

FIRE ALARM SYSTEM  
POLON 6000

# CONTROL ELEMENT TYPE EKS-6000

Installation and Maintenance Manual  
IK-E337-001GB

Issue ID

EKS-6000 control elements, the subject of this manual, meet the essential requirements of the following regulations of the European Parliament and Council (EU) as well as European Union directives:

**CPR** CPR/305/2011 Regulation (EU) no. 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC;

**LVD** Directive 2006/95/EC relating to electrical equipment designed for use within certain voltage limits;

**EMC** Directive (UE) 2004/108/WE relating to electromagnetic compatibility.

Declaration of Performance no 1/E337/2014/PL has been issued for EKS-6000 control elements.

EKS-6000 control elements have received the Certificate of Constancy of Performance no. 1438-CPR-0375 issued by CNBOP-PIB, a Polish notified body no 1438 in EU, confirming the conformity of devices with the standard requirements: PN-EN 54-18:2007, PN-EN 54-17:2007.

The Certificate and the Declaration of Performance can be downloaded from [www.polon-alfa.pl](http://www.polon-alfa.pl)

The contents of this manual should be thoroughly read and understood before installation and operation of the device.

Failure to follow the instructions included in this manual may be dangerous or result in the violation of applicable regulations.

As the manufacturer, Polon-Alfa is not liable for any damages resulting from the improper device operation that is not in accordance with this manual.

Used product at the end of its service life, unsuitable for further use, should be handed over to one of the collection points for electrical and electronic equipment waste.



**Note** – This manual as well as the device are subject to change without notice.



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1438

1438-CPR-0375

Control element, type **EKS-6000**

versions: EKS-6044, EKS-6022, EKS-6040, EKS-6004, EKS-6202, EKS-6400

EN 54-18, EN 54-17

Declaration of Performance no. 1/E337/2014/PL

Product essential characteristic	Performance	Harmonised technical specification EN 54-18:2005 Chapter
Reaction delay		
Properties and resistance to power supply parameter change	Compliant	5.2
Operation (efficiency) in fire conditions		
Functional tests	Compliant	5.1.4
Durability, operation reliability and reaction delay: heat resistance		
Dry heat resistance	Compliant	5.3
Low temperature resistance	Compliant	5.4
Durability and operation reliability: vibration resistance		
Single impact resistance	Compliant	5.8
Impact resistance	Compliant	5.9
Vibration resistance	Compliant	5.10
Vibration strength	Compliant	5.11
Durability and operation reliability: moisture resistance		
Damp heat, cyclic test resistance	Compliant	5.5
Damp heat, constant test resistance	Compliant	5.6
Durability and operation reliability: corrosion resistance		
Resistance to corrosion induced with sulphur dioxide (SO <sub>2</sub> )	Compliant	5.7

Product essential characteristic	Performance	Harmonised technical specification EN 54-18:2005 Chapter
Durability and operation reliability: electrical stability		
Properties and resistance to power supply parameter change	Compliant	5.2
Resistance to electromagnetic interference	Compliant	5.12
Product essential characteristic	Performance	Harmonised technical specification EN 54-17:2005 Chapter
Efficiency in fire conditions		
Reproducibility	Compliant	5.2
Operation reliability		
Requirements	Compliant	4
Durability and operation reliability: heat resistance		
Dry heat resistance	Compliant	5.4
Low temperature resistance	Compliant	5.5
Durability and operation reliability: vibration resistance		
Single impact resistance	Compliant	5.9
Impact resistance	Compliant	5.10
Sinusoidal vibration resistance	Compliant	5.11
Sinusoidal vibration strength	Compliant	5.12
Durability and operation reliability: moisture resistance		
Damp heat, cyclic test resistance	Compliant	5.6
Damp heat, constant test resistance	Compliant	5.7
Durability and operation reliability: corrosion resistance		
Resistance to corrosion induced with (SO <sub>2</sub> )	Compliant	5.8
Durability and operation reliability: electrical stability		
Power supply voltage changes	Compliant	5.3
Electromagnetic compatibility (EMC), immunity test	Compliant	5.13
Intended use: Fire safety – control element for protection and fire alarm devices as well as their control		
Technical data — see manual: IK-E337-001		

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## 1. Intended use

EKS-6000 universal control element is an addressable element intended for the following:

- control of automatic safety and fire protection devices
- operation supervision of the devices mentioned above
- inspection of equipment condition.

EKS-6000 control element is intended for use in addressable detection lines of POLON 6000 control and indicating panel.

The element is designed to be operated indoors and outdoors.

Depending on version, EKS-6000 is equipped with low-voltage inputs, high-voltage inputs and outputs.

EKS-6000 low-voltage inputs (IN) are designed for independent, volt-free contacts that are normally closed or normally open.

EKS-6000 high-voltage inputs (IN HV) are designed for independent contacts at 6-220 VDC or 230 VAC.

EKS-6000 inputs allow the connection of devices if current consumption does not exceed 2 A.

Note: (IN HV) denotes connector terminals where a voltage exceeding permissible low voltage that is dangerous for humans, can be present.

EKS-6000 control elements are available in six configuration versions designated as:

- EKS-6040** – equipped with 4 low-voltage inputs,
- EKS-6004** – equipped with 4 outputs,
- EKS-6022** – equipped with 2 low-voltage inputs and 2 outputs,
- EKS-6044** – equipped with 4 low-voltage inputs and 4 outputs,
- EKS-6202** – equipped with 2 high-voltage inputs and 2 outputs,
- EKS-6400** – equipped with 4 high-voltage inputs.

## 2. Technical data

Control element type	EKS-6040	EKS-6004	EKS-6022	EKS-6044	EKS-6202	EKS-6400
Detection line supply voltage	16.5 - 24.6 V					
Current consumption from detection line	< 210 $\mu$ A	< 240 $\mu$ A	< 220 $\mu$ A	< 240 $\mu$ A	< 250 $\mu$ A	< 230 $\mu$ A
Detection line short-circuit insulator	yes					
Configuration of control element	from control panel					
Number of outputs	0	4	2	4	2	0
Supply voltage of the controlled device	6 - 220 VDC 230 VAC					
Relay control output	volt-free, supervised, change-over contact, max. current 2 A, max. voltage 230 VAC / 220 VDC, max. power 62.5 VA / 60 W					
Continuity control of the cable connected to the control output	yes (jumper on printed circuit board) closed, opened					
Control output safe state	no change, not triggered, triggered					
Current consumption in the continuity control circuit of the cable connected to the control output	< 200 $\mu$ A (6 - 220 VDC) < 370 $\mu$ A					
Number of inputs	4 IN	0	2 IN	4 IN	2 IN HV	4 IN HV
Input function	(IN) control or alarm				(IN HV) control	
Input initialisation	(IN) volt-free, NO or NC contact				(IN HV) live contact	
Control of the cable connected to the input	(IN) close, open				(IN HV) none	
Input line capacity	< 12 nF (about 100 m of YnTKSY cable, 1x2x0.8 mm)					
Cable entry:	2 x M12					
- Detection line cable bushing	4 x M12	-	2 x M12	4 x M12	-	-
- Low-voltage input cable bushing	-	4 x M16	2 x M16	4 x M16	4 x M16	4 x M16
- High-voltage output/input cable bushing						
Conductor permissible cross-section	up to 2.5 mm <sup>2</sup>					
Dimensions	Figure 1	Figure 2	Figure 3	Figure 4	Figure 2	Figure 2
Weight	< 0.5 kg					
Operating temperature	-40 +85°C					
Climatic category	40/085/04					
Permissible relative humidity	to 95% at 40°C					
Electrical strength of insulation	1500 V					
Protection class	IP 66					
Enclosure material and colour	polycarbonate (PC), grey					

### 3. Description of the design

EKS-6000 control element is designed in the form of a printed circuit board with electronic components and a connector set, that has been put inside an enclosure.

The enclosure has wall mounting holes in the corners.

Depending on the type of control element, cable bushings are situated in the housing base, along longer sides.

There are six types of control elements:

- EKS-6040 **Figure 1**
- EKS-6004, EKS-6202, EKS-6400 **Figure 2**
- EKS-6022 **Figure 3**
- EKS-6044 **Figure 4**

M12×1.5 cable bushing is used for detection line cable or low-voltage input cable, a M16×1.5 cable bushing is used for output or high-voltage input cable.

The enclosure cover is mounted to the enclosure base with four screws.

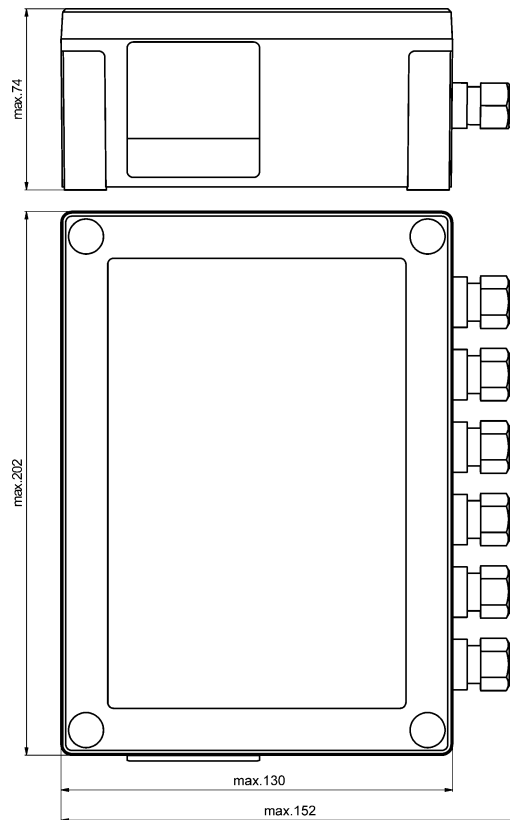


Figure 1 Dimensions of EKS-6040



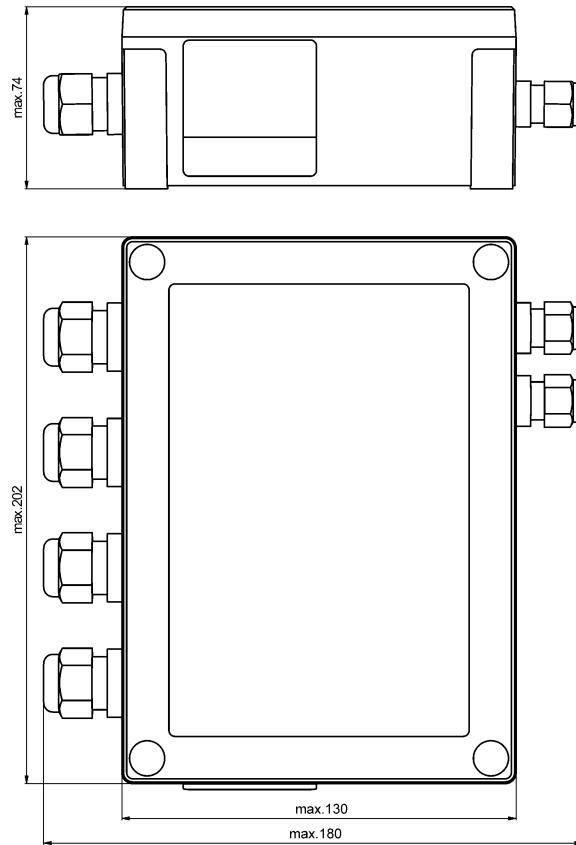


Figure 2 Dimensions of EKS-6004, EKS-6202, EKS-6400

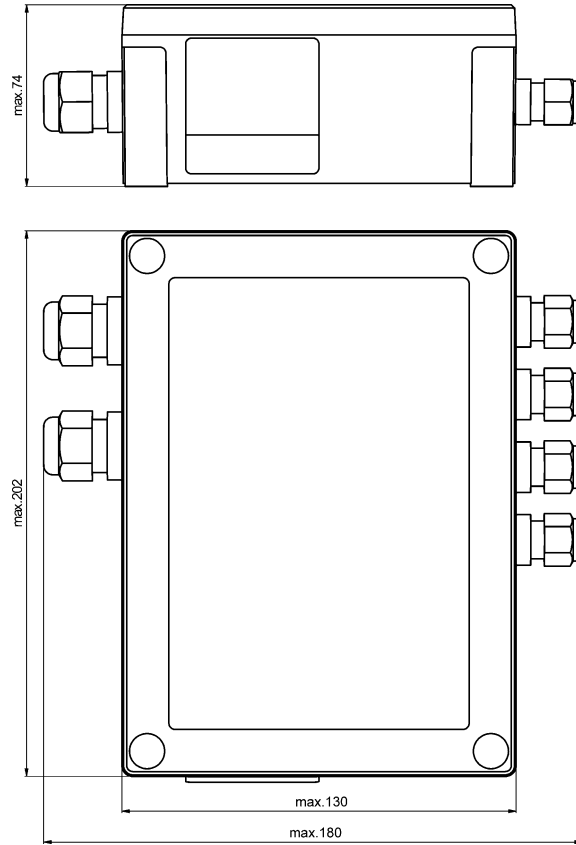


Figure 3 Dimensions of EKS-6022

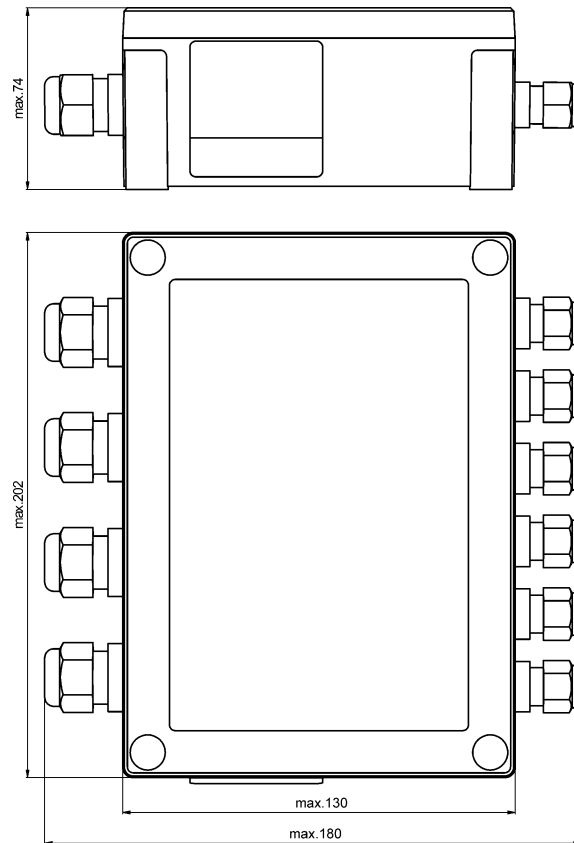


Figure 4 Dimensions of EKS-6044

#### 4. Description of the operation

The communication between POLON 6000 control panel and EKS-6000 control element is carried out via an addressable two-wire detection line. Unique, fully digital communication protocol enables transferring any information from the control panel to the element and from the element to the control panel. The activation of fire protection equipment (e.g. a smoke vent) or a fire alarm indicating equipment (e.g. a buzzer, a visual alarm) takes place after switching relay contacts in the control element after issuing a command in the control panel. Relay contacts return to their initial position also after receiving a command from the control panel.

The control element transfers the following states to the control panel:

- Writing the address
- Reading the address
- Writing the operating mode
- Reading the operating mode
- Task for outputs with mask
- Start of group outputs
- Stop of group outputs
- Damage of the cable connected to the control output: if it becomes open
- Setting the control output safe state: if there is no power supply
- Reporting relay damage
- Setting active X at IN input, switching control or alarm input, NO or NC
- Setting active X or active Y at IN input, three-state control input, NO
- Setting active X at IN HV input, switching control input
- Damage of the cable connected to IN input: in case of short circuit or open circuit
- Short circuit separation

- Location: reporting using a button
- Non-volatile memory corruption: erroneous data stored in non-volatile memory

The way the control element is supposed to operate is determined by the operation mode of this element. The mode of operation of a control element is defined by several data bytes, which indicate the mode of operation and behavior of this element. Automatic configuration of POLON 6000 control panel utilizes the operating mode set by the manufacturer. That means the following:

- IN input turned on – **yes**
- IN input function – **control**
- IN input operation mode – **NO**
- IN HV input turned off – **yes**
- IN HV input function – **control**
- IN HV input operation mode – **voltage (detection), no voltage (active)**
- Control input turned off – **yes**
- Control input operation mode – **continuous**
- Continuity control of the cable connected to the control output – **On**
- Control output safe state – **no change**
- Group number – **1**
- Trigger delay time – **0 s**
- Trigger/Reset delay time – **0 s**
- Reset time – **0 s**
- Number of cycles – **0**

**Note:**

Jumpers marked as ON<sub>x</sub>, OFF<sub>x</sub> are used to switch on or off the continuity control of the cable connected to the control output.

If you want to control the continuity of the cable connected to control output 1, the control should be switched on at the control panel and additionally set the jumper to ON1 position in the terminal block at the board edge near the relay. Current strength will be additionally increased by <200 μA or <370 μA (based on voltage type) from the power supply of the controlled device through the control system.

The IN input of the control element reacts to a short circuit or open circuit of potential-free contacts. The control panel indicates this change as an active state from the control or alarm input, depending on the operating mode. Short-circuit or open circuit of the input cable is detected with the control element and indicated with the control panel as input cable damage.

IN HV input of the control element reacts to voltage or lack of voltage using the contact. The control panel indicates this change as an active state from the control input.

Example connections of control elements are shown in the drawings: **Figure 5** and **Figure 6**.

The control element is equipped with an internal short-circuit isolator that separates the operational part of the detection line from the adjacent compact part, which enables its undisturbed operation. The active state coming from the element alarm input is indicated with a flashing red LED located between the detection line terminal block and the IN input terminal block. The indicator is designed to quickly locate the alarming element and help with periodical functional check of the element.

Damage and short-circuit states of the short-circuit insulator are indicated with flashing yellow LED.

Jumpers marked as HI<sub>x</sub>, LO<sub>x</sub> determine the low power supply level of IN HV outputs and inputs.

Full configuration of the control element requires the location of these jumpers to be determined.

For example, if you decide to control the continuity of the cable connected to output 1, the jumper should be set in **ON1** position, and the controlled device is powered with e.g. 230 VAC, the jumper should be set to **HI1**, which corresponds to a low state of about 75 V. When the controlled device is

powered with e.g. 48 VDC, the jumper should be set to **LO1**, which corresponds to a low state of about 3 V.

The same rules apply to IN HV inputs.

If the IN HV outputs or inputs are not used, the position of corresponding jumpers is not relevant.

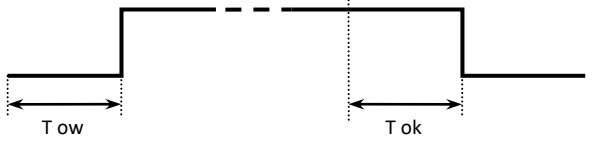

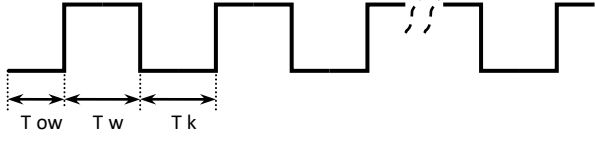
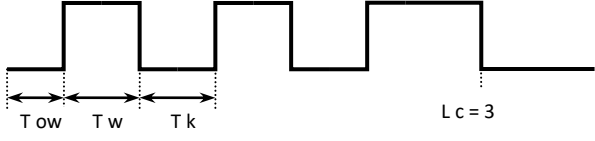
## 5. Operating modes of the control element

Based on the type of control output operation, the appropriate number of operating mode parameters must be defined.

The control element makes it possible to define the following parameters:

- a) Profile
  - Operating mode of the control output (off, continuous, pulse, cyclic, finite cyclic)
  - Continuity control of the cable connected to the control output (off, on)
  - Control output safe state (no change, not triggered, triggered)
  - IN input function (control, alarm)
  - Operation mode of the IN input (NO, NC) or IN HV input (voltage-detection, no voltage-active or no voltage-detection, voltage-active)
- b) Group number (0 - 65,535)
- c) Trigger delay time (0 - 120 s with 2 s steps or 120 - 1,250 s with 10 s steps)
- d) Trigger/Reset delay time [only continuous operating mode] (0 - 120 s with 2 s steps or 120 - 1,250 s with 10 s steps)
- e) Reset time (0 - 120 s with 2 s steps or 120 - 1,250 s with 10 s steps)
- f) Number of cycles (0 - 255)

The following table shows the configuration of the control element based on the operation mode of the control output:

Control input operation mode	Parameters to be defined
Off	Profile
<p>Continuous</p> 	<p>Profile Group number Trigger delay time Reset delay time – <math>T_{ok}</math></p>
<p>Pulse</p> 	<p>Profile Group number Trigger delay time Trigger time – <math>T_w</math></p>
<p>Cyclic</p> 	<p>Profile Group number Trigger delay time Trigger time – <math>T_w</math> Reset time – <math>T_k</math></p>
<p>Definite cyclic</p> 	<p>Profile Group number Trigger delay time Trigger time – <math>T_w</math> Reset time – <math>T_k</math> Number of cycles – <math>L_c</math></p>

## 6. Operating conditions

Reliable operation of EKS-6000 control element depends on proper operating conditions, correct installation and regular periodic inspections. The inspection is carried out in order to determine the proper operation of the element as well as its proper cooperation with the control panel. The inspection should be carried out at least every 6 months by a qualified person who is familiar with the element operation to such extent that its operation irregularities can be detected. The inspection involves the functional check of the element in an operational alarm system.

Note:

Inspections should be carried out with special care. All persons concerned shall be informed if the inspection involves the test of actuation devices.

**When carrying out any repair work, control elements should be protected with a painting tape. Elements damaged during painting and repair works by workers carrying out these works (e.g. painted, sealed with paint enclosure, etc.) are not subject to warranty.**

**Control element is equipped with "TEST" button to enable testing the element communication with the control panel and determining its location within the premises of the facility. After pressing and holding the "TEST" button for approx. 2 seconds, the element yellow LED starts flashing, which denotes correct communication with the control panel.**

## 7. Installation of control elements

It is recommended to install EKS-6000 control elements in a detection line near controlled devices.

The elements can operate in loops, loops with simple branches or in radial detection lines of POLON 6000 control panels. (See Operation and Maintenance Manual of POLON-6000 control panel.)

Connection method of EKS-6044 (4 low-voltage inputs, 4 outputs) is shown in the drawing: Figure 5.

Connection method of EKS-6202 (2 high-voltage inputs, 2 outputs) is shown in the drawing: Figure 6.

Control element enclosures should be fixed to the walls or ceilings through the corner mounting holes with four screws. Screws with  $\Phi 6$  wall plugs are recommended. Installation cables should be inserted through cable bushings.

Detection line of IN input should be inserted via the M12 cable bushing with a diameter ( $\Phi$ ) 3-6.5 mm.

IN HV output or input should be inserted via the M16 cable bushing with a diameter ( $\Phi$ ) 5-10 mm.

When inserting cables into the enclosure, make sure that they are properly sealed in the cable bushings and unused ducts are blanked off.

When connecting installation cables, use a screwdriver, the working part of which should be inserted into the smaller opening of the connector, then insert the cable into the larger opening and pull out the screwdriver. It is recommended to use a short bent screwdriver, 3,5×0.5 mm, cat. no. WAGO 210-258 (available for purchase at Polon-Alfa). Connect the cables as described at the connectors. There is a sticker on the enclosure cover that shows the functions of EKS-6000 terminals, depending on the element type, as shown in the drawing: **Figure 7**. Connect the shields of detection line cables to the fields marked as SHLD.

Route the alarm system cables in accordance with the regulations applicable to low-voltage electrical installations.

Elements should not be installed in rooms with corrosive atmosphere, containing corrosive gases, corrosive fumes or dust.

It is recommended that EKS-6000 control elements to be installed outside should be equipped with a "Pressure compensation element". To do this, drill a 12 mm dia. hole at any point on the side wall of the enclosure base (e.g. near the nameplate) and fix the "Pressure compensation element" with a lock nut.

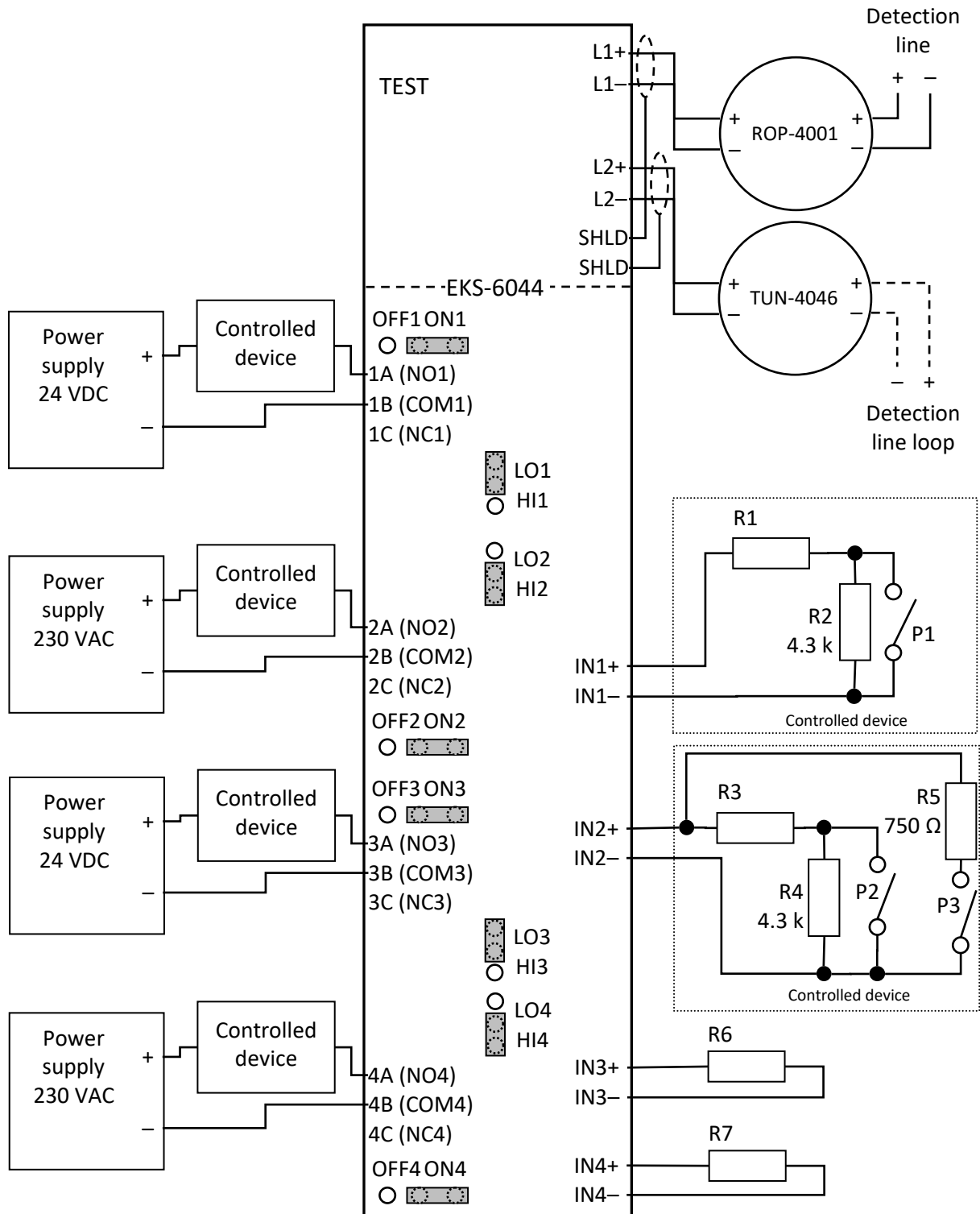


Figure 5 Wiring diagram of EKS-6044

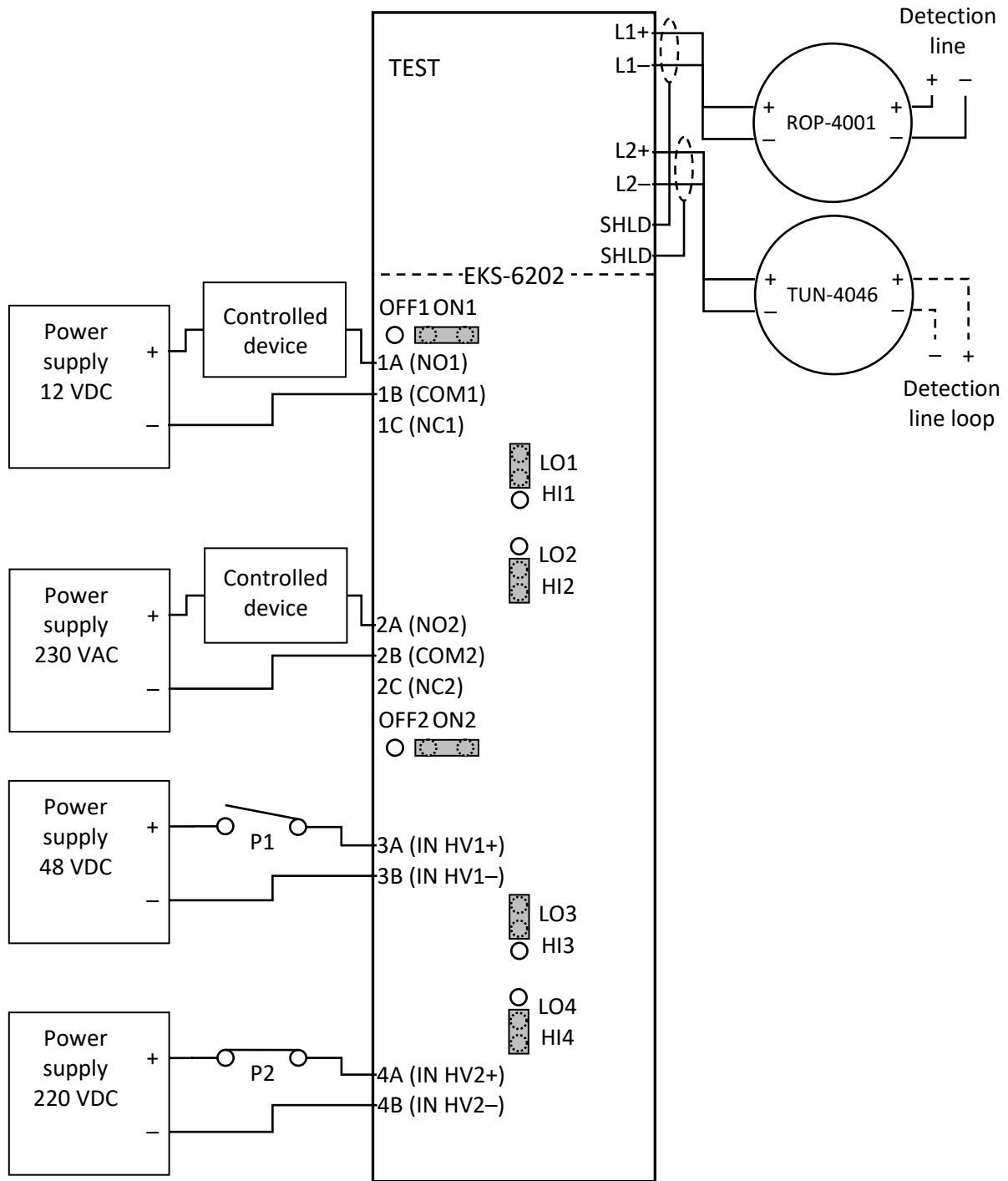


Figure 6 Wiring diagram of EKS-6202



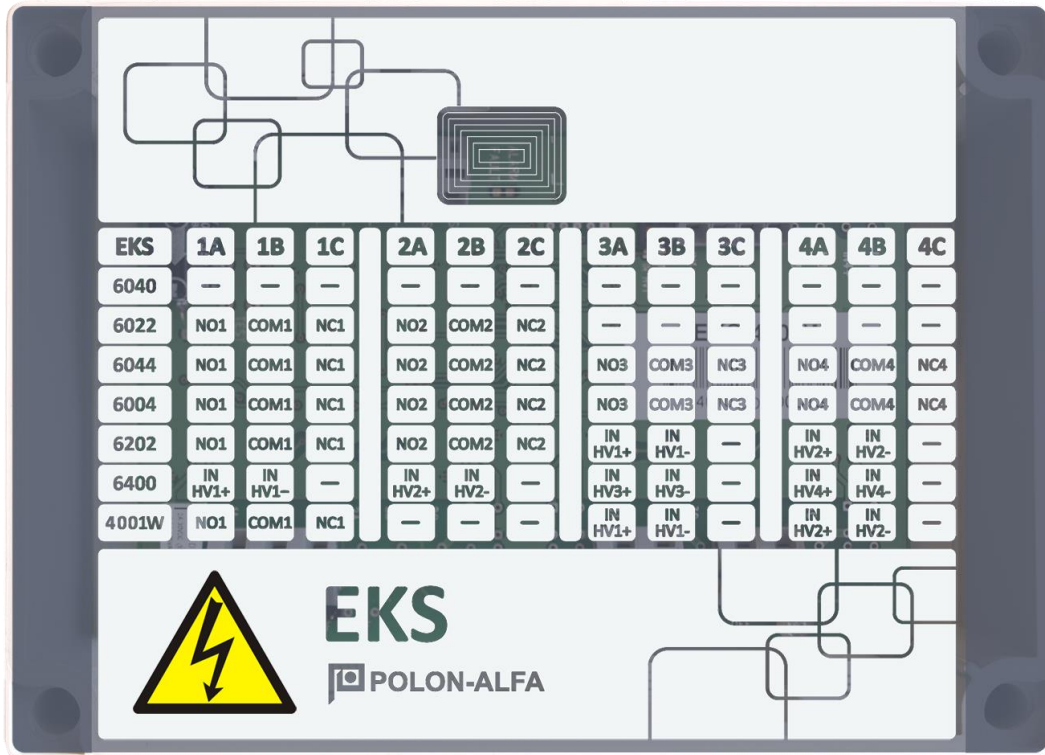


Figure 7 Enclosure cover with EKS-6000 terminal functions

## 8. Safety conditions

### 8.1. Repair and maintenance

Maintenance and periodic inspections must be carried out by personnel that is authorised or trained by Polon-Alfa.

All repairs must be carried out by the manufacturer.

Polon-Alfa is not responsible for the operated equipment maintained and repaired by unauthorised personnel.

### 8.2. Work at height

Work at height related to the installation of control elements must be carried out with special care using equipment and tools in sound condition. Please pay particular attention to the stability of ladders, elevators, hoists, jacks etc.

Power tools should be used in accordance with safe working conditions specified in relevant manufacturer's instructions.

### 8.3. Eye protection against dust

Protective goggles and dust masks should be worn during work that produces large amount of dust, especially when drilling holes in ceilings in order to fix enclosure bases of control elements.

### 8.4. Protection against electric shock

When installing control elements, observe relevant national regulations for low-voltage electrical installations. Any work may only be carried out by personnel authorised to do so.

If used voltage is higher than the permissible low voltage, the voltage must be switched off before opening the enclosure cover.

Fix the detection line shields to the connectors in a snug manner, without excessive slack.

The remaining cables should be insulated at the appropriate length so that only the insulated part is accessible after insertion into the connectors. This will reduce accidental short circuits between cables.

Avoid crossing detection line and input (IN) cables with output and input (IN HV) cables.

## 9. Storage and transport

### 9.1. Storage

EKS-6000 control elements should be stored in closed rooms, with no corrosive fumes or gases, at the temperature range from 0°C to +40°C, with relative humidity not exceeding 80% at the temperature of +35°C.

Elements should not be exposed to direct sunlight or heat from heating equipment during storage.

Storage time of elements in the transport packaging should not exceed 12 months.

### 9.2. Transport

EKS-6000 control elements should be transported in closed spaces of transport vehicles, in a packaging corresponding to the requirements of the applicable transport regulations.

Transport temperature should not fall below -40°C or exceed +55°C and the relative humidity should not exceed 95% at +45°C.

IK-E337-001GB/ID/01.2019/