

**SMOKE AND HEAT DETECTOR
DUT-6046AD TYPE
WITH G-40S BASE,
SOUNDER**

AND SHORT CIRCUIT ISOLATOR

POLON 4000 and POLON 6000 INTERACTIVE FIRE DETECTION AND ALARM SYSTEM

INSTALLATION AND MAINTENANCE MANUAL

IK-E372-001

IB Edition



The DUT-6046AD Universal Smoke and Heat Detector with Sounder, which is the subject of this manual, meets the essential requirements of the following European Parliament and Council (EU) regulations and European Union directives:

- CPR** CPR/305/2011 The European Parliament and the Council (EU) regulation of March 9, 2011 stipulating harmonized conditions for placing construction products on the market and repealing Council Directive 89/106/EEC;
- EMC** Directive 2014/30/EU concerning electromagnetic compatibility.

CNBOP-PIB, notified body No. 1438, issued performance features constancy certificate confirming the products technical features/parameters required by the EN 54-3:2001+A1:2002+A2:2006, EN 54-5:2000+A1:2002, EN 54-7:2000+A1:2002+A2:2006, EN 54-17:2005+ AC:2007 standards. Features/technical parameters exceeding the requirements of the mentioned standards and other product features/parameters provided in this manual and not specified by the mentioned standards are confirmed by the Manufacturer.

These products are covered by an approval certificate issued by CNBOP-PIB.

The manufacturer issued a declaration of performance for the products.

The abovementioned Certificate, Approval Certificate and Declaration of Performance are available on the website **www.polon-alfa.pl**

Read this manual before installation and operation.

Failure to observe the instructions in this manual may be dangerous or result in a breach of regulations in force.

The manufacturer **POLON-ALFA** accepts no liability 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 specification of products at any time without a prior notice.



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DUT-6046AD TYPE SMOKE AND HEAT DETECTOR WITH G-40S BASE,
SOUNDER AND SHORT CIRCUIT ISOLATOR

DUT-6046AD

Intended use:

Fire safety - point smoke detector based on the scattered light and heat principle, with an integrated short-circuit isolator and sounder, designed for fire alarm systems used in buildings.

Notified body:

1438 -CNBOP-PIB

Declaration of performance:

1/E372/2018/PL

Harmonized standards:

EN 54-3, EN 54-5, EN 54-7, EN 54-17

#	Product essential features	Performance properties	Harmonized technical specification EN 54-3:2001 A1:2002 A2:2006 Chapter
1	Effectiveness in fire conditions		
	Sound level	Fulfilled	4.2
	Frequency and sound pattern	Fulfilled	4.3
	Reproducibility	Fulfilled	5.2
	Functionality	Fulfilled	5.3
	Warning signal and message broadcasting sequence	Not applicable	C.3.1
	Synchronization (option with requirements)	Not applicable	C.3.2
	Broadcasting messages	Not applicable	C.5.1
	Timing of warning signal/silence/message sequence	Not applicable	C.5.2
	Message synchronization test (option with requirements)	Not applicable	C.5.3
2	Operation reliability		
	Durability	Fulfilled	4.4
	Design	Fulfilled	4.5
	Markings and technical data	Fulfilled	4.6
	Durability	Fulfilled	5.4
	General tests	Not applicable	C.4

#	Product essential features	Performance properties	Harmonized technical specification EN 54-3:2001 A1:2002 A2:2006 Chapter
3	Durability of operational reliability: heat resistance		
	Dry heat (resistance)	Fulfilled	5.5
	Dry heat (endurance)	Not applicable	5.6
	Cold (resistance)	Fulfilled	5.7
	Moist cyclic heat (resistance)	Fulfilled	5.8
	Moist solid heat (endurance)	Fulfilled	5.9
4	Reliability durability: moisture resistance		
	Moist cyclic heat (resistance)	Fulfilled	5.8
	Moist solid heat (endurance)	Fulfilled	5.9
	Moist cyclic heat (endurance)	Not applicable	5.10
5	Durability of operational reliability: corrosion resistance		
	Corrosion caused by sulfur dioxide (endurance)	Fulfilled	5.11
6	Durability of operational reliability: shock and vibration resistance		
	Single shocks (resistance)	Fulfilled	5.12
	Impact (resistance)	Fulfilled	5.13
	Sinusoidal Vibration (resistance)	Fulfilled	5.14
	Sinusoidal Vibration (endurance)	Fulfilled	5.15
7	Reliability durability: electric stability		
	Electromagnetic compatibility (resistance)	Fulfilled	5.16
8	Durability of operational reliability: degree of protection		
	Protection class	Fulfilled	5.17
#	Product essential features	Features	Harmonized technical specification EN 54-5:2000 A1:2002 Chapter
1	Nominal startup conditions/sensitivity, response delay (response time), and fire conditions effectiveness.		
	Classification	Fulfilled	4.2
	Location of heat sensitive elements	Fulfilled	4.3
	Directional relationship	Fulfilled	5.2
	Static response temperature	Fulfilled	5.3
	Response times at the initial typical temperature of use	Fulfilled	5.4
	Operating times at the initial temperature of 25°C	Not applicable	5.5
	Operation times at initial high ambient temperature	Fulfilled	5.6
	Reproducibility	Fulfilled	5.8
	Detectors additionally marked with the letter S test	Not applicable	6.1
	Detectors additionally marked with the letter R test	Fulfilled	6.2
2	Operation reliability		
	Individual alarm indicator	Fulfilled	4.4
	Connecting auxiliary devices	Fulfilled	4.5
	Detachable detectors supervision	Fulfilled	4.6
	Manufacturer's regulation	Not applicable	4.7

#	Product essential features	Features	Harmonized technical specification EN 54-5:2000 A1:2002 Chapter
2	Operation reliability		
	Detector reaction in the installation location adjustment	Not applicable	4.8
	Markings	Fulfilled	4.9
	Technical documentation	Fulfilled	4.10
	Additional requirements for software controlled detectors	Fulfilled	4.11
3	Supply voltage tolerance		
	Change in power supply parameters	Fulfilled	5.7
4	Stability of operational reliability and delayed operation: temperature resistance		
	Resistance to cold	Fulfilled	5.9
	Dry heat resistance	Not applicable	5.10
5	Stability of operational reliability: vibration resistance		
	Single shock resistance	Fulfilled	5.14
	Impact resistance	Fulfilled	5.15
	Resistance to sinusoidal vibration	Fulfilled	5.16
	Sinusoidal vibration endurance	Fulfilled	5.17
6	Stability of operational reliability: moisture resistance		
	Resistance to moist cyclic heat	Fulfilled	5.11
	Constant humid hot endurance	Fulfilled	5.12
7	Stability of operational reliability: corrosion resistance		
	Resistance to corrosion caused by sulfur dioxide	Fulfilled	5.13
8	Stability of operational reliability: electrical stability		
	Electromagnetic Compatibility (EMC), resistance test	Fulfilled	5.18
#	Product essential features	Features	Harmonized technical specification EN 54-7:2000 A1:2002+A2:2006 Chapter
1	Nominal start-up conditions/Sensitivity, response delay and effectiveness in fire conditions		
	Reaction to slowly developing fires	Fulfilled	4.8
	Recurrence	Fulfilled	5.2
	Directional relationship	Fulfilled	5.3
	Reproducibility	Fulfilled	5.4
	Air movement resistance	Fulfilled	5.6
	Glare resistance	Fulfilled	5.7
	Fire sensitivity	Fulfilled	5.18
2	Operation reliability		
	Operation indicator	Fulfilled	4.2
	Auxiliary devices connections	Fulfilled	4.3
	Detachable detectors monitoring	Fulfilled	4.4
	Factory settings	Fulfilled	4.5
	Adjustment of the sensitivity threshold in installation location	Fulfilled	4.6

#	Product essential features	Features	Harmonized technical specification EN 54-7:2000 A1:2002+A2:2006 Chapter
	Protection against the ingress of foreign bodies	Fulfilled	4.7
	Technical documentation	Fulfilled	4.10
	Markings	Fulfilled	4.9
2	Operation reliability		
	Additional requirements for software-regulated detectors	Fulfilled	4.11
3	Supply voltage tolerance		
	Changes in power supply parameters (resistance)	Fulfilled	5.5
4	Durability of operation reliability and reaction delay: heat resistance		
	Dry heat (resistance)	Fulfilled	5.8
	Cold (resistance)	Fulfilled	5.9
5	Reliability durability: vibration resistance		
	Single shocks (resistance)	Fulfilled	5.13
	Impact (resistance)	Fulfilled	5.14
	Sinusoidal Vibration (resistance)	Fulfilled	5.15
	Sinusoidal Vibration (endurance)	Fulfilled	5.16
6	Reliability durability: moisture resistance		
	Constant humid hot (resistance)	Fulfilled	5.10
	Moist solid heat (endurance)	Fulfilled	5.11
7	Durability of operational reliability: corrosion resistance		
	Corrosion caused by sulfur dioxide (endurance)	Fulfilled	5.12
8	Reliability durability: electric stability		
	Electromagnetic compatibility (resistance)	Fulfilled	5.17
#	Product essential features	Features	Harmonized technical specification EN 54-17:2005 AC:2007 Chapter
1	Effectiveness in fire conditions		
	Reproducibility	Fulfilled	5.2
2	Operation reliability		
	Requirements	Fulfilled	4
3	Durability of operational reliability: heat resistance		
	Dry heat resistance	Fulfilled	5.4
	Resistance to cold	Fulfilled	5.5
4	Reliability durability: vibration resistance		
	Single shock resistance	Fulfilled	5.9
	Impact resistance	Fulfilled	5.10
	Resistance to sinusoidal vibration	Fulfilled	5.11
	Sinusoidal vibration endurance	Fulfilled	5.12
5	Reliability durability: moisture resistance		
	Resistance to moist cyclic heat	Fulfilled	5.6
	Constant humid hot endurance	Fulfilled	5.7
6	Durability of operational reliability: corrosion resistance		
	Resistance to corrosion caused by sulfur dioxide (SO ₂)	Fulfilled	5.8

#	Product essential features	Features	Harmonized technical specification EN 54-17:2005 AC:2007 Chapter
7	Reliability durability: electric stability		
	Supply voltage changes	Fulfilled	5.3
	Electromagnetic compatibility (EMC), immunity test	Fulfilled	5.13
Technical data, see manual: IK-E372-001			

1 INTENDED USE

The DUT-6046AD Universal Addressable Smoke and Heat Detector with Sounder is designed to detect the initial stage of fire characterized with the appearance of smoke appears and/or temperature rise. It has substantial immunity to air movement and pressure changes. The use of a double smoke detection system and a double heat detection system provides increased resistance to false alarms such as those caused by steam and dust, with maintained small dimensions and highly aesthetic appearance of the detector.

The detectors are equipped with an internal short-circuit isolator and sounder.

The DUT-6046AD Universal Addressable Smoke and Heat Detectors are intended for operation in the addressable detection lines of POLON 4000 and POLON 6000 Fire Alarm Control Panel systems.

The detectors are equipped with an internal short circuit isolator.

2 TECHNICAL DATA

Operating voltage	16.5V ÷ 24.6V
Current consumption in operational mode	≤ 1mA
Working temperature:	
- for modes "1", "3", "4"	-10°C to +50°C
- for modes "2", "5", "6", and "7"	-10°C to +55°C
Permissible relative humidity	up to 95% at 40°C
Dimensions (with base)	∅115mm x 56mm
Number of basic operating modes	7
Weight (without base)	0.2kg
Standard detector color	white
Address coding method	programmed from the control panel
Test fires detection suitability	TF1, TF2, TF3, TF4, TF5, TF6, TF7, TF8, TF9
Sound pattern	4kHz tone: 0.5s signal, 0.5s pause
Maximum acoustic signal level	> 85dB/m from one direction > 70dB/m from other directions (Fig. 5 at the end of the manual)

The detector should be installed in accordance with applicable design guidelines.

3 DESIGN DESCRIPTION

The detector contains two sets of fire factor detectors: heat and smoke. The heat detector set contains two thermistors, and the smoke detector set is a special system of coupled diodes: two emitting diodes and a receiving diode. These diodes are mounted in such a way that the light emitted by the emitting diodes does not reach the receiving diode directly, and they are protected against the external light interference by labyrinth. The metal mesh prevents small insects and larger debris from entering the smoke detector. The whole assembly is placed in a casing made of white, non-flammable material.

4 OPERATION DESCRIPTION

The DUT-6046AD Smoke Detector operates based on the Tyndall principle: light scattering on smoke particles. Smoke particles entering the measuring chamber reflect the light emitted by the emitting diode. The scattered light reaches the photodiode resulting in photocurrent. Heat entering the detector causes changes in thermistor resistance. Information on fire factors from four detectors is subjected to advanced signal analysis by a microprocessor to assess the degree of fire hazard.

Communication between the POLON 4000 or POLON 6000 System Control Panel and the DUT-6046AD Detectors is carried out via an addressable, two-wire detection line. The unique, fully digital communication protocol enables the transmission of information from the control panel to the detector and from the detector to the control panel, e.g. assessment of the environment state (smoke, temperature), its tendency to change as well as the current analogue temperature value and smoke density.

The detector's microprocessor controls the correct operation of its basic systems and, in the event of abnormalities, transmits relevant information to the control panel.

The DUT-6046AD Detector is an analogue detector with a digital self-regulation mechanism, i.e. it maintains constant sensitivity with progressive soiling of the measuring chamber. After exceeding the set threshold (technical alarm threshold), the detector provides the control panel with information on partial soiling of the measuring chamber in order to inform the servicing staff about the need to take appropriate action.

The detector is equipped with an internal short-circuit isolator that cuts off the working part of the detection line from the adjacent short-circuited part. This feature enables further undisturbed operation of the detector.

The detector alarm status is signaled by pulsed red light of two LEDs located on opposite sides of the detector housing. This indication enables the alarming detector to be quickly located and helps with periodic detector operation checks. If the detector is badly visible or installed in a hard-to-reach place, it can be connected with an additional optical indicator, installed in an accessible and visible place.

Damage states, technical alarm states and operation of the short-circuit isolator are signaled by yellow flashes of the LED.

5 DETECTOR OPERATING MODES

The configuration of the detector operation mode depends on the system (4000 or 6000) in which the detector operates. Its configuration for the 4000 system includes the smoke and heat sensor settings only, and for the 6000 system the configuration also includes the WZ output setting. Additionally, it is possible to control the integrated sounder regardless of the detector status.

5.1 OPERATION IN THE 4000 SYSTEM

The detector has several modes of operation (apart from the alarm variants in the control panel) that allow the user to best match its characteristics with operation in a specific environment:

Smoke sensor selection (at least 1 must be selected):

- Smoke sensor O_{uv} : YES/NO
- Smoke sensor O_{ir} : YES/NO
- Heat sensor $2xT_{A1R}$: YES/NO

Interaction:

- **Independent sensors (0)** - sensors work independently (OR feature)
- **Interdependent sensors (1)** - an increase of fire factor in one sensor increases sensitivity of the other sensor and accelerates fire detection,
- **Sensors in coincidence (2)** - sensors operate in coincidence (AND function), for the detector to signal an alarm, the alarm threshold must be exceeded by two sensors sensing different fire factors, i.e. smoke and heat; this mode is used to increase immunity to false alarms,

Sensitivity:

- Normal
- Increased by 20%
- Reduced by 20%
- Reduced by 40%

Technical damages and alarms of deactivated sensors are not transferred to the control panel.

Depending on the enabled sensors, the detector's suitability for fire detection is specified in the table below.

Mode	Enabled sensor			Interaction			Suitability for fire detection								
	O _{UV}	O _{IR}	2 x T _{A1R}	Absent	Interdependence	Coincidence	TF1	TF2	TF3	TF4	TF5	TF6	TF7	TF8	TF9
71	x	x	x		x		+++	++	++	+++	+++	++	+++	+++	+++
67	x	x			x		+++	++	++	+++	+++		+++	+++	+++
4			x	x								++			
7	x	x	x	x			++	++	+++	+++	+++		+++	+++	+++
1	x						++	++	+++	+++	+++		+++	+++	+++
2		x						+	++	+++	+++		+++	+++	++
135	x	x	x			x	+				+				

In the 4000 system, it is possible to control the sounder regardless of the detector status.

5.2 OPERATION IN THE 6000 SYSTEM

The detector operating mode in 6000 system consists of sensor configurations similar to the ones in the 4000 system

and additionally the WZ output is configured.

WZ output operating mode:

- **as in the 4000 system** - WZ flashes concurrently with the detector internal diode reporting the alarm
- **duplication of the red LED flashing** - WZ flashes concurrently with the detector diode reporting the alarm but a **multiple operation indicator connected to the positive power supply line** is to be used,
- **alarm-independent flashing**, and a **group of outputs** should be declared.
- WZ flashes similarly to the LED in the detector reporting the alarm, while it is possible to control the sounder with a group address regardless of the detector status.

6 OPERATING CONDITIONS

During the operation of detectors, do not allow dew and frost to form on the product surfaces and protect the device against excessive dusting.

For any repair works, remove the detector or protect it with a cover provided for this purpose. Covers can be obtained from the installer or purchased from the manufacturer. If the detector is removed, cover the base with masking tape for painting. Detectors damaged during painting and renovation works by those conducting the works (e.g. painted detector housing, painted mesh, etc.) are not covered by warranty.

The DUT-6046AD Optical Smoke Detector during operation should be subject to periodic inspection in accordance with PKN-CEN/TS 54-14:2006. Such inspections are carried out in order to determine the correct operation of the detector and its proper communication with the control panel.

The smoke detector correct operation check may be performed using a smoke simulator (producing no heat), followed by heat detector operation check performed using a temperature simulator (producing no smoke).

The detector is equipped with a magnetic field sensor that is used to test the detector's communication with the control panel and to determine the detector location in the facility with a service kit. After putting the tester head on the detector, the detector starts flashing with a yellow LED, which shows correct communication with the control panel.

Prolonged use of the DUT-6046AD Detector can cause dust to accumulate inside the smoke detector. After exceeding the self-regulation range, as a result of progressive soiling of the smoke detector, the detector enters a technical alarm condition, sending information on excessive contamination to the control panel. The control panel signals the need to clean the detector optical system: labyrinth, holder, transmission diode lenses and photodiode. Service action should be taken as soon as possible to prevent false alarms.

The detector installation and disassembly method is shown in Fig. 1 and Fig. 2. To disassemble the detector:

- a) press the hitch (fig. 1) and turn the cover clockwise in the basket until the cover is removed;
- b) remove the grid from the labyrinth;
- c) pull up and remove the labyrinth;
- d) perform the necessary cleaning.

For cleaning, it is recommended to use a delicate brush and a vacuum cleaner. Compressed air may be used optionally for this purpose. The labyrinth may be washed with warm water with added dishwashing liquid. After washing and drying, no streaks may remain on the inner surfaces of the labyrinth. When installing the detector, be careful not to bend the thermistor feet.

After cleaning, the detector should be assembled. To do this:

- a) put the labyrinth in the guides and push in order to feel a perceptible click;
- b) put a mesh on the labyrinth;
- c) put the cover in the basket so that the indicator light is located slightly to the right of the lens;
- d) turn the cover to the left.

After assembly, the detector should be checked using a smoke imitator (producing no heat), and then using a temperature simulator (producing no smoke). The detector should be then reinstalled in the detection line.

NOTE: If cleaning does not allow to reach the desired result, the detector should be sent to the manufacturer for repair.

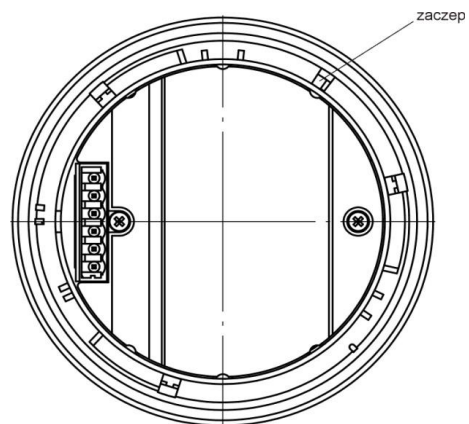


Fig. 1 View of the detector from below

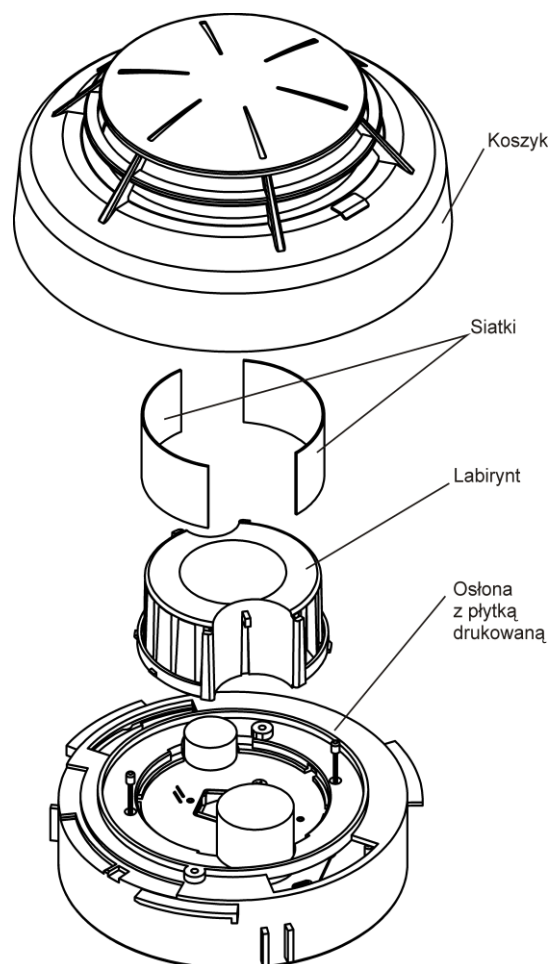


Fig. 2 Detector components after disassembly

7 DETECTORS INSTALLATION

The detectors are installed (height, layout) in accordance with selected design guidelines. The detectors are installed in rooms where equipment and accumulated materials will emit visible smoke when the fire starts. If it is difficult to determine the most likely fire factor (type of smoke) that may be produced in the first stage of fire development, appropriate tests should be performed (at the design stage) using several types of detectors or mixed protection should be adopted, e.g. with optical and ionization detectors.

When installing the base, use the directional characteristics of the sounder contained in the detector against the vicinity of the base (Fig. 5 at the end of the manual) so that the loudest sound is generated in the desired direction.

The detectors can work in loops, in loops with straight branches or in radial detection lines of the POLON 4000 and POLON 6000 System Control Panels (see the Operation and Maintenance Documentation of the POLON 4000 and POLON 6000 Control Panels).

The detectors are installed in the G-40S bases. The method for connecting with the detection line is presented in the installation and maintenance manual for the G-40S base. Additional optical signaling of a single detector or group of detectors can be obtained by attaching the WZ-31 alarm indicator:

- **standard configuration of operation indicator,**

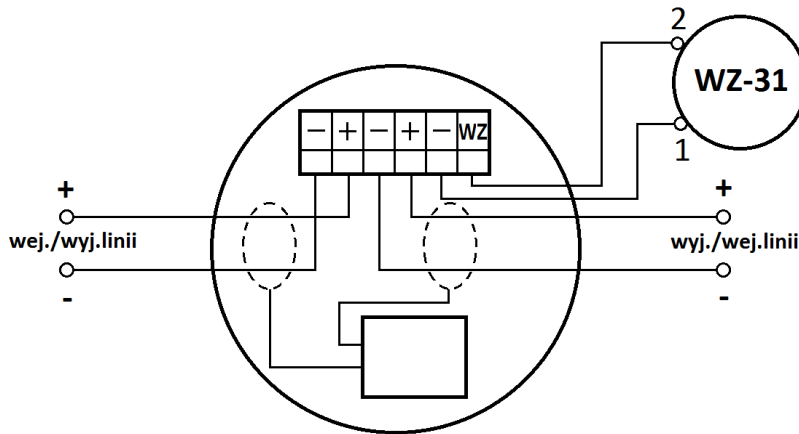


Fig. 3 Connection diagram for the detector operating in zero additional mode.

- **multiple operation indicator connected to the power supply positive line:**

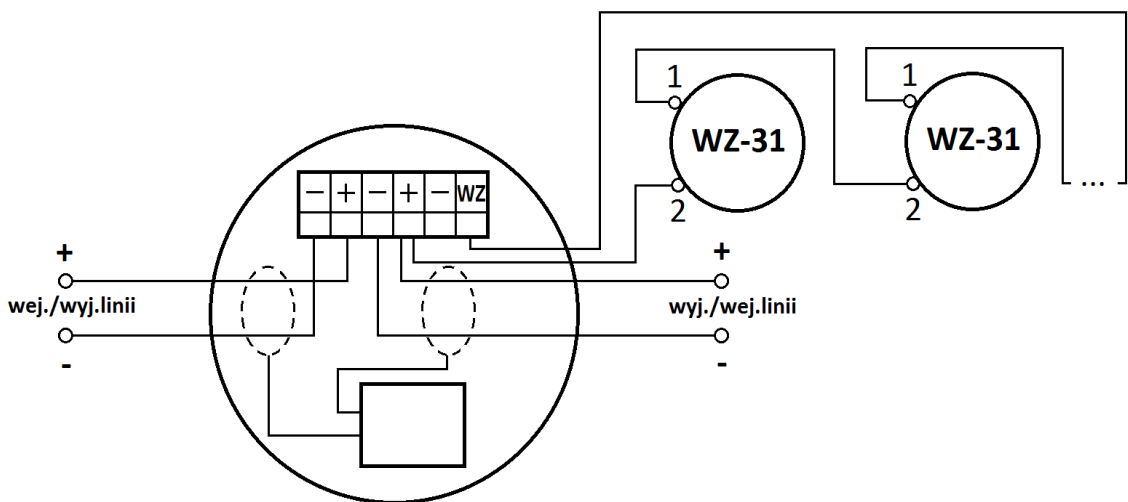


Fig. 4 Connection diagram for the detector working in the 6000 system with additional WZ modes. It is possible to connect 2 to 5 operation indicators.

Alarm system cables should be laid in accordance with the regulations in force for low-voltage installations (those below 42V).

NOTE: Detectors should not be installed in rooms with corrosive atmosphere, containing corrosive gases and vapors, as well as dust. Steam condensation on the detectors is not permitted.

8 SAFETY CONDITIONS

8.1 Repairs and maintenance

The maintenance works and periodical inspections should be conducted by authorized employees of companies which have been authorized or trained by POLON-ALFA personnel.

All repairs must be carried out by the manufacturer.

POLON-ALFA will not be responsible for the operation of equipment maintained and repaired by unauthorized personnel.

8.2 Work at heights

Work at heights related to the installation of detectors should be carried out with extreme caution and using fully functional equipment and tools.

Particular attention should be paid to the stability of ladders, elevators, etc.

Power tools should be used in accordance with the conditions of their safe operation specified in the respective manufacturer's manuals.

8.3 Eye protection against dust

For works creating lots of dust, especially when drilling holes in ceilings in order to install detector bases, wear protective goggles and dust mask.

9 STORAGE AND TRANSPORTATION

9.1 Storage

The DUT-6046AD Detectors should be stored in closed rooms with no corrosive vapors and gases in the atmosphere, within the temperature range from 0°C to +40°C, and with the relative humidity below 80% at +35°C.

During storage, detectors should not be exposed to direct sunlight or heat from heating devices.

The detector storage period in transport packaging should not exceed 12 months.

9.2 Transportation

The DUT-6046AD Detectors should be transported in closed spaces of transport means, in packaging meeting the requirements of applicable transport regulations. The temperature during transport should not be lower than -40°C and not higher than +70°C, and the relative humidity should not exceed 95% at 45°C or 80% at +70°C.

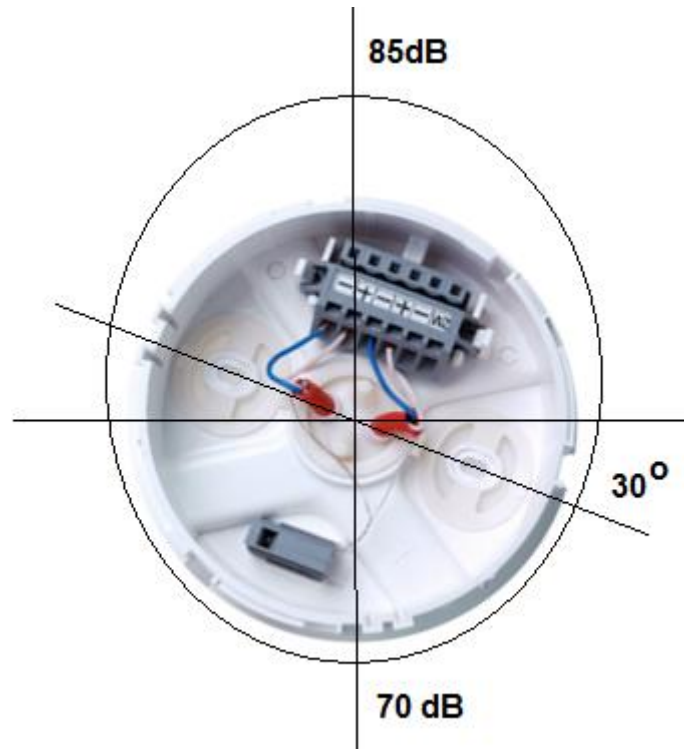


Fig. 5. The directional characteristics of the detector siren seated in base.



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