



USER MANUAL

Gas Detector

DK-24 CARBON MONOXIDE AND NATURAL GAS DK-25 CARBON MONOXIDE AND PROPANE BUTANE



GETTING FAMILIAR WITH THIS USER MANUAL **AND ITS STORAGE IS MANDATORY.**

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1. PURPOSE

Home detector type DK-24, DK-25 is used for continuous monitoring of the presence of gas in the living areas and auxiliary rooms.

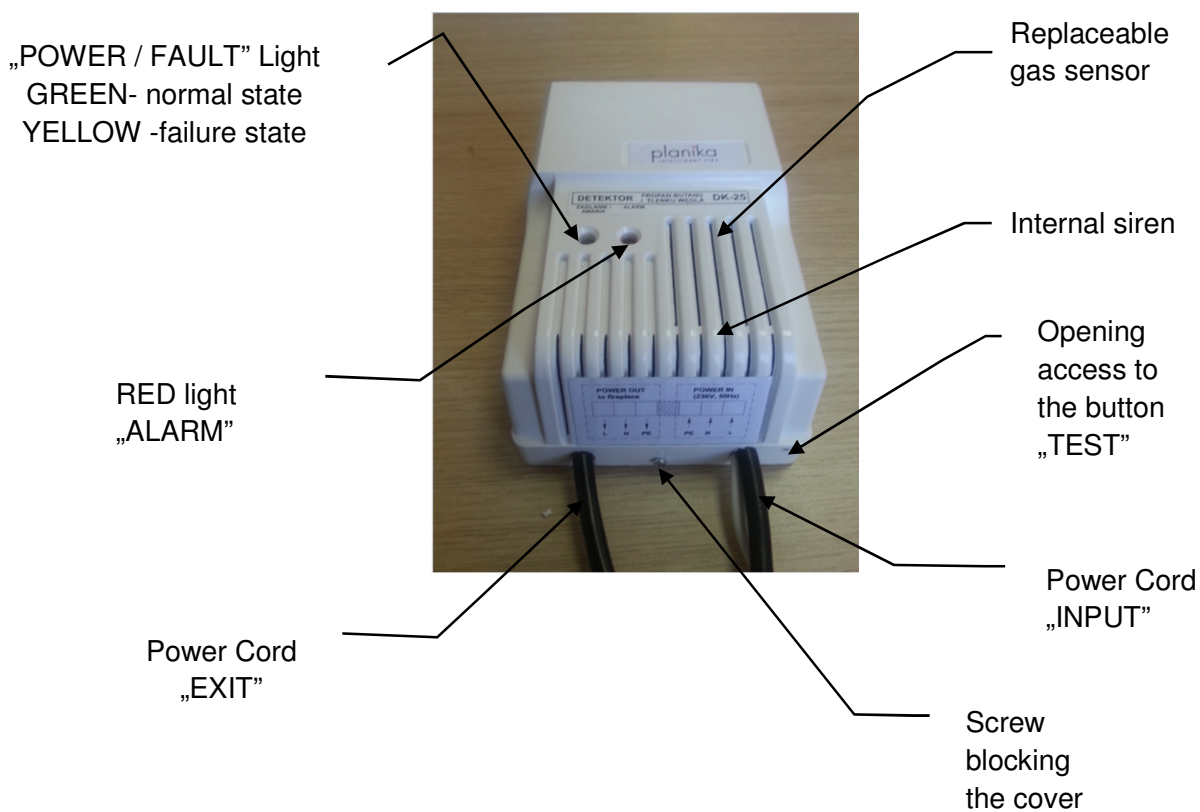


Photo.1. CONSTRUCTION OF THE DETECTOR

2. ASSEMBLY OF DETECTOR AND EXTERNAL EQUIPMENT

2.1. The location of the detector.

The location of DK installation SIGNIFICANTLY affects the proper detection of gas in a room at risk of its emission. Installation criteria are strictly dependent on the type of gas being detected and they strongly differ for natural gas and propane-butane mixture. In most cases, the location of optimum installation is shown below.

Model DK-24 for detection of **NATURAL GAS** and **CARBON MONOXIDE** (urban gas is much lighter than air, it accumulates in the upper zone of the premises) should be installed:

- on the wall, at a height of not less than 30cm below the ceiling (because methane is the main component of natural gas being much lighter than air and it accumulates under the ceiling and at the same time carbon monoxide is very easily mixed with air)
- ALWAYS above the top edge of doors or windows,
- away from ventilation openings, windows and doors (increased airflow at these locations may reduce gas concentrations locally),
- as close as possible to a potential source of gas emissions (no more than 8m away from it, measured through the ceiling), ■ in a space not separated from the gas emission by the partitions on the ceiling of height > 30cm, ie beam, coffers (gas may accumulate at the ceiling on the other side of the partition)
- in a place NOT covered by furniture, curtains or other objects limiting the air supply to the detector,
- In a place where there is no direct sunlight, without direct impact of: water vapor (not over the sink), water from showers, exhaust gas from furnace, dust and ash,
- away from sources of strong electromagnetic fields or heat sources (not above radiators).

DK-25 Model for detection of **PROPANE-BUTANE-CARBON MONOXIDE** (LPG stored in gas cylinders, commonly called LPG is much heavier than air and it accumulates in the lower parts of the premises) should be installed:

- on the wall at height: NOT higher than 30 ÷ 50cm above floor level (because propane-butane is much heavier than air and carbon monoxide is very easily mixed with air)
- as CLOSE as possible to a potential gas source, no further than 4m (measured through the floor),
- far away from the door,
- NOT over the recesses in the floor,
- in a place NOT separated from the potential source of gas emissions by steps, thresholds, channels in the floor,
- in the place not directly exposed to the sun, not exposed to direct external air, not subjected to direct splashing with water (> 0.5 m from the sink), mechanical shock or vibration,
- away from sources of strong electromagnetic fields or heat sources (not above radiators),

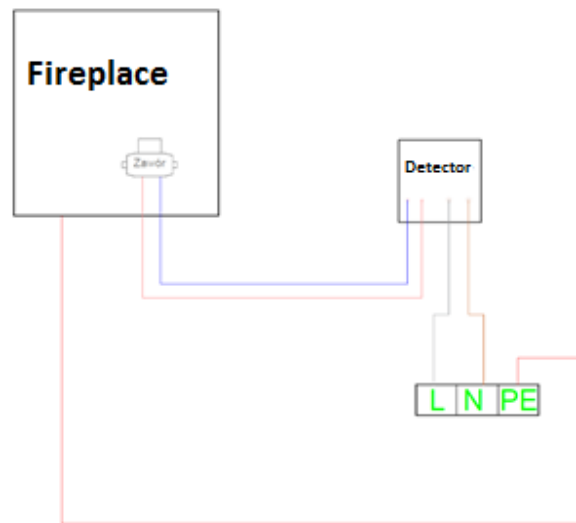
3. DESCRIPTION OF DETECTOR'S OPERATION

After the power is turned on, the DK detector activates the test sequence of the signaling elements - single yellow and green flashes "**POWER / FAILURE**" and then red "**ALARM**" light with a single beep (**Warning:** all the elements **MUST** be shown!). Then, the detector automatically goes into the test state as well as sensor warm- up state - the slow-flashing green light indicates the correct supply of the measuring circuits. After about 1 minute, the green light should light continuously. The ALARM light should be off.

Only when green light is lit (after the heating is complete) means Normal state - the detector is working and there is no dangerous concentration of detected gases in the room. However, the user should be aware that the DK detector is suitable for continuous operation. Full measuring power is achieved after 4 days of continuous power. Power interruptions longer than 1 hour can reduce sensor sensitivity in the detector during the first 15 minutes of recovery. The sporadic, short, few minutes of DK power off have practically no effect on the metrological properties of the detector.

The short, cyclical extinction of the green "**POWER**" light (see Table 1) indicates the presence of a specific gas: methane or propane-butane with a concentration of $> 15\%$ Lower Explosive Limit or carbon monoxide concentration > 50 ppm (even before **ALARM**). This is information to the user about the presence of gas around the detector, but the emission of which is not yet a danger for people staying near the detector

A lit or blinking yellow light indicates a failure of the device. In that case please refer to Table 1. Of emergency status code. If possible, remove the fault (as recommended in Table 1) or contact the Distributor.



Drawing 1. Connection scheme

The detector is connected to a network with parameters $U_N = 230\text{ V}$, $f = 50\text{ Hz}$ and in addition, the DK detector can control ONLY one type of valve: ZB or MAG-3 (prod. FLAMA-GAS) or another normally open poppet valve with a release coil with similar parameters ie nominal voltage 12V.

WARNING.IMPORTANT- The electrical circuit must be equipped with a disconnect switch for both power supplies!

Table 1. Signaling of detector states

STATE	LIGHTS		SIREN	REASON	WHAT TO DO ?
	POWER / FAULT	ALARM			
NORMAL	Green light flashes slowly once per second.	none	none	Heating up of the sensor for 1 minute, from turning on the power or its temporary disappearance	Wait until it goes to NORMAL state
	Green light is constantly on	none	none	NORMAL operating state	Sleep peacefully DK is overwatching!
	Green flashes continuously 2-3 times per second.	none	none	NORMAL working state, the period of 3 years has passed since the last calibration	recalibration of the gas sensor is recommended
NORMAL before ALARM	Green goes off once every 2 seconds	none	none	Detection of CO , exceeded level of required safety concentration: if it lasts for longer, it will automatically go to the ALARM state	The carbon monoxide concentration or disturbance factor is not yet harmless
	Green goes off twice every 2 seconds	none	none	Detection of combustible gas , exceeded level of required safety concentration: if it lasts for longer, it will automatically go to the ALARM state	The carbon monoxide concentration or disturbance factor is not yet harmless
	Green goes off three times every 2 seconds	none	none	Detection of CO and combustible gas , exceeded level of required safety concentration: if it lasts for longer, it will automatically go to the ALARM state	The carbon monoxide concentration or disturbance factor is not yet harmless
ALARM	Green goes off once every 2 seconds	Red light flashes slowly (f= 1Hz)	intermittent tone in tact of flashing ALARM light	ALARM carbon monoxide is exceeding the level of required safety concentration	Danger of carbon monoxide poisoning. Follow the appropriate emergency procedures
	Green goes off twice every 2 seconds	Red light flashes quickly (f= 2,5Hz)	intermittent tone in tact of flashing ALARM light	ALARM liquid gas is exceeding the level of required safety concentration	Gas explosion danger. Follow the appropriate emergency procedures
	Green goes off three times every 2 seconds	Red light - alternating, slow flashes (f= 1Hz) fast (f=2,5Hz)	intermittent tone in tact of flashing ALARM light	FAILURE carbon monoxide and liquid gas are exceeding the level of required safety concentration	Danger: carbon monoxide poisoning and gas explosion Follow the appropriate emergency procedures
FAILURE	none	none	none	No AC power	turn on the power
	yellow constantly lit	none	none	FAILURE , Lack of sensor module or sensor module failure	faulty detector, please contact distributor or Producer
	yellow 1 switching off every 10 seconds	none	none	FAILURE , Power parameters outside the allowable range	the failure of the internal power circuit, please contact Distributor

					or the manufacturer
	yellow 2 switching off every 10 seconds.	none	none	FAILURE , lack of conformity of the detector and the type of sensor module	faulty detector you must insert the correct type of sensory module
	yellow 3 switching off every 10 seconds	none	none	FAILURE , valve not connected to terminals Output connector	podłączyć zawór::przy pracy bez zaworu należy do zacisków sterujących podłączyć opornik ok 10 kΩ
	yellow 5 switching off every 10 seconds	none	none	FAILURE , a short circuit or overloading the SIREN output, damage to the control circuit output	Odłączyć sygnalizator od wyjścia SYRENA wygenerować ALARM , jeśli awaria nie ustąpi należy skontaktować się z Producentem
	Yellow different amiant Switching off every 10 seconds	none	none	FAILURE	detektor niesprawny , należy skontaktować się z Dystrybutorem lub Producentem

WARNING: IMPORTANT !!! The user should be aware that the toxic effect of **CARBON MONOXIDE** on the human body is proportional to the concentration of CO in the air and to the time and intensity of absorption.

This means that the **DANGER** of poisoning **GROWS** along with the **INCREASE CONCENTRATION** of Carbon monoxide at the specified absorption TIME or along with the **EXPANDING THE TIME OF ABSORPTION** or the increase of **INTENSITY** of breathing at constant CO concentration.

Take actions leading to the removal of CO, ie natural ventilation (opening windows, doors) and forced ventilation (turning on fans or kitchen exhausts). Those who stay in a supervised room until then, should be discharged to fresh air for at least 15 minutes or until symptoms of poisoning will stop.

It should also be taken into account that the distribution of CO concentration in the room is never even and that there may be CO concentration higher than that of DK. Therefore, staying in a supervised room during the ALARM should be limited to the minimum necessity. The lack of the ALARM detector cannot be equated with the total security of all the people staying in the supervised room - this may depend on the individual sensitivity and health of each person. Examples are children and pets, which show much higher sensitivity to carbon monoxide than adult human sensitivities.

Please note that the detector is designed to protect people against the effects of acute carbon monoxide poisoning. It may not fully prevent the effects of chronic exposure on relatively low concentrations of carbon monoxide.

4. ALARM – DANGER OF GAS EXPLOSION (related to DK-24, DK-25).

The fast flashing ($f = 2.5\text{Hz}$) red light **ALARM** and the audible intermittent beep (see Table 1) indicate that the detector is in the **ALARM** state, ie it detects a dangerous concentration of flammable gas in the air and activates the alarm outputs. The detector reacts for several seconds after the instantaneous gas concentration exceeds the alarm threshold. The threshold value is defined with respect to the Lower Explosive Limit of Explosive Gas, in accordance with EN 194-1:

- -DK-24 - 15% of DGW methane - **ALARM** before 1 minute;
- -DK-25 – 15% of DGW propane-butane - **ALARM** before 1 minute;

Activation of the alarm at 15% of the DGW (ie concentration approximately 7 times lower than the one at which the gas may explode) does not mean that there is no higher concentration in the monitored room. Depending on the volume of gas emissions, the level of gas explosion can quickly be reached. Note that the distribution of gas concentration in a room is never equal. There may arise local accumulation of gas which may cause gas explosion (particularly when the detector has been misplaced). Therefore, in the event of an ALARM, the intervention should be taken immediately:

- extinguish all sources of fire, cigarettes, pipes, candles, etc..,
- it is **NOT ALLOWED** to switch on or off any power or lighting equipment at this time,
- **DO NOT** switch of the detector !!!
- close all gas oven knobs, water heater; close the valves of the cylinder, tank or installation,
- ventilate the room by wide opening of windows and doors (not only supervised rooms but also the ones adjacent);
- make sure that the shut-off valve is closed

If it is not possible to determine the source of the gas emission and / or the cause of its outflow is not obvious, it is essential to inform the gas emergency or the competent gas surveillance authority and strictly follow the instructions given.

At the same time, it is important to note that natural gas (municipal) supplied to your home as well as liquefied petroleum gas (LPG) is specially watered. The intensity of the smell of the escaping gas (which depends on personal characteristics and environmental conditions) is not an authoritative factor determining the degree of danger!! The concentration of fragrances in gas is selected in such way, so that it was palpable as small concentrations and reveal the smallest leakage of the installation. The detector reacts to gas concentrations several times higher and the presence of "odor" in the absence of **ALARM** of the detector is not an indication of its inadequate action!

Table 2. Output Test

The time from the moment of pressing [sec]	TEST button	POWER light	ALARM light	Internal Siren	State of outputs
0 - 5	pressed	lights up every 1 second	Does not lit	muted	NORMAL (on all outputs)
5 - 10	buton release	flashes quickly ((f=2,5) Hz)			
10 - 20	released	lights up every 1 second		signal impulse every 1 second	ALARM „SIREN” - the remaining outputs- NORMAL
20 - 22 (version DK-24, DK-25)	released	flashes every 1 second		signal impulse every 1 second	ALARM „SIREN” - the remaining outputs- NORMAL
22+ or 30+	Back to normal operation-the current state of the detector				NORMAL (on all)
(*) Warning: After closing, you should open the valve manually! The test procedure can be triggered at intervals of not less than 1 minute. This is the minimum time required to gather energy to re-close the valve.					

The gas detector is a highly accurate device for the protection of **HEALTH** and even **LIFE**, intended for use in residential areas, therefore it must be protected against: - strong shakes, impacts, strong electromagnetic fields (eg mobile phones), - flooding or splashing with water, paint or any other liquids (this can lead to electric shock and irreparable damage to the sensor like sensitive gas element), - direct impact of the aerosol spray (lacquers, deodorants, air fresheners, etc.), - long-lasting work in a high-gaseous atmosphere, exhaust gases, chemically aggressive liquids, diluents, etc. This significantly shortens the life of the sensor or can lead to damage or change in the setting of alarm thresholds.

In case of repair works, the detector must be switched off and covered tight with a foil bag for the repair period and for the time necessary to dry the paint and ventilate the premises. Secure the detector from dust and splashes. The DK gas sensor can have a natural tendency to increase sensitivity over time. During normal, long-term operation, excessive alarm thresholds may occur, so it is recommended to calibrate the detector no less frequently than every three years.

!!! WARNING: long-term operation of the detector in conditions of gas concentration above the alarm threshold or in continuous presence of other explosive or toxic gases can lead to permanent changes in gas sensor parameters or its irreparable damage!

Table 3. Technical Parameters

<i>Model</i>	DK-24, DK-25
Power Parameters	U _N = 230 V , f=50 Hz
Detected	DK-24- carbon monoxide (CO) i methane (NG) DK-25- carbon monoxide (CO) i propane-butane (LPG)
Interference factors	Hydrogen alcohol (high level) other chlorine hydrocarbons; Significant oxygen deficiency (19% volume); High rise in humidity
Temperature while working	Up to 50 °C
Measurement cycle	DK-24..., DK-25..., every 25 sec ;
Predicted life time	15 years from the date of production
Optical signalling	POWER / FAILURE light - green (normal state) or yellow (emergency state) red light ALARM (alarm state) Special description in table 3
Sound Signaling	Internal siren intensity 85 dB / 1m, pulsating tone

5. MAITENENCE

Maintenance of the detector is based on periodic inspection of the ventilation openings holes in the cover and possible cleaning from dust excess with a dry brush, dry cloth or vacuum cleaner (with detector power off). NEVER use sharp objects such as nails, screwdrivers, metal plates, etc. The cover of the detector (with power off) is to be cleaned with a soft cloth, slightly dampened with clean water (in any case do not use solvents, alcohol or detergents). The frequency of this treatment should be selected according to the level of dust of the supervised room but: at least once a year !!! The predicted durability of the gas sensor in DK is estimated for about 15 years in clear air. It is recommended to calibrate the detector in case of its exceeded sensitivity (especially when used in extreme humidity) or after 3 years of operation. Before the expiry date stated on the nameplate (15 years from the date of production), the DK gas sensor should be inspected or replaced.