power and lightning protection systems should be kept as required. Taking into account system resistance to electromagnetic interference, it is recommended to use protective grounding. A reserve batteries cluster must be connected to the unit during the final installation process stages.

The components of this unit are high-temperature sensitive. The maximum ambient temperature must not exceed  $40\text{ }^{\circ}\text{C}$ . It is forbidden to block the ventilation openings on the side of the unit. The

space around the unit must facilitate free flow of air. The air humidity in the rooms where the unit operates must not exceed 95 %.

### **1.3.3 Repairs and maintenance**

The maintenance works and periodical inspections should be conducted by the authorised employees of companies which have been authorised or trained by Polon-Alfa personnel. All repair works must be done exclusively by the manufacturer. Polon-Alfa does not bear any responsibility for the operation of devices maintained and repaired by unauthorised personnel.

### **1.3.4 Fuse replacement**

When replacing fuses, it is obligatory to use only spare ones of the appropriate type and nominal value. The appropriate types and nominal values are contained in Table 2.2 and chapter 13 of this Documentation.

## **1.4 DEFINITIONS**

### **Addressable detection line**

A detection line that enables connection of addressable elements.

### **Side detection line**

A detection line for two-state non-addressable fire warning devices, created using the ADC-4001 adapter.

### **Addressable element**

An element operating in a detection addressable line with a unique and unchangeable identifier, i.e. serial number, and the element number defined during its configuration. An addressable element enables two-way exchange of digital data with the control panel (transmission and reception).

### **Line element**

An element installed in detection addressable lines (addressable element) and side lines (non-addressable element).

### **Serial number**

A unique 12-digit number assigned to each addressable element during the production process. The serial number contains the addressable element type identified by the control panel.

### **Line number**

An ordinal number (of 1 ÷ 8 range) assigned to open or loop detection lines. The line numbering is linked with the MSL-1M (1 ÷ 4) and MSL-2M (5 ÷ 8) modules.

### **Element number**

An ordinal number (range 1 ÷ 127) assigned to an addressable element when a detection line is configured. During normal operation, the control panel communicates using the element number (so-called "short number").

### **Address space**

A set of number pairs containing a line number and element number that define all possible program locations of the elements within an installation.

### **Zone**

A separated section of the protected premises to which defined line elements are assigned.

**Non-maskable fault**

A fault connected with the EKS-4001 elements or LK monitoring lines

**Standard configuration**

A set of data defining the control panel equipment furnishing and its operation organisation (e.g. addressable elements declaration, assignment of elements to zones, alarming variants) which has been defined and stored in the memory by the manufacturer.

**User message (text)**

Information on the text display (text - max. length 64 characters each) assigned, during the programming process, to zones or input/output elements and used by users to identify their location.

**Quiescent (detection) mode**

An operating condition in which the control panel is supplied from an electric energy source meeting defined requirements and in which no other operation mode is signalled.

**Alarm (fire) mode**

An operating condition the control panel enters after receipt from warning devices information regarding fire detection.

**Preliminary alarm mode (first alarm mode)**

An operating condition the control panel enters after warning devices transmits the first fire alarm signal.

**Disablement mode**

An operating condition in which the control panel's reception of signals and generation of alarms from any call points are intentionally disabled or the output from the control panel and/or the transmission track to any fire alarm system elements which create the alarm installation are disabled.

**Test mode**

An operating condition in which the control panel signals that applicable functions are being checked.

**Fault mode**

A condition in which the control panel signals a fault in any element of the alarm installation or own circuits.

**Technical alarm mode**

An operating condition in which the control panel signals actuation of any supervised external devices or provides information regarding the service status of fire detectors.

**POLON 4000 system digital monitoring (PMC-4000)**

A digital monitoring protocol defined in the POLON 4000 control panels.

**Local control panel**

A control panel, to which detection lines and outputs are connected, that performs signalling and operating and programming functions using its own console.

**Remote control panel**

A distant control panel, to which detection lines and outputs are connected, that performs signalling and operating and programming functions using another panel's console.



**Control panel local monitoring area**

Detection zones which are monitored by detection lines, connected to a local control panel.

**Control panel common monitoring area**

An area consisting of a control panel local monitoring area and areas of the remote control panels being declared for joint monitoring.

**Collective control panel**

A control panel that services a common monitoring area, consisting of a local control panel and the remote control panels declared for common monitoring.

**2 DEVICE COMPLETENESS**

Table 2.1 lists the set of items which compose the POLON 4900 control panel furnishings.

Table 2.2 provides a list of fuses installed in the control panel.

Table 2.3 contains a list of additional equipment which may be installed in the POLON 4900 control panels (ordered separately).

Table 2.1

Item	Description	Drawing (catalogue) No.	Quantity
1	Complete casing	A/E270-110.00.00-1	1
2	M122-F-Z mains power supply unit		1
3	MZ-48 power supply module	B/E270-50.00.00-1	1
4	PSC-49 central controller module	B/E270-180.00.00-1	1
5	MP-49 programme memory module	D/E270-180.02.00-1	1
6	DR-48 printer	C/E270-40.00.00-1	1
7	MSL-1M line module	B/E270-160.00.00-1	1
8	PPW-49 programmable outputs module	B/E270-190.00.00	1
9	MIK-48 interface module	C/E270-60.00.00-1	1
10	PS-49 signalling devices board	C/E270-200.00.00-1	1
11	Frame - complete	D/E240-120.00.00.00-5	1
12	Operation and Maintenance Documentation (OMD)	ID-E270-011	1
13	Servicing manual	IO-E270-011	1
14	Warranty certificate		1
15	Control panel package		1

Table 2.2

Item	Description	Quantity
1	Melt fuse F6,3L250 V	1
2	Melt fuse F1L250 V	1
3	Melt fuse F630L250 V	1
4	Melt fuse F500L250 V	1

Table 2.3

Item	Description	Drawing (catalogue) No.
1	MSL-2M line module	B/E270-170.00.00-1
2	MSI-48 mains module	C/E270-70.00.00-1
3	PAR-4800 battery casing	B/E297-00.00-1
4	Hanger	B/E297-04.00-1
5	Bar code reader	
6	Computer keyboard	

### 3 TECHNICAL SPECIFICATIONS

Control panel power supply voltage - 50 Hz mains	230 V +10 % -15 %
Maximum mains current consumption	2.8 A
Control panel internal operating voltage (DC)	24 V + 25 % -15 %
Reserve supply source:	
- Pb "24V" battery (airtight) cluster – capacity	17 ÷ 90 Ah
Maximum internal resistance of the battery cluster plus supply cables resistance	1 Ω
Switching to reserve supply	automatic
Switching to battery charging	automatic
Maximum battery current consumption in the quiescent mode	
with 2 MSG-45 modules in 8 lines x 20 mA mode	0.6 A
Max. current consumption available for external devices	1 A
Number of addressable detection lines	4 or 8
Maximum voltage in a detection line	23.4 V ÷ 24.6 V
Permissible quiescent current in a detection line (depending on configuration):	
- at maximum cabling resistance equal to 2 x 100 Ω	20 mA
- at maximum cabling resistance equal to 2 x 75 Ω	22 mA
- at maximum cabling resistance equal to 2 x 45 Ω	50 mA

Maximum permissible resistance of detection line cabling	
– addressable line, depending on configuration	2 x 100 $\Omega$ , 2 x 75 $\Omega$ or 2 x 45 $\Omega$
– ADC-4001 side line	2 x 25 $\Omega$
– between two consecutive elements containing short circuit isolators	2 x 50 $\Omega$
Maximum permissible capacity of an addressable detection line cabling	300 nF
Minimum insulation resistance between cables in the installation	100 k $\Omega$
Addressable detection line operation layout:	
– loop-shaped – with a possibility to eliminate one break or short circuit in the detection line cabling (A type detection line)	
– radial without a loop (B type detection line)	
Number of addressable elements in one line, depending on the total quiescent current but not higher than:	
– for A type lines	127
– for B type lines	32
Maximum number of EKS-4001 monitoring and controlling elements connected to a control panel	250
Maximum number of EWS-4001 multi-output controlling elements connected to a control panel	100
Maximum number of EWS-4001 multi-output control elements connected to one detection line	20
Maximum number of EWK-4001 multi-input monitoring elements connected to a control panel	100
Maximum number of EWK-4001 multi-input monitoring elements connected to one detection line	20
Maximum number of SAL-4001 acoustic signalling devices connected to a control panel	250
Maximum number of UCS 4000 universal control panels connected to control panel	100
Maximum number of UCS 6000 universal control panels connected to control panel	100
Number of zones to which line elements are program assigned	1024
Number of inter-dependent detector groups in a zone	1 (A and B)
Fire alarm types:	
– preliminary alarm	1 <sup>ST</sup> STAGE ALARM
– main alarm	2 <sup>ND</sup> STAGE ALARM
Number of alarming variants to be used in zones	17

Liquid Cristal Display (graphical) - resolution:	320 x 240 pixels
Time programming ranges:	
– T1 time - waiting for confirmation of a 1 <sup>st</sup> STAGE ALARM	0 ÷ 10 min
– T2 time - situation recognition after a 1 <sup>st</sup> STAGE ALARM confirmation	0 ÷ 10 min
– T3 time - alarm outputs activation delay	0 ÷ 10 min
Programmable outputs (PK1 constantly programmed):	
– 1 A/24 V relay non-potential switchable contacts	16 (PK1 ÷ PK16)
– signalling lines of 0.5 A/24 V capacity	2 (LS1, LS2)
– signalling lines of 100 mA / 24 V capacity	6 (LS3÷LS8)
Programmable inputs – monitoring lines:	
number of monitoring lines	8 (LK1÷LK8)
monitoring line resistance	see Table 5.9
Maximum number of zones/controlling elements assigned to outputs (total number of assignments to PK and LS type outputs and EKS-4001, EWS-4001, UCS 4000 and UCS 6000 type line elements)	64,000
Maximum number of stored events (EVENT MEMORY)	2,000
Maximum number of stored alarms (ALARM MEMORY)	9,999
Control panel case ingress protection degree	IP30
Operating temperature range	- 5 °C ÷ + 40 °C
Control panel mass (without batteries)	ca. 17 kg
Control panel dimensions (without PAR-4800 container)	536x492x218 mm
PAR-4800 battery container dimensions	212x492x195 mm
Control panel dimensions with PAR-4800 container attached	766x492x218 mm
Interoperation with devices:	
– bar code reader,	
– computer keyboard,	
– computer,	
– TELSAP 2100 digital monitoring system,	
– POLON 4000 (PMC-4000) digital monitoring system,	
– control panels framework interoperation – max. number of control panels	31
– control panel co-operation with the TSR-4000 terminals – maximum number of terminals connected to one control panel	16

## 4 DESIGN DESCRIPTIONS

### 4.1 CONTROL PANEL OVERALL DESCRIPTIONS

The control panel is designed in the form of a metal cuboid cabinet to be installed on walls using a special frame. The cabinet door (front panel of the unit) is secured with a cylinder lock.

All signalling and handling elements are placed on the control panel door. Electronic circuit modules and a mains power supply unit are placed inside the cabinet.

Round holes are provided (at the control panel back side top) for installation wires introduction. Below, there is a round rubber pass to introduce mains power supply and grounding wires. A special shelf (of appropriate dimensions) can be placed inside the control panel that enables connection of two 12 V 17 – 22 Ah capacity batteries.

The control panel can be optionally equipped with the PAR-4800 battery container of the dimensions that enable inserting two 12 V batteries of capacity up to 38 Ah.

It is possible to connect a computer keyboard (PS/2 standard) and a bar code reader to the control panel.

### 4.2 MODULE ARRANGEMENT

The POLON 4900 control panel module arrangement is shown in Fig. 4.1.

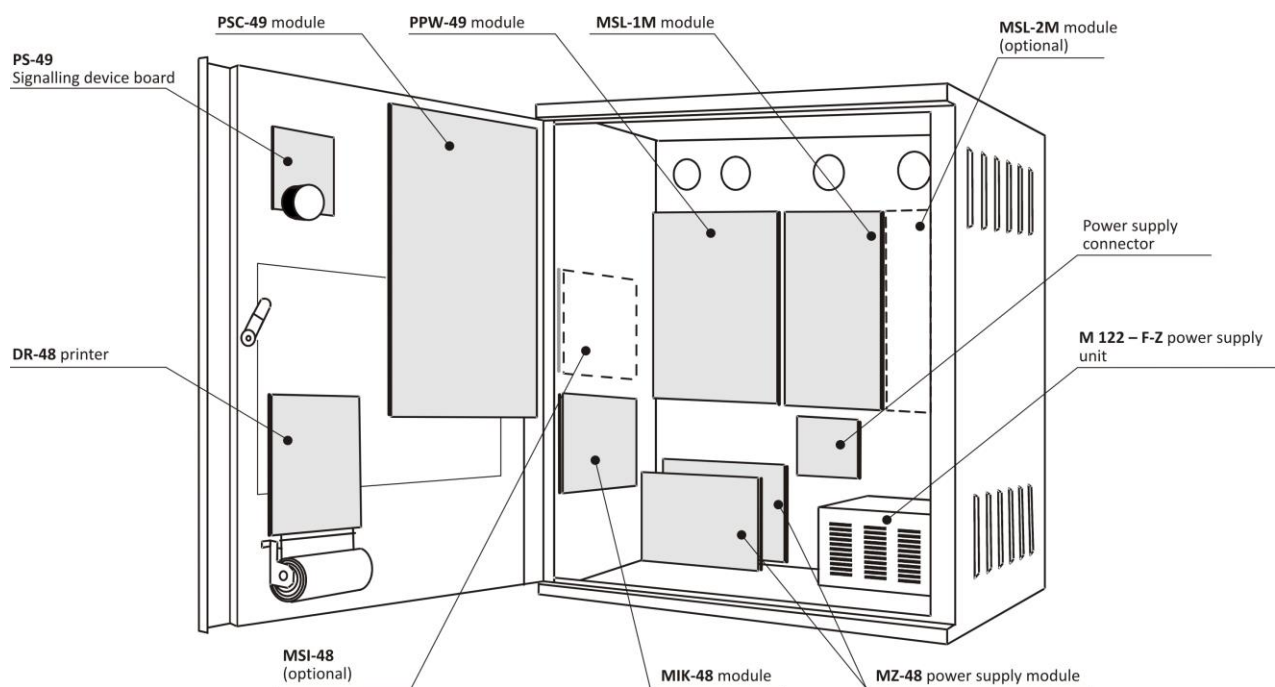


Fig. 4.1 POLON 4900 control panel furnishings arrangement

They are placed on the control panel door and walls and are fastened with screws.

The PSC-49 central controller module, together with an LCD display, is mounted on the control panel door. The DR-48 thermal printer is located in the lower corner of the cabinet, and an acoustic signalling device board with the main fire indicator - above it.

The following modules are located on the back wall:

- PPW-49 programmable outputs module, on the left upper side,
- MSL-1M detection lines module, supporting 1 ÷ 4 detection lines, in the middle,
- MSL-2M (optional) detection lines module, supporting 5 ÷ 8 detection lines, on the right,

On the left side wall the following elements are placed:

- MIK-48 interface module, at the bottom,
- MSI-48 (optional) network module, on top.

**Note:**

Any module installation or removal can be carried out only with disconnected power supply sources.

### 4.3 HANDLING AND SIGNALLING ELEMENTS

#### 4.3.1 Introduction

The signalling and handling elements are placed on the control panel door, which is called the TSO-4900 signalling and operating board or, in other words, the operator console. Fig. 4.2 presents the signalling and handling elements arrangement.

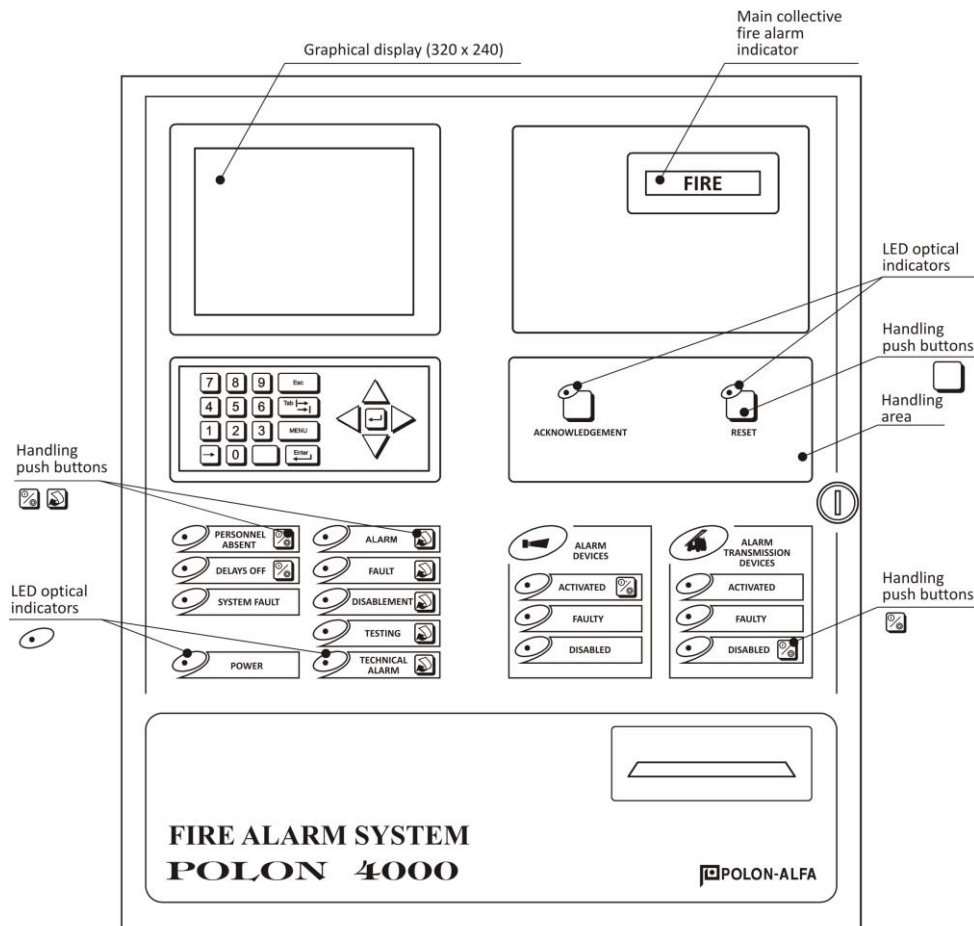


Fig. 4.2 Signalling and handling elements located on the control panel front panel

### 4.3.2 Control panel handling and signalling elements

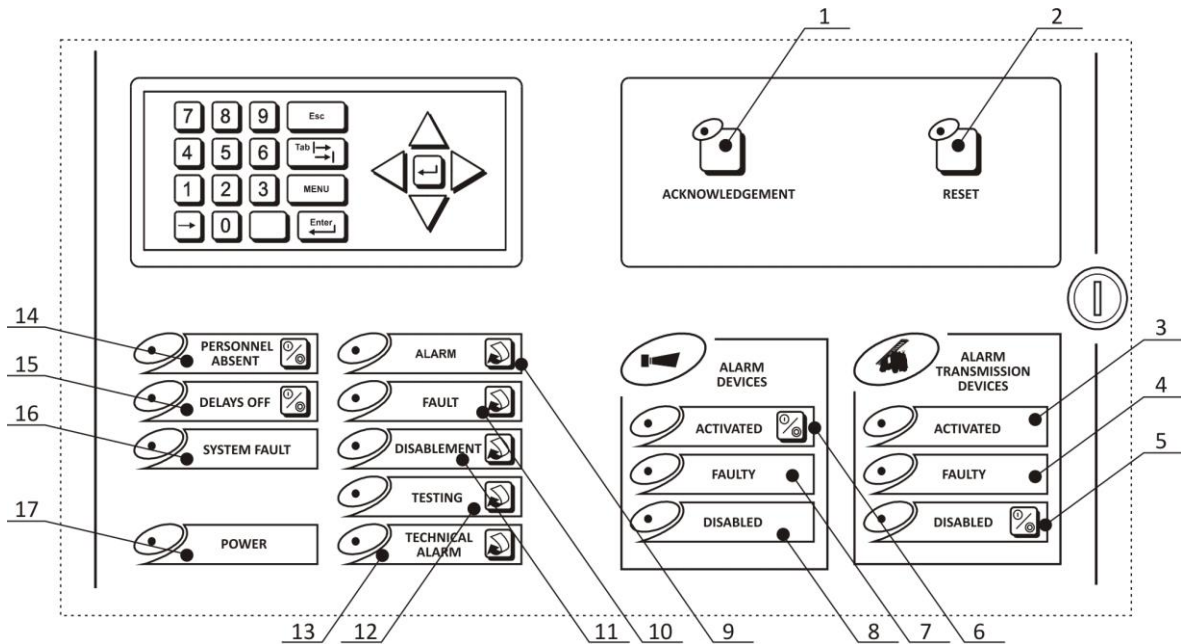


Fig. 4.3 Control panel handling and signalling elements

#### 1 – ACKNOWLEDGEMENT

- a) **indicator** – active acknowledgement function,
- b) **push button** – to silence the control panel buzzer in a fire alarm, technical alarm or fault mode; in the two-stage alarm it actuates the T2 time.

#### 2 – RESET

- a) **indicator** – active reset function,
- b) **push button** – fire alarm reset.

#### 3 – ACTIVATED (ALARM TRANSMISSION DEVICES)

- a) **indicator** – at least one alarm transmission output is activated.

#### 4 – FAULTY (ALARM TRANSMISSION DEVICES)

- a) **indicator** – alarm transmission device outputs faults:
  - steady light – some or all alarm transmission device outputs are faulty.

#### 5 – DISABLED (ALARM TRANSMISSION DEVICES)

- a) **indicator** – alarm transmission device outputs disablement:
  - steady light – all alarm transmission device outputs are disabled,
  - pulsing light – some alarm transmission device outputs are disabled.
- b) **push button** – all alarm transmission device outputs switch on/off (with an exception for the outputs disabled permanently).

#### 6 – ACTIVATED (ALARM DEVICES)

- a) **indicator** – at least one alarm output is activated.
- b) **push button** – switching on/off all alarm device outputs that meet the actuation criterion (with an exception for the outputs disabled permanently).

#### 7 – FAULTY (ALARM DEVICES)

a) **indicator** – some or all alarm device outputs are faulty.

## **8 – DISABLED (ALARM DEVICES)**

a) **indicator** – alarm device outputs disablement:

- steady light – all alarm device outputs are disabled;
- pulsing light – some alarm device outputs are disabled.

## **9 – ALARM**

a) **indicator** – collective on preliminary or fire alarm:

- steady light – acknowledged preliminary or fire alarm,
- pulsing light – non-acknowledged preliminary or fire alarm.

b) **push button** – quick access to alarm messages;

## **10 – FAULT**

a) **indicator** – collective on faults:

- steady light – acknowledged fault,
- pulsing light – non-acknowledged fault.

b) **push button** – quick access to fault messages.

## **11 – DISABLEMENT**

a) **indicator** – collective on disablements:

- steady light – disablement switched on.

b) **push button** – quick access to disablement messages.

## **12 – TESTING**

a) **indicator** – collective on testing:

- steady light – testing switched on.

b) **push button** – quick access to testing messages.

## **13 – TECHNICAL ALARM**

a) **indicator** – collective on technical alarm:

- steady light – acknowledged technical alarm,
- pulsing light – non-acknowledged technical alarm.

b) **push button** – quick access to technical alarm messages.

## **14 – PERSONNEL ABSENT**

a) **indicator** – Personnel Absent mode.

b) **push button** – Personnel Absent mode switch on/off.

## **15 – DELAYS OFF**

a) **indicator** – delays switch off.

b) **push button** – all delay times (T1,T2,T3,Top) switch on/off.

## **16 – SYSTEM FAULT**

a) **indicator** – system (processor based circuits) fault.

## **17 – POWER SUPPLY**

a) **indicator** – control panel power supply:



- steady light – control panel powered from the mains, no faults,
- pulsing light – any power supply fault.

### 4.3.3 Numeric keypad and edition push buttons

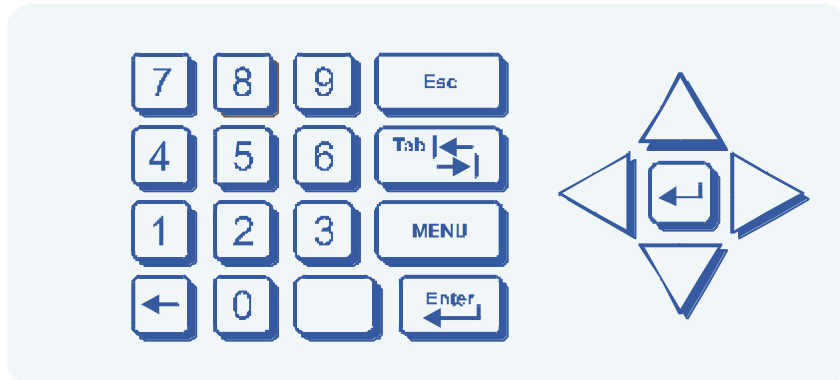


Fig. 4.4 Numeric keypad and edition push buttons

**0 ÷ 9** – numeric keypad.

**MENU** – control panel main menu display.

**Esc** – current operation aborting.

**↵ Enter** – activation of a currently selected menu option and moving the cursor to the beginning of the next line (during message edition)).

**↔ Tab** – movement from one menu window to another.

**← Back Space** – deleting the character to the left of the cursor and moving the text backwards one character space. Space, unmarked key – inserting one character space in the cursor's position.

**←↑→↓** – cursors.

**Note:**

Alternatively to the keypad located on the control panel door, a PS/2 computer keyboard can be used if it is connected through the socket placed on the MIK-48 module.

## 5 OPERATION DESCRIPTIONS

### 5.1 GENERAL DESCRIPTION

The POLON 4900 control panel is a multi-microprocessor based module-construction device. The control panel block diagram is presented in Fig. 5.1.

Line elements installed in an addressable detection line, after receiving an appropriate signal from the control panel (element's address), send relevant signals back with information about their type and status. Information exchange between the line elements and the control panel is executed through the MSL modules. After an analysis of the received signals, the MSL-1M or MSL-2M module passes proper information through the control panel bus to the PSC-49 central controller module. The active uP1 or uP2 microprocessor on the PSC-49 module processes the information and adequate signals for remaining circuits are produced.

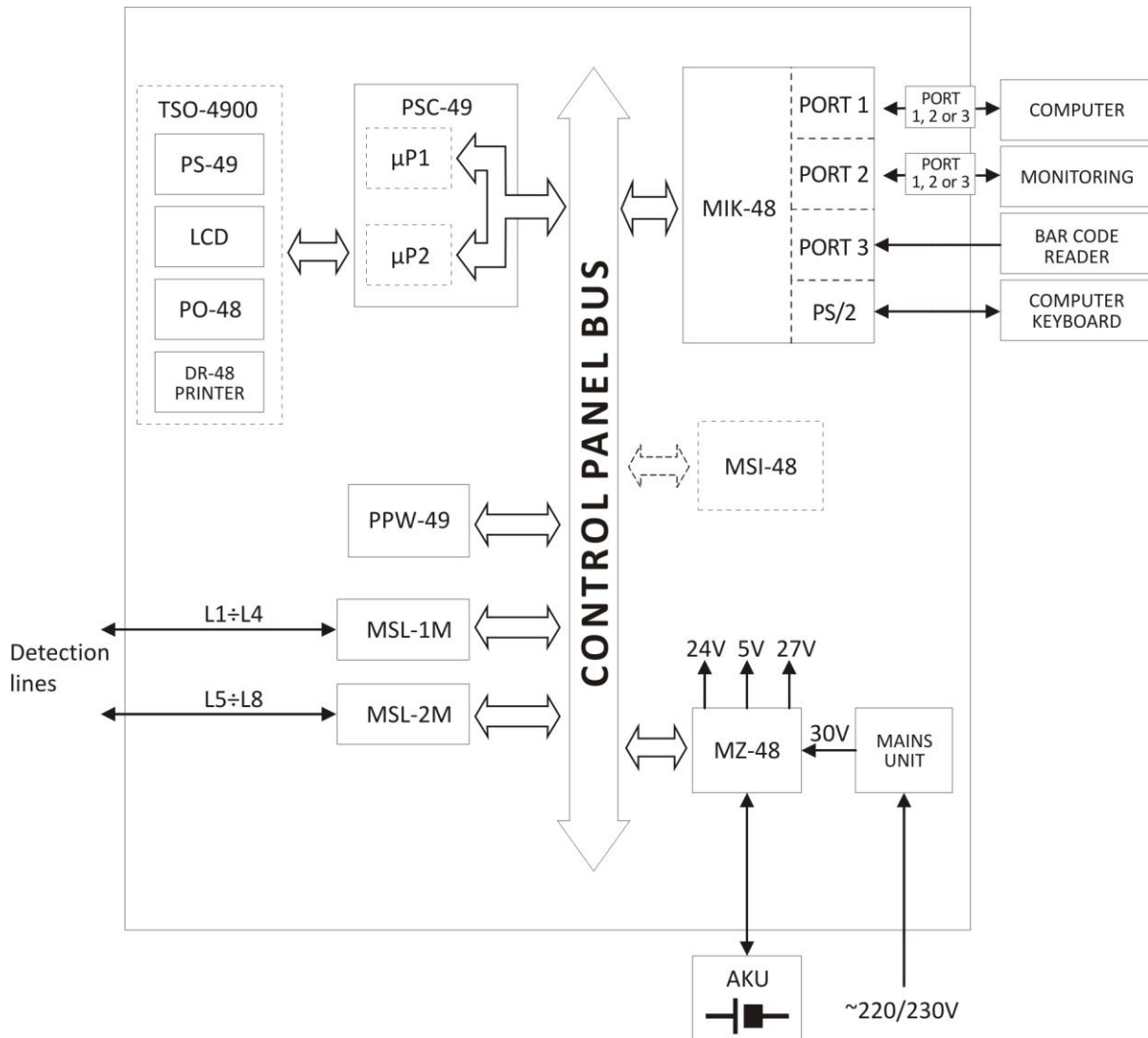


Fig. 5.1 POLON 4900 block diagram

The PSC-43 module, performing the programmed operation procedures, controls – through the bus – the relays or signalling lines on the PPW-49 module, LCD display, TSO-4900 panel signalling and handling elements. The panel purpose is to provide communication between the attending personnel and the control panel.

The mains supply module provides the control panel operation voltage and – in case of a voltage outage – this role is executed by the battery cluster.

The MZ-48 module produces the following power supply voltage:

1. operation voltage+ 24 V for the control panel and for the user,
2. insulated voltage + 27 V for detection lines
3. power supply voltage + 5 V for the LCD display and DR-48 printer.

## 5.2 TSO-4900 OPERATOR CONSOLE

The TSO-4900 panel consists of the following main parts:

- liquid crystal display (LCD),
- PS-48 signalling devices board,
- PO-48 operation panel (keypad + signalling diodes),
- DR-48 printer.

The LCD is connected (mechanically and electrically) with the PSC-49 central controller board located on the control panel door.

### 5.3. PSC-49 CENTRAL CONTROLLER MODULE

The central controller module is equipped with two independent microprocessor circuits ( $\mu$ P1 and  $\mu$ P2) which ensure mutual supervision and unfailing control panel operation. Each circuit has an independent set of ROM memory (in a separate MP-49 memory module), RAM operating memory and SETUP configuration memory (set of data defining the hardware environment and system operation organisation). In normal operating conditions, the whole control panel operation is managed by the first microprocessor circuit ( $\mu$ P1) – the active microprocessor. In case this circuit fails, the entire control panel operation is monitored by the other (redundant) microprocessor circuit ( $\mu$ P2). In this condition, the  $\mu$ P2 is the active circuit.

The circuits that execute the central panel communication bus for information exchange and other modules (MSL-1M-42, PPW-42 and MZ-4212) controlling, are also located in the module.

The PSC-43 module is equipped with its own 3 V DC and 5 V DC converters to supply its own and external electronic circuits.

#### 5.3.1 Module signalling and handling elements

Illuminating diodes indicating the service conditions of the module operation are provided on the left internal edge of the PSC-49 module.

At the back, two miniature push buttons marked as Reset  $\mu$ P1 and Reset  $\mu$ P2 are located below the MP-49 module. They are used to restart a relevant  $\mu$ P1 or  $\mu$ P2 microprocessor (with short push button pressing).

The SW1 switch is located in the centre of the module. It is a set of 8 keys (K1 ÷ K8) to change the hardware and software setup of the control panel. The SW1 switch keys functions are described in table 5.1.

Table 5.1

SW1 Key	Position	Function
K1	ON	After an active microprocessor restart, the control panel standard configuration loading
K2	ON	After an active microprocessor restart, the control panel operation data actuation
K3	ON	After an active microprocessor restart, loading standard access codes at the 2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> levels
K4	ON	Switching on service diodes located on PSC-49 module
K5		Unused
K6	ON	Permission to reset SYSTEM FAULT – the reset is performed after an active $\mu$ P1 or $\mu$ P2 microprocessor reset
K7	ON OFF	If the K8 key is in the ON position: - extortion of $\mu$ P2 operation as the active microprocessor - extortion of $\mu$ P1 operation as the active microprocessor (e.g. in the system fault condition)
K8	ON	Permission for 'manual' extortion of active microprocessor operation (using the K7 key)

In order to carry out the operations described for the K1 or K2 key in the Table 5, it is necessary to turn the proper SW1 switch key ON, press a proper momentary switch (Reset  $\mu$ P1 or Reset  $\mu$ P2) and after about 30 seconds, turn the SW1 switch key back to the OFF position.

**Note:**

Turning the key 1 of the switch ON and restarting the PSC-49 module results in deleting the previous system configuration and loading the standard configuration in this place.

Leaving the keys 1, 2 and 3 in the ON position may result in losing the entered data (signalled as a fault).

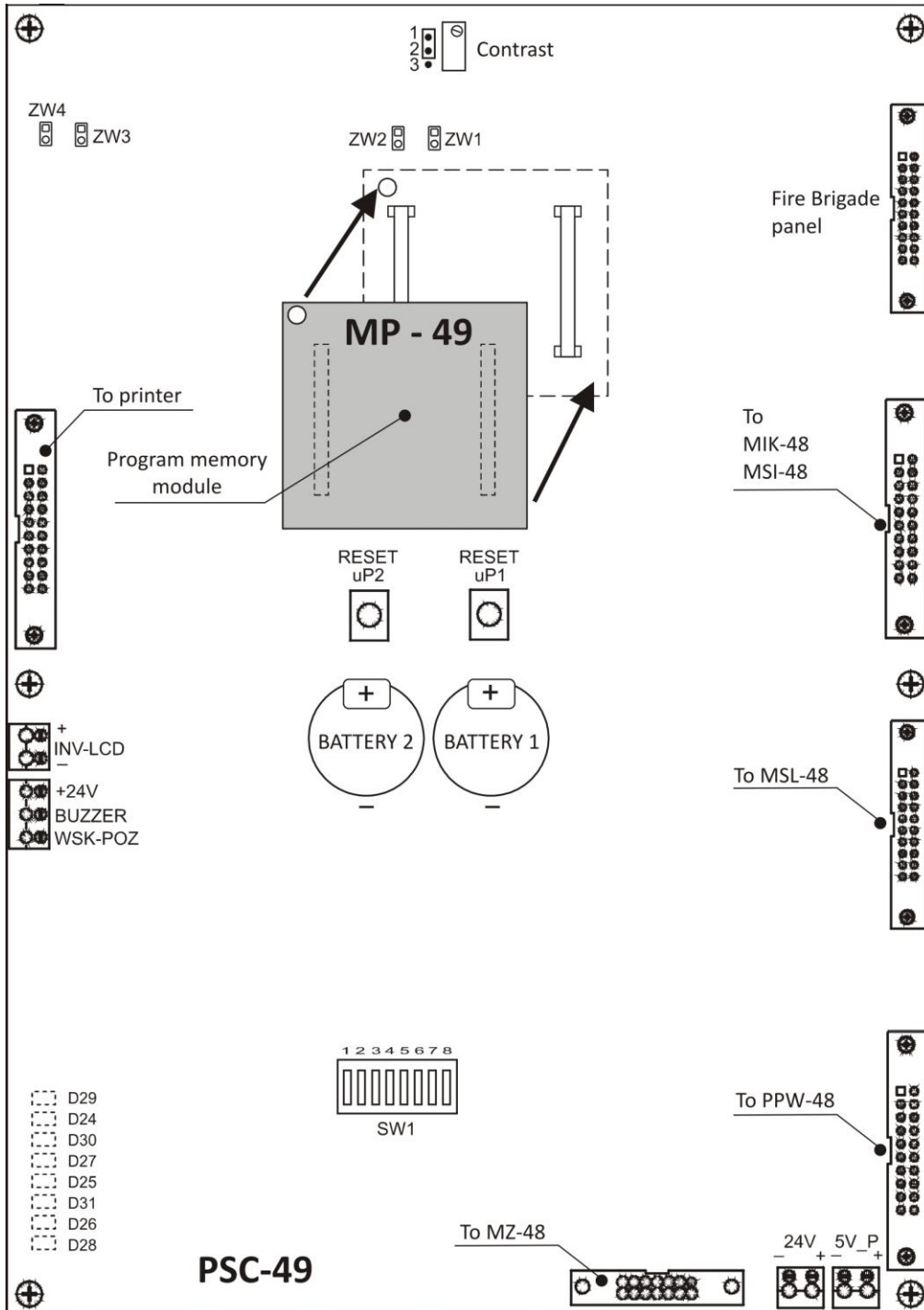


Fig. 5.2 PSC-49 central controller module

#### 5.4 MSL-1M, MSL-2M LINE MODULES

POLON 4900 control panels are permanently equipped with one MSL-1M line module supporting 4 loop-shaped or radial detection lines marked as L1 ÷ L4. Optionally, the control panel can be furnished with additional MSL-2M module that will support L1 ÷ L4 detection lines. Appropriately marked detection line clamps are located directly on the MSL-XM module (X stands for 1 or 2 number). The MSL-XM line module is provided for controlling and servicing 4 detection lines to which the POLON 4000 system addressable elements are attached.

Any addressable detection line can operate as a loop-shaped A type circuit or radial B type one (open line).

Operation in the loop-shaped circuit enables elimination of one line fault – a line break, and isolation of a line short circuit between neighbouring addressable elements (all addressable elements are equipped with short circuit isolators).

The MSL-1M line module is declared permanently, whereas the MSL-2M module, in case it is installed, is declared automatically (all lines being declared by default as loop-shaped) after the SETUP execution. In the configuration menu the MSL modules are declared with simultaneously with the detection line types (loop-shaped, radial) declaration.

It is possible to exchange the MSL-1M module with the MSL-2M (and vice versa) by changing the S1, S9, S10, S11, S12 jumper positions according to Fig. 5.3 and Fig. 5.4.

The S1 jumper and S9, S10, S11, S12 jumpers that programme the MSL-1M module should always be in the position shown in Fig. 5.3.

The service diodes, placed on the left edge of the module, enables displaying of general service states of the main processor and line processors. The line service diodes, located at the back of the module, enable displaying of the detection lines service states.

The MSL-XM line module contains a microprocessor-based controller circuit with EPROM and RAM memories, a 5 V power supply unit as well as circuits for co-operation with the PSC-49 central controller module through the control panel bus. The detection lines are supplied from the +27 V insulated voltage source, what ensures high immunity to interferences and electric shocks.

The line module also contains monitoring circuits to supervise 27 V DC voltage and earth fault, restart circuit with a switch and circuit for addressable detection line state signalling, based on illuminating diodes.

Table 5.2

Line No.	Jumper	Jumper position	Max. current [mA]	Max. resistance [Ω]
L1 (L5)	S21	1-2	20	2 x 100
		1-2	22	2 x 75
		2-3	50	2 x 45
L2 (L6)	S22	1-2	20	2 x 100
		1-2	22	2 x 75
		2-3	50	2 x 45

Line No.	Jumper	Jumper position	Max. current [mA]	Max. resistance [ $\Omega$ ]
L3 (L7)	S23	1-2	20	2 x 100
		1-2	22	2 x 75
		2-3	50	2 x 45
L4 (L8)	S24	1-2	20	2 x 100
		1-2	22	2 x 75
		2-3	50	2 x 45

**Note:**

In case the ADC-4001 adapter with a grounded intrinsically safe barrier on a side line is used, the earth fault signalling must be disconnected by the S4 jumper removal from the MSL-1M and MSL-2M modules.

The MSL-XM module communicates with the PSC-49 module receiving information regarding the current configuration of the addressable elements in the lines and commands to be executed (actuate/dis-actuate an element, lines, reset an element, etc.) and returns processed data regarding the addressable elements status and the detection line.

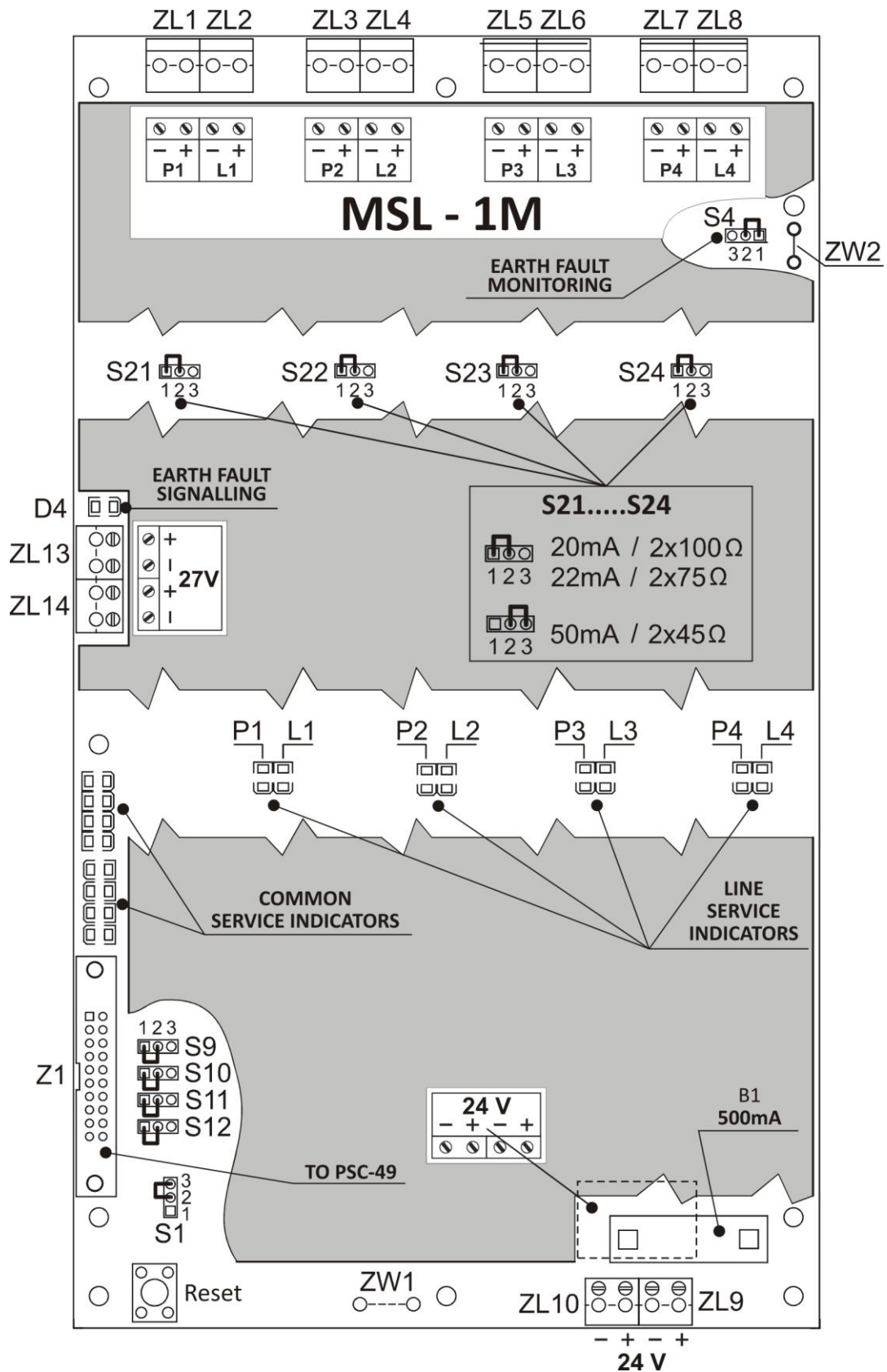


Fig. 5.3 MSL-1M line module view

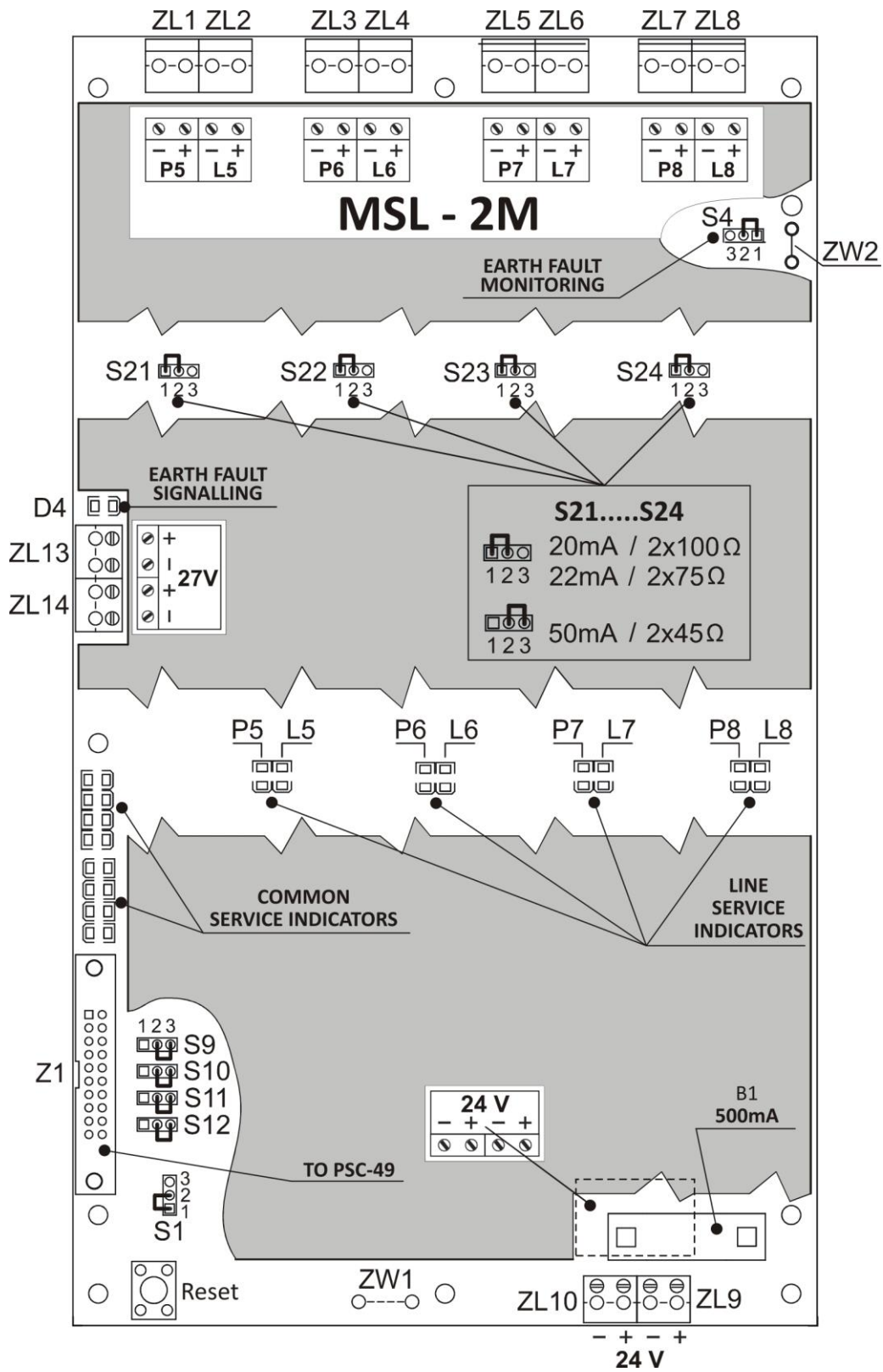


Fig. 5.4 MSL-2M line module view



## 5.5 PPW-48 AND PPW-49 PROGRAMMABLE OUTPUTS/INPUTS MODULE

### 5.5.1 General description

It is possible to install the PPW-48 module or its replacement, the PPW-49 module in the POLON 4900 control panel. The difference between those two modules consists in the possibility to monitor relay output lines by the PPW-49 module. Apart from that both modules PPW-48 and PPW-49 are furnished with the following outputs and inputs:

- 16 relay outputs with switchable contacts (PK),
- 2 signal outputs (potential) supervised (LS) of 0.5 A load capacity each,
- 6 signal output (potential) supervised (LS) of 100 mA load capacity each
- 8 monitoring inputs (LK).

The PPW-48 and PPW-49 programmable outputs/inputs modules enable connection of external devices to the control panel, alarm and fault signal transmission, other equipment operation supervision, etc. The extended outputs software makes the device flexible and makes possible any installation configuration.

### 5.5.2 PK relay outputs and LS signal outputs

The PK1 relay output (PU - fault relay) is permanently programmed and operates in the following manner: the output is activated if the control panel is in a fault mode (also during a complete power outage).

Other POLON 4900 control panel outputs, both relay outputs (PK2 ÷ PK16) and supervised potential outputs (LS1 ÷ LS8) may be freely defined. Every output can be assigned to one of six groups by attributing each of them with one of the following types:

- TYPE 0 - inactive output;
- TYPE 1 - output to fire alarm devices;
- TYPE 2 - output to fire alarm transmission devices (monitoring);
- TYPE 3 - output to protection devices;
- TYPE 4 - fault signalling output (to fault signal transmission devices);
- TYPE 5 - information output;
- TYPE 6 - reset output (only for relays).

In order to program individual physical potential or relay outputs, the following parameters must be defined in applicable output setup menu windows

- output type,
- actuation variant,
- time parameter (if applicable),
- in case an output type and variant require, it can be necessary to state the actuation criteria, such as:
  - determining a set of relevant control panels and zones numbers for given events, or
  - determining a set of relevant inputs numbers assigned to EKS elements, or
  - determining a set of relevant inputs numbers assigned to EWK elements.

Depending on how a given output type is defined, it is possible to assign a given variant and defined actuation time parameters to this output

Table 5.2

Relay	Condition	Relay contacts status
PU (PK1)	No fault, quiescent mode	Closed C-NO
	General fault	Closed C-NC
PK2÷PK16	No actuation criterion	Closed C-NC
	Actuation criterion	Closed C-NO

### Output actuation time parameters

Every output: both PK relay output (except for PU) and LS potential output may operate with a defined actuation time program (also depending on the defined output time).

It may depend on the global parameters (T1, T2 and T3), individual parameters (Top) or a combination of these parameters, depending on the programming types and variants.

The meaning of time parameters:

- T1 – time necessary to confirm the 1<sup>st</sup> stage alarms;
- T2 – time necessary to recognise the situation after an alarm is acknowledged or possible reset (after this time, the control panel switches to the 2<sup>nd</sup> stage alarm mode);
- T3 – alarm output (TYPE 1) actuation delay time from the moment the 1<sup>st</sup> stage alarm is evoked. The T3 is reset (alarm outputs are immediately activated) after the control panel enters the 2<sup>nd</sup> stage alarm mode;
- Top - individually programmable output actuation delay time.

Parameter range: T1, T2, T3, Top – from 00:00 to 10:00.

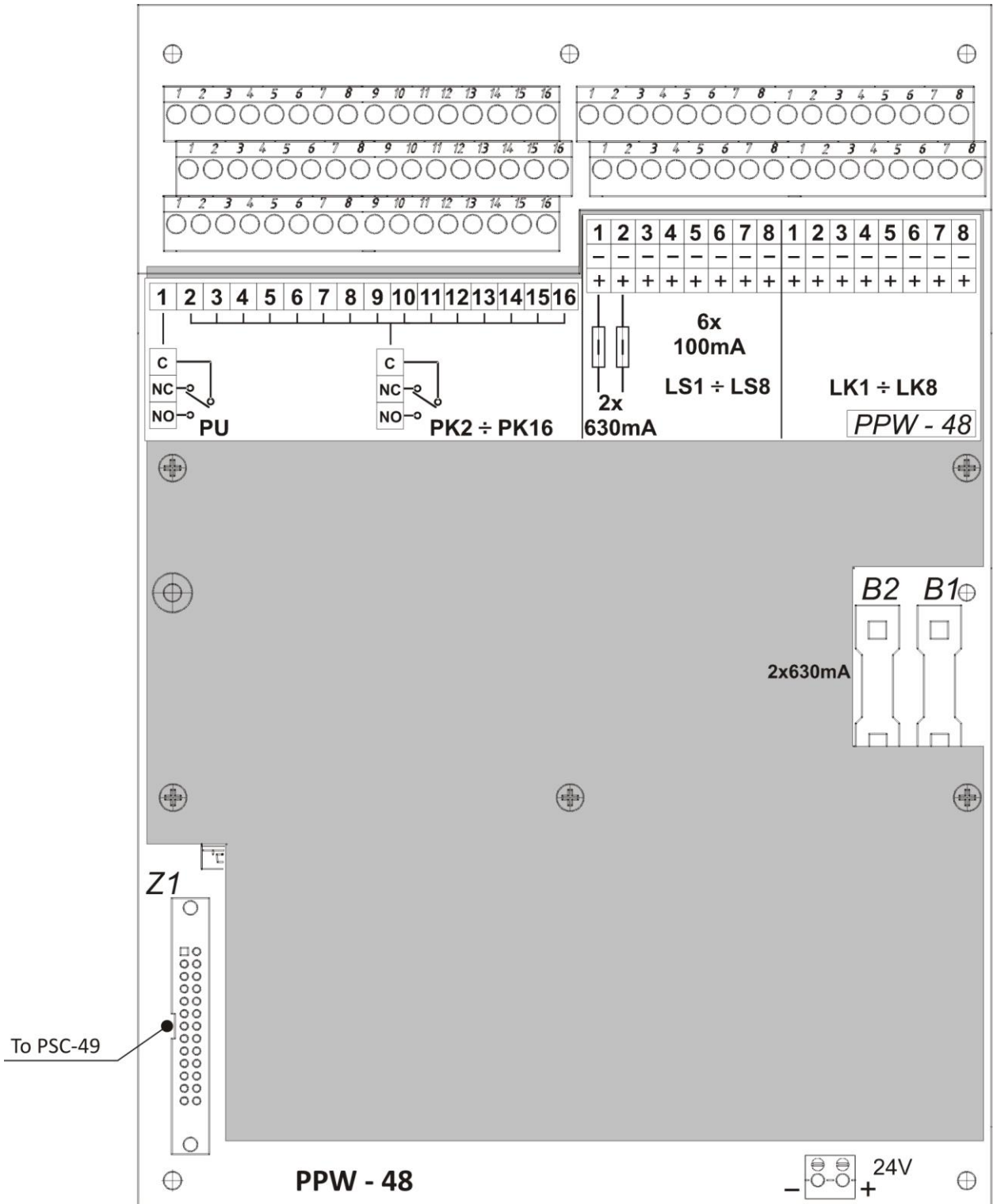


Fig. 5.5 PPW-48 programmable outputs/inputs module

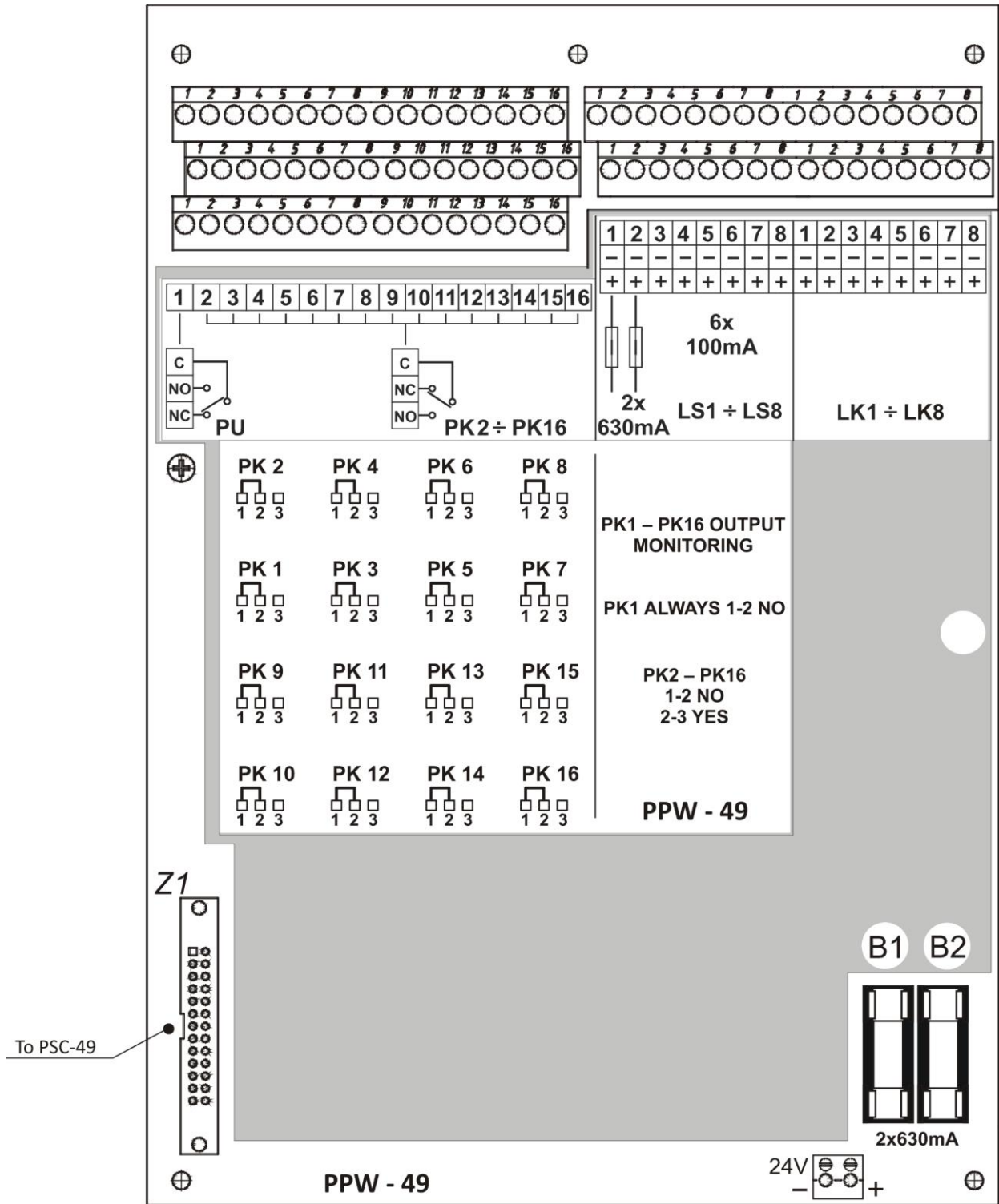


Fig. 5.6 PPW-49 programmable outputs/inputs module

**Specifications of the LS supervised potential output lines**

The potential outputs are defined as supervised outputs, i.e. they are tested by measuring the characteristic resistance of a potential line during quiescent mode in order to detect line faults with the reversed polarisation (negative) of the output voltage. The range of the potential line resistance (including the connecting cables resistance) is 2.7 kΩ - 16 kΩ. If the line resistance is outside the defined range, this situation is interpreted as a fault mode and is appropriately signalled in the

control panel. After the output is actuated (according to a proper actuation variant), the output voltage polarisation is positive.

### Specifications of the PK supervised relay output lines

The relay outputs can be supervised, in the control panel quiescent mode, in case the PPW-49 module is applied and in the control panel outputs supervision is declared. The output lines should be connected pursuantly to Fig. 5.7. The quiescent current lower than 1.2 mA flows in a line connected in such a manner. In the case the current flow is undesirable (e.g. load activation occurs), it is necessary to disconnect the supervision circuit by placing an appropriate jumper in the 1-2 position (Fig. 5.6) and undeclaring the output supervision in the control panel.

### Output actuation criteria for control panel network version

In Tables 5.4 ÷ 5.8 presenting the programming possibilities of the PK and LS outputs, the "control panels' numbers" parameter (for control panels operating within a network) has the following meaning:

#### I. For variants without additional zone dependencies:

- control panel number = 0 means the dependence on an occurrence in any control panel included in the common detection area;
- control panel number > 0 means the dependence on an occurrence in a given control panel (provided it is included in the common detection area);
- control panel number "—" allows for making actuation dependent only on local control panel occurrences.

#### II. For variants with additional zone dependencies:

- control panel number = 0 means the dependence on the total number of occurrences in selected zones in any control panel included in the common detection area;
- control panel number > 0 means the dependence on the 'union' of occurrences in selected zones of given control panels (provided they are included in the common detection area);
- control panel number "—" allows for making actuation dependent only on local control panel occurrences.

#### Notes:

1. "Zone 0" means the dependence on the 'union' of occurrences from all zones supported by a given control panel.
2. "The union of occurrences" means that an actuation criterion is fulfilled if at least one occurrence happens.
3. The total number of zones, EKS and EWK elements assigned to all executive outputs and SAL type elements in the control panel must not exceed 64,000.

### 5.5.3 Fire alarm devices outputs (TYPE 1)

Outputs to fire alarm devices (e.g. acoustic signalling devices) may be programmed in the following variants:

Table 5.4

Variant	Control Panel Nos	Zone Nos	Time Parameters	Activation Criterion
1	0	—	T3	1 <sup>st</sup> stage alarm in control panel (or central panels group in case of network operation) or activation with ACTIVATED push button in ALARM DEVICES box
2	0 ÷ 31	0 ÷ 1024	T3	1 <sup>st</sup> stage alarm in assigned zones

**Note:**

The countdown of the delay time will be discontinued (T3 time will be reset during the countdown) and the outputs to alarm devices will be activated immediately after the control panel enters the 2<sup>nd</sup> stage alarm mode. After setting the T3 parameter to maximum time (10 minutes), the actuation criterion may be dependent on "the 2<sup>nd</sup> stage alarm only".

At any time (quiescent mode), the outputs to fire alarm devices may be activated (if this setting has not been permanently disabled within the program) or deactivated at a proper access level by using the ALARM DEVICES – ACTIVATED push button on the control panel front panel.

During a fire alarm, the above mentioned push button is used to deactivate and reactivate alarm devices (excluding the devices permanently disabled within the program).

The output activation is signalled by the red LED in the ALARM DEVICES – ACTIVATED field.

The output disablement is signalled by the yellow LED in the ALARM DEVICES – DISABLED field: flashing - some outputs disabled; steady - all outputs disabled.

The output fault is signalled by the yellow LED in the ALARM DEVICES – FAULTY field.

### 5.5.4 Fire alarm transmission devices outputs (TYPE 2)

The outputs to fire alarm transmission devices may be programmed as follows:

Table 5.5

Variant	Control Panel Nos	Zone Nos	Time Parameters	Activation Criterion
1	0	—	T1, T2	2 <sup>nd</sup> stage fire alarm in control panel
2	0 ÷ 31	0 ÷ 1024	T1, T2	2 <sup>nd</sup> stage fire alarm in assigned zones

At any time, the outputs to fire alarm transmission devices may be disabled and re-enabled (excluding outputs permanently disabled) at a proper access level by using the push button on the control panel front panel marked: ALARM TRANSMISSION DEVICES – DISABLED.

The output actuation is signalled by the red LED in the ALARM TRANSMISSION DEVICES – ACTIVATED field.

The output disablement is signalled by the yellow LED in the ALARM TRANSMISSION DEVICES – DISABLED field: flashing - some outputs disabled; steady - all outputs disabled.

The output fault is signalled by the yellow LED in the ALARM TRANSMISSION DEVICES – FAULTY field.

### 5.5.5 Protecting devices outputs (TYPE 3)

Outputs to protecting devices may be programmed in the following variants:

Table 5.6

Variant	Control Panel Nos	Zone Nos	Time Parameters	Activation Criterion
1	0	—	$T_{op}$	1 <sup>st</sup> stage alarm in control panel
2	0	—	$T_{op}$	1 <sup>st</sup> stage alarm in control panel until acknowledgement
3	0	—	$T_{op}$	2 <sup>nd</sup> stage fire alarm in control panel
4	0	—	$T_{op}$	2 <sup>nd</sup> stage alarm in control panel until acknowledgement
5	0 ÷ 31	0 ÷ 1024	$T_{op}$	1 <sup>st</sup> stage alarm in assigned zones
6	0 ÷ 31	0 ÷ 1024	$T_{op}$	1 <sup>st</sup> stage alarm in assigned zones until acknowledgement
7	0 ÷ 31	0 ÷ 1024	$T_{op}$	2 <sup>nd</sup> stage alarm in in assigned zones
8	0 ÷ 31	0 ÷ 1024	$T_{op}$	2 <sup>nd</sup> stage alarm in assigned zones until acknowledgement

### 5.5.6 Fault/technical alarm signalling output (TYPE 4)

The output of the fault signalling system may be programmed in the following variants:

Table 5.7

Variant	Control Panel No.	Zones/EKS/EWK Numbers	Time Parameters	Activation Criterion
1	0 ÷ 31	—	$T_{op}$	General fault in control panel
2	0 ÷ 31	—	$T_{op}$	General non-maskable fault in control panel
3	0 ÷ 31	—	$T_{op}$	General technical alarm in control panel
4	0 ÷ 31	—	$T_{op}$	General fault in control panel until acknowledgement
5	0 ÷ 31	—	$T_{op}$	General non-maskable fault in control panel until acknowledgement
6	0 ÷ 31	—	$T_{op}$	General technical alarm in control panel until acknowledgement
7	—	0 ÷ 1024	$T_{op}$	Fault in zone
8	—	1 ÷ 250	$T_{op}$	EKS 1 ÷ 2 inputs fault
9	—	1 ÷ 250	$T_{op}$	EKS 1 ÷ 2 inputs non-maskable fault
10	—	1 ÷ 250	$T_{op}$	EKS 1 ÷ 2 inputs technical alarm
11	—	0 ÷ 1024	$T_{op}$	Fault in zone until acknowledgement
12	—	1 ÷ 250	$T_{op}$	EKS 1 ÷ 2 inputs fault until acknowledgement

13	—	1 ÷ 250	T <sub>op</sub>	EKS 1 ÷ 2 inputs non-maskable fault until acknowledgement
14	—	1 ÷ 250	T <sub>op</sub>	EKS 1 ÷ 2 inputs technical alarm until acknowledgement
15	—	—	T <sub>op</sub>	Potential outputs fault
16	—	—	T <sub>op</sub>	System fault
17	—	—	T <sub>op</sub>	Power supply fault
18	—	—	T <sub>op</sub>	Potential outputs fault until acknowledgement
19	—	—	T <sub>op</sub>	System fault until acknowledgement
20	—	—	T <sub>op</sub>	Power supply fault until acknowledgement
21	—	1 ÷ 100	T <sub>op</sub>	EWK inputs 1 ÷ 8 fault
22	—	1 ÷ 100	T <sub>op</sub>	EWK inputs 1 ÷ 8 technical alarm

**Note:**

Variants 1, 2, 4, 5 and 15, 16 must not be assigned to LS potential lines as it may result (if this line is broken or shorted) in improper operation of these outputs.

**5.5.7 Information output (TYPE 5)**

The information output may be programmed to transmit information about the mode of the system (control panel and line elements) not being the fire alarm or fault mode.

Table 5.8

Variant	Control Panel No.	Time Parameters	Activation Criterion
1	—	—	Disablement mode
2	—	—	1 ÷ 1024 zones disablement mode
3	—	—	Test mode
4	—	—	1 ÷ 1024 zones test mode
5	—	—	Personnel absent

**5.5.8 Reset output (TYPE 6)**

The reset output supports only relays and its objective is to generate a reset impulse (duration approx. 1.5 second), after a fire alarm reset. This type may be used, e.g. to power supply or reset of detectors requiring a separate power supply source, e.g. flame detectors manufactured by Det-Tronics.

**5.5.9 LK monitoring input**

Each of the POLON 4900 control panel 8 monitoring inputs for may be programmed in the following variants:

- to monitor the actuation of external devices after receiving an actuation criterion from a declared relay output or potential output (for TYPE-1, TYPE-2, TYPE-3 outputs);
- to monitor the proper operation of external devices;



- as a technical alarm input.

The input status is analysed on the basis of the monitoring line characteristic resistance measurement (Table 5.9). The range of the characteristic resistance (including the connecting cables resistance) is 2.7 k $\Omega$  - 16 k $\Omega$ . If the monitoring line resistance is outside the determined range, this condition is treated as an acknowledgement of external devices actuation (variant 1) or external devices fault (variant 2).

In the control panel, improper conditions are signalled as faults in the following cases:

- no acknowledgement of external device actuation with an active actuation signal of a declared relay or potential output;
- detection of an external device fault.

Table 5.9

Variant	Function	PK or LS assigned output	Mode dependent on detection line characteristic resistance	
1	Actuation monitoring	Activated	Non-maskable fault 2k7 < R < 16 k	Technical alarm R < 0.9 k R > 30 k
		Non-activated	Quiescent mode 2k7 < R < 16 k	Technical alarm R < 0.9 k R > 30 k
2	Functioning inspection	-	Quiescent mode 2k7 < R < 16 k	Non-maskable fault R < 0.9 k R > 30 k
3	Technical alarm	-	Quiescent mode 2k7 < R < 16 k	Technical alarm R < 0.9 k R > 30 k
R – characteristic resistance of detection lines together with connecting cables				

### Monitoring inputs programming variants

#### Variant 1:

A monitoring line input may be assigned to one of the previously declared outputs (relay or potential) defined as TYPE-1, TYPE-2, TYPE-3. Then, this input may be used to monitor external devices actuation after receiving an actuation criterion from the declared output. Monitoring is enabled approx. 60 seconds after the monitored output is actuated (permissible time of the controlled device actuation delay). Examples of using a monitoring input assigned to a relay or potential output are shown in Fig. 5.8 and 5.9.

#### Variant 2:

A monitoring line input may be programmed to monitor efficiency of, e.g. external devices. It consists in connecting an NO contact of this device in parallel with the end-of-line resistor in the monitoring line circuit. The correct condition is observed when the monitoring line characteristic resistance is within the 2.7 k $\Omega$  - 16 k $\Omega$  range. An example of connecting the contact in the monitoring line is presented in Fig. 5.10.

#### Variant 3:

A monitoring line input may be programmed as a general purpose technical alarm input to be used by the installer for individual needs.

It operates as an input for monitoring external devices efficiency. In case any resistance within the line technical alarm range is detected, the technical alarm is evoked. Applicable examples are presented in Fig. 5.8 and 5.9.

### Monitoring line inputs programming

Table 5.10

Variant	Monitored output type	Monitored output number	Monitoring type
0			Output inactive
1	1-PK, 2-LS	2 ÷ 16 or 1 ÷ 8	KZ actuation monitoring
2	-	-	KS functioning inspection
3	-	-	AT technical alarm

**Note:**

Outputs defined as TYPE 4 must not be assigned to monitoring lines as it may result in incorrect interpretation of the current condition if an actuation variant is assigned to a fault of monitoring or potential lines circuits.

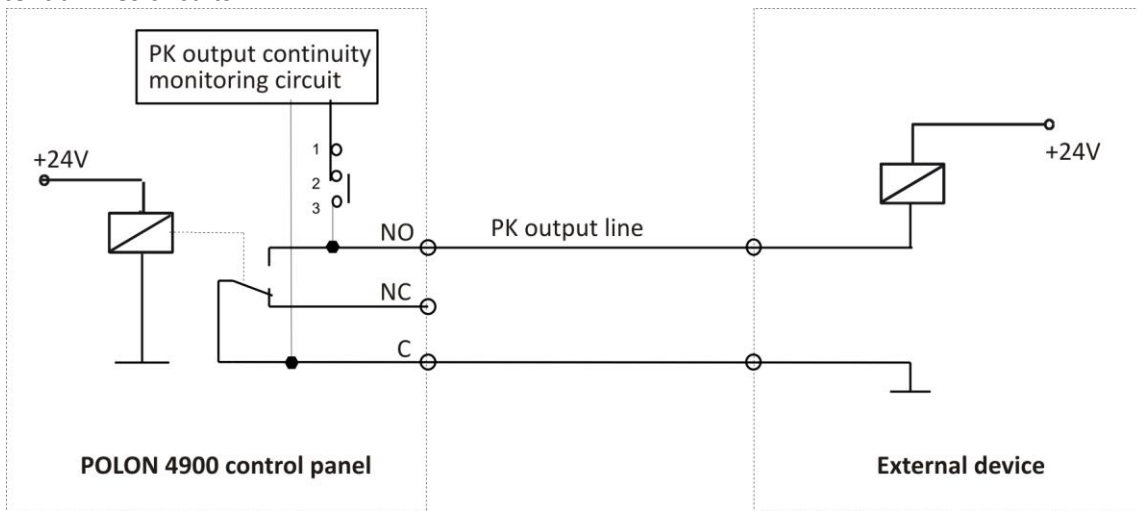


Fig. 5.7 Exemplary use of PPW-49 module with PK output line monitoring

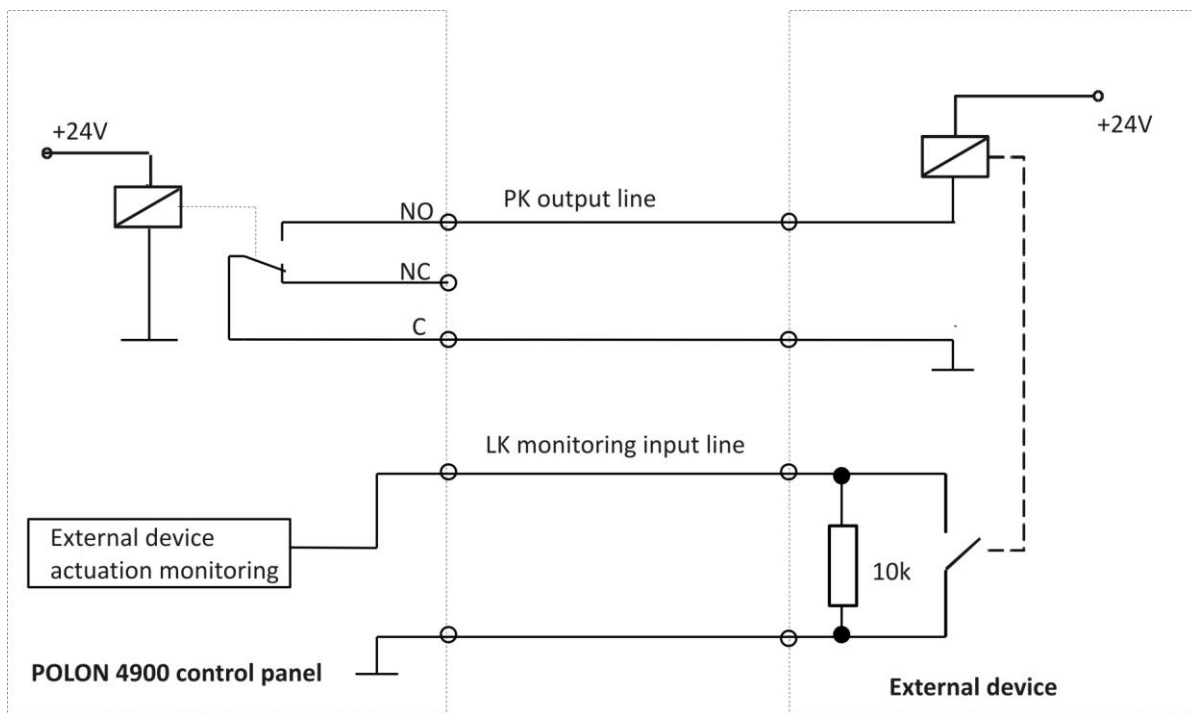


Fig. 5.8 Exemplary use of monitoring line assigned to relay output

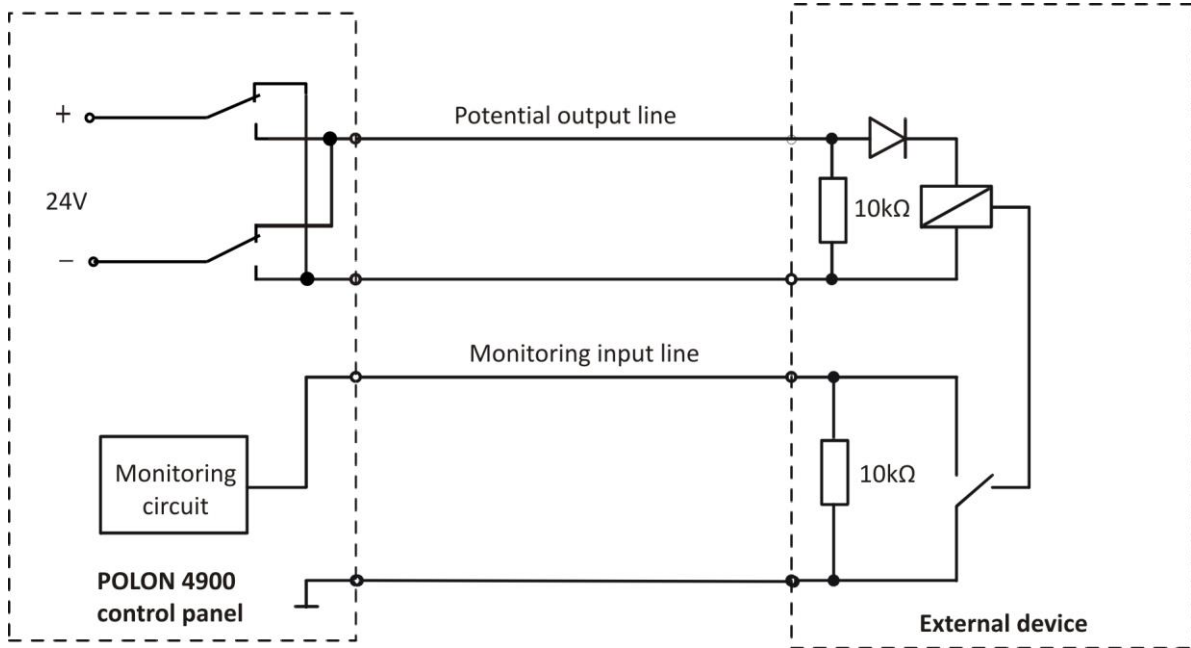


Fig. 5.9 Exemplary use of LK monitoring line assigned to LS potential output

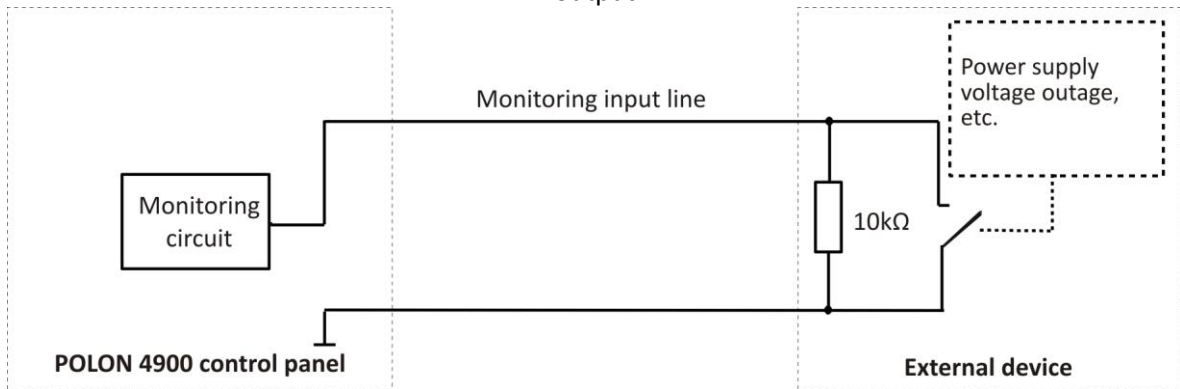


Fig. 5.10 Exemplary connection of external device contact into LK monitoring line

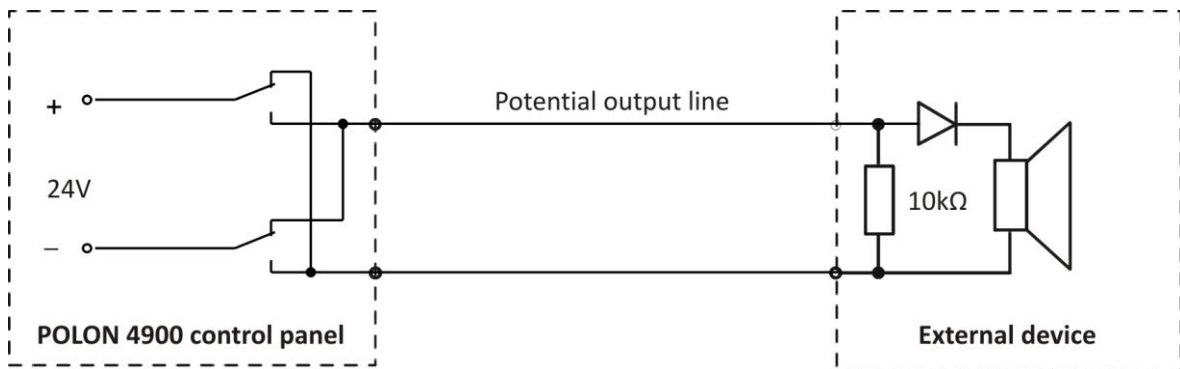


Fig. 5.11 Exemplary use of LS potential line for acoustic signalling device actuation

## 5.6 MIK-48 INTERFACE MODULE

The interface module is used to connect external devices to the control panel.

The following elements are located on the interface panel:

- one universal USB serial port connector:
- ZP1 - PORT 1 - computer, PMC-4000 monitoring, TELSAP 2100 monitoring
- two 9-pin EIA RS-232 standard serial port connectors:
  - ZP2 - PORT 2 - computer, PMC-4000 monitoring, TELSAP 2100 monitoring;
  - ZP3 - PORT 3 – computer, PMC-4000 monitoring, TELSAP 2100 monitoring, bar code reader.

Moreover, the panel is equipped with RS-485 standard serial connector terminals:

- "A", "B", "CHGND" - output to the TSR-4000 terminal.

**All module outputs are galvanically isolated from the control panel.**

### Note:

When control panels operate in an optical fibre version of the network, an optical fibre converter supplied with the control panel power removes the galvanic isolation. In this case, connecting a PC supplied from mains results in the earth fault signal emission. Thus a PC connected to the control panel must always be supplied from the same point of mains as the panel. Otherwise, the difference between the PC and control panel "mass" may result in the MIK-48 module outputs fault.

The above may also be caused by connecting a monitoring system. That is why the monitoring system must be equipped with a galvanically isolated input.

However, the best solution is to use an external power supply adapter to support the optical fibre converter – see p. 9.1 Note.

Each serial port is declared (see the programming manual [PM]) and may be used for different purposes according with the declaration. An RS232 port should be connected with an external device by means of a standard PC cable connecting devices with COM type serial outputs. See section 5.6.2 for instructions regarding an RS485 port connection.

MIK-48 is equipped with a ZK1 connector to install a PS/2 keyboard which may replace the keypad provided in the handling area. Moreover, the keyboard is necessary to enter user's messages. The connected keyboard may not be declared.

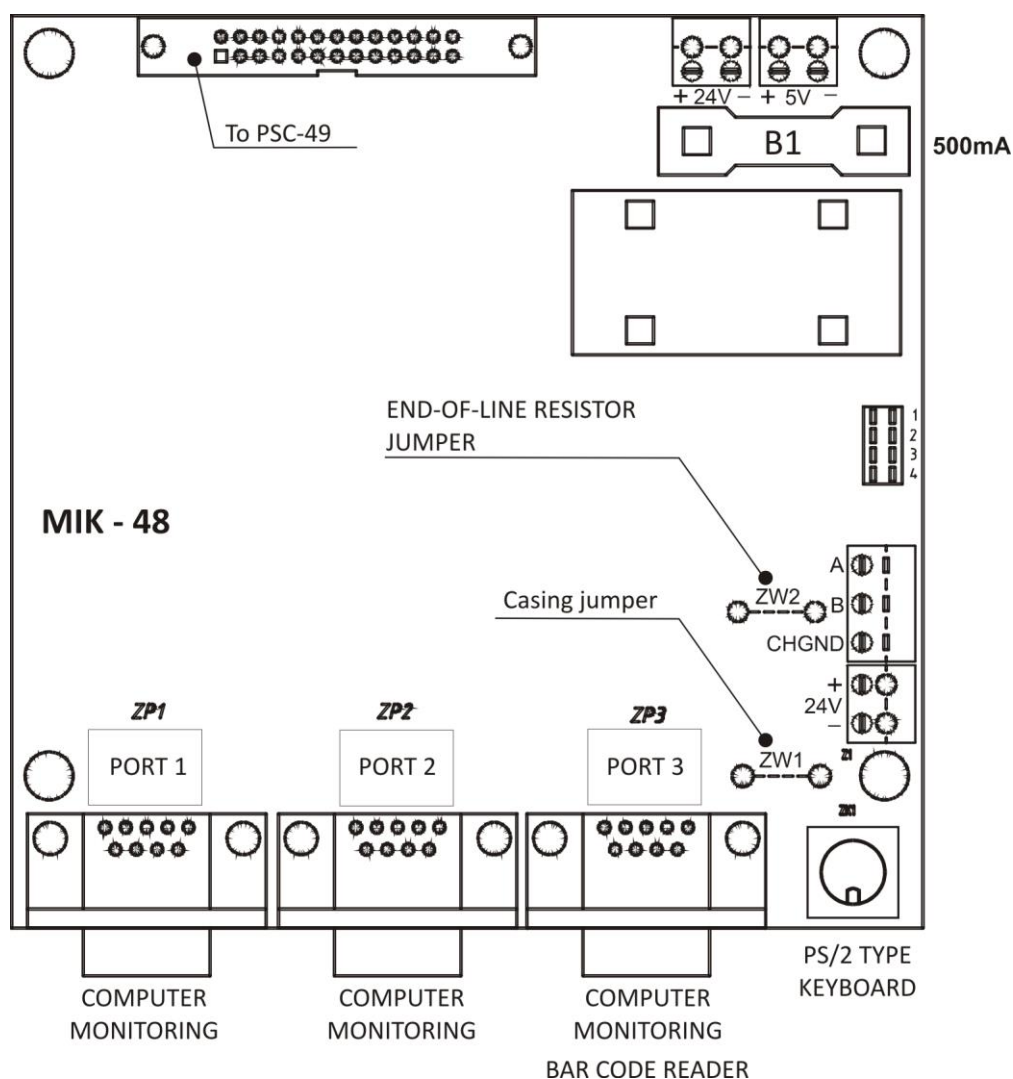


Fig. 5.12 MIK-48 interfaces module

### 5.6.1 PORT 1, PORT 2, PORT 3 communication ports

Each of the serial ports may be used to operate with an external device, after a port type is declared. A given port type may be declared only for one port. Type 5 (barcode reader) may only be declared for PORT no. 3.

**PORT TYPE: 0** - not declared port - inactive.

**PORT TYPE: 1** - interoperation with a PC

Used to transmit or read the configuration by means of a PC - special software for the POLON 4900 control panel configuration must be used.

The transmission bitrate is 9600 bps.

**PORT TYPE: 2** - interoperation with the PMC-4000 monitoring system

Used to operate with the monitoring station utilising the PMC-4000 digital monitoring protocol of the POLON 4000 system.

Declared transmission bitrate: 2400 bps, 4800 bps, 9600 bps.

The PMC-4000 protocol makes it possible to supply a monitoring station with information regarding the following events/occurrences:

- fire alarms;
- technical alarms and their resets;
- 2<sup>nd</sup> stage alarms;
- reset;
- acknowledgement;
- faults and their resets;
- non-maskable faults and their resets;
- tests and their resets;
- disablements and its resets;
- output actuation and its resets.

Moreover, the permission for remote operation in the control panel (SYSTEM SETUP -> REMOTE OPERATION -> OPERATION FROM MONITORING STATION: RE-ENABLED) enables the monitoring station to remotely acknowledge an alarm or fault and remotely reset an alarm.

A full description of the PMC-4000 protocol is provided in a separate document.

#### **Notes regarding the PMC-4000 monitoring in the network system:**

Information from a given control panel may be transmitted to a monitoring station through one of the RS-232 serial ports or, in the network system, through the network and, next, through the remote control panel serial port. Both these methods may also be applied simultaneously, i.e. supervision transmission through own RS-232 port and simultaneous transmission through the network and, then, through the remote control panel RS-232 port. Thus each control panel may be supervised in two points at the same time.

In order to ensure correct monitoring transmission over the network, the following data must be declared in the NETWORK MONITORING option (see the programming manual [PM]):

- in the control panel to be supervised, it is necessary to define the transmission control panel number in the TRANSMISSION CONTROL PANEL option (i.e. remote control panel directly connected with the monitoring station through the RS-232 port);
- in the remote control panel (option: CENTRAL MONITORING), declare from which control panels in the network the monitoring is to be received in order to transmit it through the RS-232 port directly to the monitoring station.

#### **Recommendations regarding control panel operation in the network mode**

- network groups of control panels should coincide with the monitored groups of control panels;
- taking into account the system reaction time, each control station should be directly connected with a monitoring station (only options - through the RS-232 port).

#### **PORT TYPE: 3 - TELSAP 2100 monitoring**

Facilitates operation of the monitoring station in a format identical to the basic digital monitoring protocol of a TELSAP 2100 control panel.

Declared transmission bitrate: 2400 bps, 4800 bps.

#### **PORT TYPE: 4 - TELSAP 2100 extended monitoring**

Facilitates operation of the monitoring station in a format identical to the extended digital monitoring protocol of a TELSAP 2100 control panel.

Declared transmission bitrate: 2400 bps, 4800 bps.

#### **Note:**

The TELSAP 2100 system digital monitoring may be implemented only from a local control panel. This means that each control panel operating in the network may provide monitoring stations only with information regarding events within the local detection area.

**PORT TYPE: 5** - barcode reader

Facilitates operation with a barcode reader to enter line elements serial numbers.

**5.6.2 Output to TSR-4000 terminal**

The output marked as "A", "B" and "CHGND" is used only to connect the TSR-4000 terminal. It is an output of the RS485 standard serial bus to which max. 16 TSR-4000 terminals may be connected.

The A and B output terminals of the control panel must be correctly connected with A and B input terminals (A with A and B with B). The correct A and B terminal clamps should be connected in the same manner with A and B clamps of the next terminal, etc.

The maximum length of the cable connecting the control panel with the last terminal must not exceed

**1200 m.** It is recommended to use a YnTKSYekw installation cable (1 x 2 x 0.8 mm). A detailed description of the method of connecting terminals is provided in the Operation and Maintenance Manual (ID-E305-001E) of the TSR-4000 Parallel Signalling Terminals.

**5.7 DR-48 PRINTER**

The DR-48 printer is used to register (in a printout form, on a paper band) the events which take place when a facility is monitored by the POLON 4900 control panel.

The events include:

- alarms;
- faults and their removals;
- fault or alarm acknowledgements;
- switching the control panel operating mode from PERSONNEL PRESENT to PERSONNEL ABSENT and vice versa;
- delays switching on and off;
- alarm resets;
- testing;
- disablements;
- access to the configuration.

Each event message contains its date and time and a short description. Additionally, if a text message is assigned to a zone (user's text), during an alarm of this fire protection element, apart from the line number, element number and zone number, the assigned message is also printed out.

The POLON 4900 control panel stores 2,000 latest events that have been signalled. The stored events, sorted by their date and time of occurrence may be printed after choosing a proper function on the keypad according to the programming manual (PM).

On-going events recording on the paper tape and printing out the contents of the event memory is possible only when the printer is assigned for operation in accordance with the programming manual (PM). Regardless of assigning the printer to operation, the event memory is constantly updated.

See below for examples of incident printouts:

FAULT !

TERMISTOR IN TUN-4046 !

L-1 E-8 ZONE-31

2007-01-30 / 14:53:18

ACKNOWLEDGEMENT !

2007-01-30 14:54:00

FIRE ALARM WITH TUN-4046 !

L-1 E-98 ZONE-25

CONFERENCE HALL

2ND FLOOR

2007-01-30 17:20:00

\*\* 1ST STAGE FIRE ALARM! \*\*

2007-01-30 17:20:00

ACKNOWLEDGEMENT !

2007-01-30 17:22:30

----- ALARMU RESET -----

2007-01-30 17:25:17

The printer is equipped with a thermal paper roll (width 80 mm and max. diameter  $\varnothing$  50 mm).

At the back of the printer on a panel, there are two monostable push buttons located (PAPER and RESET) used for the following operations:

- printer paper out feed using the PAPER push button;
- printer test: press PAPER and RESET buttons simultaneously; next, release the RESET button; next, after 1 second, release the PAPER button;
- printer controller restart after pressing the RESET push button.

In order to replace a paper roll:

- use lever 1 to open the printer mechanism;
- replace the used roll with a new one on the holder;
- insert the paper into the printer mechanism guide slit so that the thermo-sensitive surface is visible while inserting it into the printing mechanism guide slit;
- use lever 1 to close the printer mechanism;
- press PAPER to pull the paper into the mechanism.



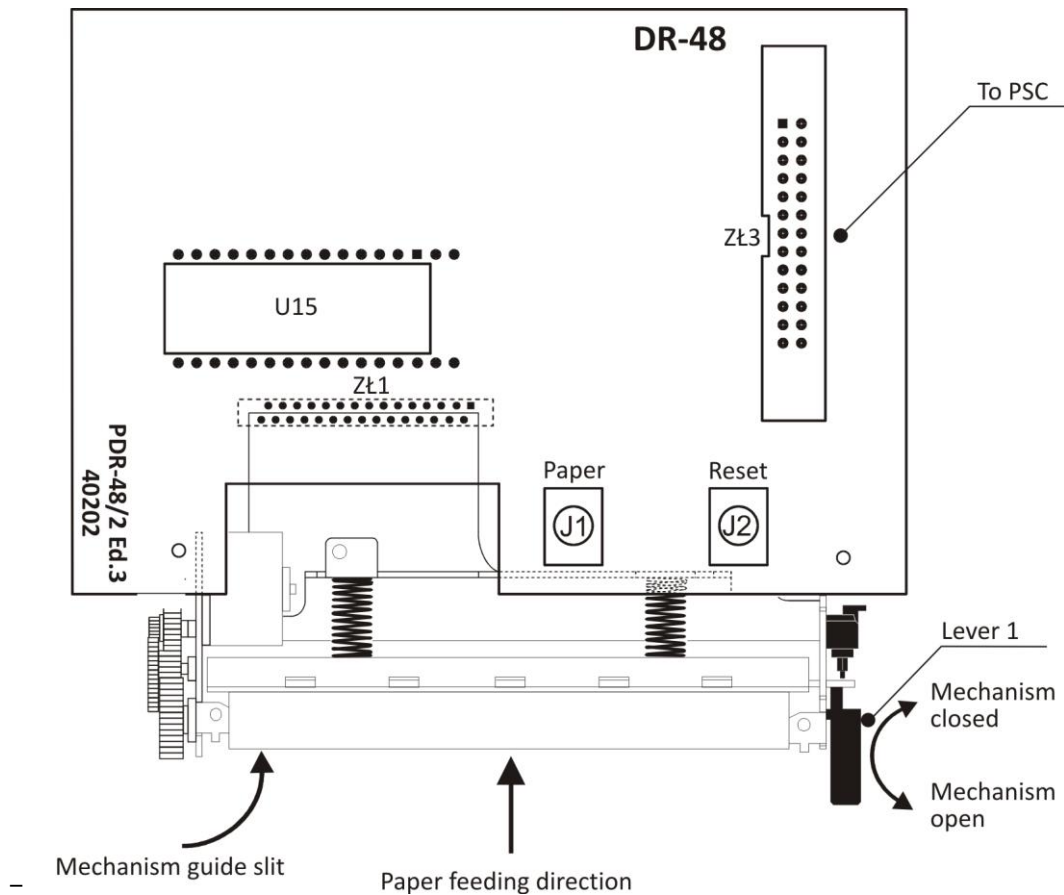


Fig. 5.13 DR-48 printer view from control panel inside

## 5.8 POWER SUPPLY UNIT AND POWER SUPPLY MODULE

The POLON 4900 control panel's design makes it possible to supply it from two power sources:

- AC 230 V/50 Hz - basic power source;
- DC 24 V – reserve power source (battery cluster).

The AC power adaptor (nominal voltage 30 V/5 A) is equipped with a circuit breaker and fuse. It is designed as a separate module located in the right lower corner of the control panel. The adaptor supplies all control panel modules and facilitates operation with the battery cluster by means of the MZ-48 power supply module.

In the case of 230 V/50 Hz mains power failure, the control panel is automatically switched to power supply provided by the battery cluster and the device operation remains uninterrupted. When the mains power supply is restored, the power adaptor recharges batteries until the "recharging complete" voltage is obtained and switches to the buffering mode.

Apart from the basic functions including supplying power to the control panel, recharging or buffering the battery cluster, the power supply module protects the energised control panel circuits.

The power adaptor is equipped with the following protection, monitoring and signalling circuits:

- overvoltage circuit - actuated when the output voltage increases over 33 V - 35 V, which results in permanent power adaptor disconnection. In order to remove the results of the protection element actuation and return to the normal operation condition, the power adaptor must be disconnected from mains for approx. 5 seconds;
- current limiting circuit - actuated when the power adaptor is overloaded - signalled with the LIMIT lamp;
- correct operation indication - green OK diode is lit.

The MZ-48 power supply module has output terminal blocks for the following voltages:

- 24 V - control panel operating voltage;
- 27 V - insulated voltage to supply detection lines;
- 5 V - electronic circuits supply voltage;
- 24 V - internal equipment supply voltage protected with a B2 /1 A fuse.

Moreover, the MZ-48 has input terminal blocks to connect the following elements:

- AC power adaptor (+ 30 V);
- battery cluster (AK) protected with a B1/6.3 A fuse;
- temperature probe (PROBE).

The MZ-48 power supply module is equipped with the following protection, monitoring and signalling circuits:

- 230 V/50 Hz voltage monitoring circuit – "mains OK" LED is lit;
- + 5 V power adaptor correct operation indication - green "5 V OK" LED is lit;
- battery recharging indication - green "CHARGING" LED is lit;
- battery efficiency control circuit - faults indicated by the yellow "BATTERY FAULT" LED;
- control panel ground fault indication - yellow "EARTH FAULT" LED is lit;
- voltage decrease detection circuit - when the battery voltage drops below  $22\text{ V} \pm 1\text{ V}$ .

Such conditions as loss of mains voltage, loss of battery cluster voltage or fuse failure are also indicated on the TSO-4900 board – the collective "FAULT" diode is lit, "POWER" diode blinks and an acoustic signal is emitted. The fault indication messages may be accessed by pressing the "FAULT" push button, in accordance with the programming manual (PM).

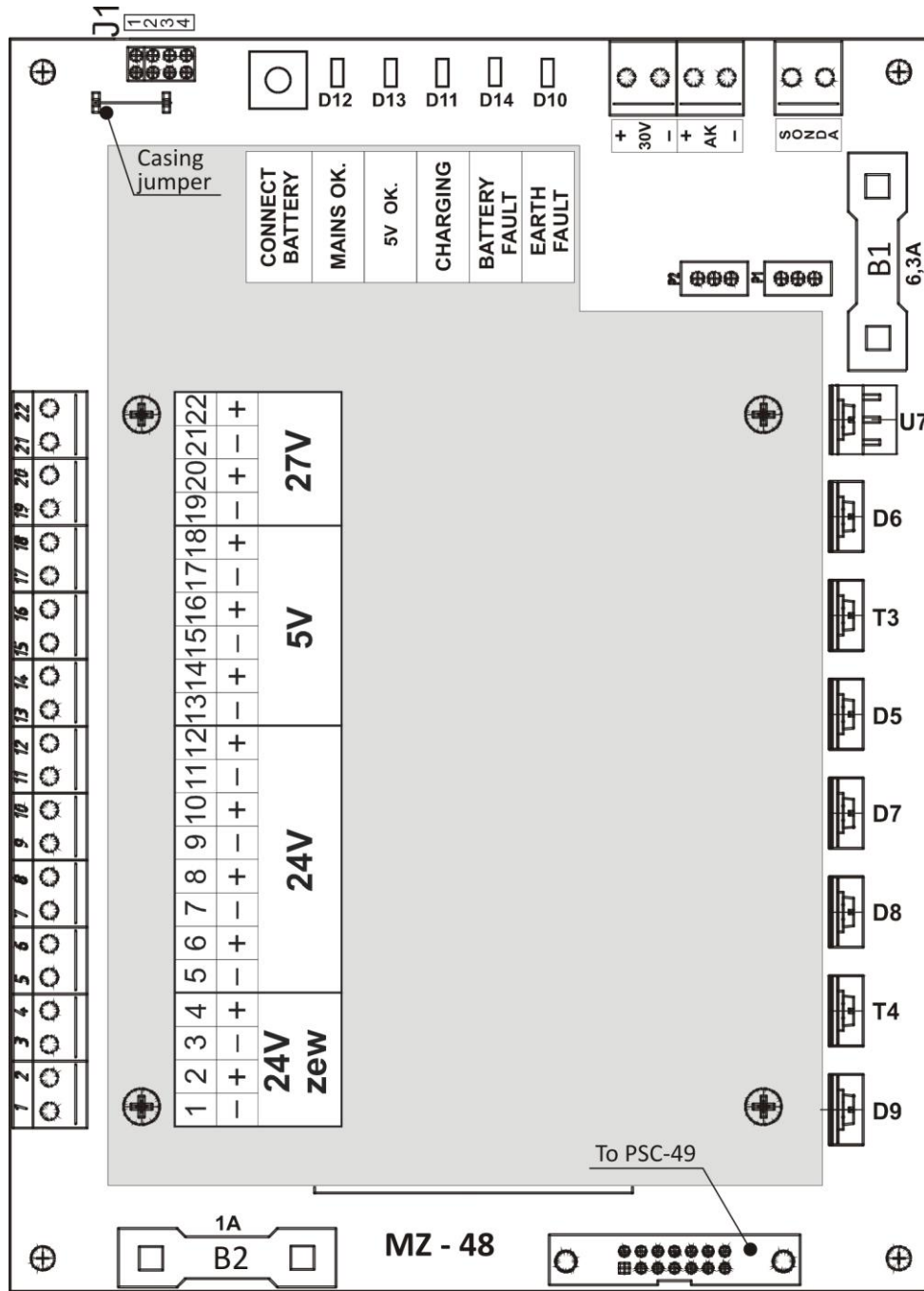


Fig. 5.14 MZ-48 control panel power supply module

### 5.9 CONTROL PANEL OPERATION WITH BATTERY CLUSTER

The POLON 4900 control panel may be supplied by the battery cluster comprising of two 12 V leak-proof lead-acid batteries. The battery cluster must be connected to the terminals marked as AK on the MZ-48 module board. A terminal block marked as "PROBE" is also located on the same board and it is used to connect a temperature probe.

The advantage of using this probe in the vicinity of the batteries is a possibility of automatic adjustment of the buffering voltage depending on the temperature and according to the defined temperature factor. It extends the life of batteries operated in different ambient temperatures. While choosing a battery size, it is necessary to obey the rule that its capacity should ensure at least 30-hour (in the case of the servicing personnel availability within 24 h) or 72-hour control panel operation in the quiescent mode, and after that a 30-minute alarm.

The control panel equipped with one MSL module in standard load condition (each line consumes 20 mA), draws from the batteries the current not higher than 0.45 A. The control panel with two MSL modules can draw from the batteries the current up to 0.6 A (depending on the detection lines load). Thus, the battery charging current, equal to the difference between the maximum power supply unit current (5 A) and the sum of the current drawn by the control panel in the quiescent mode (0.6 A) and the external devices current (max. 1 A), amounts to 3.4 A, what allows for application of a battery cluster of the capacity between 17 Ah and 90 Ah.

The battery cluster can be installed:

- inside the control panel, on a special shelf – batteries 2 x 17 Ah manufactured by Hitachi or their equivalents (e.g. CT17-12 by CTM), that are able to power the control panel for 30 h in the quiescent mode (without additional loads);
- in the PAR-4900 container attached under the control panel in which 2 x 44 Ah batteries can be located ensuring 72 hours of the control panel power supply in the above mentioned conditions);
- in an external container (e.g. PAR-2000) of capacity up to 90 Ah (maximum charger capability).

**Note:**

As far as an optical fibre network is concerned, the current drawn by the optical fibre transducer must be taken into account – max. 150 mA.

**Installation, operation and disposal of waste batteries should be carried out in accordance with the battery manufacturer manuals. Used batteries should be handed over for recycling in accordance with the regulations in force.**

### 5.10 Battery cluster capacity calculation

The POLON 4900 control panel maximum battery current consumption (during power supply only from the reserve power source) in the quiescent mode can be expressed with the formula:

$$I_{c_d} = 0.24 + 0.08 \cdot N_{MSL} + 0.025 \cdot n_{20} + 0.06 \cdot n_{50} + I_{d_{zew}} [A]$$

The POLON 4900 control panel maximum battery current consumption (during power supply only from the reserve power source) in the alarm mode can be expressed with the formula:

$$I_{c_a} = 0.54 + 0.08 \cdot N_{MSL} + 0.025 \cdot n_{20} + 0.06 \cdot n_{50} + I_{a_{zew}} [A]$$

where:

$N_{MSL}$  – number of MSL-48M modules

$n_{20}$  – number of lines operating in 20 mA mode (at maximum line elements load)

$n_{50}$  – number of lines operating in 50 mA mode (at maximum line elements load)

$I_{d_{zew}}$  – current for external devices powered from the control panel in the quiescent mode

$I_{a_{zew}}$  – current for external devices (including LS activated signal lines) powered from the control panel in the alarm mode

Minimum battery capacity necessary for the control panel power supply during a failure of the basic supply source for the determined period (30 h + 0.5 h or 72 h + 0.5 h) can be expressed in the formulas:

$$C_{30min} = 30 \cdot I_{c_d} + 0.5 \cdot I_{c_a} [Ah]$$

$$C_{72min} = 72 \cdot I_{c_d} + 0.5 \cdot I_{c_a} [Ah]$$

where:

$C_{30min}$  – minimum battery capacity ensuring the control panel operation for 30 h in the quiescent mode and 0.5 h in the alarm mode,

$C_{72min}$  – minimum battery capacity ensuring the control panel operation for 72 h in the quiescent mode and 0.5 h in the alarm mode.

Table 5.11 presents an exemplary calculation of the necessary battery cluster capacity depending on the POLON 4900 control panel hardware configuration.

Table 5.11

Number of MSL modules	Number of detection lines	Current draw in quiescent mode $I_{d_{zew}} = 0 \text{ A}$	Current draw in alarm mode $I_{a_{zew}} = 1 \text{ A}$	$C_{30min}$ [Ah]	$C_{72min}$ [Ah]
MSL-1M	1 X 20 mA	0.345 A	1.645 A	11.2	25.7
	2 X 20 mA	0.370 A	1.670 A	11.9	27.5
	3 X 20 mA	0.395 A	1.695 A	12.7	29
	4 X 20 mA	0.420 A	1.720 A	13.5	31
MSL-1M, MSL-2M	5 X 20 mA	0.525 A	1.825 A	16.7	38.7
	6 X 20 mA	0.550 A	1.850 A	17.4	40.5
	7 X 20 mA	0.575 A	1.875 A	18	42.3
	8 X 20 mA	0.600 A	1.900 A	19	44

## 6 ADDRESSABLE DETECTION LINES

### 6.1 DETECTION LINE TYPES

The POLON 4900 control panel A type addressable detection lines are resistant to line wire faults (short circuit or break). This immunity is ensured by: the loop-shaped line operation layout and built-in short circuit isolators in the system addressable elements. Additionally, it is possible to connect a B type (radial) open line, however, according to the applicable standards, more than 32 warning devices must not be installed in this configuration.

In the loop-shaped layout, one line break does not eliminate any line element from operation. Having detected a fault, the control panel indicates its occurrence and ensures the addressable detection line is reviewed from both sides. After the break is removed, the signal informing about this fault is automatically cleared.

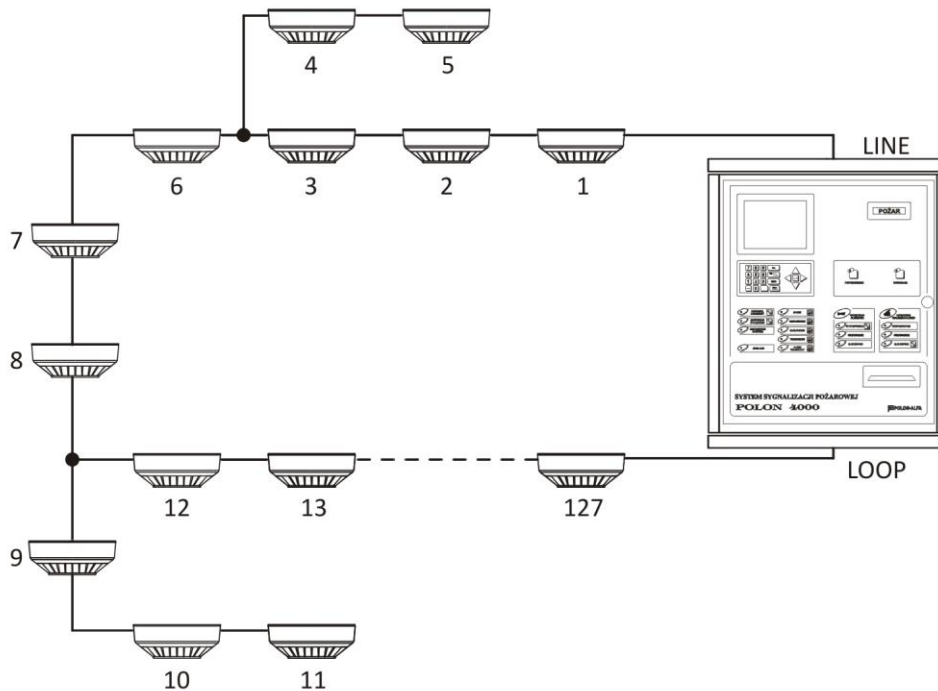
A detection system operating in other layout than the loop is not resistant to line breaks. A break results in disconnecting line elements from the fault location to the last element in the line.

As far as radial detection lines are concerned, in case a short circuit is detected, the isolator closest to the short circuit is actuated and the line section behind this isolator is disconnected.

In the loop-shaped layout, if a line wiring short circuit is detected, two isolators in line elements installed closest to the fault location are actuated, which triggers the disconnection only of the

detection line section located between these elements. It is not recommended to design detection lines with branches as a break or short circuit in a side line results in disconnection of the elements located between the fault and the end of a given branch, regardless of whether or not the line operates in a loop system. If it is necessary to create a branch, it is recommended that only a few line elements are installed in the branch (i.e. fewer than a dozen or so).

a) loop-shaped line



b) radial line

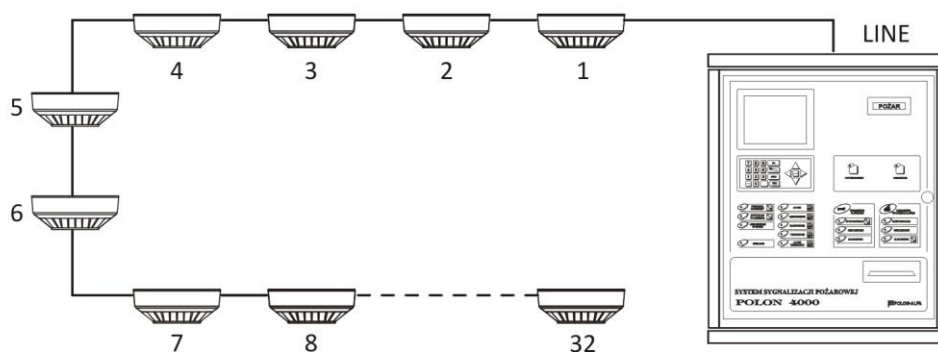


Fig. 6.1 POLON 4900 control panel addressable detection line examples

The detection lines in the POLON 4000 system should be routed in the following manner:

- radial lines without branches;
- loop-shaped lines may have single branches but two neighbouring branches should be separated by at least one addressable element.

This line routing method enables the automatic addressable elements configuration.

While designing addressable detection lines, the following program and electric requirements must be taken into account:

- the number of addressable elements in a detection line must not exceed 127;
- the maximum current consumption of all elements installed in the line must not exceed:
  - 20 mA in a quiescent mode at the detection line cabling resistance of  $2 \times 100 \Omega$ ,
  - 22 mA in a quiescent mode at the detection line cabling resistance of  $2 \times 75 \Omega$ ,
  - 50 mA in a quiescent mode at the detection line cabling resistance of  $2 \times 45 \Omega$ ,
  - the detection line cabling capacity must not exceed 300 nF.

## 6.2 ADDRESSABLE ELEMENTS NUMBERING

In the POLON 4000 system, each addressable element has a unique 12-digit number (factory number) but the control panel, during its normal operation, refers to addressable elements via their element numbers (short number of the  $1 \div 127$  range). During the detection lines configuration, the serial numbers of addressable elements are assigned to the consecutive element numbers.

Three methods of the POLON 4000 system addressable elements configuration can be applied:

- automatic configuration,
- configuration with verification,
- manual numbering.

### 6.2.1 Automatic configuration

The elements located in the main loop are numbered consecutively starting from 1 from the side of the terminals marked as Lx, up to the closest branch. Next, the control panel numbers the elements located in the branch to its end. After the numbering process is finished in the branch, the system returns to the main loop and numbers the elements to the next branch and then continues numbering the elements within the branch according to the above mentioned procedure. This process is continued until all addressable elements are numbered.

In this numbering method the elements are always allocated with consecutive numbers from 1 to n.

### 6.2.2 Configuration with verification

In this option it is necessary, on the basis of the circuit design and the control panel number allocation algorithm, to carry out a pre-declaration, i.e. to assign (from a keyboard or computer file) an element type to each number. Then a verification option should be run at the control panel. In case the element types declared for given numbers are consistent with the element types allocated in accordance with the required algorithm, the control panel automatically gives numbers to the addressable elements.

### 6.2.3 Manual number allocation

This method allows to assign numbers to addressable elements arbitrarily. Matching factory numbers with element numbers is carried out by typing the element number in the factory number box manually.

Manual number declaration in the whole detection line enables arbitrary elements configuration in this line (numbers allocation can be performed in any order, not necessarily abiding the numeration order).

#### Notes:

The ADC-4001M adapter with incorrectly assigned number can produce a detecting line overload. It is necessary to take the adapter out from its base and wait for at least 5 minutes. Reinstalled adapter shall draw only 150  $\mu$ A from the line (the side line is automatically blocked). Before the adapter side line re-enablement, it should be assigned a proper operation mode in accordance with the programming manual.

Since wireless radio detectors create a line branch, automatic configuration and configuration with verification is possible only in the case of the adapter installation in the detection line. If the adapter is installed in a radial line, its configuration should be carried out manually.

### 6.3 DESIGN GUIDELINES

Due to installation operation reliability, a loop-shaped detection line routing system should be applied. Radial lines should be used only exceptionally (e.g. in case a small number of detectors must be installed in a long distance).

When designing a detection line, each addressable element must be assigned with its own address (element number), under which it shall be identified by the control panel. In order to assure the installation project clarity and service facilitation, it is recommended that the consecutively installed elements possess consecutively increasing addresses – best if assigned in accordance with the control panel number allocation algorithm, which is utilized during automatic configuration.

The ADC-4001M adapters are fitted with an illuminating diode that signals a side line detector triggering. Therefore, such adapter can be installed in front of premises, instead of an actuation indicator. Regardless of this, it is possible to attach the WZ-31 actuation indicators to the ADC-4001M side line detectors as well as to 4046 model range detectors.

It is recommended to use screened wires in the POLON 4000 system.

In the installation design process it is important to meet all requirements contained in technical specifications; pay special attention should be paid to the detection line capacity. The detection line appropriate resistance should be provided as well as resistance between neighbouring short circuit isolators.

## 7 ALARMING SYSTEM/STRUCTURE AND EXECUTIVE LINE ELEMENT DECLARATION

The POLON 4900 control panel alarming structure as well as other programmable parameters must be defined during the installation designing stage. For this purpose, the designer's tables must be correctly filled in, taking into account the conditions existing in the protected premises. These tables are an integral part of a design and must be available to the commissioning and service personnel.

The alarming structure is programmed as follows:

- addressable elements declaration, assignments to zones, operation modes and groups;
- alarming variants and user's messages declaration;
- general alarming parameters programming (T1, T2, T3 times)
- programming of actuation variants and monitoring of all monitoring and controlling elements outputs and inputs.

### 7.1 DETECTION ZONE

Addressable elements must be programmed grouped in detection zones; it is possible to create max. 1024 zones in the control panel. According to the standard, max. 32 line elements may be assigned to one zone. Zones to which no element has been assigned are referred to as empty or inactive. The zones are created to describe a given detection area with a given set of line elements in a manner making it possible to identify the installation location. Moreover, a zone allows a given alarming variant programming in order to eliminate false alarms in facilities where the risk of accidental actuation of fire warning devices is high.

An area of one zone may be divided into two groups of fire warning devices, defined as A and B. Each fire warning device must be assigned to one of these groups during the programming process. The groups of fire protection elements (A/B) are created in order to program coincidental variants of zone alarming in order to eliminate false alarms as much as it is possible.



The program makes it possible to provide each zone with a text message (user message) containing two lines of text and max. 32 characters in each line.

In the case an alarm is received from a zone, this text is displayed on the LCD screen showing the precise location of the fire.

## 7.2 ADDRESSABLE ELEMENTS DECLARATION

The control panel receives information and controls the operation of addressable elements which have been declared (assigned to operation) by the user. The control panel is delivered with the standard configuration loaded in which no addressable element is declared. Until the elements are declared, the control panel does not receive signals regarding line elements type and status but, every 2 minutes, it checks the compliance of the elements installed in the addressable detection line with the declared ones and, in case an irregularity is detected, a fault, whose type can be read, is indicated.

An addressable element declaration consists in defining the element following data:

- line number;
- element number;

and providing the following data for this address:

- serial number (entered manually or using a bar code reader);
- zone number and logical number;
- zone number (from the 1 ÷ 1024 range) in the case of manual call points;
- logical number (1 ÷ 250 range) for the EKS-4001 monitoring and controlling elements and for the SAL-4001 addressable signalling devices;
- logical number (1 ÷ 100 range) for the EWS-4001, EWK-4001 UCS 4000, UCS 6000 line elements;
- A or B group (within a given zone) for manual call points;
- operation mode (according to individual possibilities and needs for different element types).

The addressable elements declaration can be preceded by automatic configuration or configuration with verification that enable matching consecutive element numbers with their factory numbers.

Incorrect type assignment to an addressable element is revealed by the control panel and indicated as a fault.

### Note:

1. Any number of warning devices can be installed in one detection line. It is recommended, however, to install not more than 32 warning devices.
2. Line elements logical numbers can repeat only in the case of different element types, e.g. the logical number 35 can be assigned simultaneously to one element of a device group: EKS, EWK, EWS, SAL or UCS.

## 7.3 ASSIGNING ALARMING PARAMETERS TO ZONES

In order to group addressable elements, installed in the supervised premises, the territory is divided into zones (separated parts of the premises, room, etc.). In the POLON 4900 control panel it is possible to create up to 1024 detection zones. Every zone can be described with the user message composed of two text lines up to 32 characters each.

Zone creation means assigning an addressable element with a short number to the zone number, according to the PM.

The POLON 4900 control panel ensures a possibility to choose an alarm method for a particular zone, one of the 14 available ones.

Alarm variants should be matched so that they guarantee early and at the same time dependable fire danger detection. Alarm variants descriptions are contained in p. 8.1 of this OMD. As default, the control panel is programmed with the variant 2 in all zones. The alarm variants can be divided into two groups considering an alarm triggering way:

1. one-stage alarming (variants 1, 3, 4, 7, 9, 11, 17),
2. two-stage alarming (variants 2, 5, 6, 8, 10, 12, 13, 14, 15, 16).

Alarming is performed according to the programmed variants only in the case of PERSONNEL PRESENT operation mode. If the PERSONNEL ABSENT mode is set, alarming shall be performed in all zones, regardless of the variants programmed, pursuantly to one-stage variant (variant 1) that immediately generates the 2<sup>nd</sup> fire alarm at the control panel. Alarming as per the variants is not executed also in the case of a manual call point (ROP) triggering, since such a situation is treated in different way than signals by other addressable element – the control panel evokes the 2<sup>nd</sup> fire alarm without any delay. The program alarm variants assignment to zones should be carried out together with the user message declaration according to the PM.

#### **7.4 EKS-4001 MONITORING AND CONTROLLING ELEMENTS DECLARATION**

The EKS-4001 monitoring and controlling element (hereinafter called 'EKS') is a line element that enables activation and supervising of fire protection devices, e.g. smoke exhaust dampers, doors, sounders, optic signalling devices, etc. A single EKS (assembled in cases consisting 1, 2 or 4 devices) is equipped with one controlling relay output and two monitoring inputs. Each of the two monitoring inputs can indicate – depending on the programmed operation mode and characteristic resistance – one of the following modes:

1. supervision,
2. fault,
3. non-maskable fault,
4. technical alarm.

The EKS proper programming consists of a line element declaration (similarly to fire warning devices) and its assignment to a logical number.

The EKS logical number is a figure from the 1 ÷ 250 range, which is assigned to the element in order to enable the EKS variant declaration depending on various events in own control panel or in a control panel belonging to a common detection area,, and to assign an appropriate user messages. Each EKS element can be assigned only to one logical number and reversely. In programming meaning – with some simplification – it can be stated that for the EKS element a logical number is an equivalent of a zone for fire elements. The EKS element is linked with actuation variants and the user messages for monitoring inputs just through the logical number.

The EKS-4001 operation way is a resultant of the element programmed operation mode and the output relay activation variant.

The entire EKS-4001 programming process is completed in two stages:

##### **Stage I:**

The EKS-4001 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or configuration with verification or manual configuration procedures;
- a logical number (1 ÷ 250);
- an operation mode (it is set by default but may be changed – see below).

The EKS-4001 operation mode is defined by the following element parameters (standard mode in bold print):

- output line continuity monitoring (**YES** or NO);
- input 1 - actuation monitoring (YES (40 sec.) or YES (70 sec.) or YES (130 sec.) or **NO**);
- input 2 - actuation monitoring (YES (40 sec.) or YES (70 sec.) or YES (130 sec.) or **NO**);
- input 1 operation method (NC or **NO**);
- input 2 operation method (NC or **NO**);
- output relay actuation delay.

The set of parameters defining an operation mode is directly connected with a line element and is programmed while declaring the EKS element as a line element. An operation mode may always be changed in the program.

### Stage II:

The EKS-4001 logical configuration consisting in assigning:

- a variant to the previously assigned logical number;
- a set of assigned zones if it is required by a given variant (from the 1 ÷ 1024 range; from own control panel or control panels of a common detection area);
- a set of assigned inputs of other EKS elements if it is required by a given variant (or own inputs if the variant permits it) – range of assigned EKS elements: 1 ÷ 250, EKS inputs range: 1 ÷ 2 – only of own control panel);
- a set of assigned EWK inputs if it is required by a given variant (range of assigned EWK elements: 1 ÷ 100, EWK inputs range: 1 ÷ 8 – only of own control panel);
- user messages for a technical alarm and non-maskable fault of monitoring inputs.

### The EKS-4001 output relay activation variants

Table 7.1 lists the EKS output programming possibilities. The "control panel number" parameter (only for control panels operating in a network) has the following meaning:

- control panel number = 0 shows the dependence on an event in any control panel included in the common detection area;
- control panel number > 0 shows the dependence on an event from a given control panel (provided it is included in the common detection area);
- control panel number "—" allows for actuation dependence only on local control panel events.

For variants with additional zone dependencies: zone number = 0 shows the dependence on the 'union' of events within all zones in a selected control panel included in the common detection area.

Table 7.1

Variant	Control Panel No.	Zones/EKS/EWK Numbers	Actuation Criterion
0	—	—	inactive output
1	0	—	1 <sup>st</sup> stage general alarm
2	0 ÷ 31	0 ÷ 1024	'union' of 1 <sup>st</sup> stage alarms in assigned zones
3	0 ÷ 31	0 ÷ 1024	'conjunction' of 1 <sup>st</sup> stage alarms in assigned zones
4	0	—	2 <sup>nd</sup> stage general alarm
5	0 ÷ 31	0 ÷ 1024	'union' of 2 <sup>nd</sup> stage alarms in assigned zones
6	0 ÷ 31	0 ÷ 1024	'conjunction' of 2 <sup>nd</sup> stage alarms in assigned zones
7	0	—	general fault in control panel
8	0	—	non-maskable general fault in control panel
9	0	—	general technical alarm in control panel
10	—	1 ÷ 250	'union' of faults of assigned EKS inputs
11	—	1 ÷ 250	'union' of non-maskable faults of assigned EKS inputs
12	—	1 ÷ 250	'union' of technical alarms of assigned EKS inputs
13	—	1 ÷ 100	'union' of faults of assigned EWK inputs
14	—	1 ÷ 100	'union' of technical alarms of assigned EWK inputs
15	—	—	reset output
16	—	—	alarming device – 1 <sup>st</sup> stage general alarm
17	—	0 ÷ 1024	alarming device – 'union' of 1 <sup>st</sup> stage alarms in assigned zones

**Variant 0**

- No EKS actuation criterion (output permanently deactivated).

**Variant 1 – general 1<sup>st</sup> stage alarm**

- The output is activated in case a 1<sup>st</sup> stage alarm is generated in the control panel or in any control panel from the common detection area.

**Variant 2 – ‘union’ of 1<sup>st</sup> stage alarms in the assigned zones of the control panels from the common detection area**

- the output is activated when a 1<sup>st</sup> stage alarm is generated in at least one of the zones assigned to this relay.

**Variant 3 – ‘conjunction’ of 1<sup>st</sup> stage alarms in the assigned zones of the control panels from the common detection area**

- the output is activated when a 1<sup>st</sup> stage alarm is generated in at least two of the zones assigned to this relay.

**Variant 4 – general 2<sup>nd</sup> stage alarm**

- the output is activated in case a 2<sup>nd</sup> stage alarm is generated in the control panel or in any control panel from the common detection area.

**Variant 5 – ‘union’ of 2<sup>nd</sup> stage alarms in the assigned zones of the control panels from the common detection area**

- the output is activated when a 2<sup>nd</sup> stage alarm is generated in at least one of the zones assigned to this relay.

**Variant 6 – ‘conjunction’ of 2<sup>nd</sup> stage alarms in the assigned zones of the control panels from the common detection area**

- the output is activated when a 2<sup>nd</sup> stage alarm is generated in at least two of the zones assigned to this relay.

**Variant 7 – general fault in the control panel**

- the output is activated in case a general fault is detected in the control panel or in any control panel from the common detection area.

**Variant 8 – general non-maskable fault in the control panel**

- the output is activated in case a general non-maskable fault is detected in the control panel or in any control panel from the common detection area.

**Variant 9 – general technical alarm in the control panel**

- the output is activated in case a general technical alarm is generated in the control panel or in any control panel from the common detection area.

**Variant 10 – ‘union’ of faults in assigned EKS inputs**

- the output is activated in case a fault has occurred in at least one assigned input from the list of assigned EKS elements. The assigned inputs may include own inputs of the controlled EKS element. The list of assigned EKS inputs may include only their own control panel (when the control panel operates in a network).

**Variant 11 – ‘union’ of non-maskable faults in assigned EKS inputs**

- the output is activated in case a non-maskable fault is revealed in at least one assigned input from the list of assigned EKS elements. The assigned inputs may not include own inputs of the controlled EKS element. The list of assigned EKS inputs may include only their own control panel (when the control panel operates in a network).

**Variant 12 – ‘union’ of technical alarms in assigned EKS inputs**

- the output is activated in case a technical alarm is generated in at least one assigned input from the list of assigned EKS elements. The assigned inputs may include own inputs of the controlled EKS element. The list of assigned EKS inputs may include only their own control panel (when the control panel operates in a network).

**Variant 13 – ‘union’ of faults in assigned EWK inputs**

- the output is activated in case a fault is revealed in at least one assigned input from the list of assigned EWK elements. The list of assigned EWK inputs may include only their own control panel (when the control panel operates in a network).

**Variant 14 – ‘union’ of technical alarms in assigned EWK inputs**

- the output is activated in case a technical alarm is generated in at least one assigned input from the list of assigned EWK elements. The list of assigned EWK inputs may include only their own control panel (when the control panel operates in a network).

**Variant 15 – reset output**

- the reset output's objective is to generate a reset impulse (duration approx. 1.5 second), after a fire alarm is reset. This type may be used, e.g. to supply or reset detectors requiring a separate power supply, e.g. flame detectors manufactured by Det-Tronics.

**Variant 16 – alarm device - general 1<sup>st</sup> stage alarm**

- in this variant, an output is treated in the system as an alarm device.

The output is activated in case a 1<sup>st</sup> stage alarm is generated in the control panel or in any control panel from the common detection area.

**Variant 17 – alarm device – ‘union’ of 1<sup>st</sup> stage alarms in assigned zones**

- in this variant, an output is treated in the system as an alarm device.  
The output is activated when a 1<sup>st</sup> stage alarm is generated in at least one of the zones assigned to this relay.

**The output relay actuation variants are programmed only for an EKS element with a logical number defined.**

**In case variant 2 or 5 is used, at least one zone must be assigned to the EKS element, however, if variant 3 or 6 is used, at least two zones must be assigned. Variants 1 and 4 do not require assigning any zones.**

**As far as the variants with zone dependence are concerned, the assigned zones may originate in their own control panel (a standalone control panel) or in any control panels from the common detection area (a control panel operating in a network).**

**The total number of zones, EKS and EWK elements assigned to all executive outputs and SAL type elements in the control panel must not exceed 64,000.**

**Note:**

- A non-maskable fault of an output may occur only during the output actuation monitoring time. For example, for the Yes (40 sec.) mode, if a technical alarm mode occurred during 40 seconds from output actuation and the line resistance changed into the resistance equivalent to a non-maskable fault, a non-maskable fault will not be signalled.

- A non-maskable fault will not be signalled if variant 0 is set for an output.
- After completing the standard and automatic configuration procedures, the EKS type elements are assigned to a special logical number 0 which makes them inactive.

An illustration of an exemplary implementation of an EKS-4001 element is provided in the manual called "Designing fire alarm installations using the POLON 4000 interactive fire signalling system" and the EKS-4001 Installation and Maintenance Manual.

## 7.5 EWS-4001 MULTI-OUTPUT CONTROLLING ELEMENTS DECLARATION

The EWS-4001 (EWS in short) multi-output controlling element is a line element that enables to control fire protection devices, e.g. smoke exhaust dampers, doors, sirens, light signalling devices, etc. The EWS element has 8 relay control outputs. Up to 20 EWS elements may be connected to a single detection line.

The EWS proper programming consists in declaring a line element (similarly to fire warning devices) and assigning it to a logical number.

A logical number for EWS is selected from the 1 ÷ 100 range and assigned to an element in order to make the EWS actuation variants dependent on different events in the control panel. Each EWS type element may be assigned only to one logical number and vice versa. As far as the program is concerned, a logical number for the EWS is an approximate equivalent to a zone for fire protection elements. The logical number connects the EWS with actuation variants. A logical number or actuation variant must be assigned to an EWS element.

The EWS-4001 operation depends on assigning output relay actuation variants to different outputs.

The EWS-4001 entire programming procedure includes two stages:

### Stage I:

The EWS-4001 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or the configuration with verification or the manual configuration procedures;
- a logical number (1 ÷ 100).

### Stage II:

The EWS-4001 logical configuration consisting in assigning:

- a variant for each output of the previously assigned logical number (see below);
- a set of assigned zones for each output if it is required by a given variant (from the 1 ÷ 1024 range; from own control panel or control panels of the common detection area).

### Variants of activating individual EWS-4001 relay outputs

Table 7.2 presents the EWS output programming possibilities. The "control panel number" parameter (only for control panels operating in a network) has the following meaning:

- control panel number = 0 shows the dependence on an event in any control panel included in the common detection area;
- control panel number > 0 shows the dependence on an event from a given control panel (provided it is included in the common detection area);
- control panel number "—" allows for making actuation dependent only on local control panel events.

For variants with additional zone dependencies: zone number = 0 shows the dependence on the total number of events within all zones in a selected control panel included in the common detection area.

Table 7.2

Variant	Control Panel No.	Zones Numbers	Actuation Criterion
0	—	—	inactive output
1	0	—	general 1 <sup>st</sup> stage alarm
2	0 ÷ 31	0 ÷ 1024	'conjunction' of 1 <sup>st</sup> stage alarms in assigned zones
3	0 ÷ 31	0 ÷ 1024	'conjunction' of 1 <sup>st</sup> stage alarms in assigned zones
4	0	—	general 2 <sup>nd</sup> stage alarm
5	0 ÷ 31	0 ÷ 1024	'conjunction' of 2 <sup>nd</sup> stage alarms in assigned zones
6	0 ÷ 31	0 ÷ 1024	'conjunction' of 2 <sup>nd</sup> stage alarms in assigned zones
7	—	—	reset output

**Variant 0**

Means lack of the EWS actuation criterion (permanently non-activated output).

**Variant 1 – general 1<sup>st</sup> stage alarm**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in the control panel or any control panels of the common supervision area.

**Variant 2 – 'union' of 1<sup>st</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 3 – 'conjunction' of 1<sup>st</sup> stage alarms in assigned zones of common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least two zones that are assigned to this relay.

**Variant 4 – general 2<sup>nd</sup> stage alarm**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in the control panel or any control panels of the common supervision area.

**Variant 5 – 'union' of 2<sup>nd</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 6 – 'conjunction' of 2<sup>nd</sup> stage alarms in assigned zones of common supervision area control panels**



The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least two zones that are assigned to this relay.

#### **Variant 7 – reset output**

The reset output is provided in order to generate a resetting impulse, lasting for ca. 1.5 s, after fire alarm reset. This type can be utilized for instance for power supply and reset of detectors that require a separate power supply, e.g. flame detectors manufactured by Det-Tronics.

#### **Note:**

Variant 7 is active only for the EWS element outputs 1 and 2.

**Output relay actuation variants are programmed only for a EWS that possesses a logical number.**

**In the case of variant 2 and variant 5 application, at least one zone should be assigned to the EWS, whereas in the case of variant 3 and variant 6 application, at least two zones should be assigned. Variants 1 and 4 do not require any zone assignment.**

**In variants with zone dependence, the assigned zones can be ..... from own control panel (in the case of independently operating control panel) or from any control panel of the common supervision area In the case of control panel network.**

**The total assignments of zones to all executive outputs and SAL type elements in the control panel should not exceed 64,000.**

#### **Note:**

After the standard configuration loading and automatic configuration performance, EWS elements are assigned to a special logical number 0, and after a number attribution, variant 0 is assigned, which causes that such an element is inactive.

Detailed information concerning the EWS element is contained in the EWS-4001 'Installation and Maintenance Manual'.

### **7.6 EWK-4001 MULTI-INPUT MONITORING ELEMENTS DECLARATION**

The EWK-4001 (EWK in short) multi-input monitoring element is a line element with 8 monitoring inputs. An EWK element makes it possible to monitor the condition of fire protection devices, .e.g. smoke exhaust dampers, doors, sirens or other technical devices and receive fire alarms depending on the configuration. Up to 20 EWK elements may be connected to a single detection line.

Depending on the characteristic resistance, each input may indicate one of the three following modes:

1. quiescent (operation);
2. fault;
3. (technical or fire) alarm.

The EWK proper programming consists in declaring a line element (similarly to fire warning devices) and assigning it to a logical number.

A logical number for EWK is selected from the 1 ÷ 100 range and assigned to an element in order to make the EWK actuation variants dependent on different events in the control panel and assign the required user messages to it. Each EWK type element may be assigned only to one logical number and vice versa. As far as the program is concerned, a logical number for the EWK is an approximate equivalent to a zone for fire protection elements. The logical number connects the EWK with monitoring variants and user messages for monitoring inputs.

The EWK-4001 operation results from the operation mode programmed for an element and the input monitoring variant.

The EWK-4001 entire programming procedure includes two stages:

#### **Stage I:**

EWK-4001 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or the configuration with verification or the manual configuration procedures;
- a logical number (1 ÷ 100);
- an operation mode (it is factory set but may be changed - see below).

The EWK-4001 **operation mode** defines the operation method (standard mode in bold print) for individual 1 - 8 inputs:

- **NO** – shows characteristic resistance closing in order to generate an alarm;
- **NC** – shows a characteristic resistance opening in order to generate an alarm.

#### **Stage II:**

The EWK-4001 logical configuration consists in assigning (with a previously defined logical number) the following elements to each input:

- variant (see below);
- fire alarm zone (if required by the variant);
- technical alarm message (if required by the variant).

### **The EWK-4001 input monitoring variants**

#### **Variant 0**

Means inactive input (no signals from the input are received).

#### **Variant 1 –technical alarm input**

The input activation by specific resistance clench or opening (depending on the input settled operation mode) causes technical alarm evoking in the control panel.

#### **Variant 2 – fire alarm input**

The input activation by specific resistance clench or opening (depending on the input settled operation mode) causes a fire alarm triggering in the control panel assigned zone (if the zone alarming variant criteria requirements are met).

#### **Variant 3 – functioning monitoring**

The input activation by specific resistance clench or opening (depending on the input settled operation mode) causes a non-maskable fault occurrence in the control panel.

Input monitoring variants are programmed only for an EWK that possesses a logical number.

#### **Note:**

After the standard configuration loading and automatic configuration performance, the EWK elements are assigned to a special logical number 0, and after a number attribution, variant 0 is assigned, which causes that such an element is inactive.

Detailed information concerning the EWK element is contained in the EWS-4001 'Installation and Maintenance Manual'.

## **7.7 SAL-4001 ACOUSTIC SIGNALLING DEVICES DECLARATION**

A SAL-4001 addressable acoustic signalling device is a line element equipped with a piezoelectric transducer used to generate an acoustic signal.

The SAL proper programming consists in declaring a line element (similarly to fire warning devices), assigning it to a logical number and assigning the type and actuation variant by means of this logical number.

A logical number for the SAL element is selected from the 1 ÷ 250 range and assigned to an element in order to make the SAL actuation variants dependent on different events in the control panel. Each SAL type element may be assigned only to one logical number and vice versa. As far as the program is concerned, a logical number for the SAL element is an approximate equivalent to a zone for fire protection elements. The logical number connects the SAL with actuation variants.

The SAL-4001 operation results from the operation mode programmed for an element and the piezoelectric transducer actuation variant.

The SAL-4001 entire programming procedure includes two stages:

#### **Stage I:**

SAL-4001 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or the configuration with verification or the manual declaration procedures;
- a logical number (1 ÷ 250);
- an operation mode (it is factory set but may be changed - see below).

The operation mode is defined by the following element parameters (standard mode in bold print):

sound pattern – **type1** or type2 or type3;

battery power supply monitoring (YES or **NO**);

internal power supply monitoring (**YES** or NO).

The set of parameters defining an operation mode is directly connected with a line element and is programmed while declaring the SAL element as a line element. An operation mode may always be changed in the program.

#### **Stage II:**

The SAL-4001 logical configuration consisting in assigning:

- an output type (TYPE-1 or TYPE-3);
- variant (depending on the output type);
- a set of assigned zones if it is required by a given variant (from the 1 ÷ 1024 range; from own control panel or control panels of the common detection area).

#### **Output types and variants**

See Tables 7.3 and 7.4 for the programming possibilities of the SAL elements. The "control panel number" parameter (only for control panels operating in a network) has the following meaning:

- control panel number = 0 shows the dependence on an event in any control panel included in the common detection area;
- control panel number > 0 shows the dependence on an event from a given control panel (provided it is included in the common detection area);
- control panel number "—" allows for making actuation dependent only on local control panel events.

For variants with additional zone dependencies: zone number = 0 shows the dependence on the total number of events within all zones in a selected control panel included in the common detection area.

**Type1**

Table 7.3

Variant	Control Panels No.	Zones Numbers	Time Parameters	Actuation Criterion
1	0	—	T3	1 <sup>st</sup> stage alarm in control panel (or control panel group in case of network operation) or activation with ACTIVATION push button in ALARM DEVICES area
2	0 ÷ 31	0 ÷ 1024	T3	1 <sup>st</sup> stage alarm in assigned zones

**Note:**

The countdown of the delay time will be discontinued (T3 time will be reset during the countdown time) and the outputs to alarm devices will be activated immediately after the control panel enters the 2<sup>nd</sup> stage alarm mode. After setting the T3 parameter to maximum time (10 minutes), the actuation criterion may be dependent on "the 2<sup>nd</sup> stage alarm only".

**Type 3**

Table 7.4

Variant	Control Panels No.	Zones Numbers	Time Parameters	Actuation Criterion
1	0	—	T <sub>op</sub>	1 <sup>st</sup> stage alarm in control panel
2	0	—	T <sub>op</sub>	1 <sup>st</sup> stage alarm in control panel until acknowledgement
3	0	—	T <sub>op</sub>	2 <sup>nd</sup> stage alarm in control panel
4	0	—	T <sub>op</sub>	2 <sup>nd</sup> stage alarm in control panel until acknowledgement
5	0 ÷ 31	0 ÷ 1024	T <sub>op</sub>	1 <sup>st</sup> stage alarm in assigned zones
6	0 ÷ 31	0 ÷ 1024	T <sub>op</sub>	1 <sup>st</sup> stage alarm in assigned zones until acknowledgement
7	0 ÷ 31	0 ÷ 1024	T <sub>op</sub>	2 <sup>nd</sup> stage alarm in assigned zones
8	0 ÷ 31	0 ÷ 1024	T <sub>op</sub>	2 <sup>nd</sup> stage alarm in assigned zones until acknowledgement

The type and actuation variants are programmed only for a SAL element with a logical number defined.

As far as the variants with zone dependence are concerned, the assigned zones may originate in their own control panel (a standalone control panel) or in any control panels from the common detection area (a control panel operating in a network).

The total number of zone assignments to all executive outputs and SAL type elements in the control panel must not exceed 64,000.

**Note:**

- The "Top" delay time is not applicable (equal to 0).
- After completing the standard configuration and automatic declaration procedures, the SAL type elements are assigned to a special logical number 0 and TYPE 0 is set, which makes them inactive.

Detailed information regarding a SAL element itself is provided in the SAL-4001 Installation and Maintenance Manual.

## 7.8 UCS 4000 UNIVERSAL CONTROLLING PANELS DECLARATION

The UCS 4000 (UCS in short) universal controlling panel is a standalone device enabling to control and supervise fire protection devices, e.g. smoke exhaust dampers, doors, etc. (see the detailed description provided in its Operation and Maintenance Manual). The UCS 4000 control panel may cooperate with the POLON 4900 control panel through a detection line (connected to the circuit similarly to any other line elements).

The POLON 4900 control panel may receive the following modes from the UCS 4000:

- quiescent (also during operation of the air venting function in the UCS);
- fire alarm (manual call point active - manual smoke extraction button connected to a dedicated UCS input or alarm from a conventional detection line connected to UCS);
- technical alarm (of the main relay [P1] and additional relays [P2, P3]) – acknowledgement of output actuation in the UCS transformed into a fire alarm from the control panel;
- non-maskable fault (from the monitored main relay [P1] and additional relays [P2, P3]) – lack of actuation of an output in the UCS transformed into a fire alarm in the control panel;
- testing – the UCS in a mode of testing elements and systems connected with a smoke exhaust system;
- UCS fault:
  - o UCS power supply fault:
    - 230 V power supply fault;
    - battery fault;
    - battery charging circuit fault;
    - voltage drop below 22 V;
    - earth fault;
  - o UCS controller fault:
    - microprocessor or program memory fault;
    - EEPROM memory fault;
  - o UCS main (P1) relay fault;
  - o faults of UCS special dedicated inputs and outputs:
    - PA alarm relay fault (PSU-4000 module);
    - P2 or P3 individually programmed relays fault (PSD-4000 module);

- conventional detection line fault (PSU-4000 module);
- RPO (manual smoke exhaust button) line fault (PSU-4000 module);
- fault of an output to alarm devices (PSU-4000 module);
- power supply (fuse) of a rain/wind sensor fault (PSU-4000 module);
- declared PSD-4000 module faulty or lack;

- modes of an addressable module for communication with the POLON 4000 system:
  - EEPROM memory fault;
  - short circuit isolator actuation;
  - short circuit isolation;
  - no connection between the line processor and main UCS element.

Depending on whether the programmed variant condition is met, the POLON 4900 control panel may send a signal actuating the P1 main relay to the UCS (and other outputs individually dependent on this signal).

The UCS controlling panel configuration may be programmed by means of keys located in this unit, however, the data regarding the co-operation of the UCS with a fire detecting control panel must be declared in the POLON 4900 control panel.

The UCS proper programming consists in declaring a line element (similarly to fire warning devices) and assigning it to a logical number.

A logical number for UCS is selected from the 1 ÷ 100 range and assigned to an element in order to make the UCS actuation variants dependent on different events in its own control panel or control panels in the common detection area and provide it with the required user messages. Each UCS type element may be assigned only to one logical number and vice versa.

The UCS 4000 operation results from the P1 main relay actuation variant and individual setting for keys in UCS 4000.

A full UCS 4000 programming procedure in the POLON 4900 includes two stages:

#### **Stage I:**

UCS 4000 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or the configuration with verification or the manual configuration procedures;
- a logical number (1 ÷ 100).

#### **Stage II:**

UCS 4000 logical configuration consisting in assigning:

- a P1 main relay actuation variant to a previously assigned logical number;
- fire alarm zone (1 ÷ 1024) or zone 0 to block the reception of a fire alarm from the UCS unit;

user messages for a technical alarm and non-maskable fault of outputs: P1 main relay and P2/P3 additional relays.

#### **The P1 main relay actuation variants for the UCS 4000 control panel**

See Table 7.5 for the possibilities of activating the P1 main relay for the UCS 4000 control panel. The "control panel number" parameter (only for control panels operating in a network) has the following meaning:

- control panel number = 0 shows the dependence on an event in any control panel included in the common detection area;
- control panel number > 0 shows the dependence on an event from a given control panel (provided it is included in the common detection area);
- control panel number "—" allows for making actuation dependent only on local control panel events.

For variants with additional zone dependencies: zone number = 0 shows the dependence on the total number of events within all zones in a selected control panel included in the common detection area.

Table 7.5

Variant	Control Panel No.	Zone Number	Actuation criterion
0	—	—	Inactive output
1	0	—	1 <sup>st</sup> stage general alarm
2	0 ÷ 31	0 ÷ 1024	'union' of 1 <sup>st</sup> stage alarms in assigned zones
3	0 ÷ 31	0 ÷ 1024	'conjunction' of 1 <sup>st</sup> stage alarms in assigned zones
4	0	—	2 <sup>nd</sup> stage general alarm
5	0 ÷ 31	0 ÷ 1024	'union' of 2 <sup>nd</sup> stage alarms in assigned zones
6	0 ÷ 31	0 ÷ 1024	'conjunction' of 2 <sup>nd</sup> stage alarms in assigned zones

**Variant 0**

Means lack of the relay actuation criterion (permanently non-activated output).

**Variant 1 – general 1<sup>st</sup> stage alarm**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in the control panel or any control panel of the common supervision area.

**Variant 2 – 'union' of 1<sup>st</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 3 – 'conjunction' of 1<sup>st</sup> stage alarms in assigned zones of common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least two zones that are assigned to this relay.

**Variant 4 – general 2<sup>nd</sup> stage alarm**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in the control panel or any control panel of the common supervision area.

**Variant 5 – 'union' of 2<sup>nd</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 6 – 'conjunction' of 2<sup>nd</sup> stage alarms in assigned zones of common supervision area control panels**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least two zones that are assigned to this relay.



The P1 main relay actuation variants are programmed only for a UCS unit with a logical number defined.

In case variant 2 or 5 is used, at least one zone must be assigned to the UCS, however, if variant 3 or 6 is used, at least two zones must be assigned. Variants 1 and 4 do not require assigning any zones.

As far as the variants with zone dependence are concerned, the assigned zones may originate in their own control panel (a standalone control panel) or in any control panels from the common detection area (a control panel operating in a network).

The total number of zone assignments to all executive outputs and SAL type elements in the control panel must not exceed 64,000.

**Note:**

- A non-maskable fault will not be signalled if variant 0 is set for an output.
- After completing the standard and automatic configuration procedures, the UCS type elements are assigned to a special logical number 0 which makes them inactive.

An exemplary drawing showing the UCS 4000 panel use is included in the UCS 4000 I&MM.

## **7.9 UCS 6000 UNIVERSAL CONTROL PANELS DECLARATION**

The UCS 6000 (UCS in short) universal control panel is a standalone device making it possible to control and supervise fire protection devices, e.g. smoke exhaust dampers, doors, etc. (see the detailed description provided in its Operation and Maintenance Manual). The UCS controlling panel may co-operate with the POLON 4900 control panel through a detection line (connected to the circuit similarly to any other line elements).

The POLON 4900 control panel may receive the following modes from the UCS 6000:

1. quiescent (also during operation of the air venting function in the UCS);
2. fire alarm (manual call point active - manual smoke exhaust button connected to a dedicated UCS input, alarm from a conventional detection line connected to UCS or alarm from an external input);
3. technical alarm – acknowledgement of output actuation in the UCS transformed into a fire alarm from the control panel;
4. non-maskable fault – lack of actuation of an output in the UCS during a given period of time transformed into a fire alarm in the control panel;
5. UCS fault.

The UCS controlling panel full configuration is performed by means of dedicated software.

See the detailed description provided in the product Operation and Maintenance Manual.

The UCS proper programming in the POLON 4900 control panel consists in declaring a line element (similarly to fire warning devices) and assigning it to a logical number.

A logical number for UCS is selected from the 1 ÷ 100 range and assigned to an element in order to declare and configure individual modules of the UCS 6000 control panel.

The UCS 6000 entire programming procedure in the POLON 4900 panel includes two stages:

**Stage I:**

UCS 6000 declaration consisting in assigning:

- an element number (1 ÷ 127) using the automatic configuration or the configuration with verification or the manual configuration procedures;

- a logical number ( $1 \div 100$ );

### Stage II:

UCS 6000 logical configuration consisting in:

- declaring MGL modules;
- declaring an MPD module;
- declaring MPW modules;
- defining the zone for the fire alarm generated by the MGS module;
- MGL modules configuration:
  - defining the zone for the fire alarm generated by the MGL module;
  - defining the activation variant of an MGL module;
  - defining user messages for a technical alarm and non-maskable fault of an MGL module output;
- MPD module configuration:
  - defining activation variants for PK1, PK2 and an MPD module;
  - defining user messages for a technical alarm and non-maskable fault of PK1 and PK2 outputs of an MPD module;
- MPW module configuration:
  - defining activation variants for PK1, PK2 and an MPW module;
  - defining user messages for a technical alarm and non-maskable fault of PK1 and PK2 outputs of an MPW module;

### Variants of activating UCS 6000 control panel module outputs

See Table 7.6 for the possibilities of programming activation of UCS 6000 control panel module outputs.

The "control panel number" parameter (only for control panels operating in a network) has the following meaning:

control panel number = 0 shows the dependence on an event in any control panel included in the common detection area;

control panel number > 0 shows the dependence on an event from a given control panel (provided it is included in the common detection area);

control panel number "—" allows for making actuation dependent only on local control panel events.

For variants with additional zone dependencies: zone number = 0 shows the dependence on the total number of events within all zones in a selected control panel included in the common detection area.

Table 7.6

Variant	Control Panel No.	Zone number	Actuation Criterion
0	—	—	inactive output
1	0	—	general 1 <sup>st</sup> stage alarm
2	0 ÷ 31	0 ÷ 1024	'union' of 1 <sup>st</sup> stage alarms in assigned zones

3	0 ÷ 31	0 ÷ 1024	'conjunction' of 1 <sup>st</sup> stage alarms in assigned zones
4	0	—	general 2 <sup>nd</sup> stage alarm
5	0 ÷ 31	0 ÷ 1024	'union' of 2 <sup>nd</sup> stage alarms in assigned zones
6	0 ÷ 31	0 ÷ 1024	'conjunction' of 2 <sup>nd</sup> stage alarms in assigned zones

**Variant 0**

Means lack of an actuation criterion (permanently non-activated output).

**Variant 1 – general 1st stage alarm**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in the control panel or any control panels of the common supervision area.

**Variant 2 – 'union' of 1<sup>st</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 3 – 'conjunction' of 1<sup>st</sup> stage alarms in assigned zones of common supervision area control panels**

The output activation is performed in the case of a 1<sup>st</sup> stage alarm occurrence in at least two zones that are assigned to this relay.

**Variant 4 – general 2<sup>nd</sup> stage alarm**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in the control panel or any control panels of the common supervision area.

**Variant 5 – 'union' of 2<sup>nd</sup> stage alarms in assigned zones of the common supervision area control panels**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least one zone that is assigned to this relay.

**Variant 6 – 'conjunction' of 2<sup>nd</sup> stage alarms in assigned zones of common supervision area control panels**

The output activation is performed in the case of a 2<sup>nd</sup> stage alarm occurrence in at least two zones that are assigned to this relay.

In the case of variant 2 and variant 5 application, at least one zone should be assigned to an UCS, whereas in the case of variant 3 and variant 6 application, at least two zones should be assigned. Variants 1 and 4 do not require any zone assignment.

In the case of variants with zone dependence, the assigned zones are allocated to own control panel (an alone panel) or to control panels of the common supervision area (panels operating in a network).

The total number of zones assignments to all executive outputs and SAL type elements in the control panel should not exceed 64,000.

**Note:**

A non-maskable fault is also not signalled if the output is settled at variant 0.

After the standard configuration loading and automatic configuration performance, UCS elements are assigned to a special logical number 0, which causes that such an element is inactive.

## 7.10 TSR-4000 TERMINAL DECLARATION

A TSR-4000 terminal is a remote device to signal the POLON 4000 system control panel modes. Up to 16 terminals may be connected to one control panel and an RS-485 serial interface is responsible for transmission.

The declaration of terminals consists in selecting the SYSTEM CONFIGURATION -> HARDWARE DECLARATION -> TSR-4000 TERMINAL DECLARATION option for the declared terminal numbers of one of the two following options: WITH ACCESS and WITHOUT ACCESS. WITH ACCESS shows the permission for remote operation of the control panel and the fact that a terminal may remotely acknowledge an alarm or fault and remotely reset the control panel alarm.

## 8 FUNCTIONALITY DESCRIPTIONS

### 8.1 ALARMING

#### 8.1.1 Alarm types

After a line element in an addressable detection line is actuated, the POLON 4900 control panel, on the basis of the decision algorithms, generates the PRELIMINARY ALARM, 1<sup>st</sup> stage alarm or 2<sup>nd</sup> stage alarm depending on the alarming variants programmed for given zones (rooms).

A preliminary alarm is signalled by means of the internal acoustic signalling system and a red diode in the ALARM field.

The LCD display shows a window marked as !!! PRELIMINARY ALARM !!! and the information regarding the number of alarming zones and the number of zones not shown on the display (due to limited space) is displayed in a separated field below. The main alarm window displays messages assigned to the alarming zones. If the number of alarming zones is too big to display them simultaneously, i.e. more than 8 zones, the alarms which are not displayed may be viewed by means of the ALARM push button.

A preliminary alarm is an internal alarm and may be acknowledged with the ACKNOWLEDGEMENT push button and reset with the RESET push button.

#### **Note:**

A preliminary alarm may be transformed into a fire alarm or automatically cleared by the control panel according to the applicable algorithms resulting from alarming variants for zones.

**1<sup>st</sup> stage alarm** is indicated by fast flashing of a big red FIRE indicator, internal acoustic signalling and an additional diode in the ALARM field.

The LCD display shows a window marked as !!! FIRE ALARMS !!! and information regarding the number of alarming zones and the number of zones not shown on the display (due to a limited space) is displayed in a separated field below. On the right hand side, the system displays information regarding the elapsing time after which outputs to alarm transmission (monitoring) devices will be activated. Until that time, the control panel signals the 1<sup>ST</sup> STAGE ALARM.

The 1<sup>st</sup> stage alarm is an internal alarm and it always requires that the personnel on duty reacts in an appropriate manner, the alarm is acknowledged with the ACKNOWLEDGEMENT push button (during the T1 time) and the hazards within the facility are recognised (during the T2 time). If the personnel does not react properly to a 1<sup>st</sup> stage alarm, a 2<sup>nd</sup> stage alarm is generated.

The main alarm window displays messages assigned to the alarming zones. If the number of alarming zones is too big to display them simultaneously, i.e. more than 8 zones, the alarms which are not displayed may be viewed by means of the ALARM push button. All alarming zones will be viewed

apart from the first one which is permanently displayed in two alarm window lines and the last one displayed in the last two lines.

**2<sup>nd</sup> stage alarm** is an internal control panel mode (indicated by internal acoustic signalling and the 2<sup>ND</sup> STAGE ALARM message in the location of the previously displayed monitoring clock) which, apart from generating the signals in the control panel, causes the transmission of the fire signal outside (actuation of declared outputs as outputs to alarming-monitoring devices and actuation of additional outputs whose actuation depends on the 2<sup>nd</sup> stage alarm occurrence (e.g. external signalling devices or fire protection devices controlled with relay or potential outputs contacts).

A 2<sup>nd</sup> stage alarm may be preceded with a 1<sup>st</sup> stage alarm or it is generated immediately depending on the programmed alarming variant for a given zone in the premises or the operation mode set for the control panel. A 2<sup>nd</sup> stage alarm requires an immediate fire fighting action. During a fire alarm, a constant acoustic signal is evoked in the control panel (simultaneously with the optical signalling) which may be dis-actuated by pressing the backlit ACKNOWLEDGEMENT push button.

Pressing the backlit RESET push button results in clearing the fire alarm in the control panel. At least 2<sup>nd</sup> access level is required to reset the fire alarm signalling.

The POLON 4900 control panel enables users to choose (program) one of the 17 alarming variants for a given zone (marked as 1 ÷ 17). The process of switching a given line element in the addressable detection line into the alarm mode is verified by the control panel and, in the following sections of this Manual will be referred to as line element actuation.

The alarming process defined by means of variants 1 ÷ 17 may include all zones in the control panel programmed according to the programming manual PM. Within one zone, two groups of detectors marked as group A and group B may be defined. The groups allow creating coincidences within one zone.

When a fire alarm is generated, an applicable message is printed on the paper tape if the printer has been provided for operation.

### **8.1.2 One-stage alarm (variant #1)**

Actuation of a fire warning device results in immediate generation of a 2<sup>nd</sup> stage alarm.

This variant is applicable especially for zones of high fire danger.

### **8.1.3 Two-stage alarm (variant #2)**

Actuation of a fire warning device generates a 1<sup>st</sup> stage alarm which is signalled acoustically and optically during the T1 time allocated for the personnel to react and acknowledge the alarm (ACKNOWLEDGEMENT push button). If the personnel does not react during the T1 time, a 2<sup>nd</sup> stage alarm is evoked. Personnel's reaction prolongs the duration of a 1<sup>st</sup> stage alarm with the T2 time measured from the moment the 1<sup>st</sup> stage alarm is acknowledged. This alarm objective is to investigate the current fire danger.

After the T2 time elapses, if the personnel has not reset the alarm by accessing the system at the 2<sup>nd</sup> level and pressing the backlit RESET push button, the 2<sup>nd</sup> stage alarm is generated. The T1 and T2 times may be programmed taking into account individual features of the protected facility, in accordance with the programming manual (PM).

Two-stage alarming switches into one-stage alarming (immediate 2<sup>nd</sup> stage alarm) when the control panel operates in "PERSONNEL ABSENT" and "DELAYS OFF" mode.

### **8.1.4 One-stage alarm with single reset (40/60 sec.) of a fire warning device (variant #3)**

After a fire warning device is actuated, the control panel waits for 40 seconds for another fire warning device in the same zone to be actuated. Then the control panel generates a 2<sup>nd</sup> stage alarm. Otherwise, the control panel resets the device treating its actuation as false and waits for other

signals from the facility. If, during 60 seconds, the same or different fire warning device is not actuated in the same zone again, the control panel generates a 2<sup>nd</sup> stage alarm.

If the same or different element in the same zone is not re-actuated during 60 seconds, the control panel will treat the previous actuation as a false alarm.

The above-mentioned variant must be implemented for momentary occurrences of fire factors not connected with the fire.

#### **8.1.5 One-stage alarm with single reset (60 sec./8 min.) of a fire warning device (variant #4)**

After a fire warning device is actuated, the control panel waits for 60 seconds for another fire warning device in the same zone to be actuated. Then the control panel generates a 2<sup>nd</sup> stage alarm. Otherwise, the control panel resets the device treating its actuation as false and waits for other signals from the facility. If, during 8 minutes, the same or different fire warning device is re-actuated in the same zone, the control panel generates a 2<sup>nd</sup> stage alarm.

If the same or different device in the same zone is not re-actuated during 8 minutes, the control panel will treat the previous actuation as a false alarm.

The above-mentioned variant must be implemented for momentary occurrences of fire factors not connected with the fire.

#### **8.1.6 Two-stage alarming with single reset (40/60 sec.) of a fire warning device (variant #5)**

After a fire warning device is actuated, the control panel waits for 40 seconds for another fire warning device in the same zone to be actuated. Then the control panel generates a 1<sup>st</sup> stage alarm. Otherwise, the control panel resets the device treating its actuation as false and waits for other signals from the facility. If, during 60 seconds, the same or different element is re-actuated in the same zone, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

If the same or different element in the same zone is not re-actuated during 60 seconds, the control panel will treat the previous actuation as a false alarm.

The above-mentioned variant must be implemented for momentary occurrences of fire factors not connected with the fire.

#### **8.1.7 Two-stage alarm with single reset (60 sec./8 min.) (variant #6)**

After a fire warning device is actuated, the control panel waits for 60 seconds for another fire warning device in the same zone to be actuated. Then the control panel generates a 1<sup>st</sup> stage alarm. Otherwise, the control panel resets the device treating its actuation as false and waits for other signals from the facility. If, during 8 minutes, the same or different element is re-actuated in the same zone, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

If the same or different device in the same zone is not re-actuated during 8 minutes, the control panel will treat the previous actuation as a false alarm.

The above-mentioned variant must be implemented for momentary occurrences of fire factors not connected with the fire.

#### **8.1.8 One-stage alarm with a coincidence including two fire warning devices (variant #7)**

After a fire warning device is actuated, it is initially reset and the control panel generates the initial alarm mode. If, during 8 minutes, the reset device and at least one more device in the same zone are actuated, the control panel generates a 2<sup>nd</sup> stage alarm. Otherwise, after 8 minutes, the control panel resets the preliminary alarm mode treating the device actuation as false and returns to the quiescent mode.

### **8.1.9 Two-stage alarm with a coincidence including two fire warning devices (variant #8)**

After a fire warning device is actuated, it is initially reset and the control panel generates the initial alarm mode. If, during 8 minutes, the reset device and at least one more device in the same zone are actuated, the control panel generates a 1<sup>st</sup> stage alarm and the alarming process is the same as in variant 2. Otherwise, after 8 minutes, the control panel cancels the preliminary alarm mode treating the device actuation as false and returns to the quiescent mode.

### **8.1.10 Interactive one-stage alarm (variant #9)**

After a detector detects fire factor changes, other detectors located in this zone are informed about this fact. Confirmation of the changes by other detectors in the zone results in an alarm for this zone and a 2<sup>nd</sup> stage alarm in the control panel.

In this variant, fire may often be detected much faster than in the cases when the system waits for a single detector to fulfil a given criterion. Simultaneously, correct location of detectors and selection of their types does not result in increasing the system vulnerability to interrupting factors.

Depending of the forecast fire types, different smoke (ionising, optical) and heat detectors combinations may be used. Redundant actuation of a single detector in a given zone also generates an alarm in this zone and a 2<sup>nd</sup> stage alarm in the control panel.

### **8.1.11 Interactive two-stage alarm (variant #10)**

After a detector detects fire factor changes, other detectors located in this zone are informed about this fact. Confirmation of the changes by other detectors in the zone results in an alarm for this zone and a 1<sup>st</sup> stage alarm in the control and the alarming procedure is the same as in variant 2.

In this variant, fire may often be detected much faster than in the cases when the system waits for a single detector to fulfil a given criterion. Simultaneously, correct location of detectors and selection of their types does not result in increasing the system vulnerability to interrupting factors.

Depending of the forecast fire types, different smoke (ionising, optical) and heat detectors combinations may be used. Redundant actuation of a single detector in the zone results in an alarm for this zone and a 1<sup>st</sup> stage alarm in the control panel and the alarming procedure is the same as in variant 2.

### **8.1.12 One-stage alarm with a group-time coincidence (variant #11)**

After fire warning devices belonging either to group A or group B are actuated, the devices in this group are initially reset and the control panel generates the preliminary alarm mode. After the initial reset, if, during 8 minutes, the devices belonging to group A and B (at least one device in each group) report actuation, the control panel generates a 2<sup>nd</sup> stage alarm.

Otherwise, after 8 minutes, the control panel resets the preliminary alarm mode treating the devices actuation as false and returns to the quiescent mode.

#### **Note:**

Correct operation of this variant requires that one (preferably two) fire warning device is declared both for group A and group B. Such created groups must not be separated with any physical obstacles. Failure to meet the above mentioned requirements may result in constant reset of the alarming device.

### **8.1.13 two-stage alarm with a group-time coincidence (variant #12)**

After fire warning devices belonging either to group A or group B are actuated, the devices in this group are initially reset and the control panel generates the preliminary alarm mode. After the initial reset, if, during 8 minutes, the devices belonging to group A and B (at least one device in each group)

report actuation, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

Otherwise, after 8 minutes, the control panel resets the preliminary alarm mode treating the devices actuation as false and returns to the quiescent mode.

**Note:**

Correct operation of this variant requires that one (preferably two) fire warning device is declared both for group A and group B. Such created groups must not be separated with any physical obstacles. Failure to meet the above-mentioned requirements may result in constant cancellation of the alarming device.

**8.1.14 Two-stage alarm with a group-time coincidence to accelerate a 2<sup>nd</sup> stage alarm (variant #13)**

After a fire warning device belonging either to group A or group B is actuated, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

Simultaneous actuation (coincidence) of fire warning devices from both groups results in immediate generation of a 2<sup>nd</sup> stage alarm.

**Note:**

Correct operation of this variant requires that one (preferably two) fire warning device is declared both for group A and group B. Such created groups must not be separated with any physical obstacles.

**8.1.15 Two-stage alarm with initial zone reset and a group coincidence to accelerate a 2<sup>nd</sup> stage alarm (variant #14)**

After a fire warning device belonging to a zone is actuated, the control panel waits for 40 seconds and cancels the zone automatically.

If, during 8 minutes from the zone reset, any other device is re-actuated, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

Otherwise, if the devices in the zone are not re-actuated within 8 minutes, the control panel treats the previous actuation as false and returns to the quiescent mode.

Simultaneous actuation (coincidence) of fire warning devices from both groups results in immediate generation of a 2<sup>nd</sup> stage alarm.

**Note:**

Correct operation of this variant requires that one (preferably two) fire warning device is declared both for group A and group B. Such created groups must not be separated with any physical obstacles.

**8.1.16 Two-stage alarm with a coincidence including two fire warning devices to accelerate a 2<sup>nd</sup> stage alarm (variant #15)**

After a fire warning device belonging to a zone is actuated, the control panel generates the 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

Actuation of two or more fire warning devices in this zone results in accelerated generation of a 2<sup>nd</sup> stage alarm.

**Note:**

Correct operation of this variant requires that at least two (preferably three) fire warning devices are declared in the zone.



### **8.1.17 Two-stage alarm with initial zone RESET and a coincidence including two fire warning devices to accelerate a 2<sup>nd</sup> stage alarm (variant #16)**

After a fire warning device belonging to a zone is actuated, the control panel waits for 40 seconds and resets the zone automatically.

If, during 8 minutes from the zone reset, any other device is re-actuated, the control panel generates a 1<sup>st</sup> stage alarm and the alarming procedure is the same as in variant 2.

Otherwise, if the devices in the zone are not re-actuated within 8 minutes, the control panel treats the previous actuation as false and returns to the quiescent mode.

Actuation of two or more fire warning devices in this zone results in accelerated generation of a 2<sup>nd</sup> stage alarm.

#### **Note:**

Correct operation of this variant requires that at least two (preferably three) fire warning devices are declared in the zone.

### **8.1.18 One-stage alarm with temporary zone dis-actuation (variant #17)**

Actuation of a fire warning device in a zone during control panel operation in the PERSONNEL ABSENT mode (the PERSONNEL ABSENT diode is lit) results in generating a 2<sup>nd</sup> stage alarm. When the control panel operates in the PERSONNEL PRESENT mode (the PERSONNEL ABSENT diode is off), the zone is automatically dis-actuated (fire warning devices are not visible to the control panel).

### **8.1.19 Alarm with a manual call point (ROP)**

After the ROP-4001M or ROP-4001MH manual call points is actuated, the control panel immediately generates a 2<sup>nd</sup> stage alarm, regardless of the variant programmed in the zone to which the manual call point is assigned.

### **8.1.20 Alarming in the "DELAYS OFF" mode**

In the "DELAYS OFF" mode, the control panel does not introduce any delays of given outputs actuation. The T1, T2 and T3 time is reset so two-stage alarm changes into appropriate one-stage alarm. However, the lack of delays does not result in removing any coincidental variants or variants with initial reset (in these variants two-stage alarm is replaced with one-stage alarm).

The "DELAYS OFF" mode also results in zeroing delays for PK relays and LS potential outputs.

#### **Note:**

The "DELAYS OFF" mode does not reset the delays programmed directly in the EKS-4001 element by means of the "OPERATION MODE" option.

### **8.1.21 Alarming in the "PERSONNEL ABSENT" mode**

The alarming variants aimed at eliminating false alarms require the operating personnel's co-operation.

These variants are useless if an operator is not present by the control panel. In such cases, programming any delays in informing the responsible service about a fire is not advisable. To this end, it is possible to switch the control panel operation mode into PERSONNEL ABSENT, which will result in the fact that the alarming variants for all zones are automatically changed into standard one-stage alarm (variant 1) or, in the case of interactive variants, they are changed into one-stage interactive alarm (variant 9).

The operation mode is switched after pressing the PERSONNEL ABSENT push button (the diode located in this push button is lit). Changing the control panel operation mode is possible with at least 2<sup>nd</sup> access level.

The operation mode is automatically switched to PERSONNEL ABSENT when one of the four times for automatic operation mode switching into the PERSONNEL ABSENT is programmed.

The operation mode is switched to PERSONNEL PRESENT after pressing the PERSONNEL ABSENT push button again (the diode located in this push button is off). The programmed alarming variants are restored to all zones.

## 8.2 FAULTS SIGNALLING

Thanks to its internal self-monitoring systems, the POLON 4900 control panel detects and signals faults in detection lines and in the control panel.

Any detected fault is signalled optically and acoustically. Faults are signalled optically by steady light of the yellow collective FAULT diode and acoustically by a slow intermittent signal of constant frequency.

Clearing the optical and acoustic signals (FAULT) takes place automatically after the fault is removed. The FAULT acoustic signalling is dis-actuated after pressing the backlit ACKNOWLEDGEMENT button.

Information regarding the detected faults is provided on the display. If, during 10 minutes from the latest registered fault occurrence, there is no new fault, the LCD display is dis-actuated. If the display is dis-actuated, the currently detected faults may be viewed after pressing the FAULT push button. Then the display will present fault messages. If the number of messages exceeds the display capability, they may be scrolled using the same push button or ↓↑ push buttons.

The exception from this rule are non-maskable faults in (properly programmed) monitoring circuits of LK monitoring lines or the EKS-4001 monitoring and controlling elements whose messages are automatically presented on the display until they are cleared.

If a printer is provided for operation, a message regarding a given fault will be printed on a paper tape after it is detected.

### 8.2.1 Fault types

#### 1. System faults:

- program memory, RAM memory or CONFIGURATION fault;
- microprocessor operation interference.

#### 2. Microprocessor module faults:

- microprocessor controller for the LCD display and operator's console fault;
- the MSL-1M module microprocessor controller fault;
- the MSL-2M module microprocessor controller fault;
- loss of communication with the controller for the LCD display and operator's console;
- loss of communication with the MSL-1M module controller;
- loss of communication with the MSL-2M module controller;
- non-declared MSL-1M or MSL-2M module if connected;
- MSI-48 module microprocessor controller fault.

#### 3. Detection line faults:

- line processor fault;
- line output short circuit;
- loop output short circuit;
- break in a detection line;

- detection line earth fault;
- number of line elements in a detection loop exceeding 127;
- presence of not declared elements in a detection line;
- incorrect parameters for the detection loop (resistance, capacity);
- no response from a line element to a query from the control panel;
- multiple declaration of the same line element.

#### 4. Line element faults:

- measuring element fault;
- short circuit isolator actuated;
- EEPROM memory fault;
- EKS output line fault;
- WE1 EKS input line fault;
- WE2 EKS input line fault;
- WE1 EKS non-maskable fault;
- WE2 EKS non-maskable fault;
- EWS relay fault;
- battery of SAL external power adaptor fault.

#### 5. Control panel input and output faults:

- LS supervised potential outputs fault;
- LK monitoring line outputs non-maskable fault.

#### 6. Power supply fault:

- voltage outage on the main power source;
- reserve power supply fault (no battery, short circuit in terminals connecting the batteries or B1 fuse damage);
- decrease in battery voltage below  $22\text{ V} \pm 1\text{ V}$ ;
- battery cluster charger fault;
- + 5 V transducer fault (also a short circuit);
- temperature probe fault (short circuit, no probe);
- burnt or missing melt insert of the B2 fuse for the MZ-48 module;
- earth fault, i.e. connection of the power supply output module with the control panel housing or grounding.

#### 7. Network faults:

- hardware number not compliant with the declaration;
- no network control panel declaration;
- repeated control panel numbers in the network;
- no. 1 ring fault;
- no. 2 ring fault;
- incorrect connection of rings;
- no communication with the network control panel.

#### 8. TSR-4000 terminal faults

- configuration memory fault;
- EPROM memory fault;
- LCD display fault;
- relay output fault;
- signalling line fault;
- incorrect terminal number;
- 230 V power supply fault;
- battery fault;
- battery charging system fault;

- voltage drop below 22 V;
- terminal earth fault.

#### 9. Other faults:

- thermal printer fault;
- no paper in the printer
- UCS 4000 control panel faults ( opisane w rozdziale poświęconym temu urządzeniu).

#### Note:

In order to reset a system fault, it is necessary to switch the K6 key of the SW1 switch on the PSC board and reset the active microprocessor. After clearing a system fault, the standard configuration must be loaded and the control panel must be set up again.

### 8.3 TESTING

The POLON 4900 control panel provides three types of operation tests:

- tests of the TSO-4900 board signalling elements;
- tests of line elements installed in the facility;
- tests of executive devices controlled by the EKS-4001 controlling elements.

Tests may be carried out by operators at the 2<sup>nd</sup> or higher access level authorisation. The testing procedures must be in accordance with the programming manual (PM).

#### 8.3.1 TSO-4900 board signalling elements testing

During the test of signalling elements, all optical diodes and acoustic signals are actuated one after another. When the test is finished, the control panel automatically returns to the standard operation mode.

Testing is automatically stopped when the control panel receives a fire alarm signal. Moreover, switching to the testing mode during fire alarm signalling is not possible.

The signalling elements test may always be stopped after pressing the ESC key.

#### 8.3.2 Testing fire line elements in zone

The POLON 4900 control panel makes it possible to test line elements in an addressable line which belong to any zone.

The procedure of switching into the testing mode of elements in a zone is carried out according to the programming manual (PM). Switching a given zone into the test mode is signalled by steady light of the yellow collective TESTING diode.

After an alarm signal is received from a line element, information regarding a test alarm is shown on the LCD display and printed out (if a printer is connected).

The alarming element is cancelled in approx. 60 seconds.

The procedure of dis-actuating of the mode for testing elements (detectors) in a zone is carried out according to the programming manual (PM).

A fire alarm from the zone which has not been switched into the testing mode results in automatic dis-actuation of the testing mode and switching into fire alarm signalling in the control panel according to the programmed variant.

Any number of line elements within the tested zone may be in the alarm mode at the same time, however, for the inspection purposes, it is recommended to actuate line elements consecutively.

It is impossible to switch the system into the TEST mode within faulty or disabled zones or in case a fire alarm is signalled.

### **8.3.3 EKS-4001 monitoring and controlling elements testing**

The EKS-4001 monitoring and controlling elements tests consist in switching an element into the testing mode, which should result in actuating an output relay. The element should indicate a correct relay output condition.

### **8.3.4 EWS-4001 multi-output controlling elements testing**

The EWS-4001 testing consists in switching individual relay outputs of an element into the testing mode, which should result in activating the tested relay. The element should indicate a correct condition of the relay output tested.

### **8.3.5 EWK-4001 multi-input monitoring elements testing**

The EWK-4001 testing consists in forcing (by means of a characteristic resistor) a technical alarm mode on individual inputs. The control panel should indicate a technical alarm mode for these inputs.

### **8.3.6 SAL-4001 acoustic signalling devices testing**

The SAL-4001 testing consists in switching an element into a testing mode, which should result in actuation of the required sound signals.

### **8.3.7 Line elements location**

The control panel enables its users to physically inspect the line element location through alternate actuation of the red and yellow LEDs of the element. This testing procedure is described in the programming manual (PM).

## **8.4 SYSTEM ELEMENTS DISABLEMENT/RE-ENABLEMENT**

The control panel software enables disablement of line elements, zones, outputs controlled by the PPW-49 module or EKS-4001 monitoring and controlling elements.

Any disablement is indicated by the control panel with a steady light of the DISABLEMENT collective yellow diode. Disablement and re-enablement is executed from at least 2<sup>nd</sup> access level.

### **8.4.1 Fire warning devices and zones disablement/re-enablement**

In the case of fire warning devices fault or performing repair works in the supervised premises that can produce false alarm triggering, the control panel provides a possibility to switch off monitoring of the premises section through the entire zone (or its appropriate part) disablement.

Fire warning devices disablement/re-enablement is carried out in the FIRE WARNING DEVICES DISABLEMENT option.

A section of a zone disablement/re-enablement is performed disabling individual addressable elements in the zone, whereas the whole zone disablement/re-enablement can be performed in much simpler way, carrying out the operation for the whole zone in the ZONES DISABLEMENT option.

Any disablement and re-enablement is executed from at least 2<sup>nd</sup> access level.

A disablement of fire warning device or entire zone entails that the control panel does not receive alarm and fault signals from the disabled line elements, therefore automatically switches off fault signalling within this zone, if such signal is sent. After the zone re-enablement, if the fault is not removed, the fault signalling occurs again.

**Note:**

A partial zone disablement, with programmed alarm variant higher than the second one, causes that this zone variant is automatically replaced with the immediate one (variant 1). After the zone complete re-enablement, the initially programmed variant recurs.

#### **8.4.2 PK relays disablement/re-enablement**

The PK relays disablement/re-enablement is accomplished in the RELAYS DISABLEMENT option. The PK relay disablement brings switching off an appropriate relay regardless of the control panel state.

#### **8.4.3 LS signalling lines disablement/re-enablement**

The LS signalling lines disablement/re-enablement is executed in the SIGNALLING LINES DISABLEMENT option as a logical device. The LS line disablement results in an interruption of fault signalling. After a re-enablement, unless the fault is removed, signalling appears again.

#### **8.4.4 LK monitoring lines disablement/re-enablement**

The LK monitoring lines disablement/re-enablement is executed in the MONITORING LINES DISABLEMENT option as a logical device. The LK line disablement results in an interruption of fault signalling or technical alarm signalling. After a re-enablement, unless the fault or technical alarm is removed, signalling appears again.

#### **8.4.5 EKS-4001 monitoring and controlling elements disablement/re-enablement**

The EKS-4001 monitoring and controlling elements disablement/re-enablement is accomplished in the EKS ELEMENTS DISABLEMENT option as logical devices. The EKS disablement produces switching off the output relay and the element fault signalling or technical alarm signalling interruption. After a re-enablement, unless the fault or technical alarm is removed, signalling is restored.

#### **8.4.6 EWS-4001 multi-output controlling elements disablement/re-enablement**

The EWS-4001 controlling elements disablement/re-enablement is achieved in the EWS ELEMENTS DISABLEMENT option as logical devices. The EWS disablement results in switching off the output relay and an interruption of the output fault signalling. After a re-enablement, unless the fault is removed, signalling is restored.

#### **8.4.7 EWK-4001 multi-input monitoring elements disablement/re-enablement**

The EWK-4001 monitoring elements disablement/re-enablement is executed in the EWK ELEMENT DISABLEMENT option as a logical device. The EWK disablement results in switching the input off, what induces that no signal from this input are received, and the fault or technical alarm signalling is interrupted. After a re-enablement, the control panel indicate the current status of this input.

#### **8.4.8 SAL-4001 acoustic signalling devices disablement/re-enablement**

The SAL-4001 acoustic signalling disablement/re-enablement is executed in the SAL ELEMENT DISABLEMENT option as a logical device. The SAL disablement results in switching off the SAL signalling and a fault signalling interruption. After a re-enablement, unless the fault is removed, the fault signalling is restored.

### **8.5 EVENT AND ALARM MEMORY**

#### **8.5.1 Event memory**

The POLON 4900 control panel may store 2,000 last events in its non-volatile memory. Each event is accompanied by a description, date and time of occurrence (accuracy up to 1 second). The events stored in the memory in chronological order include:

- alarm occurrences;
- technical alarms;
- faults;
- entering the configuration option and exit;
- tests;
- disabled elements;
- actuation of executive devices;
- personnel reactions: ACKNOWLEDGEMENT, RESET, delay actuation, etc.

The event memory contents may be viewed on the display or printed out (see the counter manual in the programming manual [PM]).

**Note:**

Loading the standard configuration results in clearing the event memory.

### 8.5.2 Alarm memory

The control panel may store up to 9,999 latest alarms in its non-volatile memory together with the date, time (accuracy up to 1 second) and zone of their occurrence. Moreover, if the control panel operates in a network, the unit number is also stored.

The alarm memory contents may be viewed on the display or printed out (see the counter manual in the programming manual [PM]).

**Note:**

The alarm memory may be cleared only from the control panel menu (4<sup>th</sup> access level authorisation necessary). Loading the standard configuration does not result in clearing the alarm memory.

## 9 CONTROL PANEL NETWORK OPERATION

The POLON 4000 system control panels may be connected with one another by means of a double pair of wires (or a pair of optical fibre cables) in a form of a ring in order to create a network of control panels. The double ring of connections among control panels prevents from the network system fault in case any transmission path is faulty (redundancy).

Up to 31 control panels equipped with the MSI-48 module may operate in a network. All units should be equipped with identical software versions. Each control panel should have an individually programmed number from the 1 ÷ 31 range (local control panel number) and the numbers must not repeat. A control panel number is declared within software and additionally set within hardware on the MSI-48 module keys. The compliance between the declaration and hardware setting is checked. The number set within hardware is used by the MSI-48 module in case the I2C connectivity with the PSC-49 module is interrupted. A standalone control panel (outside the network) must be programmed as No. 0 (the MSI-48 must be disconnected and not declared). The network should include a control panel programmed with no. 1 – MASTER. The MASTER control panel makes it possible to program the system configuration, i.e. the set of numbers of control panels belonging to the network elements, i.e. SLAVE control panels. The MASTER panel transmits the system configuration to the SLAVE panels and monitors the network. In the event of the MASTER control panel fault, the next control panel in the sequence takes its role over.

Every network control panel makes it possible to declare a group of control panels which co-operate with it in order to create this control panel common detection zone. The network control panel, in which other (remote) panels are declared for co-operation, works as a collective control panel.

This function is not symmetrical, i.e. if control panel B is within the common detection area of control panel A, control panel A is not required to be included in the common detection area of control panel B. In particular, this function allows creating zones in which the differentiated control panel enables

to collect fire and fault signals from several control panels without reciprocity or with full reciprocity. The network logical configuration diagram is shown in Fig. 9.1.

In special cases, the collective control panel may serve as a local control panel if no remote panel has been declared to co-operate with it.

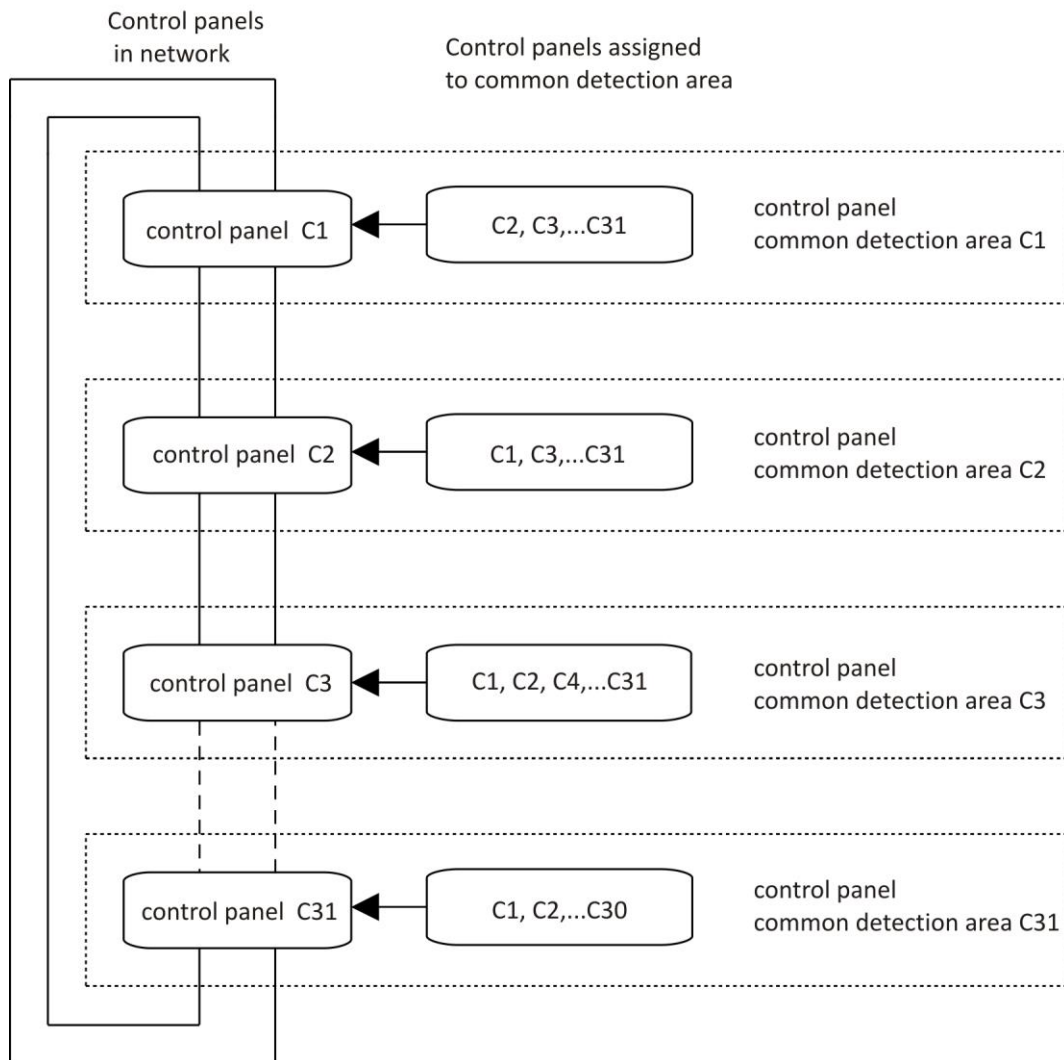


Fig. 9.1 General diagram of control panels logical network configuration.

### 9.1 MSI-48 NETWORK MODULE

The optional MSI-48 and MSI-48 Ed.3 network module makes it possible to connect control panels within a network by means of RS-422 serial interfaces (bitrate 19,200 bps). Every module operates as an amplifier enabling the ring's total length to be extended. In case the module is faulty or cut off from power supply, it is disconnected from the ring (by means of hardware) and other control panels (participants to the network) may operate without interruptions.

The module is supplied with separated 5 V or 24 V (Ed.3) voltage generated on the MIK-48 interfaces module. If the module is purchased individually, it must be installed on the left side of the control panel, above the MIK-48 module. Next, the MIK-48 module output terminals marked as + 5 V – (Z2 connection) or + 24 V – (Ed.3) (Z3 connection) must be connected with + 5 V – or + 24 V – (Ed.3) (ZL5 connection) input terminals of the MSI-48 module. Then, the middle pin of the 26-core strip cable connecting the PSC-49 with the MIK-48 must be inserted in the ZL6 socket marked as "TO PSC-49".



The MSI-48 module is equipped with an 8-position switch containing keys K1...K8.

Keys K1...K5 are used to assign (by means of hardware) a number to a control panel using the binary code. Each of these five keys has significance ( $W_n$ ) defined by its number.

The control panel number may be expressed by means of the following formula:

$$\text{CONTROL PANEL NO.} = W_1 \cdot 1 + W_2 \cdot 2 + W_3 \cdot 4 + W_4 \cdot 8 + W_5 \cdot 16$$

where:

$W_n=0$ , if  $K_n$  key is in OFF position

$W_n=1$ , if  $K_n$  key is in ON position

E.g. control panel numbered as 9 has the following keys settings:

K1 - ON

K2 - OFF

K3 - OFF

K4 - ON

K5 - OFF

$$\text{CONTROL PANEL NO.} = 1 \cdot 1 + 0 \cdot 2 + 0 \cdot 4 + 1 \cdot 8 + 0 \cdot 16 = 9$$

Keys K6, K7, K8 currently are not used.

The MSI-48 module is equipped with ZW1 ÷ ZW4 or ZW1 ÷ ZW6 (Ed.3) programming jumpers which should be set in the position shown in Fig. 10.2.

Additionally, the module is equipped with 8 service diodes (D1 ÷ D8) which may be tuned off by setting the ZW5 or ZW8 (Ed.3) in position 2-3, which results in decreasing the total current consumption of the module.

There are two methods of interconnecting the control panels:

- in a form of a double ring created by means of two independent pairs of wires in a screen;
- in a form of a double ring created by a pair of optical fibre cables.

In case the control panels are connected by means of wires, the first ring is created by connecting a pair of wires to applicable output terminals A and B (OUT-1) in one control panel with applicable input terminals A and B (IN-1) in the other control panel (terminal is connected with terminal A and terminal B is connected with terminal B). By analogy, applicable terminals A and B (OUT-2) of one control panel must be connected with terminals A and B (IN-2) of the other control panel in order to create the second ring. An example of connecting four control panels by means of a double ring of wires is shown in Fig. 9.3. The maximum cable length between two control panels must not exceed 1,200 m. It is recommended to use the YnTKSYekw. 1 x 2 x 0.8 mm installation cable.

The screen of each cable section should be grounded only from one side and the other end should be connected (via 10 nF/1500 V capacitor) to the grounding system of a remote control panel (in order to ensure better resistance to interference – see Fig. 9.3). Both rings should be created independently, i.e. wire pairs should not be routed in the same cable in order to provide their resistance to interference and possible cable damage.

In case control panels are connected by means of optical fibre cables, each unit should be equipped with two optical fibre converters. It is recommended to use converters manufactured by LANEX:

- TR-55 for any type of fibre-optic cables terminated with the SC/PC type contacts. The distance between two neighboring control panels in a ring depends on a fibre-optic cable type used. (For a single-mode optic fibre of attenuation at 0,4 dB/km, the maximum distance is equal ca. 40 km taking into consideration the converter parameters.)
- TR-43.7.1 for 62.5/125  $\mu\text{m}$  or 50/125  $\mu\text{m}$  multi-mode fibre-optic cables (850 nm wave) terminated with the ST<sup>®</sup> type contacts. This type connection enables reaching the distance between two neighbouring control panels in a ring equal to approx. 3 km (depending on the cables attenuation).

- TR-43.7.2 for 9/125 μm single-mode fibre-optic cables (1,300 nm wave) terminated with the FC type contacts. This type connection enables reaching the distance between two neighbouring control panels in a ring equal to approx. 12 km (depending on the cables attenuation).

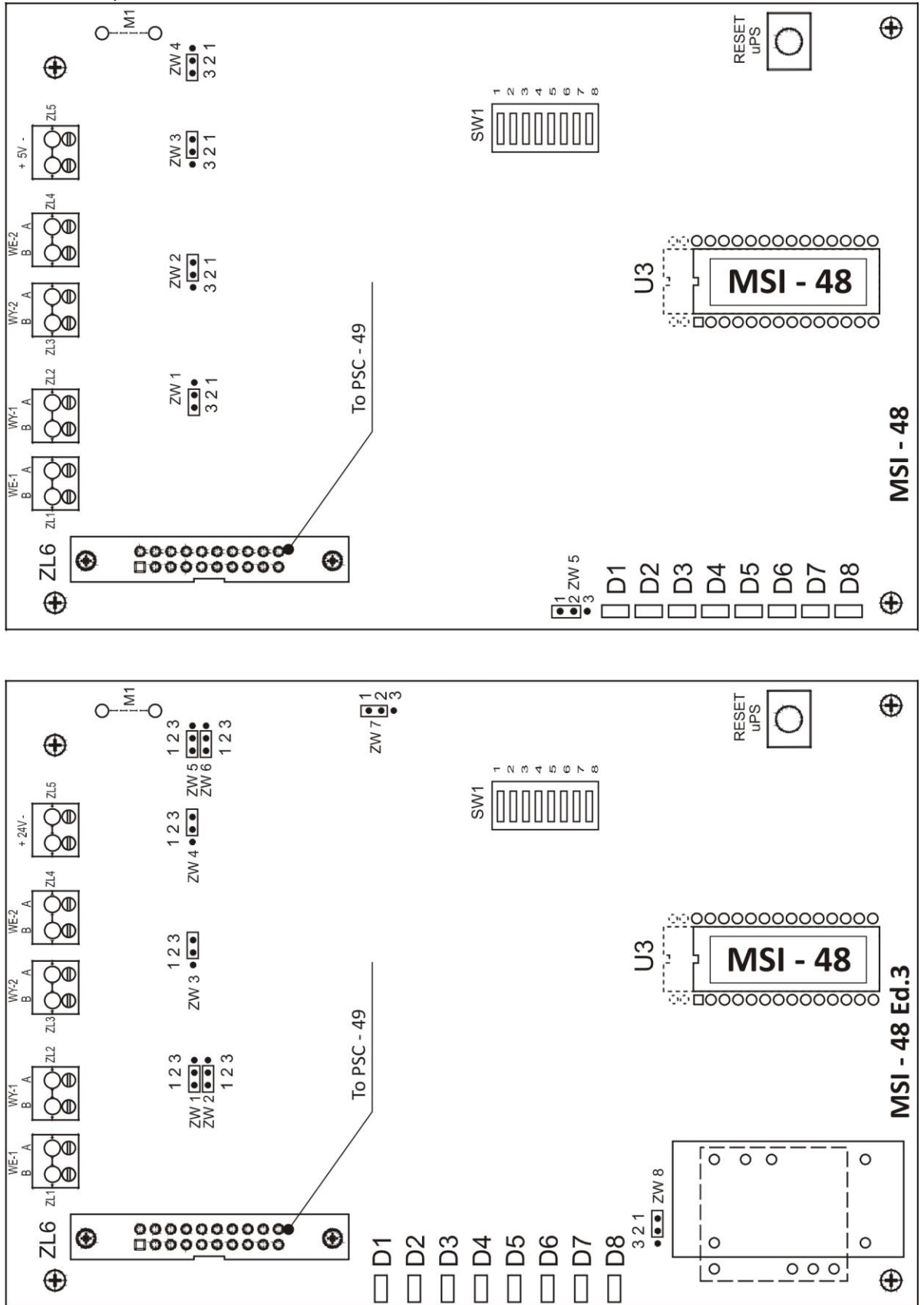


Fig. 9.2 MSI-48 and MSI-48 Ed. 3 network modules.

Every converter is equipped with a special latch for fast installation on a typical supporting rail (DIN EN 50022) located below the control panel top wall. The converters should be power supplied with + 24 V voltage which can be routed from the MZ-48 module or MIK-48 module output terminal blocks. If the converters are powered from the control panel voltage and the MSI-48 Ed.3 module, the ZW7 jumper should be switched into the 2-3 position. The diagram showing connections between the converters and the MSI-48 module and further between control panels by means of fibre-optic cables is presented in Fig. 9.4.

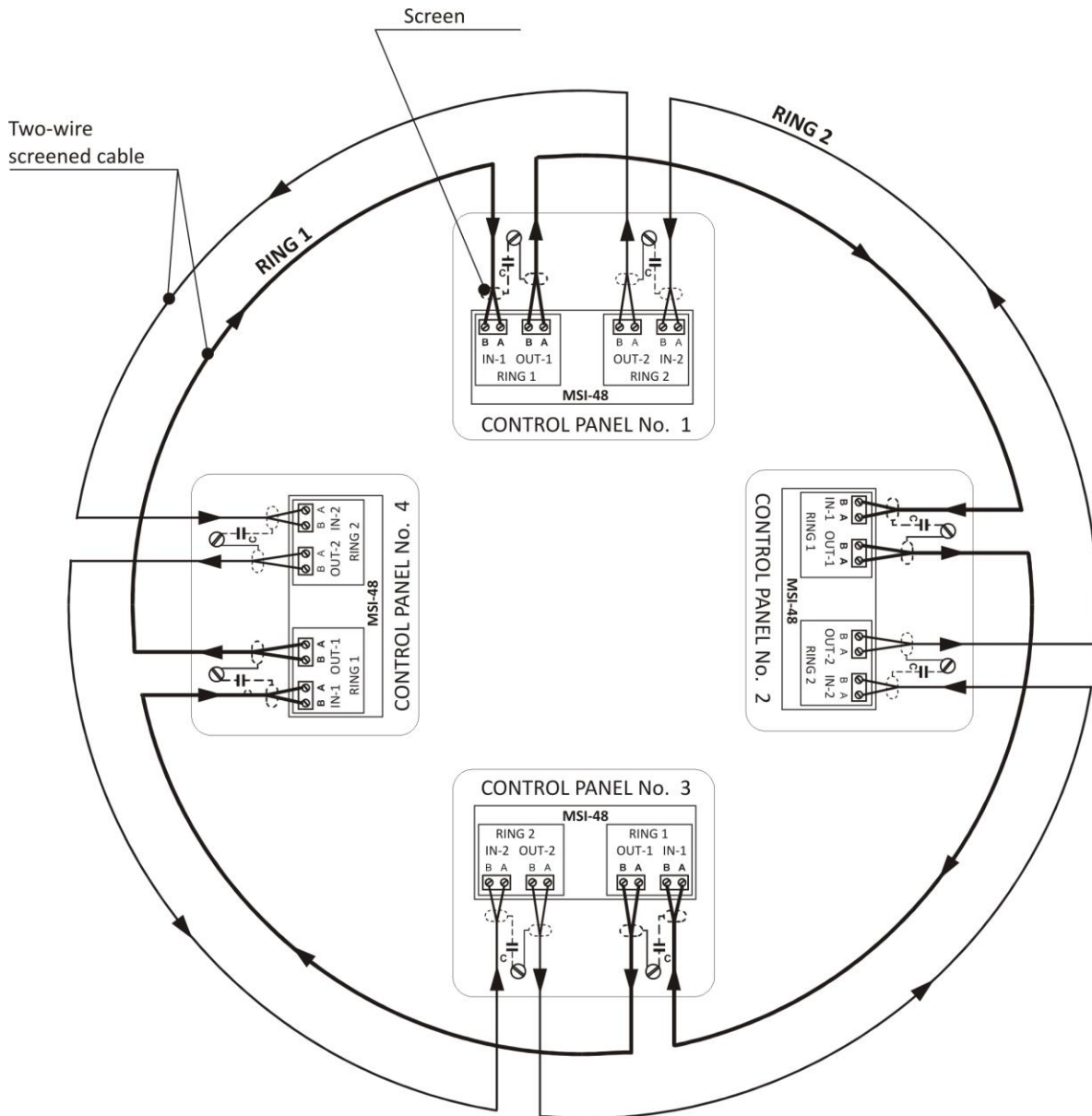


Fig. 9.3 Four control panels network connection with two pairs of cables

**Note:**

When control panels are connected using fibre-optic cables, it is recommended to provide the optical fibre converters power supply from an external power supply unit (independent from the control panel voltage) of the following parameters:  $U_{out}$  at  $10 \div 40$  V,  $I_{out}$  at min. 200 mA, insulation resistance at min. 1,000 V DC. Maintenance purpose disconnection of the control panels in which optical fibre converters are supplied by external voltage, should not result in the connection rings break (in the case of the converters power supply from the control panel, the control panel switch off will result in the discontinuity of both rings connecting the control panels; one break does not

influence the transmission continuity between the control panels). It is advisable that the power supply device is fitted with a latch (similarly to the optical fibre converter) to enable its installation on the rail shared with the converters.

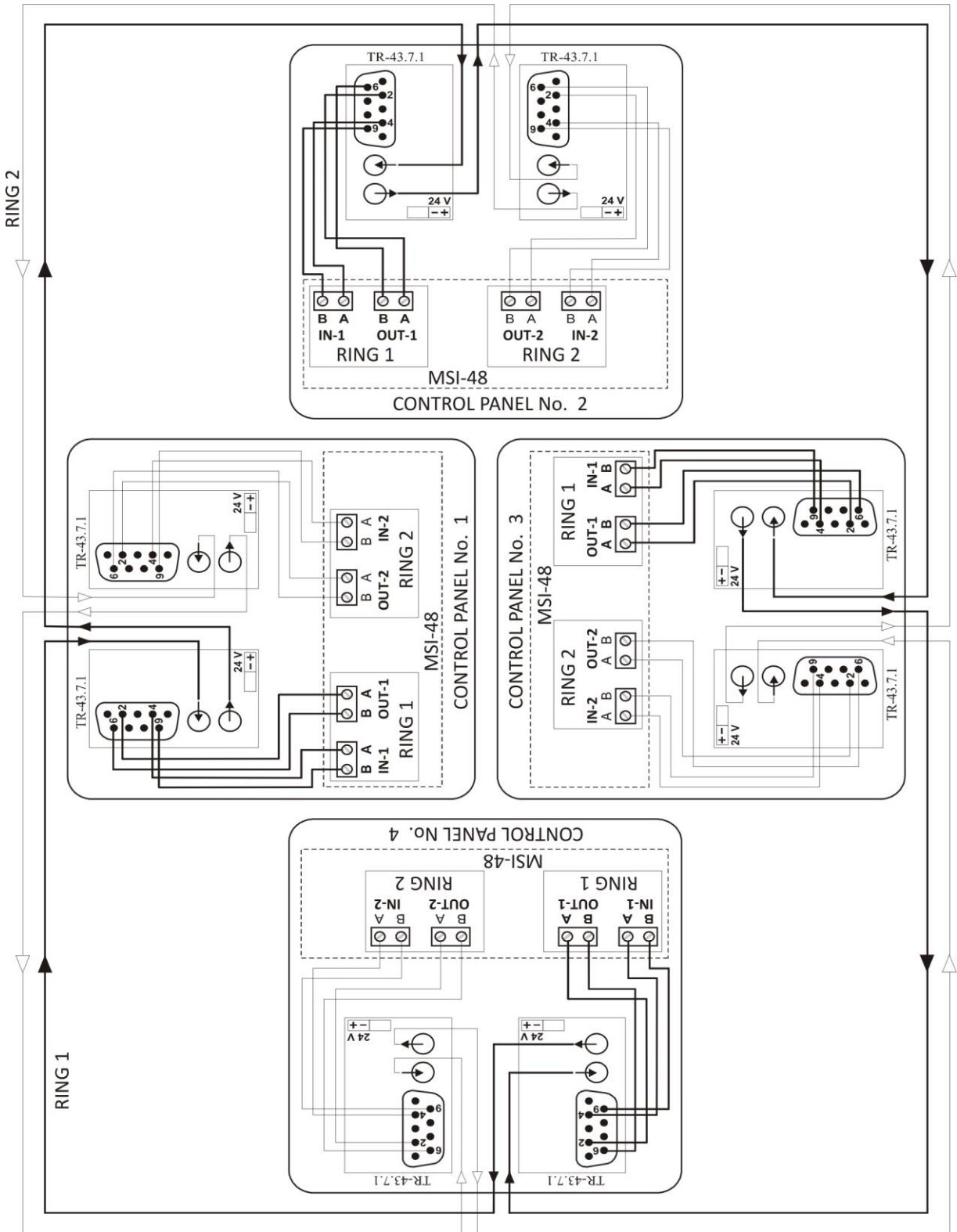


Fig. 9.4 Four control panels network connection with a pair of optical fibres (ST type contact)

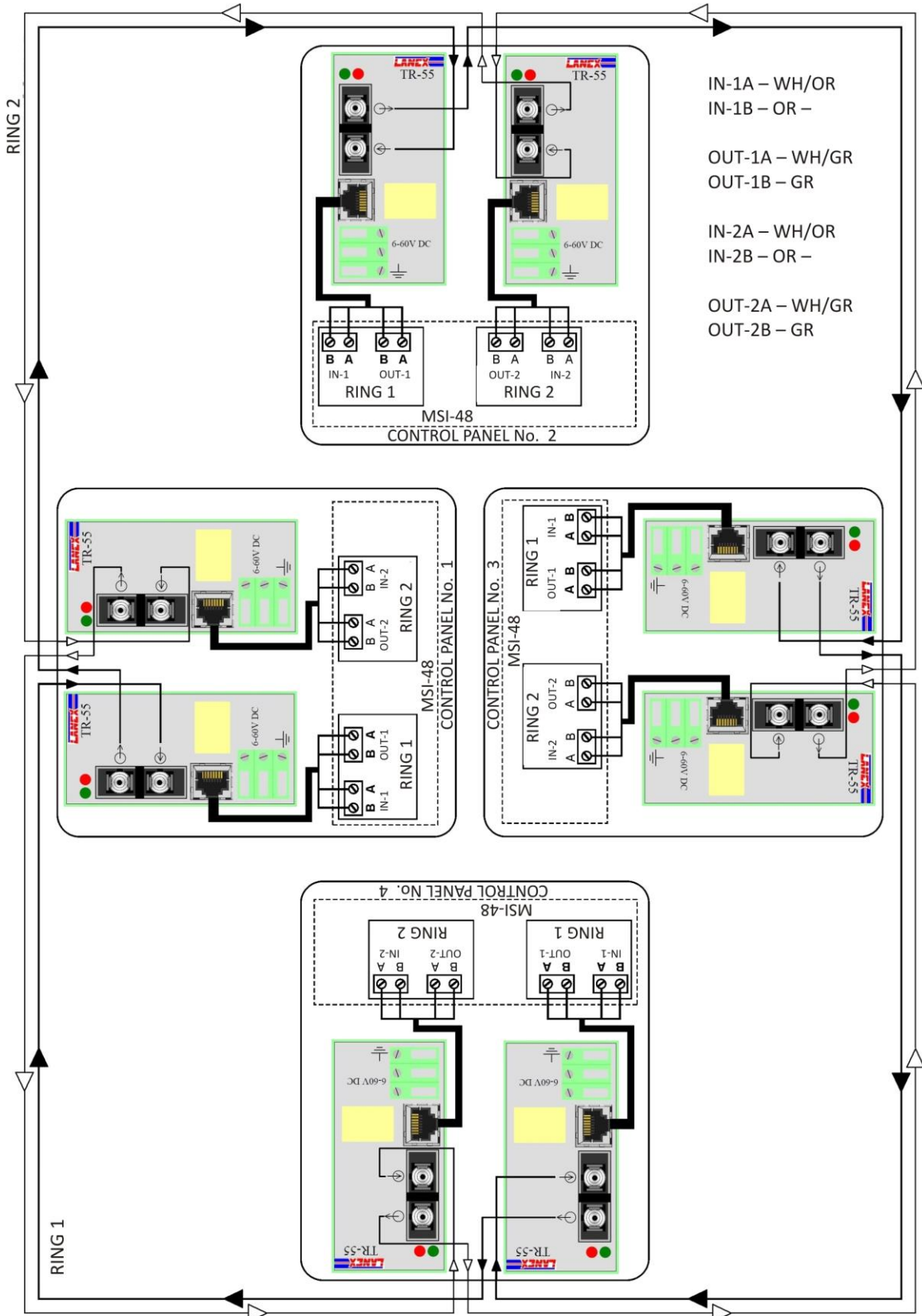


Fig. 9.5 Four control panels network connection with a pair of optical fibres (SC/PC type contact)

## 9.2 NETWORK PANEL FUNCTIONALITY

The console of a control panel operating in the network may work in three display and access modes:

- **local mode** – when a control panel with a local number is selected;
- **collective (group) mode** – when a control panel with number 0 is selected;
- **remote mode** – when a control panel with a different number is selected (it should exist in the network).

Display and access modes may be changed at any moment by direct selection of a control panel number and its confirmation with the Enter key or in the configuration menu.

The basic display mode for a control panel operating in the network is the collective mode.

### 9.2.1 Local mode

In the local mode (when the local control panel number is selected) the local control panel mode is displayed. All readout and configuration functions relate to the control panel in which these actions are taken. Signalling diodes and the acoustic signalling device indicate the internal mode of a local control panel.

In order to select the local ("our") control panel, the access to its network number must be selected. Then, the control panel shows (by means of its indicators) only the condition of this local control panel (local detection area condition).

### 9.2.2 Collective mode

The collective mode is the basic mode for control panel operation in a network. In case the fire is detected in the common detection area, the control panel automatically switches into the collective operation mode.

In order to select the collective mode, the control panel No. 0 must be selected, which means that the control panel indicators will display the condition of the common detection area for the control panel.

If no other control panels are assigned to the control panel (single control panel local detection area), the indications for the local and common detection areas are identical.

Within the common detection area (when the control panel no. 0 [collective] is selected), the indicators operate as follows:

- FIRE indicator – global fire mode for the control panels of the common detection area;
- ALARM indicator – global fire mode for the control panels of the common detection area; the push button enables display of all alarming zones of the common detection area with control panels numbers given;
- FAULT indicator – global fault mode for the control panels of the common detection area; the push button enables display of all control panel faults and general information regarding the fault occurrence in co-operating control panels. Similarly to alarms, non-maskable faults can be viewed in detail within the entire common detection area. In order to view the faults within the remote control panel in detail, it is necessary to select the remote control panel and view its faults.
- DISABLEMENT indicator – global disablement mode for the control panels of the common detection area; the push button enables display of all control panel disablements and general information regarding the disablement occurrences in the control panels within the common detection area. In order to view the disablements within the remote control panel in detail, select the remote control panel and view its disablements.

- TEST indicator – global testing mode for the control panels of the common detection area; the push button enables display of all control panel tests and general information regarding the test occurrences in the control panels within the common detection area. In order to view the fault tests within the remote control panel in detail, select the remote control panel and view its tests.
- TECHNICAL ALARM indicator – global technical alarm mode for the control panels of the common detection area; the push button enables display of all control panel technical alarms and general information regarding the technical alarm occurrences in the control panels within the common detection area. In order to view the technical alarms within the remote control panel in detail, select the remote control panel and view its technical alarms.
- ACKNOWLEDGEMENT indicator – global mode of the indicator for the control panels of the common detection area; the push button enables acknowledgement of all events in the control panels within the common detection area.
- RESET indicator – shows the possibility of cancelling a local control panel alarm or locally received alarm from the control panels of the detection area; the push button resets an alarm in the control panels within the common detection area.
- Other indicators, i.e. PERSONNEL ABSENT, DELAYS OFF, POWER SUPPLY, ALARM DEVICES and ALARM TRANSMISSION DEVICES, show the local control panel mode.

In order to view the events in a remote control panel, select this panel and proceed similarly to viewing the events in a local control panel.

In the collective mode, if a remote control panel is declared for co-operation as one of the control panels within the common detection area, even after disabling the remote operation in this control panel, it is still possible to remotely operate the ACKNOWLEDGEMENT and RESET push buttons.

In the collective mode, all programming, disablement, testing and programming review functions relate to the control panel with the local number.

### 9.2.3 Remote mode

In the remote mode, it is possible to select access to any "remote" control panel (also outside the common detection area) and view its software resources and condition (i.e. faults, disablements, event memory, etc.).

In the remote mode, when the number of a different control panel is selected, the remote control panel mode is displayed on the operator's panel. All readout and configuration functions relate to the remote control panel. In this mode, the real condition of the remote control panel is displayed without displaying the common (collective) condition of a distant control panel. For example, if an alarm from a different control panel within the common detection area is generated in the remote control panel, detection is remotely visible in this control panel since no zones belonging to this control panel is in the alarm mode.

The possibility of changing the condition and modifying the configuration resources in the remote control panel depends on the remote operation option programmed in this panel.

Three levels of remote access to a remote control panel may be programmed in this panel. They correspond to the access levels in a local control panel. The 4<sup>th</sup> level is remotely forbidden (disabled). The remote access may be disabled (recommended) but it does not mean that the access is fully denied to this control panel as its condition and software resources may still be reviewed.

After selecting a "remote" control panel, the indicators of "our" local control panel show the mode of the indicators installed in the former. The possibility of using the operating push buttons (in order to change its mode) depends on the provided level of "remote operation" in the remote control panel.

**Note:**

Common detection areas should be created as follows:

- Hierarchical group: among  $n$  allocated control panels only one  $k$  control panel (collective control panel) has the remaining  $n-1$  control panels declared to the common detection area.

The general diagram of a hierarchical group is as follows:

$$C1 \rightarrow Ck, C2 \rightarrow Ck, \dots, Cn \rightarrow Ck,$$

where  $k$  is the defined number of the collective control panel.

- Group of equal control panels: among  $n$  allocated control panels each  $k$  control panel ( $k = 1, 2, \dots, n$ ) is defined as a collective control panel for the remaining  $n-1$  control panels to the common detection area.

The general diagram of a group of equal control panels is as follows:

$$C1 \rightarrow Ck, C2 \rightarrow Ck, \dots, Cn \rightarrow Ck,$$

where  $k = 1, 2, \dots, n$  is a control panel of separated set of  $n$  panels.

It is not recommended to create cascade-type network configuration, e.g. for three control panels  $C1, C2, C3$ .  $C1 \rightarrow Ck$  and  $C2 \rightarrow Ck$ .

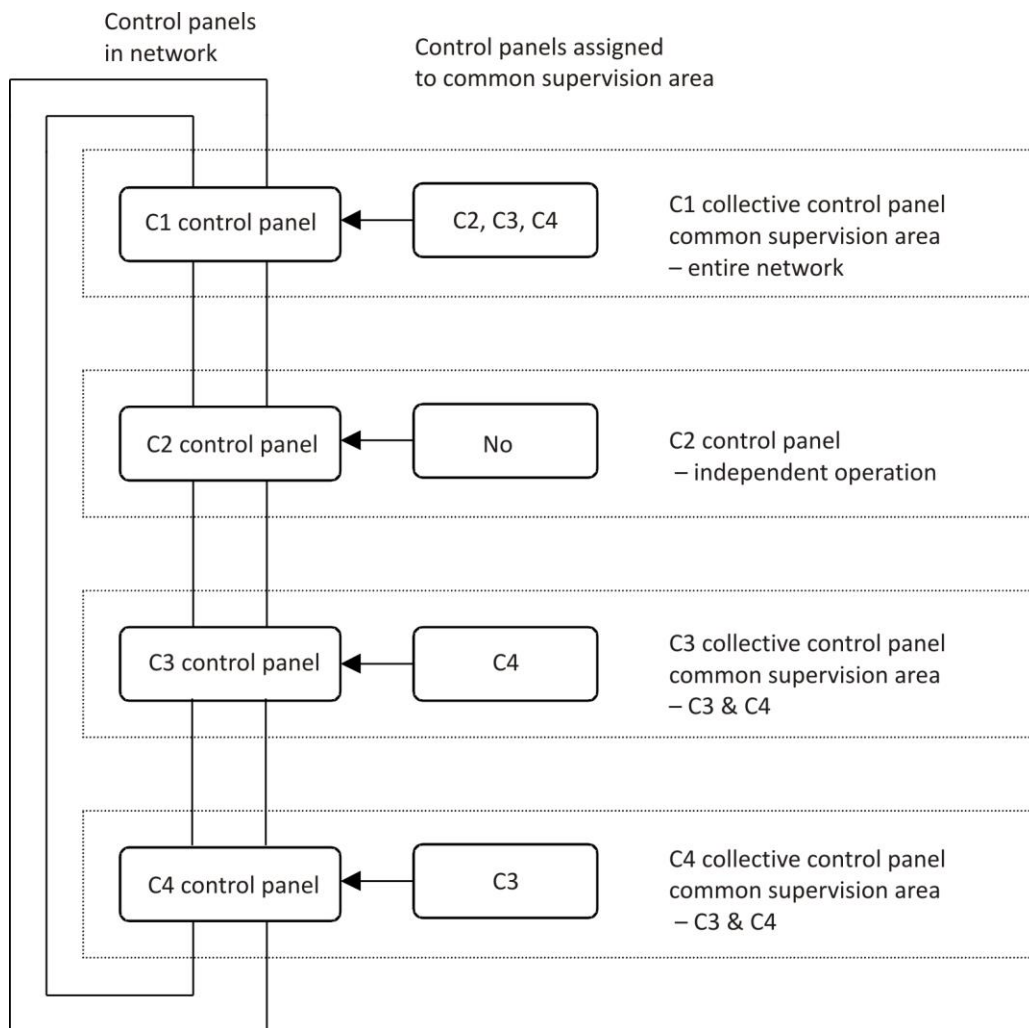


Fig. 9.6 Exemplary layout of four-control-panel network



## 10 STANDARD CONFIGURATION

The POLON 4900 control panel delivered to a customer has manufacturer's pre-programmed operation modes defined as the standard configuration.

According to the standard configuration, a control panel is programmed as follows:

- the MSL-1M module is declared by default (all loop-shaped lines); MSL-2M and MSI-48 modules are not declared;
- the control panel network number is set as 0 – individual control panel;
- the control panel remote access is disabled;
- every addressable element (in the address space) is declared as type 0 (not reviewed by the control panel)
- fire warning devices are potentially assigned to the zones with the numbers compliant with the numbers of the lines in which they are installed (detectors – programmed as A group);
- controlling, monitoring and signalling elements (EKS-4001, EWS-4001, EWK-4001, SAL-4001, UCS 4000, UCS 6000) are not configured; line elements are not allocated, zones are not assigned (zone matrix empty); no variants;
- all user messages assigned to the EKS-4001, EWK-4001 logical numbers – standard;
- fire extinguishing zones (1 ÷ 4) are assigned with variant 15 (two-stage alarm with coincidence including two fire warning devices), other zones are assigned with variant 2 (two-stage alarm);
- all user messages (technical alarms and non-maskable faults) are assigned to the logical numbers of EKS-4001, EWK-4001 – of standard type;
- variant 2 (two-stage alarming) is assigned to all zones,
- all user messages assigned to zones – of standard type,
- the PK1 relay (marked as PU) permanently programmed as a general fault signalling output;
- the PK2 output relay programmed as TYPE 3 variant 1, without delays (actuation in the event of a 1<sup>st</sup> stage alarm occurrence in the control panel);
- the PK3 output relay programmed as TYPE 2 (monitoring output);
- other relays (PK4 ÷ PK16) and signal lines (LS1 ÷ LS8) programmed as TYPE 0 (inactive);
- the PK relays and LS signal lines potentially without zone interdependence (zone matrices empty);
- all LK monitoring lines programmed with variant 0 (inactive);
- all user messages assigned to monitoring lines - standard;
- DR-48 printer – not declared;
- T1 time (for acknowledgement ) set at 30 seconds;
- T2 time (for hazard recognition) set at 1 minute;
- T3 time (alarm output actuation delay) set at 0;
- times of automatic switching between the PERSONNEL PRESENT/PERSONNEL ABSENT operation mode – not programmed;
- default access code at the 2<sup>nd</sup> level – 2222;
- default access code at the 3<sup>rd</sup> level – 3333;
- default access code at the 4<sup>th</sup> level – 3112;
- event memory cleared
- review register cleared and the review monitoring function - inactive.

## 10.1 USER CONFIGURATION PROGRAMMING

In order to adjust the control panel to its operation conditions predicted in the circuit design, it is necessary to program the panel individually. The panel must be programmed according to the programming manual (PM) after obtaining the 3<sup>rd</sup> or 4<sup>th</sup> access level authorisation. The entered configuration data will also be stored when the total power failure occurs.

### Note:

After the control panel programming, it is recommended to send the configuration to a computer (utilising the configuration software) and prepare the data backup.

## 10.2 STANDARD CONFIGURATION/ACCESS CODES LOADING

It is possible that the user loads the control panel standard settings. The standard configuration loading operation should be performed exclusively in case an old configuration must be deleted (memory erasing) and a new one must be created from the beginning.

The standard configuration loading can be completed by restarting the  $\mu$ PC micro-processor in the PSC-49 module, if the K1 key of the SW1 switch is turned on.

The standard configuration loading can be completed by restarting a  $\mu$ PC micro-processors in the PSC-49 module:

- $\mu$ P1, if it is the active microprocessor, with the SW1 switch K1 key ON,
- $\mu$ P2, if it is the active microprocessor, with the SW1 switch K2 key ON.

The default access codes can be loaded by restarting the active  $\mu$ PC micro-processor in the PSC-49 module, if the SW1 switch K3 key is ON.

### Note:

The standard configuration loading can last ca. 2 minutes.

## 11 ACCESS CODES

The POLON 4900 control panel is intended to be handled by 4 groups of people of various qualifications. The range of possible operations is divided into 4 levels as per Table 11.1.

Access to particular levels (with an exception of the 1<sup>st</sup> level) can be obtained by entering an access code. The access code is represented by a figure consisted of 4 to 8 digits.

The 2<sup>nd</sup> and 3<sup>rd</sup> level access codes can be program changed by the servicing personnel after obtaining the 3<sup>rd</sup> level access.

Table 11.1

Access level	Operator access	Allowable operations
1 <sup>st</sup> *	no code necessary	alarm or fault ACKNOWLEDGEMENT, turning acoustic signalling off, fire alarm readout, technical alarm readout, fault readout, disablement readout and zone testing readout
2 <sup>nd</sup> **	2 <sup>nd</sup> level access code	As per 1 <sup>st</sup> level plus alarm RESET, PERSONNEL PRESENT/PERSONNEL ABSENT switching over, disablement, switching over to testing mode
3 <sup>rd</sup> ***	3 <sup>rd</sup> level access code	As per 2 <sup>nd</sup> level plus control panel configuration except modules and interface output declaration

Access level	Operator access	Allowable operations
4 <sup>th</sup> ****	4 <sup>th</sup> level access code	As per 3 <sup>rd</sup> level plus hardware configuration change

- \* for the control panel direct servicing personnel
- \*\* for the direct servicing personnel or the maintenance technician
- \*\*\* for a person being authorised for program configuration change
- \*\*\*\* for the manufacturer and authorised servicing company for hardware configuration change.

## 12 INSTALLATION

### 12.1 CONTROL PANELS INSTALLATION LOCATION

The POLON 4900 control panels should be usually installed in the premises where 24-hour duty is provided. In the case of lack of such 24-hour attendance, it is obligatory to ensure that the control panel signals are passed to a place where 24-hour personnel on duty is present, using the monitoring system or additional signalling relay contacts.

The control panel should be placed in a visible, accessible place, which is not exposed to direct sunlight, far from heat sources.

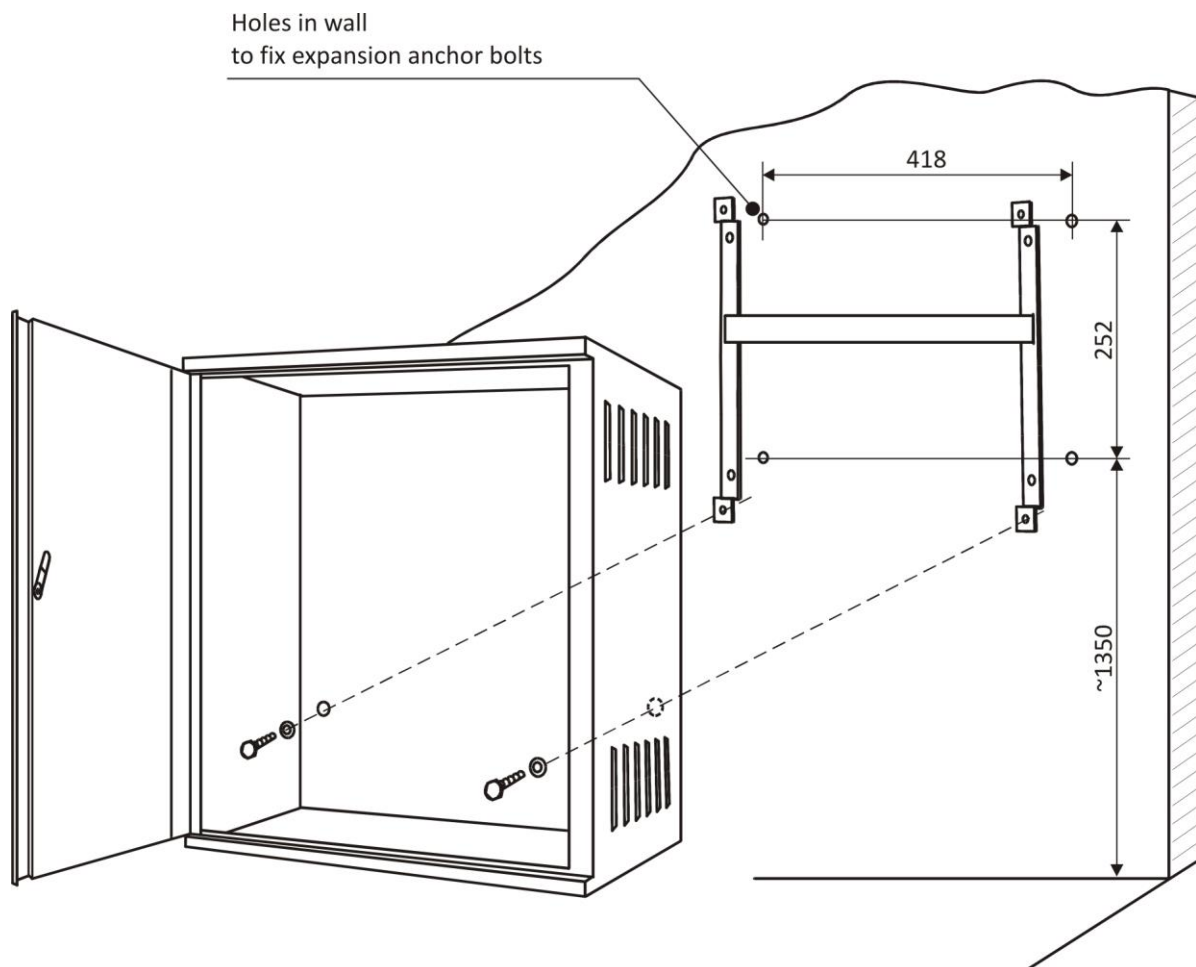


Fig. 12.1 Control panel wall mounting

Ambient temperature should not be lower than 0 °C and higher than + 40 °C. In the case of high noise level, outdoor acoustic signalling devices should be applicable, controlled by signalling line or the relay contacts.

The control panel should be fixed to a wall using a special supporting frame delivered with the device.

In the control panel vicinity (within sight) a manual fire call point should be installed.

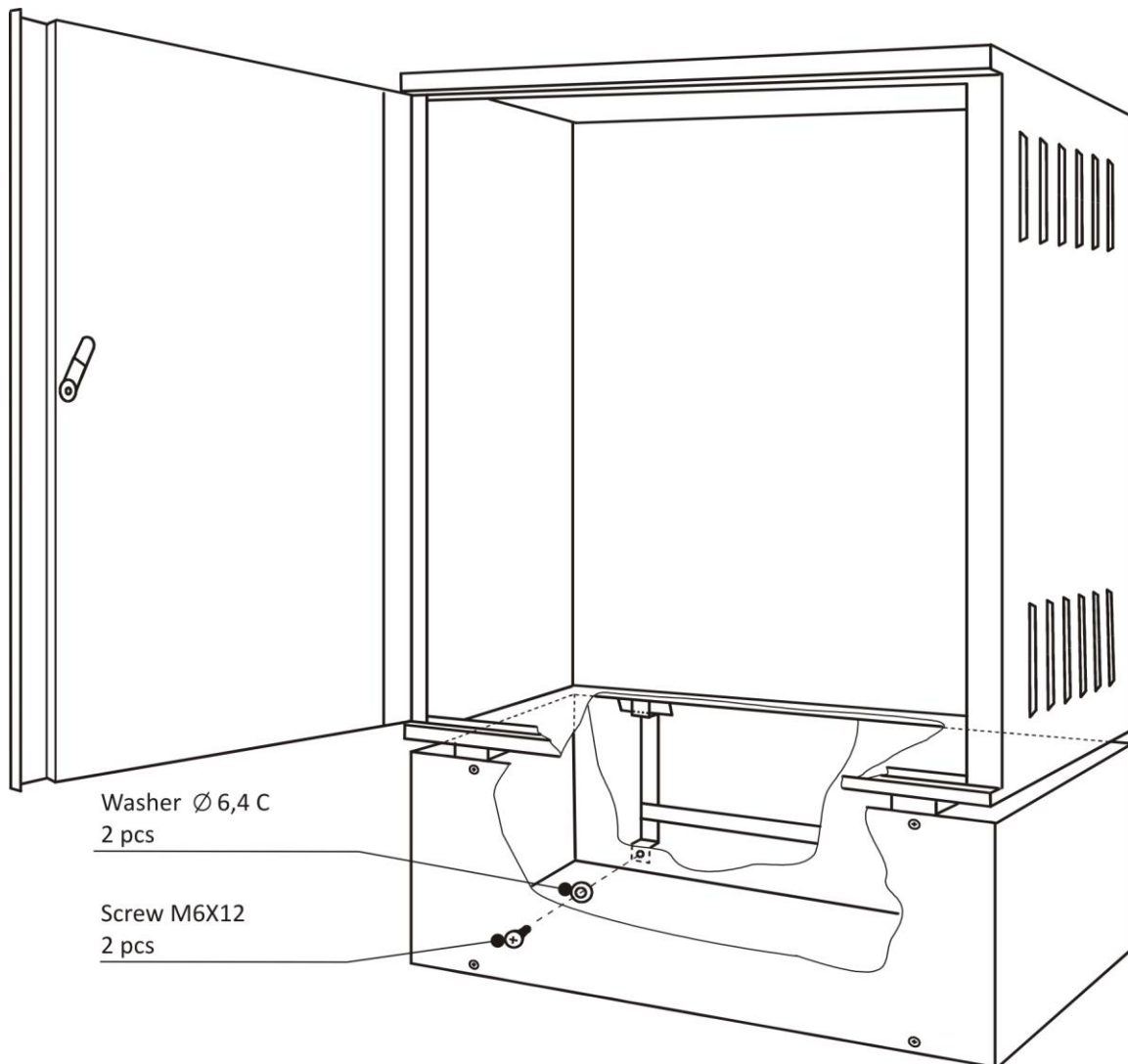


Fig. 12.2 PAR-4800 battery container fixing

**Note:**

The disposable pattern delivered with the control panel should be used for mounting hole drilling.

### 12.2 POWER SUPPLY CONNECTION

Three clamps (located on the back wall together with an anti-distortion filter) are provided to connect mains cables that supply the control panel. The mains clamps are covered with a special isolation shield with ~230 V/50 Hz description. The supplying cable marking is provided on appropriate clamps. The cables should be connected to the proper clamps in accordance with their dedication. The reserve power supply (batteries) should be connected after the mains power supply connection.

### 12.3 LINE ELEMENTS INSTALLATION

Detection line wires and external signalling circuits wires are introduced to the control panel through a round opening in the back side of the panel.

Before wire connection, it is necessary to examine thoroughly particular circuits routing to the control panel output switch clamps. Special attention should be given to detection lines and loops wires polarization.

Before detection lines wires connection, it is necessary to ensure whether the wires resistance and capacity, and insulation resistance do not exceed allowable values.

Addressable detection lines elements connection way is illustrated in Fig. 12.3 and Fig. 12.4.

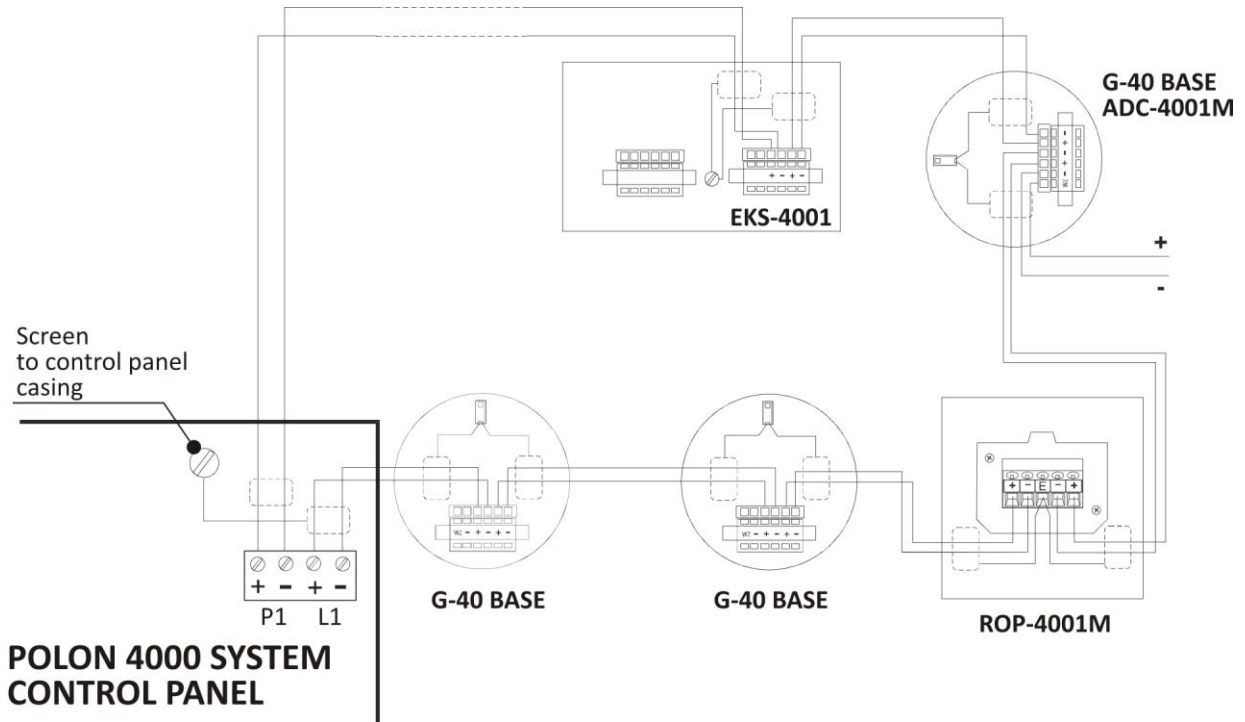


Fig. 12.3 Elements connection way in A type loop-shaped detection line

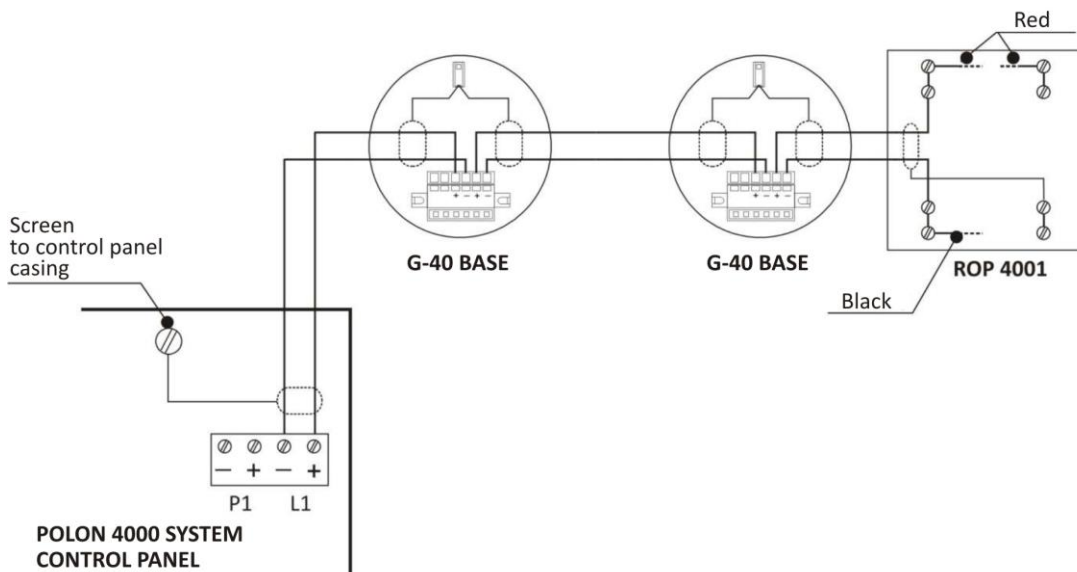


Fig. 12.4 Elements connection way in B type radial detection line

**12.4 CONTROL PANEL INPUTS AND OUTPUTS**

<b>Terminal block</b>	<b>Contacts marking</b>	<b>Location</b>	<b>Description</b>
ZL1	- + P1	MSL-1M	Detection loop 1 return
ZL2	- + L1	„	Detection line/loop 1 output
ZL3	- + P2	„	Detection loop 2 return
ZL4	- + L2	„	Detection line/loop 2 output
ZL5	- + P3	„	Detection loop 3 return
ZL6	- + L3	„	Detection line/loop 3 output
ZL7	- + P4	„	Detection loop 4 return
ZL8	- + L4	„	Detection line/loop 4 output
ZL1	- + P5	MSL-2M	Detection loop 5 return
ZL2	- + L5	„	Detection line/loop 5 output
ZL3	- + P6	„	Detection loop 6 return
ZL4	- + L6	„	Detection line/loop 6 output
ZL5	- + P7	„	Detection loop 7 return
ZL6	- + L7	„	Detection line/loop 7 output
ZL7	- + P8	„	Detection loop 8 return
ZL8	- + L8	„	Detection line/loop 8 output
PU	1 C-NC-NO	PPW-49	Fault signalling PK1 relay output, in quiescent mode

			closed C-NO
PK2	2 C-NC-NO	„	Relay No. 2 programmable outputs
PK3	3 C-NC-NO	„	Relay No. 3 programmable outputs
PK4	4 C-NC-NO	„	Relay No. 4 programmable outputs
PK5	5 C-NC-NO	„	Relay No. 5 programmable outputs
PK6	6 C-NC-NO	„	Relay No. 6 programmable outputs
PK7	7 C-NC-NO	„	Relay No. 7 programmable outputs
PK8	8 C-NC-NO	„	Relay No. 8 programmable outputs
PK9	9 C-NC-NO	„	Relay No. 9 programmable outputs
PK10	10 C-NC-NO	„	Relay No. 10 programmable outputs
PK11	11 C-NC-NO	„	Relay No. 11 programmable outputs
PK12	12 C-NC-NO	„	Relay No. 12 programmable outputs
PK13	13 C-NC-NO	„	Relay No. 13 programmable outputs
PK14	14 C-NC-NO	„	Relay No. 14 programmable outputs
PK15	15 C-NC-NO	„	Relay No. 15 programmable outputs
PK16	16 C-NC-NO	„	Relay No. 16 programmable outputs
LS1	1 + -	„	Signalling line output (of 0.5 A load in alarm)
LS2	2 + -	„	Signalling line output (of 0.5 A load in alarm)
LS3	3 + -	„	Signalling line output (of 0.1 A load in alarm)

LS4	4 + -	„	Signalling line output (of 0.1 A load in alarm)
LS5	5 + -	„	Signalling line output (of 0.1 A load in alarm)
LS6	6 + -	„	Signalling line output (of 0.1 A load in alarm)
LS7	7 + -	„	Signalling line output (of 0.1 A load in alarm)
LS8	8 + -	„	Signalling line output (of 0.1 A load in alarm)
LK1	1 + -	„	Monitoring line No. 1 input
LK2	2 + -	„	Monitoring line No. 2 input
LK3	3 + -	„	Monitoring line No. 3 input
LK4	4 + -	„	Monitoring line No. 4 input
LK5	5 + -	„	Monitoring line No. 5 input
LK6	6 + -	„	Monitoring line No. 6 input
LK7	7 + -	„	Monitoring line No. 7 input
LK8	8 + -	„	Monitoring line No. 8 input
ZP1	9-pin connector in RS-232 standard	MIK-48	PORT 1, RS 232 output to (acc. to declaration) PC computer or digital monitoring
ZP2	9-pin connector in RS-232 standard	„	PORT 2, RS 232 output to (acc. to declaration) PC computer or digital monitoring
ZP3	9-pin connector in RS-232 standard	„	PORT 3, RS 232 output to (acc. to declaration) PC computer, digital monitoring or bar code reader
ZK1	In PS/2 standard	„	External keyboard connector



ZP4	A B, CHGND	„	TSR 4000 terminal output
WE-1	A , B	MSI-48	Control panel network ring 1 input
WY-1	A , B	„	Control panel network ring 1 output
WY-2	A , B	„	Control panel network ring 2 output
WE-2	A , B	„	Control panel network ring 2 input
24 V zew.	1 – 2 + 3 – 4 +	MZ-48	External devices power supply output of maximum total load: 0,1 A/24 V in quiescent mode, 0,6 A/24 V in alarm mode

### 13 OPERATION AND MAINTENANCE

#### 13.1 PROPER OPERATION RULES

The control panel unfailing operation depends on maintaining appropriate operating conditions, power supply voltage, batteries condition and periodical inspections performance.

The periodical inspections should be carried out by an Authorised Service Station that was appointed by the user to perform maintenance works. Any damage should be immediately reported to the service station. In the case of fuse replacement, attention should be paid to their nominal values. It is not allowed to replace a burnt fuse with a spare fuse with a greater nominal value, since it can result in the unit damage.

The following fuses are used in the POLON 4900 control panels:

a) in the power supply segment:

B1/6.3 A F6,3L250 V type – protection of the battery cluster circuit;

B2/1 A F1L250 V type – protection of the + 24 V additional external devices power supply;

b) in the MSL-48M modules:

B1/500 mA F500L250 V type – protection of MSL-1M, MSL-2M modules;

c) in the MIK-48 module:

B1/500 mA F500L250 V type – protection of MIK-48 interface module;

d) in the PPW-49 module:

B1/630 mA F630L250 V type – protection of LS1 signalling line;

B2/630 mA F630L250 V type – protection of LS2 signalling line.

#### 13.2 PERIODIC INSPECTIONS AND MAINTENANCE RULES

The POLON 4900 control panel periodical inspections, according to the point 11.2 of the PKN-CEN/TS 54-14:2006 standard, should be carried out at least once per year.

Every 6 months it recommended to check connections between the control panel case and the shielding, grounding and zeroing cable and to clean battery clamps.

The battery charging level should be checked at least once a year. For this purpose, it is necessary to disconnect the mains power supply with the AC power supply switch for approx. 2 hours and, after the system renewed activation, to check if, within a period not longer than 5 hours, the mains power supply device charges the battery panel and automatically switches to the buffering mode.

A properly operating and regularly inspected control panel does not require any special maintenance works. It is recommended to regularly remove dust from the control panel outer surfaces.

The POLON 4900 control panel enables writing into its configuration a time parameter (expressed in months), stipulating required frequency of the system inspections and maintenance works. If the function is activated and, in case a new inspection is not confirmed (by entering into reviews register) despite the allowable time from the latest inspection has elapsed, the control panel signals on the liquid crystal display the necessity to perform new review (with 30-minute interval).

The review register enables saving of up to 255 entries (without possibility of the previous entries modification). The register deleting is possible only through the standard configuration loading.

## **14 PACKING, TRANSPORTATION, STORAGE**

### **14.1 PACKING**

The control panel, wrapped in a foil bag, is packed in a transport box made of five-layer cardboard. Apart from it, the following items are packed into the transport box:

1. mounting frame with fixing elements,
2. modules in unit packages,
3. spare parts,
4. technical documentation,
5. warranty card.

### **14.2 TRANSPORT RULES**

The control panel in the factory packing should be carried in closed spaces of land transport standard means taking into account the transport guidelines stated on the package and protecting it against sudden vibrations and ambient temperatures lower than - 25 °C and higher than + 55 °C.

### **14.3 STORAGE RULES**

The control panel should be stored in closed spaces of ambient temperature from + 5 °C to + 40 °C and relative humidity between 40 % and 70 %, free of caustic vapours and gases. During storage, the device should not be exposed to direct sunlight or heating elements influence.















## APPENDIX A

## POLON 4000 SYSTEM LINE ELEMENTS

Element description	Quiescent current <sup>1)</sup>
DIO-4046 addressable ionisation smoke detector	150 µA
DOR-4046 addressable optical smoke detector	150 µA
DUR-4046 universal addressable optical smoke detector	150 µA
TUN-4046 addressable universal heat detector	120 µA
DOT-4046 addressable multi-sensor smoke and heat detector	150 µA
DPR-4046 addressable multi-sensor smoke detector	170 µA
DUT-6046 addressable multi-sensor smoke and heat detector	150 µA
DUR-4047 optical smoke radio detector	–
DOP-6001 optical line smoke detector	300 µA
ROP-4001, ROP-4001H manual fire call points	135 µA
ADC-4001 adapter (burdened with a side line): <ul style="list-style-type: none"> <li>- programmed in operation mode 1</li> <li>- programmed in operation mode 2</li> <li>- programmed in operation mode 3</li> <li>- programmed in operation mode 4</li> <li>- programmed in operation mode 5</li> <li>- programmed in operation mode 6</li> </ul>	6.8 mA 16.0 mA 2.5 mA 0.5 mA 2.2 mA 1.33 mA
ACR-4001 radio detectors adapter	6.0 mA
EKS-4001 monitoring and controlling element	145 µA
EWS-4001 multi-output controlling element	400 µA
EWK-4001 multi-input monitoring element	150 µA
SAL-4001 addressable acoustic signalling device: <ul style="list-style-type: none"> <li>- power supplied from battery or ext. source</li> <li>- power supplied only from line <sup>2)</sup></li> </ul>	150 µA 600 µA
UCS 4000 universal fire control panel	600 µA
UCS 6000 universal fire control panel	600 µA

<sup>1)</sup> maximum current drawn by element from detection line/loop of POLON 4000 system control panel.

<sup>2)</sup> signalling device without additional power supply must be provided with line/loop current for alarming.





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