

UNIVERSAL SMOKE DETECTOR DUO-3000

POLON 3000 FIRE ALARM SYSTEM

INSTALLATION AND MAINTENANCE MANUAL

IK-E402-001-GB

Edition 1



The DUO-3000 universal smoke detector, which is the subject of this CI, meet the essential requirements of the following regulations of the European Parliament and of the Council (EU) and European Union directives:

CPR CPR/305/2011 Regulation (EU) of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products repealing Council Directive 89/106/EEC;

EMC Directive 2014/30/EU on electromagnetic compatibility.

The product has been issued by CNBOP-PIB, notified body No. 1438, a certificate of constancy of performance confirming the possession of technical features/parameters required by EN 54-7:2018 and EN 54-17:2005+AC:2007.

The Manufacturer's technical features/parameters exceeding the requirements of the listed standards and other features/parameters of the product specified in this manual not specified in the listed standards are confirmed by the Manufacturer.

The certificate and the Declaration of Performance are available on the website www.polon-alfa.com

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.

Failure to follow the recommendations in this manual may prove dangerous or result in a 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.

Note – Manufacturer reserves the rights to make changes to this document

A worn-out product, unfit for further use, should be handed over to one of the points dealing with the collection of waste electrical and electronic equipment.



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1 PURPOSE

The DUO-3000 universal smoke detectors are designed to detect the initial stage of fire development, during which smoke appears. It is characterized by significant resistance to air movement and pressure changes.

The DUO-3000 universal smoke and heat detectors are designed to operate in addressable detection lines of the POLON 3000 fire alarm control panels.

All detectors are equipped with an internal short-circuit isolator.

In the following parts of the manual DUO-3000 detectors will be referred to as the "detector" without the nomenclature.

2 TECHNICAL SPECIFICATIONS

Operating voltage	(16.5 ÷ 24.6) V
Maximum current consumption	≤ 150 μA
Operating Temperature:	-25 °C to +55 °C
Permissible relative humidity	up to 95 % at 40 °C
Dimensions (without base)	∅115 mm x 44 mm
Number of possible operating modes combinations	64
Weight (without socket)	0.2 kg
Standard detector colour	white
Address encoding	programmable from the control panel
Test fire detection suitability	TF1, TF2, TF3, TF4, TF5, TF7, TF8, TF9

3 DESIGN DESCRIPTION

The principal part of the detector is an optical system consisting of two diodes emitting light in ultraviolet and infrared ranges and a photodiode being a radiation receiver. They are mounted in a holder in such a way that radiation emitted by the transmitting diode does not reach the other diode directly. The detecting module (holder with diodes) is fastened to a printed board that contains all electronic elements and a circuit with the detector monitoring processor. The optical module is protected by a labyrinth, damping external radiation. A metal protective net prevents irruption of small insects or pieces of dirt into the detecting module. The whole structure is placed in a white plastic housing containing a basket, screen and detector cover.

DUO-3000 series detectors are installed in the G-40 base where detection line cables are connected to.

4 PRINCIPLE OF OPERATION

The principle of the DUO-3000 optical smoke detectors is Tyndall effect – light ray scattering on smoke particles. Its basic element is a detecting optical module consisting of an electroluminescence diode that transmits infrared radiation and an optical receiving diode. The optical module and surrounding measuring chamber are protected by a labyrinth which is shaped to dump both external light and radiation resulting from internal reflexes of the transmitting diode light. When smoke particles enter the measuring chamber, they reflect the light emitted by the transmitting diode. The reflected light reaches the optical diode producing photocurrent which is first strengthened and processed, and then analysed by the microprocessor installed inside the detector.

The alarm mode is indicated with pulse red light emitted by a signalling diode installed on the detector casing. The indicator enables fast location of the activated detector and is helpful in periodic detector inspections. In case the detector is hardly visible or is installed in a difficult-to-reach space, an additional optical alarm indicator (WZ-31) may be connected in an accessible and visible place.

Communication between the POLON 3000 fire alarm control panel and the DUO-3000 series detectors is obtained with an addressable two-wire detection line. Unique, fully digital communication protocol enables passing any information from the fire alarm control panel to the detector and inversely.

Apart from transmitting an evaluation of fire factors and tendency of their changes, the detector passes to the control panel, on its request, the current analogue value.

The detector operation controlling microprocessor monitors correctness of its basic circuits operation and, in case an irregularity is found, reports relevant information to the control panel.

DUO-3000 is an analogue detector with an automatic sensitivity self-regulation digital mechanism that is it maintains a constant sensitivity level during progressing dirt build-up in the measuring chamber. After exceeding a pre-set threshold of technical alarm, the detector transmits a signal to the POLON 3000 system control panel denoting the measuring chamber partial contamination. The signal is generated in order to inform the servicing personnel that the detector parameters shall not remain at the declared level in case the dirt build-up tendency is maintained and appropriate measures are not taken. It must be stressed that the detector shall be fully efficient within ca. 1/3 of the time period that passed since the latest maintenance works.

The detector is equipped with an internal short-circuit isolator, which cuts off the operational detection line from the adjacent shorted section, what enables further undisturbed operation. The alarm mode is signalled with flashing red light of the illuminating diode. The fault mode, technical alarm, and actuation of a short circuit isolator are signalled with yellow flashes of the diode.

5 OPERATION AND MAINTENANCE CONDITIONS

During the detectors operation it is obligatory to avoid creation of dew or rime on the detector surface as well as protect against an excessive dust contamination.

During any repair work, the detector should be removed or protected with a cover provided for this purpose. Covers can be obtained from the installer or purchased from the manufacturer. If the detector is removed, the base should be protected against painting with painter's tape. Detectors damaged during painting and renovation works due to a fault of the person executing such works (e.g. painted detector housing, mesh covered with paint, ...) are not subject to warranty repairs.

During operation lifespan device should be subjected to periodic inspection, which is carried out in order to determine the proper operation of smoke detector (using a smoke imitator).

The detector is equipped with a magnetic field sensor enabling to test detector's communication with the control panel and determine its location in the facility using a service kit. After the tester head is placed on top of device, the detector starts flashing a yellow LED indicating correct communication with the control panel.

Long-lasting operation of the detector may result in dust accumulation inside its internal optical chamber. After exceeding the self-regulation range due to a chamber contamination progress, the detector triggers the technical alarm mode sending information about the excessive contamination to the control panel. The control panel indicates required detector optics' cleaning: the labyrinth, the holder, the lenses of the transmitting diodes and the photodiode. Servicing should be done as soon as possible to prevent false alarms occurrence .

The detector assembling and dismantling is shown in Fig. 5.1 and 5.2. In order to dismantle the detector it is necessary to:

- a) press the catch (fig.5.1) and turn the guard in the basket clockwise until the guard is removed;
- b) remove the net from the labyrinth;
- c) turn and remove the labyrinth;
- d) carry out the necessary cleaning.

It is recommended to use a gentle brush and a vacuum cleaner for cleaning, or compressed air. It is allowed to wash the labyrinth with warm water and dishwashing liquid. After washing and drying, no stains can remain on the inner surfaces of the labyrinth.

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

- a) place the maze in the guides and rotate it to a perceptible click;
- b) put a net on the labyrinth;
- c) insert the cover into the base so that the LED alarm indicator is slightly to the right of the glass;
- d) turn the cover to the left.

After assembly detector operation should be verified using smoke imitator.

NOTE - If cleaning does not provide desired result detector should be sent to the manufacturer for repair.

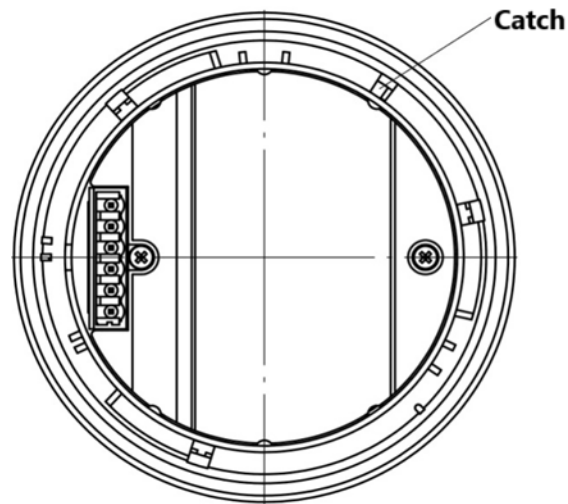


Fig.5.1 Bottom view of the detector

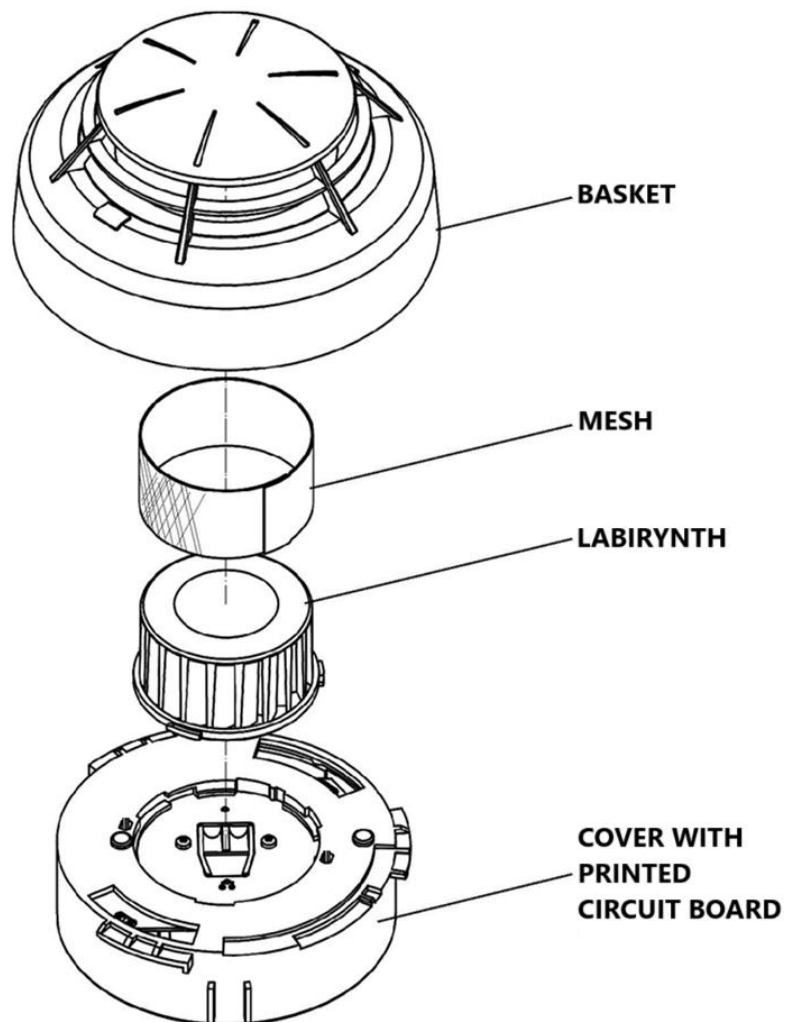


Fig.5.2 Detector elements after dismantling

6 DETECTOR OPERATING MODES

6.1 SENSOR OPERATING MODES

The detector has several operating modes (in addition to the alarm variants in the control panel) that allow the user to best match its characteristics to operate in a specific environment:

Smoke Sensor Selection (at least 1 must be selected):

- IR smoke sensor: YES/NO,
- UV smoke detector: YES/NO.

Interaction:

- **Independent sensors (0)** - sensors work independently (OR function)
- **Interdependent sensors (1)** – increasing the fire agent on one sensor sensitizes the other sensor and accelerates fire detection,
- **Sensors in coincidence (2)** - sensors operate in coincidence (AND function), in order for the detector to signal an alarm, the alarm threshold for two sensors must be exceeded, used to increase resistance to false alarms.

Sensitivity:

- normal,
- increased by 20 %,
- decreased by 20 %,
- decreased by 40 %.

Based on activated sensors, the suitability of the detector for fire detection at normal sensitivity is shown in the following table.

Mode	Sensor switched on		Interaction	Fire detection suitability								
	OUV	OIR		TF1	TF2	TF3	TF4	TF5	TF6	TF7	TF8	TF9
01	YES	NO	Independent sensors (0)	++	++	+++	+++	+++		+++	+++	+++
02	NO	YES	Independent sensors (0)		++	++	+++	+++		+++	+++	++
43	YES	YES	Interdependent Sensors (1)	++	+	++	+++	+++		+++	+++	+++
83	YES	YES	Sensors in coincidence (2)		++	++	+++	+++		+++	+++	++

6.2 WZ OUTPUT OPERATING MODES

WZ output operating mode:

- **primary** - WZ flashes like the LED in an alarm reporting detector,
- **duplication of the red LED flash** - WZ flashes like the LED in the alarm reporting detector, but a **multiple alarm indicator connected to the power supply must be used**,
- **flashes independent of the alarm**, but an **output group must be declared**.

7 DETECTOR INSTALLATION

Detectors are installed (in terms of height, arrangement) in accordance with the adopted design guidelines. The detectors are to be installed in rooms where equipment and stored materials will emit visible smoke in case of fire. If it is difficult to determine the most probable fire factor (smoke type) that may be formed during the first phase of fire development, appropriate tests with several types of detectors should be carried out (at the design stage) or mixed protection with e.g. optical and ionization detectors should be applied.

The detectors can operate in loops, loops with side lines or in open detection lines of the POLON 3000 control panels (see the Operation and Maintenance Manual of the POLON 3000 control panel).

Detectors are installed in G-40 base. The connection method of the detection line is shown in the Installation and Maintenance Manual of the G-40 base. Additional optical indication of a single detector or a group of detectors can be obtained by connecting the WZ-31 remote alarm indicator:

- standard configuration of the alarm indicator,

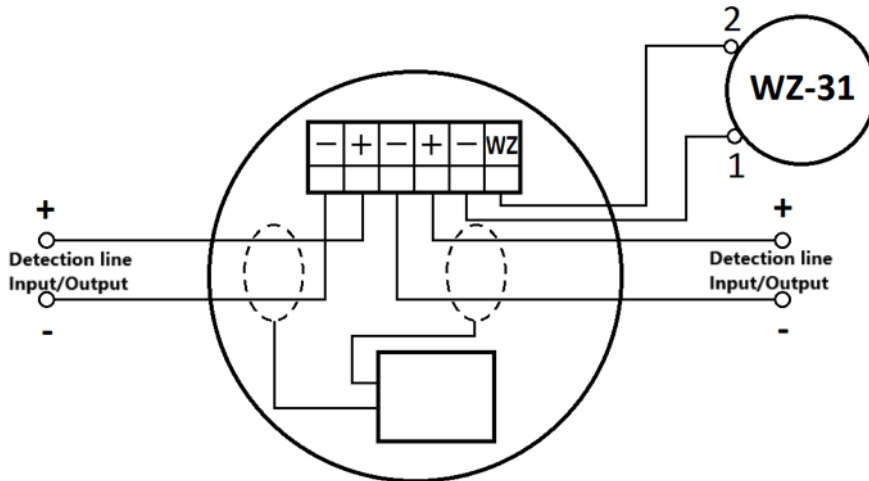


Fig.7.1 Wiring diagram used for the detector operating in the basic WZ mode.

- multiple alarm indicator connected to the power supply:

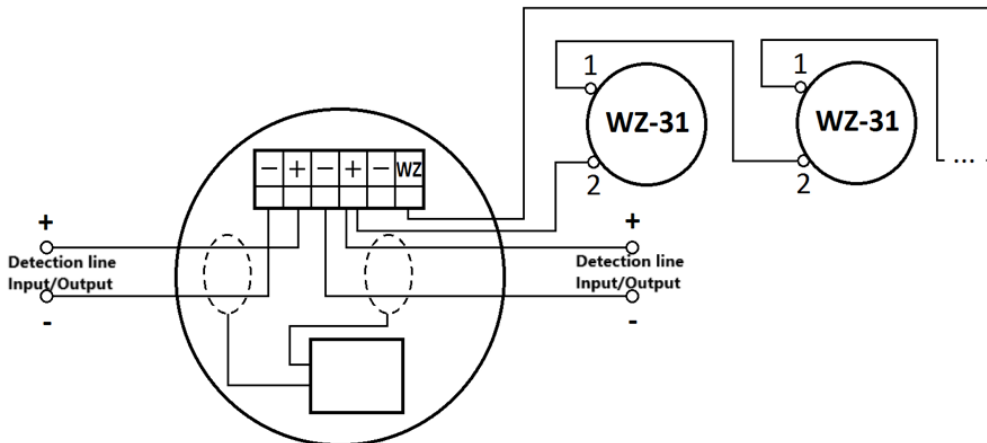


Fig.7.2 Wiring diagram used for a detector operating with additional WZ modes. It is possible to connect 2 to 5 alarm indicators.

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

NOTE – Detectors should not be installed in rooms with a corrosive atmosphere, containing corrosive gases fumes or dust. Condensation of water vapour on detectors is unacceptable.

8 SAFETY CONDITIONS

8.1 Repairs and Maintenance

Maintenance and periodic inspections must be carried out by authorized personnel of companies trained or approved by POLON-ALFA.

All repairs must be carried out by the manufacturer.

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

8.2 Work at Height

Work at height related to the installation of detectors must be carried out with special caution by the use of the functional equipment and tools.

Special attention should be paid to the stability of ladders, lifts, etc.

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

8.3 Anti-dusting eye protection

Safety goggles and dust masks should be used during work that generates a lot of dust, especially when drilling holes in ceilings in order to fix enclosures of detector bases.

9 STORAGE AND TRANSPORT

9.1 Storage

The detectors 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 +35 °C.

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

Storage time in transport packaging should not exceed 6 months.

9.2 Transport

The detectors should be transported in confined spaces of transport means, in packaging corresponding to the requirements of the applicable transport regulations. Temperature during transport should not be lower than -40 °C nor exceed + 70 °C, and the relative humidity should not exceed 95 % at +45 °C or 80 % at +70 °C.



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