ATEST GAZ

User Manual

Gas Detector

Teta MiniDet

Product code: PW-107-LPG

POD-052-ENG R04

ATEST GAZ

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Systems for Monitoring, Detection and Reduction of gas hazards

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Remarks and reservations

- Connection and operation of the device is allowed only after reading and understanding the contents of this document. Keep User's Manual with the device for future use.
- The manufacturer bears no responsibility for errors, damages and failures caused by improper selection of devices and cables, improper installation or failure to understand the contents of this document.
- Unauthorised repairs and modifications of the device are not allowed. The manufacturer bears no responsibility for the results of such interventions.
- Excessive mechanical, electrical or environmental exposure may result in damage to the device.
- Use of damaged or incomplete devices is not allowed.
- The design of the gas detection system for a protected facility may involve other requirements throughout all stages of the product life.
- Use of unauthorized spare parts different from the ones listed in Table 4 is strictly forbidden.

How to use this manual?

- Important parts of the text are marked as follows:

Pay special attention to information given in these fields.

User's Manual consists of main text and appendices. Appendices are independent documents and can exist without User's Manual. Appendices have their own page numbering independent of User's Manual page numbering. These documents can also have their own tables of contents. All documents included in the User's Manual are marked in the bottom right corner with their name (symbol) and revision (issue number).

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1 Preliminary information

1.1 Purpose

Teta MiniDet Gas Detector is designed as crucial components of the Teta Gas system for monitoring of hazardous gas concentrations and are dedicated to detect excessive (hazardous) concentrations of LPG (C_3H_8, C_4H_{10})[1] n the surrounding atmosphere, incl. in such facilities as garages, underground car parks, liquid gas boiler rooms or halls heated with gas radiators.

The detector is not an independent device but its operation is only possible after connection to the Teta EcoWent /Teta EcoN detector, which makes up a measurement station that enables simultaneous detection of LPG and carbon monoxide.

Teta MiniDet Gas Detector is not designed for operation in areas with potentially explosive atmospheres.

Key features of gas detectors

- Connection via a three-core cable.
- Easy assembling.
- Possibility to verify status of individual detectors by means of the supervising control unit.
- Optional calibration of the detector parameters by replacement the MiniPel Measuring Head – very short time of calibration.
- Three configurable alarm thresholds that trigger when a specified concentration is exceeded[2].
- Option to adjust the averaging time for alarm thresholds 1 and 2, and the delay time for alarm threshold 3.

1.2 Description of the operation

Gas detector is crucial component of any system for gas detection. They are designed for periodical measurements of gas concentration in ambient air. Information about concentration of a hazardous gas is transmitted by means of an analog signal (electric current 4..20 mA) to a Teta EcoWent /Teta EcoN master detector where it is converted into a digital output signal.

Presence of hazardous gases is detected by means of catalytic sensors. Such a solution enables high insensitivity to variations of ambient conditions, such as temperature, humidity or pressure. The sensor also distinguishes with high immunity to presence of disturbing chemical compounds (e.g. methane, isobutene or carbon dioxide), which eliminates occurrence of faked alarms.

Please refer to Appendix [2] for more details about catalytic sensors.

Types of monitored gas and tripping thresholds are specified in its calibration certificate.

During the system operation the detector carries out permanent measurements of gas concentration in ambient air. Instantaneous values of gas concentration are measured with the increment of 1 second and then transmitted as an analog (current loop) signal to a Teta EcoWent /Teta EcoN detector.

Details for operation statuses indicated by the detector are outlined in User Manual for Teta EcoWent /Teta EcoN Gas Detector POD-046-ENG.

1 Detectors are calibrated with the use of gaseous propane C_3H_8.
2 Alarm thresholds, averaging and delay times are stored in the Teta EcoWent / Teta EcoN detector.

2 Safety

Do never install gas detectors at locations exposed to direct effect of water (moisture) or direct sunlight.

When defects are revealed switch the detector off, secure connection cables and contact maintenance staff or a service team.

All activities related to connecting detectors must be carried out while Control Unit's power supply is off.

Despite the power supply voltage for the Gas Safety System is off, dangerous voltage may persist across terminals of the Control Unit. Such a voltage may come from another system controlled by the same unit, for instance ventilation, that use one output pin of the Control Unit.

The gas detector must be reliably secured during any repair, installation or maintenance works.

Before painting the facility walls and floor make sure that the device is properly secured against unintentional painting or paint splashing.

Before using silicons or silicon-containing materials (paints, glues, sealing etc.), make sure the device is secured against unintentional coating.

3 Description of the construction

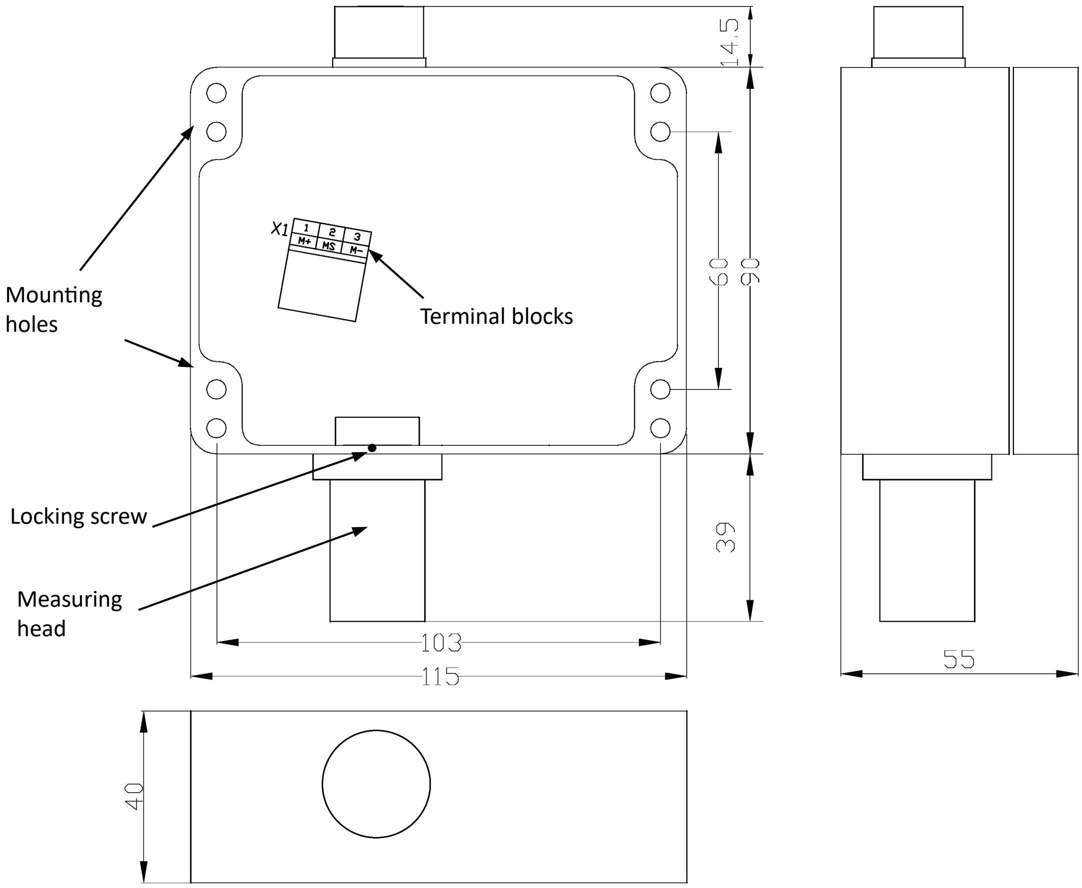


Figure 1: The construction of the device and its dimensions

4 Input-output interfaces

4.1 Electric interface

Locations and arrangement of terminal blocks is shown on Figure 1.

Port designation	Name	Terminal	Description
X1		Supply port. Parameters – see Section 8	
	M+	1	Positive
	MS	2	Signal line
	M-	3	Negative

Table 1: Electric connections

5 User interface

5.1 Indication of the device status

The Teta MiniDet Gas Detector indicates its status by means of the LPG indicating LED of the Teta EcoWent /Teta EcoN detector (see details in User Manual for Teta EcoWent /Teta EcoN Gas Detectors POD-046-ENG) or by information presented on the control module of the system.

5.2 Information about test / simulation

5.2.1 Test with gas

A gas test allows you to quickly check that the gas detector is working properly – during this test, the detector measures the momentary concentration of the specified gas (rather than the average) and alarms are generated without any delay.

> ⚠ In test mode, the system does not generate any alarms.

To perform a gas test on the Teta MiniDet detector, enable the gas test function on the Teta EcoWent /Teta EcoN detector (for details, see the Teta EcoWent /Teta EcoN Gas Detector User Manual POD-046-ENG).

This test is available when the gas detector in operating mode.

For details on how to carry out the test, see Section 7.6.1.

5.2.2 Simulation of alarms

Simulating alarms allows us to verify that the system is working correctly.

For details on how to carry out the simulation is described in the Teta EcoWent /Teta EcoN Gas Detector User Manual POD-046-ENG.

The simulation mode can be used when testing safety functions – see Section 7.6.3.

6 System architectures

6.1 Data bus architecture

In this system gas detectors are connected to the bus via S2 T-connectors.

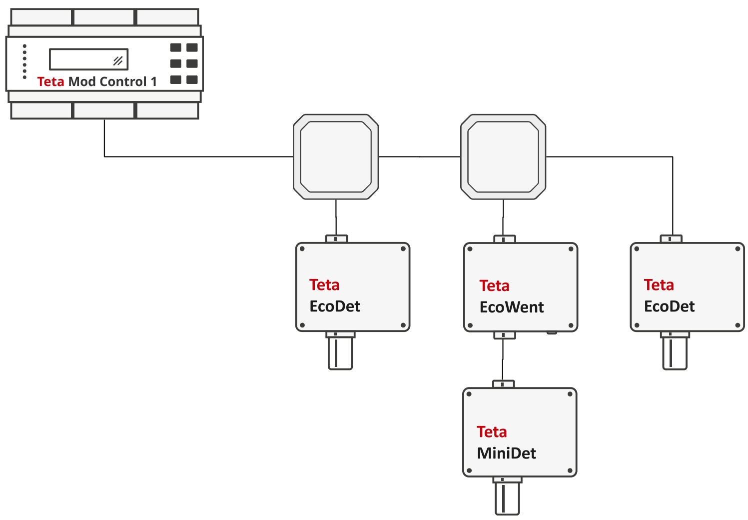


Figure 2: Arrangement of gas detectors according to the data bus architecture

Detailed schematic diagrams in an editable format can be found on our website tetagas.atestgaz.pl

7 Life cycle

7.1 Transportation

The device should be transported in the same way as new devices of this type. If the original box or another protection (e.g. corks) is not available, it is necessary to secure the device against shocks, vibrations and moisture on one's own, using other equivalent methods.

Transport of the device should be carried out under the environmental conditions described in Table 3.

7.2 Installation

7.2.1 Deployment of gas detectors

Deployment of gas detectors must be determined by the system designed with consideration to the following rules:

- It is recommended to install gas detectors very close to the floor level and, if possible, at locations inaccessible to third persons. In general, the distance between the measuring head and the lowest point of the floor should be not more than 20 cm since propane-butane is heavier than air and it can accumulate nearby the floor. Such accumulation and deposition leads to local high concentrations, which may be extremely hazardous,
- it is recommended to install gas detectors at locations where accumulation of gases is highly probable due to design features of the facility structure (e.g. confined spaces separated from the entire area by means of structural partitions),
- detectors must not be exposed to direct effect of water (moisture) or other chemicals (e.g. cleaning chemicals when the facilities are being cleaned), as well as to direct effect of sunlight, rain or wind,
- detectors must be secured against damaging mechanical impacts (e.g. by using Mounting Bracket WM3),
- locations of detectors must enable easy checks and adjustments as well as replacement or disconnection of each detector.

7.3 Mechanical mounting of detectors

⚠ Mounting of gas detector is allowed only after full completion of all civil engineering works.

- Spring clamps of terminal blocks are released by depression of the button with a screwdriver.
- Detectors must be fixed by means of mounting holes that are visible after opening of the housing. Make sure that the gas inlet looks downwards. Dimensions of the housing, arrangement of mounting holes and layout of internal components is shown in Figure 1. Drilling of mounting holes in walls or other permanent structures is easier with use of a drilling pattern attached to the device package.

7.3.1 Electric network

The electric network must be deployed according to the engineering documentation.

The electric system must be designed in conformity to general rules for engineering of A&C[3] systems.

Electric cables and conductors shall be routed in a safe manner to have them protected against possible damage.

When two conductors are to be connected to a single terminal clamp of the device they must be encapsulated first within a common clamping bushing (lug) – see details in Table 3).

Do never combine two or more wires at a single terminal if such wires are not clamped in a common cable lug.

Do never leave redundant cable cores not terminated inside the device.

Incorrect routing of cables may result in impairment of the equipment immunity to electromagnetic interferences.

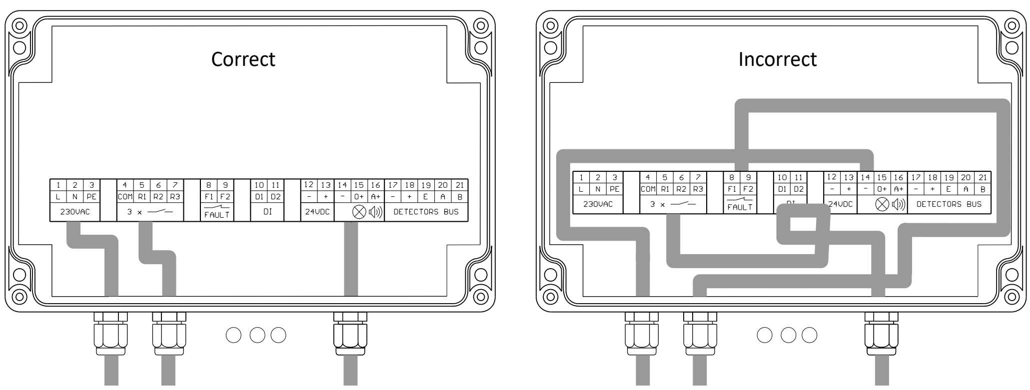


Figure 3: An example of cable termination inside a gas detector

3 Automation and Control Systems

7.3.2 Types of suitable cables and conductors

Connection type	Recommended cable type	Example of a suitable cable designation
Connections between Teta EcoWent /Teta EcoN and Teta MiniDet Gas Detectors	Three-core cable	YDY 3 x 1 mm^2

Table 2: Types of suitable cables

7.4 Commissioning of the gas monitoring system

After having the electric network complete and power voltage supplied to all devices carry out the following operations:

- configure:
  - the control unit (see User Manual for the Teta MOD Control 1 Unit POD-051-ENG),
  - Teta EcoWent /Teta EcoN Gas Detector (cooperation with Teta MiniDet) – details see in Teta EcoWent /Teta EcoN Gas Detector User Manual POD-046-ENG,
- make sure that the system works according to the underlying logic flow chart – execute a test of safety functions – see details in Section 7.6.3.

⚠ If any civil engineering or building (finishing) jobs could have been performed yet after installation of the Gas Safety System a test of all detectors is mandatory to make sure that detectors correctly respond to presence of hazardous gases.

⚠ In case of improper operation of the system recheck all wiring and connections or contact the system provider / equipment manufacturer.

⚠ The gas monitoring system can be approved for operation only after passing results of all aforementioned checks and verifications.

7.5 Troubleshooting

Irregularities associated with operation of Teta MiniDet gas detectors are indicated by means of a paired Teta EcoWent /Teta EcoN detector (see details in User Manual for Teta EcoWent /Teta EcoN Gas Detector POD-046-ENG).

7.6 Maintenance schedule

When operating a gas monitoring system, it is important to bear in mind that detectors – and particularly the sensors – are components that are susceptible to ageing, wear, and environmental influences. Therefore the systems must undergo regular and scheduled maintenance.

Maintenance operations shall include:

- test with standardized gas – verification test,

- calibration,
- test of safety functions of the entire system,
- replacements of fast-wearing parts.

7.6.1 Test with standardized gas – verification test

This test is carried out to verify that the detector is functioning correctly. It involves applying a calibration gas to the sensor and checking its response.

The gas test mode can be used to perform this test – see Section 5.2.1 for details.

Guidelines for the test with standardized gas – verification test:

- frequency of a verification test: not less than once a year,
- test gas concentration should range from the A3 alarm threshold up to 80 % of the measurement range. For instance, when the A3 alarm threshold is 20 % of Low Explosion Limit (LEL), the concentration must range from 20 % to 40 % of LEL.

Correct execution of the test needs application of a calibration kit with the proper standardized reference gas (see Table 5).

> ⚠ Unauthorized tests of gas detectors when gas with unknown composition and concentration is supplied to the detectors is prohibited. Under such circumstances the gas sensor can be damaged, which leads to loss of the detector calibration.

- gas must be supplied until the detector indication is stabilized (variations below 1 % per 10 s). The readouts should be stabilized not later than in 3 minutes after start of the test. If the stabilization time is longer, the service division of the manufacturer must be consulted.

> ⚠ Supply of the reference gas may activate alarms in the system.

- After the reference gas is supplied, the indication of the detector must be verified (e.g. by reading of the measurement results stored in the control unit). Should the indication error (deviation) exceeds ±20 %, the calibration of the detector is needed. Examples:
  - reference gas concentration is 40 % of LEL and the detector indicated 30 % of LEL: the relative indication error[4] is -25 %, i.e. the detector response is incorrect and the calibration is needed (in this case absolute indication error[5] is -10 % LEL),
  - reference gas concentration is 40 % of LEL and the detector indicated 32 % of LEL: the indication error is -20 %, i.e. the detector response is still within the tolerance,
  - reference gas concentration is 40 % of LEL and the detector indicated 44 % of LEL: the indication error is +10 %, i.e. the detector response is acceptable,
  - reference gas concentration is 40 % of LEL and the detector indicated 49 % of LEL: the indication error is +22.5 %, i.e. the detector response is out of tolerance and the calibration is mandatory.

4 Relative indication error (deviation) = (actual indication – concentration of the reference gas) / concentration of the reference gas.
5 Absolute indication error = actual indication – concentration of the reference gas.

7.6.2 Calibration

Calibration of gas detectors must be entrusted to trained servicemen and the process can be carried out in several ways:

- dismount of the complete gas detector and send it to the manufacturer,
- removing only MiniPel head (see Section 7.6.4.1),
- contact an authorized service team (e.g. service division of the manufacturer) to come and calibrate the detector on site.

7.6.3 Test of safety functions

Execution of the test for safety functions is recommended once a year. Test gas is supplied to one unit of detector and response of all components within the Gas Safety System is checked together with all collaborating systems (e.g. ventilation).

> ⚠ During the safety functions test, do not activate the gas test mode (for details, see Section 5.2.1). Do not place a magnet against the gas detectors.

Safety functions can be tested using alarm simulations (see Section 5.2.2) – however, in this case, we cannot verify that the sensor is functioning correctly. This procedure is recommended for systems where the correct operation of the gas detectors has already been verified (a verification test using a standardized gas, or a recent calibration).

7.6.4 Replacement of fast wearing parts

Please refer to Table 4 for the recommended lifetime and replacement schedule of fast wearing parts.

7.6.4.1 Replacement of a Measuring Head MiniPel

Operation of gas detector leads to natural deterioration of metrological parameters of gas sensors. That effect can be compensated by regular and scheduled adjustment of the detector indication up to the moment when the sensor is completely exhausted and must be replaced. It is assumed that replacement of a gas sensor should take place when its sensitivity drops below 50 % of the initial one.

Replacement of the sensor alone is not possible. Only the complete subassembly i.e. the measuring head can be replaced – see Table 4.

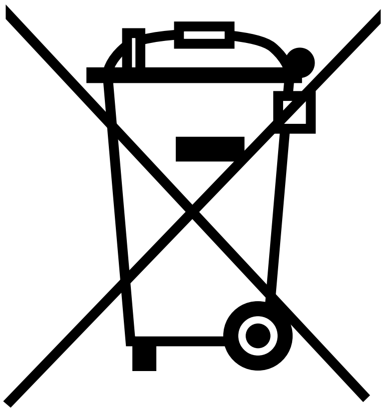
To replace the measuring head proceed in the following way:

- switch off the power voltage for the gas detector,
- remove the locking screw (see Figure 1),
- disconnect the measuring head from the socket,
- reconnect a new head,
- switch on the power voltage for the gas detector.

7.6.5 Maintenance

The only manner of cleaning the device is to wipe it with a damp soft cloth. Agents containing solvents, petrol or alcohols cannot be used to clean the detector.

7.7 Utilization



This symbol on a product or on its packaging indicates that the product must not be disposed of with other household waste. Instead, it is the user's responsibility to ensure disposal of waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The proper recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. Information about relevant designated collection points can be obtained from the Local Authority, waste disposal companies and in the place of purchase. The equipment can also be returned to the manufacturer.

8 Technical specification

Power supply • V_{CC} • Power consumption	 6 V ⎓ 0.8 W	
Environment	In-operation	Storage
• Ambient temperatures • Humidity • Pressure	-20 – 50°C 10 % – 90 % long term 0 % – 99 % short term 1013 ± 10 % hPa	0 – 60°C 30 % – 90 % long term
Detected substance	LPG (C_3H_8, C_4H_{10})	
Measuring range	50 % LEL	
Alarm thresholds range	10 % – 95 % of the measurement range	
Default alarm thresholds[6]	A1: 10 % LEL A2: 15 % LEL A3: 20 % LEL	
Default averaging time A1 / A2	1 min	
Default delay time A3	0 min	
IP	IP 43	
Protection class	III	
Dimension	See Figure 1	
Cable glands (cable diameter range)	Gland pressed into the installation pipe – diameter of the pipe 16 mm Glands multiband – diameter of wire 3.5 – 12 mm	
Acceptable cables	0.2 – 2.5 mm² – solid wire 0.2 – 2.5 mm² – multi-wire cable	
Enclosure material	ABS	
Weight	0.3 kg	
Lifetime	-	
Mandatory periodic inspection	Every 12 months	

6 Alarm thresholds, averaging and delay times are stored in the Teta EcoWent / Teta EcoN detector.

Lifetime of consumables	See Table 4
Mounting	4 holes for the pin with diameter 4 mm, hole spacing see Figure 1

Table 3: Technical specification

9 List of consumables

No.	Consumables	Lifetime	Manufacturer	Product code
{1}	Measuring Head MiniPel	Up to 5 years[7]	Atest Gaz	PWS-016-LPG

Table 4: List of consumables

10 List of accessories

Product code	Description
PW-114-C	Mounting kit for Teta EcoWent + Teta MiniDet gas detectors
PW-064-WM1	Mounting Bracket WM1 (to the wall)
PW-064-WM3	Mounting Bracket WM3 (to the wall with cover)
PW-092-A	Calibration kit (the set includes: gas supply adapter, hose and cylinder regulator)
PW-049-CB2	CB2 Service Cable
5118066001	Screwdriver
-	Standardized reference gas – propane C_3H_8 with concentration of 40 % LEL

Table 5: List of accessories

11 Product marking

Product code	Device
PW-107-LPG	Teta MiniDet Gas Detector

Table 6: Method of product's marking

12 Appendices

[1] DEZG121-ENG – EU Declaration of Conformity – Teta EcoCO2, Teta EcoDet, Teta EcoN, Teta EcoO2, Teta EcoTerm, Teta EcoWent, Teta MiniDet, Teta EcoH

[2] PU-Z-054-ENG – Parameters of gas detectors with catalytic sensors

[3] PU-Z-039-ENG – Classification of chemicals used at Atest Gaz

7 In case of installation in dwelling houses, public access buildings, car parks or garages

EU Declaration of Conformity

Atest Gaz A. M. Pachole sp. j. declares with full responsibility, that the product:

(Product description)	(Trade name)	(Type identifier or Product code)
Gas Detector	**Teta EcoCO2**	**PW-133**
	Teta EcoDet	**PW-106**
	Teta EcoN	**PW-111**
	Teta EcoO2	**PW-134**
	Teta EcoTerm	**PW-113**
	Teta EcoWent	**PW-105**
	Teta MiniDet	**PW-107**
	Teta EcoH	**PW-123**

complies with the following Directives and Standards:

- in relation to Directive 2014/30/EU – on the harmonisation of the laws of the Member States relating to electromagnetic compatibility:
  - EN 50270:2015
- in relation to directive 2011/65/EU – on the restriction of the use of certain hazardous substances in electrical and electronic equipment
  - EN IEC 63000:2018

This declaration of conformity is issued under the sole responsibility of the manufacturer.

This EU Declaration of Conformity becomes not valid in case of product change or rebuild without manufacturer's permission.

Gliwice, 23.10.2025

Research and Development Manager
Tomasz Korzec

Tomasz Korzec

(Signature)

Parameters of gas detectors with catalytic sensors

1 Detected substances

Detectors equipped with catalytic sensors are used for measuring and detecting the presence of gases and flammable gases in the range of up to 100% LEL.

2 Principle of operation

The catalytic sensor (figure 1) consists of two components: an active and a passive one, heated to a high temperature. They are both constructed of a very thin coiled platinum wire, however, the active element (figure 2) is additionally coated with a catalyst (e. g. palladium, platinum). A combustion reaction occurs on the active element. Heat is generated as a result, which causes an increase in the temperature of this element and a resultant change in its resistance. Whereas combustion is not possible on the passive element, therefore, its properties do not change under the influence of a combustible substance. This allows the passive element to compensate for the impact of ambient temperature. The same resistance change of both elements occurs when the ambient temperature changes. The passive and active elements are integrated in the Wheatstone bridge circuit, which ensures conversion of the change of resistance to voltage.

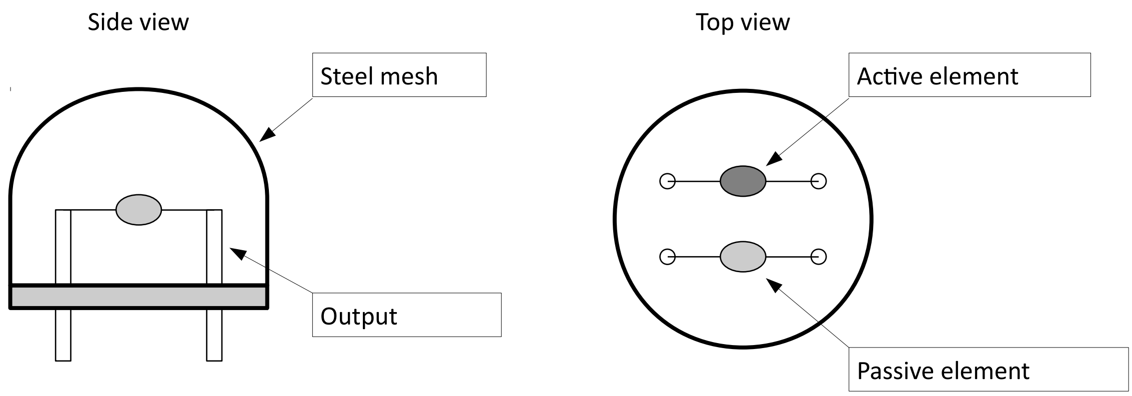


Figure 1: Sample view of catalytic sensor

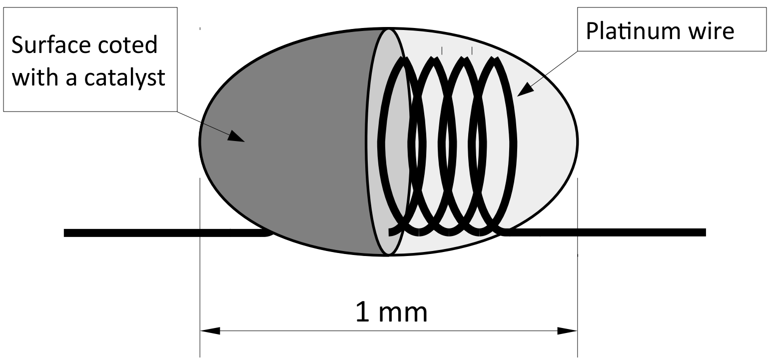


Figure 2: Active element construction

3 Impact of environmental conditions

> Never exceed the rated operating parameters of the detector. These parameters can be found in the detector calibration certificate.

> The detector must be used in accordance with the provisions in the User's Manual.

3.1 Composition of the controlled atmosphere

It is assumed that the standard composition of the atmosphere is a mixture of gases with the proportions indicated in table 1.

Ingredient	C [% vol]	C [ppm]
Nitrogen	78.084	780 840
Oxygen	20.946	209 460
Argon	0.934	9 340
Carbon dioxide	0.0360	360
Neon	0.00181	18.18
Helium	0.00052	5.24
Methane	0.00017	1.70
Krypton	0.00011	1.14
Hydrogen	0.00005	0.50
Xenon	0.000008	0.087

Table 1: Typical composition of atmospheric air

When gas concentrations in the atmosphere differ significantly from those indicated in the table 1, it is necessary to conduct the analysis of the impact of such a situation on the detector operation.

> Catalytic sensor working properly at an oxygen concentration of about 21%.

3.1.1 Impact of the presence of a working gas or other reaction gas

Catalytic sensor isn't selective – it reacts (with different sensitivity) to most flammable substances appearing in its surroundings. Because of that it is necessary to consider their presence when the sensor is operating.

When using detectors with catalytic sensors, it is necessary to be aware that:

- long-term presence of significant concentrations results in faster sensor wear. Basically, catalytic sensors are used to detect the incident presence of combustible gases. They should not work in atmospheres in which flammable gases at concentrations greater than about 20% LEL occur in a continuous or prolonged manner, as it may lead to a rapid reduction of their sensitivity and the appearance of a zero drift,

- concentrations over 100% LEL, even temporarily persistent ones, can lead to a physical wear of the sensor. For these reasons, detectors operating in places where such conditions may occur are / should be equipped with mechanisms to prevent the negative effects of high concentrations,
- a very high concentration of combustible gas (well above 100% LEL) leads to a decrease in oxygen concentration – thereby lowering the sensor's indication. Volumetric concentrations close to 100% can result in a zero sensor response, as shown in the figure (example: a small room and a large amount of flammable gas released into the atmosphere). See section 3.1.2.

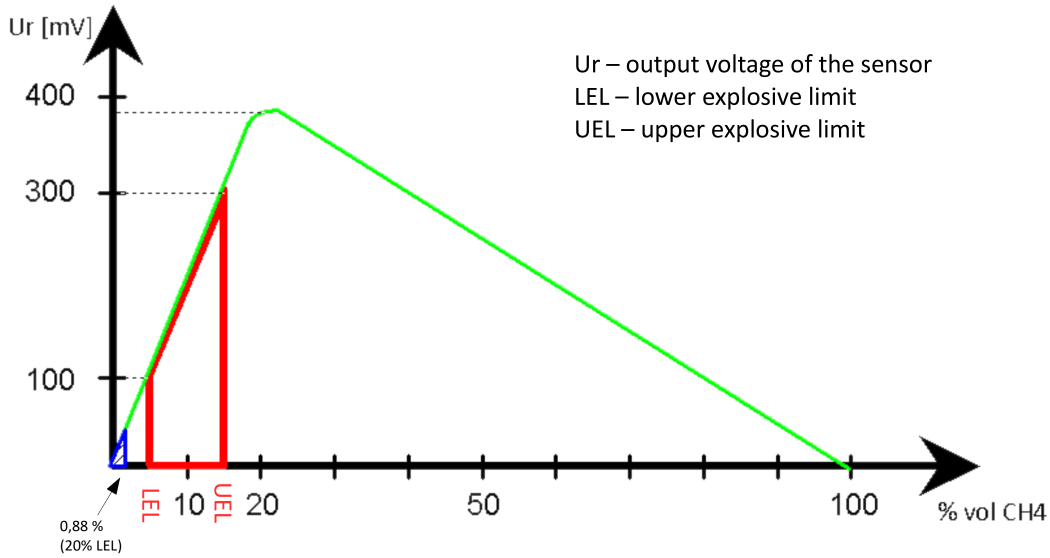


Figure 3: Sample characteristic of catalytic sensor

3.1.2 Effect of oxygen concentration value

Oxygen is required for a proper operation of the catalytic sensor. If the monitored atmosphere contains gas or gases that dilute or replace air (thereby reducing the oxygen concentration), for example, nitrogen or carbon dioxide, then the catalytic detector can give a low or even zero response.

A similar effect can occur when large amounts of reaction gas are released to the atmosphere(creating a concentration over the measurement range) – due to a too low amount of oxygen, the concentration indication of the detector will be lower than it actually is, and it may even be zero.

3.2 Influence of temperature

The temperature can have an influence on the sensor's characteristics. Within the scope of the detector's environmental parameters, its influence is compensated electronically.

3.3 Influence of pressure

Within the environmental parameters of the sensor, the influence of pressure on the measurement is negligible.

3.4 Influence of moisture

Within the environmental parameters of the sensor the influence of moisture on the measurement is negligible.

3.5 Influence of vibrations, impacts

Vibrations and impacts affect the detector's operation, as they may cause:

- damage to delicate parts of the sensor (e. g. detector element, compensation element),
- shift of the sensor's zero.

It should be ensured that the detector is not exposed to shock and vibration in excess of the amplitude of vibrations amounting to 0.15 mm of the frequencies of over 10 Hz. Under no circumstances should the peak acceleration exceed the value of 19.6 m/s^2.

3.6 Influence of physicochemical phenomena

- In the case of chemical compounds with high flash point (approx. 50°C and above) it is necessary to remember that in typical environmental conditions (ambient temperature below 40°C), it is unlikely that they will be able to produce atmospheres close to 100% LEL. Particularly in the case of ambient temperatures below 0°C it may occur that achieving measurable concentrations by the catalytic sensor (of 10% LEL) is impossible. Another measurement method is required in this case.
- High concentration**s** of inserting gases (e. g. argon, helium) can change the thermal equilibrium of the sensor, resulting in the apparent reading of the presence of a combustible substance.

4 Factors shortening the lifetime of the sensor

4.1 Poison and inhibitors

For every reaction with the presence of a catalyst that cause permanent (poisons) or temporary deceleration (inhibitors) of this reaction, which results in reduced sensor sensitivity – in particular the lack of reaction to a combustible substance.

For catalytic sensors, on the active element side, we distinguish the following poisons:

- silicons (organosilicone compounds) – e. g. PDMS (polydimethylsiloxane), HDMS (hexamethyldisiloxane), sealants, adhesives, raising agents, specific oils and lubricants, some medical supplies,
- organometallic compounds – e. g. Grignard compounds, lead tetrachloride (leaded petrol, certain aviation fuels),
- organophosphorus compounds – e. g. in herbicides, insecticides, phosphoric esters in fire-proof hydraulic fluid,

and inhibitors:

- sulfur compounds – e. g. hydrogen sulfide, mercaptans, carbon disulphide, sulfur dioxide,
- halogen compounds – e. g. methyl chloride, some freons (among others R134a), vinyl chloride,
- olefins – e. g. styrene, propylene, acrylonitrile.

Acetylene is a poison for the passive element of the catalytic sensor.

Classification of chemicals used at Atest-Gaz

Because of the need to present a **consistent and high level of maintenance services**, to ensure **the safety of the calibration process** and to **create a basis for a rational calculation of the costs** of this process, Atest-Gaz developed the "Classification of Chemical Substances" described below.

The classification determines the complexity of the calibration process of a particular detector type, consider two criteria:

- stability of the calibration mixture (criterion **A**):
  - ease of generate and its stability,
  - ergonomic complexity of operations,
  - required experience and knowledge of the employee performing the calibration,
  - required equipment,
  - environmental requirements for the process (e.g. weather conditions).
- safety / potential hazard generated by the mixture (criterion **B**).

These both criteria have an impact on the final cost of the calibration services and level of competence required from the employee conducting the calibration.

This classification is applied both by Atest-Gaz and the entities cooperating with it – distributors, authorized service providers and users of the systems.

In the case of calibration with the "crossover" substances, the classification is made in accordance with the substance category that is applied (e.g. for the detector with a PID sensor this substance is isobutylene, i.e. B0 A0).
The detector are classified on the stage of offer.

On the next page we present tables showing the above relationships.

Category	Description	Terms of facility calibration
A0	Cylinder gases, stable environment	No precipitations, and no strong winds, and temperature over **– 10°C**[1]. In other cases, calibration at a location that meets the above conditions (necessary to remove the detectors).
A1	Cylinder gases, unstable environment or absorption by the moisture	No precipitations, and no strong winds, and temperature over **+ 10°C**[1], and relative humidity under 70%. In other cases, calibration at a location that meets the above conditions (necessary to remove the detectors).
A2	Gases not available in cylinders can be generated at the relevant facilities	like **A1** In other cases, calibration at a location that meets the above conditions (necessary to remove the detectors).
A3	Laboratory calibration	Facility calibration impossible, laboratory calibration only, probably at the manufacturer's. This group also includes conditions resulting from other reasons, e.g. the need for temperature compensation, non-linearity of the sensor, the need for calculation, the use of special tools, etc.

Table 1. Classification of chemicals used at Atest-Gaz. Criterion A: mixture stability

Category	Description	Classification criteria
B0	Safe substances	concentration of flammable components **< 60% LEL**, and concentration of toxic components ≤ **NDSCh**[2], and oxygen concentration **< 25% vol**, and tank **< 3 dm³** (water capacity) and **p ≤ 70 atm**, or specified liquid chemical compounds, e.g.: glycerol, 1,2-propanediol.
B1	Low-risk substances	concentration of flammable components **< 60% LEL**, and concentration of toxic components ≤ **NDSCh**[2], and oxygen concentration **< 25% vol**, and tank **> 3 dm³** (water capacity) or **p > 70 atm**, or toxic gases with the concentration of **STEL ÷ 15 x NDSCh**, or specified liquid chemical compounds, e.g.: petrol, acetone, 1-methoxy-2-propanol.
B2	High-risk substances	inert gases having an oxygen concentration **> 25% vol**, or flammable gases with a concentration **> 60% LEL**, or specified liquid chemical compounds, e.g.: styrene, methanol, xylene, toluene, methyl methacrylate.
B3	Extremely dangerous or extremely flammable substances	toxic gases with the concentration of **> 15 x NDSCh**[2], or specified liquid chemical compounds, e.g.: benzene, formaldehyde, formic acid, epichlorohydrin.

Table 2. Classification of chemicals used at Atest-Gaz. Criterion B: OHS

1 Is allowed to perform calibrations at lower temperatures, if they meet the conditions of operation of the detector, e.g. ammonia refrigeration units.
2 In the absence of determined NDSCh it is necessary to adopt 2 x NDS as a criterion.

Reliable and Innovative Gas Detection & Safety Systems

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