PROSENSE
PEK and PES Series Gas Detectors
Installation and User Manual

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WARNING!

This manual must be carefully read by all persons who have or will have the responsibility for installing, using or servicing this product.

Like any equipment, this product will perform as designed only if installed, used and serviced in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed and persons who rely on this product for their safety could suffer severe personal injury or death.

The warranties made by Prosense with respect to this product are voided if the product is not installed, used and serviced in accordance with the instructions in this user guide. Please protect yourself and other by following them.

Important Remark
The detector has been factory-tested before delivery, the commissioning after installation must include the zero- and span-adjustment. The commissioning has to be terminated by a function test of the complete gas detection system.

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Safety Information

Ensure that this Operating Manual is read and understood **BEFORE** installing / operating / maintaining the equipment. Pay particular attention to Warnings and Cautions. All document Warnings are listed here and repeated where appropriate at the start of the relevant chapter(s) of this Operating Manual. Cautions appear in the sections/sub-sections of the document where they apply.

Strictly follow the Instructions for Use

Any use of the detectors requires full understanding and strict observation of these instructions. The detector is only to be used for purposes specified here.

The cover on Detector must be kept tightly closed until power to the detector is isolated otherwise ignition of a flammable atmosphere can occur. Before removing the cover for maintenance or calibration purposes, ensure the surrounding atmosphere is free of flammable gases or vapours.

Detectors must be protected from extreme vibration and direct sunlight in hot environments as this may cause the temperature of the detector to rise above its specified limits and cause premature failure.

Maintenance

It is recommended to obtain a service contract Prosense to carry out all repairs. Only authentic Prosense spare parts must be used, substitute components may invalidate the certification and warranty of the detector. Maintenance and calibration operations must only be performed by qualified service personnel.

Use in areas subject to explosion hazards

Equipment or components which are used in potentially explosive atmospheres and have been tested and approved according to international or European regulations may be used only under the conditions specified here. Modifications of components or the use of faulty or incomplete parts are not permitted. In case of repairs of equipment or components, the national regulations must be observed.

Liability for proper function or damage

The liability for the proper function of the detector is irrevocably transferred to the owner or operator to the extent that the detector is serviced or repaired by personnel not employed or authorized by Prosense or if the sensing head is used in a manner not conforming to its intended use. Prosense cannot be held responsible for damage caused by non-compliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Prosense are likewise not modified by the recommendations given above.

Intended Use

The PEK and PES series detectors are intended to be used for stationary, continuous monitoring for combustible gas/air or vapour/air mixtures below the Lower Explosion Limit (LEL) and toxic gas/air mixtures in particle per million (PPM) units. The detectors are marked by the device categories II 2G that can be operated in hazardous areas with potentially explosive atmospheres of zones 1 and 2. The type of protection for gas explosion protection according to device category 2 (zones 1 or 2) is flameproof enclosure and increased safety, "db". The enclosure protection is IP 65.

According to the ATEX Directive 2014/34/EU and IECEx standards the detector is an assembly consisting of three components (Sensor Head, enclosure and cable gland), where all these three components are type approved according to ATEX/IECEx rules and marked by the device category II 2G. Thus this detector is suitable to be operated in hazardous areas with potentially explosive atmospheres of zone 1 and zone 2. The detector comprises a gas sensor type Ex-proof (protection type flameproof enclosure db type). PEK and PES Series detectors for flammable gases performs % 0 to % 100 LEL measurement range; for toxic gases the measurement range would be vary. The measurement range and environmental conditions are written on each detector label.

Hazardous area classifications:

Zone 0: An area classified as Zone 0 will have ignitable concentrations of flammable gases, vapours or liquids either continuously present or present for long periods of time under normal operating conditions

Zone 1: An area classified as Zone 1 is likely to have ignitable concentrations of flammable gases, vapours or liquids present under normal operating conditions. Flameproof (Ex db) detectors are suitable for use in Zone 1.

Zone 2: An area classified as Zone 2 is not likely to have ignitable concentrations of flammable gases, vapours or liquids present under normal operating conditions. Flameproof (Ex db) detectors are suitable for use in Zone 2.

Not to be used in oxygen enriched atmospheres.

P detectors for flammable gases with pellistor sensor are designed to detect gases or vapours in air and not inert or oxygen deficient atmospheres. P oxygen detectors can measure in oxygen deficient atmospheres.

In conjunction with the central controllers Prosense detectors with preadjusted alarm thresholds audible and visible alarm devices or automatic countermeasures can be activated before the detected gases or vapours can form dangerous flammable or toxic mixtures with air. Please be alerted in following special conditions may have impact on measuring function due to the nature of measuring method:

1. Very high gas concentrations

The measuring method of catalytic or pellistor sensor used in detector based on heat produced by reaction on the oxidation of a flammable gas. There is not enough oxygen in the sensor to perform oxidation process correctly in case of high gas concentrations. Hence the measuring signal decreases at high gas concentrations and even can lead to measuring signal within the measuring range again. In case of high flammable gas concentration, do not reset latching alarms without having ensured a safe condition in the environment via performing necessary checks.

2. Minimum oxygen concentration

The measuring principle of heat of reaction needs a minimum oxygen concentration of 15 % by volume; otherwise the measuring values will be too low because of oxygen deficiency.

3. Long-term gassing with methane at very low temperatures

If the Prosense flammable gas detectors with pelistör sensor are operated applying with methane at very low temperatures, the measuring signal at long term exposition may decrease after alarm activation and may lead to misinterpretation.

If a gas alarm occurs, necessary actions need to be taken immediately. The decrease of the measuring signal does not mean that the gas concentration has been decreased. We recommend to keep alarms on the associated controllers and not to reset these alarms without performing measurement with an independent gas detector to make sure conditions are safe.

Introduction

The Prosense comprises a gas detector body and a sensor head for detecting flammable, toxic gases and oxygen. The construction of Prosense detector allows it to be used in hazardous area locations; it may also be used in other areas not classified as hazardous. Prosense detectors can be configured with a wide range of different sensors may be used to detect a broader range of target gases. The detector provides an industry standard 3-wire, 4-20mA analogue output for connection to a dedicated gas control system or PLC.

Prosense introduced an accelerometer sensor on electronic board to detect shock impacts. PEK series designed to provide safety measures for shock impacts on mounted area. PES series designed to provide safety for seismic shocks and earthquake. Both series uses same electronics but the shock impact measurement and management is different based on their development and used software.

PEK Series will generate alarm for any impact on the detector. Thanks to this feature, if an impact occurs on the detector as a result of an accident, it will be possible to cut the gas flow by controlling the valves without waiting to the gas release.

PES Series detector is sensitive to seismic shocks. Detector will generate alarm for seismic impact on the area that detector installed. This feature will provide extra protection in case of an earthquake via cutting the gas or fuel flow by controlling the valves.

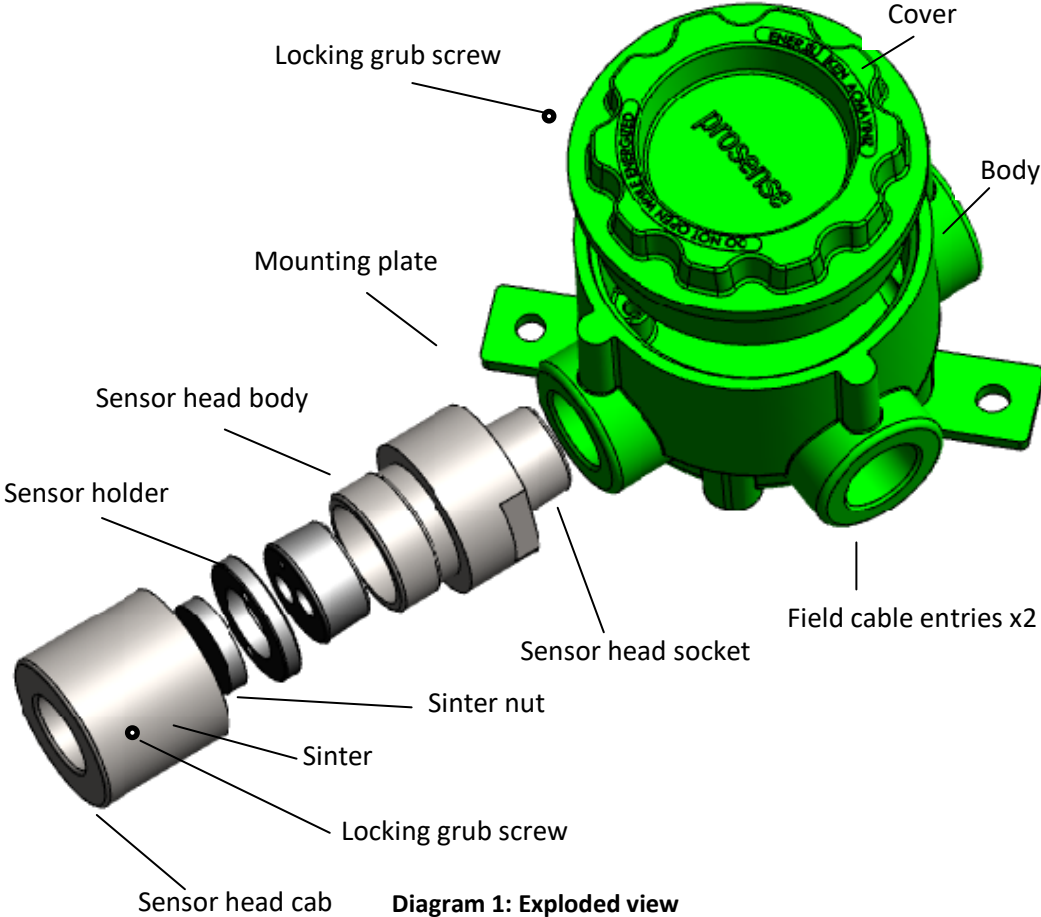Prosense detectors comprises of the main parts as shown below:

Diagram 1: Exploded view

Detector Body

The detector enclosure has two threaded entries. One cable entry is located at the upper part of the transmitter housing are for connecting the power source, signal output and relay contacts to associated signalling equipment. The bottom entry allows direct connection of the sensor socket. There is a mounting plate incorporated into the transmitter housing allowing for various mounting configuration options.
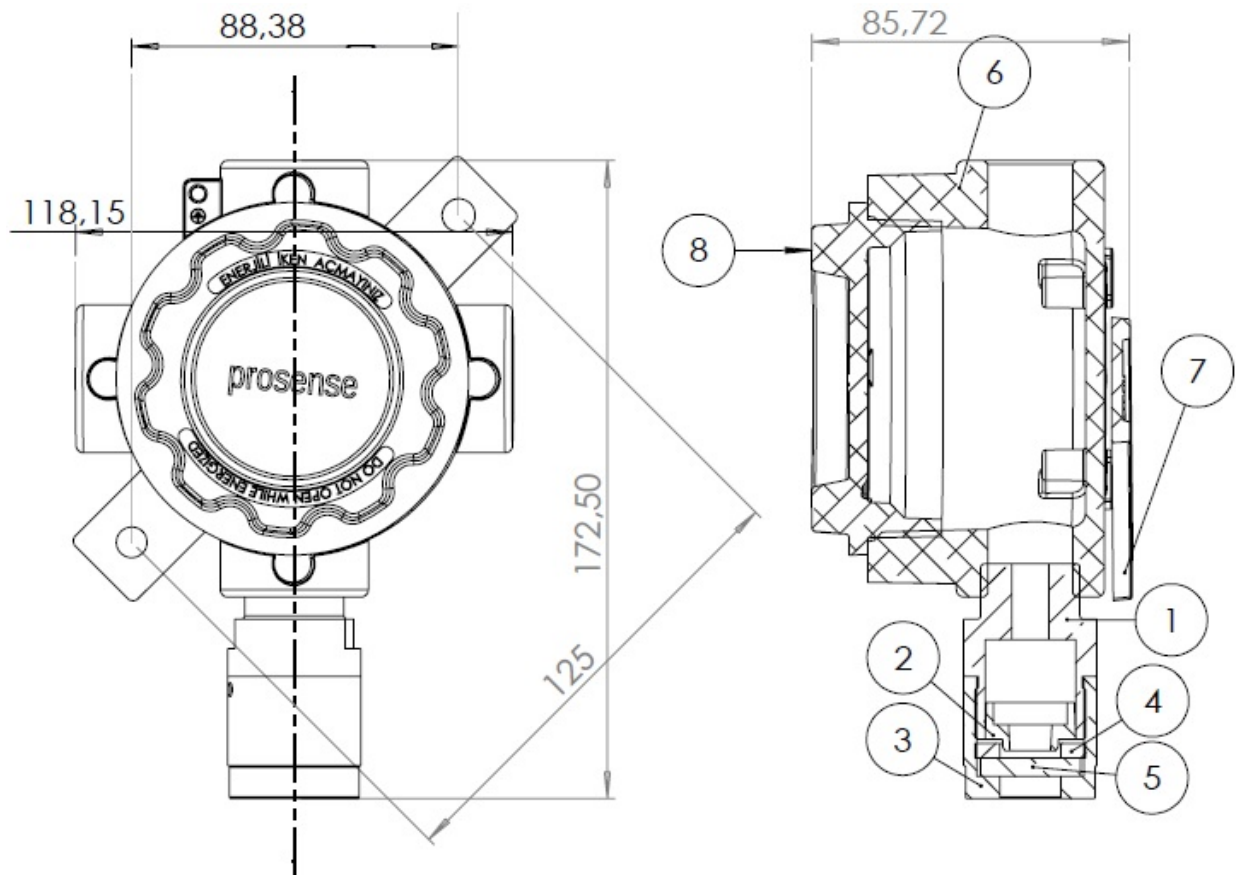
Diagram 2: Detector body size and Sensor Head components

1 : Sensor head body
2 : Sensor holder
3 : Sensor head cap
4 : Sinter nut
5 : Sinter
6 : Junction box – Detector body
7 : Wall mounting adapter
8 : Junction box cover

Sensor Head:

Prosense PEK Series detectors equipped with SH10 sensor head including catalytic sensors.
Prosense PES Series detectors equipped with SH30 including Infrared, Pellistor, semiconductor or electrochemical sensors.
Sensor head components are explained in Diagram1.

Installation:

Gas detectors should be mounted where a potential hazard of gas is most likely to be present. The following points should be noted when locating gas sensors.

- When locating detectors consider the possible damage caused by natural events e.g. rain or flooding.
- Consider ease of access to the gas detector for functional testing and servicing.
- Consider how escaping gas may behave due to natural or forced air currents.

Note: The placement of gas detectors should be determined following the advice of experts having specialist knowledge of gas dispersion, experts having knowledge of the process plant system and equipment involved safety and engineering personnel. The agreement reached on the location of detectors should be recorded.

Each gas has different nature depending on their density. The density of which is lower than air, such as hydrogen, methane or ammonia the sensor head must be located above a possible leak or at the highest points at which major concentrations of gas may be found. The gases and vapours with a density greater than air, the sensor head must be installed beneath a possible leak or at the lowest points at which such gases and vapours may be present.

Mounting the Detector:

The detector should be mounted vertically as the sensor head pointing downwards. Detector has to be mounted such that the sensor's gas entrance area.
The install location

- should be isolated from vibration, direct sun light and have temperature stability
- avoided external influences such as splashing water, oil, corrosive aerosols
- should have at least 30 cm free space beneath the sensor head to provide accessibility for calibration work.
- should be in air flow between possible leak or collection point and possible source of ignition.

Prosense do not recommend installing detectors to:

- directly above a cooking unit,
- directly above a sink unit,
- close to an extractor unit,
- outdoor without protection against the rain,

- in places where temperature is outside the admissible operating range,
- in corrosive environments,
- inside air vents.
- in environments where silicon can be found.

The Prosense detector has an independent mounting plate consisting of two mounting holes and two holes to attach to detector body. The mounting plate can be adjustable on two diagonal ways on to detector body. The detector may be fixed directly to a surface mounting. Follow below steps to mount the detector:

1- Decide which diagonal way to use and adjust mounting plate on detector body if necessary.
2- Check and make sure mounting plate is completely fixed to detector body
3- Mount the detector to the surface via using two outer mounting holes on mounting plate.

Wall mounting holes

Detector body mounting holes
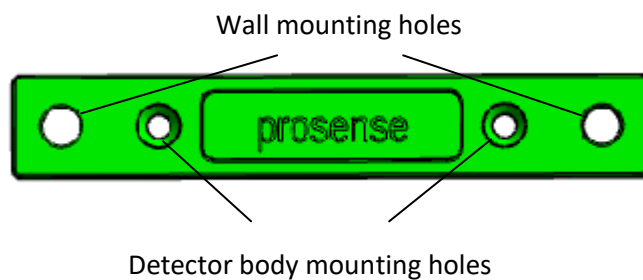
Diagram 3: Detector mounting plate

The mounting plate installed in below position at factory:
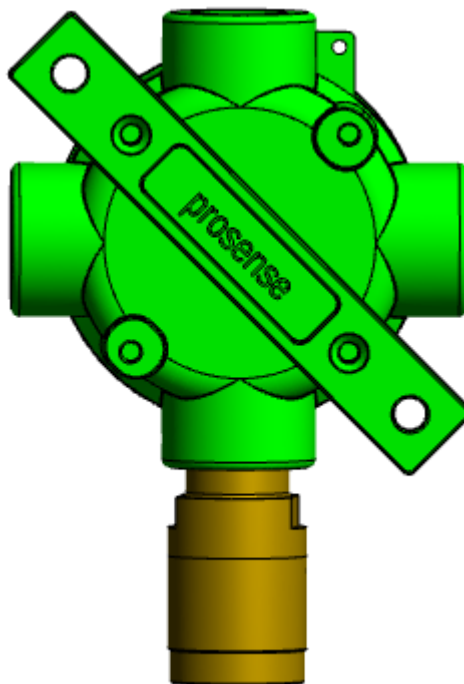
Diagram 4: Default installation of mounting plate

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Electrical Connections

Caution: All electrical connections should be made in accordance with any relevant local or national legislation, standards or codes of practice.

Prosense detectors can operate between 12 - 24 VDC. The connection socket located on main board as given in Diagram 8 and details given in below Table 2:

Output	Usage
V +	Power input (+) 12VDC – 24VDC
V -	Power input (-) 12VDC – 24VDC
S	Gas measurement Output Signal – analogue current (4mA – 20mA)
Vout	Shock measurement Output Signal – DC voltage (12VDC – 24VDC)

Table 1 : Detector output ports and their usage

The detector designed to give 4 - 20 mA current output signal. It is also possible to get voltage value via using an additional resistor. Below Table 3 gives recommended resistor specifications to get correct voltage output from detector depending of the power source level:

| Detector Power VDC	Resistor	Signal level (4mA – 20mA)
12 VDC – 24 VDC	250 Ω, tolerance %1	1 VDC – 5 VDC
12 VDC – 24 VDC	500 Ω, tolerance %1	2 VDC – 10 VDC

Table 2 : Detector power and the output resistor

Detector designed to provide power entry as DC voltage output 12-24VDC in case detecting any shock. In case user does not want to use shock feature user can activate RS485 Modbus serial output to get gas measurement level information. In order to do that user should change the pin positions as explained in RS485 communication section.

Please consider the cable length when performing installation in the field. The Prosense detector requires a power supply between 12VDC and 24VDC. Make sure that a minimum 12 VDC supply available at the detector entrance and consider the voltage drop due to cable resistance in case of long distance applications. The maximum loop resistance in the field cable is calculated as follows:

R loop = (V controller – V detector min) / I detector
Example;
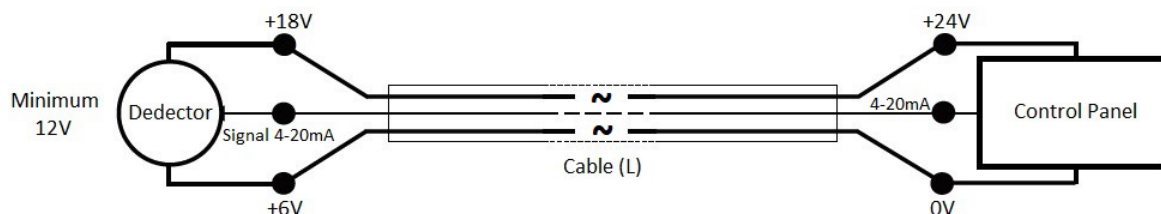
Diagram 5: Field cabling

The controller or power supply is supplying a nominal 24VDC (V controller), the detector minimum allowable voltage is 12VDC (V detector min), therefore the maximum allowable voltage drop between the controller and detector is 12VDC; this means a voltage drop of 6V in each core (V+ core and V- core). Maximum power consumption of the detector when

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optional relay modules installed and all relays are active is 2.5W. The current required to drive the detector at the minimum voltage is (I = P / V): 2.5 / 12 = 210mA (I detector). So, the maximum field cable loop resistance (R loop) = 12 / 0.21 = 56 Ohms, or 28 Ohms per core, (allowing for component variations, losses, etc.). The following tables show the maximum cable distances between the controller and transmitter assuming a voltage drop of 6V in each core and for different cable parameters. The tables are examples only and actual cable parameters and source power supply voltage for the application should be used to calculate the maximum cable distance allowed at the installation site.

Typical cable details:

Cable size (cross sectional area)	Cable type nearest equivalent	Cable resistance Ω/km	Maximum Cable length (L) Meters
0.5mm2	20AWG	36.8 Ω/km	~500
1.0mm2	17AWG	19.5 Ω/km	~800
1.5mm2	16AWG	12.7 Ω/km	~1200
2.0mm2	14AWG	10.1 Ω/km	~1500
2.5mm2	13AWG	8.0 Ω/km	~1800

Table 3 : Typical cable details and maximum distance for cabling

Typical connection to control panel via using 4-20 mA analogue signal is given below:
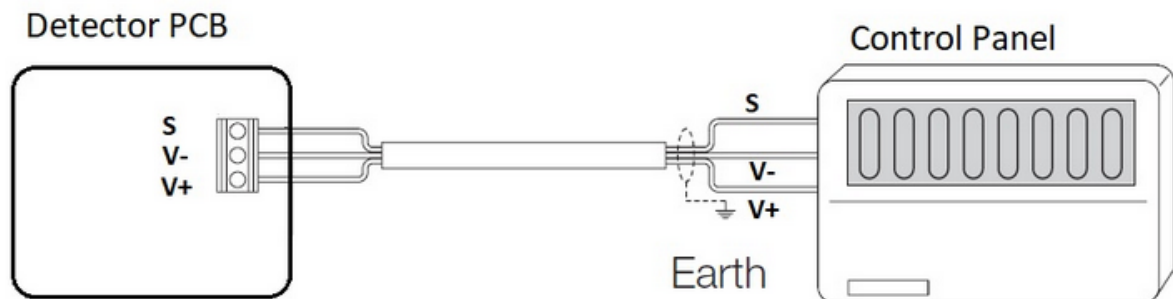

Cabling

The use of industrial grade, suitably shielded field cable is recommended. The best practices shown that, screened 3 cores (plus screen 90% coverage), suitably mechanically protected copper cable with a suitable explosion-proof gland, or ¾" NPT steel conduit, depending on the distance between signal received or control panel and detector 0.5 to 2.5 mm2 (20 to 13 AWG) conductors can give better results. Ensure the cable gland is installed correctly and fully tightened.

Cable and Earth/Ground regimes

Effective Earth/Ground bonding is important to ensure good EMC and RFI immunity. The following diagrams show examples of how to earth/ground bond the cable at enclosures. The same principles apply to conduit installations. These bonding techniques provide good RFI/EMC performance. Earth/ground loops must be avoided to prevent the risk of false signal variation.

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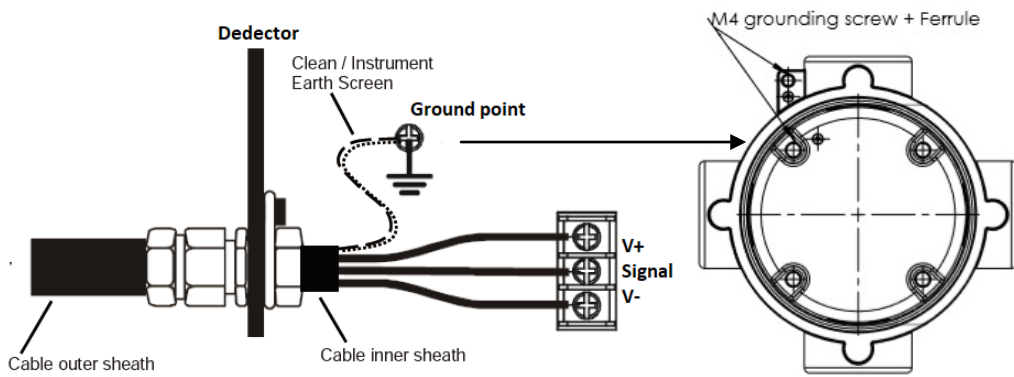
Diagram 6: Grounding

The Earth Screen of the field cable should be "tied to Earth" or connected to Ground at one point only. It is common practise to adopt a STAR EARTH connection regime where all instrumentation Screens are connected at one common point. The Screen at the other end of the cable should be "parked" or terminated into a blank terminal.

Detector Grounding

Internal Ground connection: Each detector has grounding screw which utilizes grounding for detector main PCB to detector body. The screw should be located correctly and fixed for all times. In case of any maintenance activity this screw should be checked and fixed to make sure for proper grounding.

External Ground Connection: It is recommended to utilize a No 14 AWG copper, (Stranded or Solid), wire. Loosen the screw sufficiently to enable 'wrapping the wire around the screw in a "U" shape. Raise the clamp and place the wire between the clamp and ground base, lower the clamp and tighten the screw to 10.4lb-in torque.
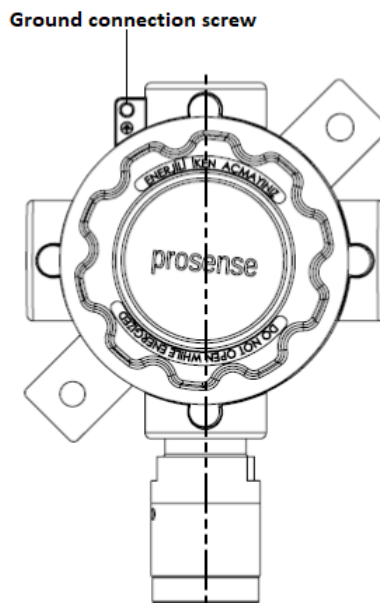
**Diagram 7: Detector grounding screw**

Default Configuration

Prosense detectors preconfigured to provide signal from analogue output depending on the gas type:

Function	Value/Setting	Meaning
Gas measurement Signal output (S)	2.0 mA	Fault
	2.0 mA to 2.5 mA	Warm-up
	4.0 mA to 20.0 mA	Normal gas measurement
	21.0 mA- 22mA	Maximum over range
Shock measurement output (Vout)	Provides power input voltage level as output (12 - 24 VDC)	In case any shock detected
Shock measurement output (S)	21.0 mA- 22mA	In case any shock detected

Table 4 : Detector default configuration details

Detector Main board and connection details given in Diagram 8:
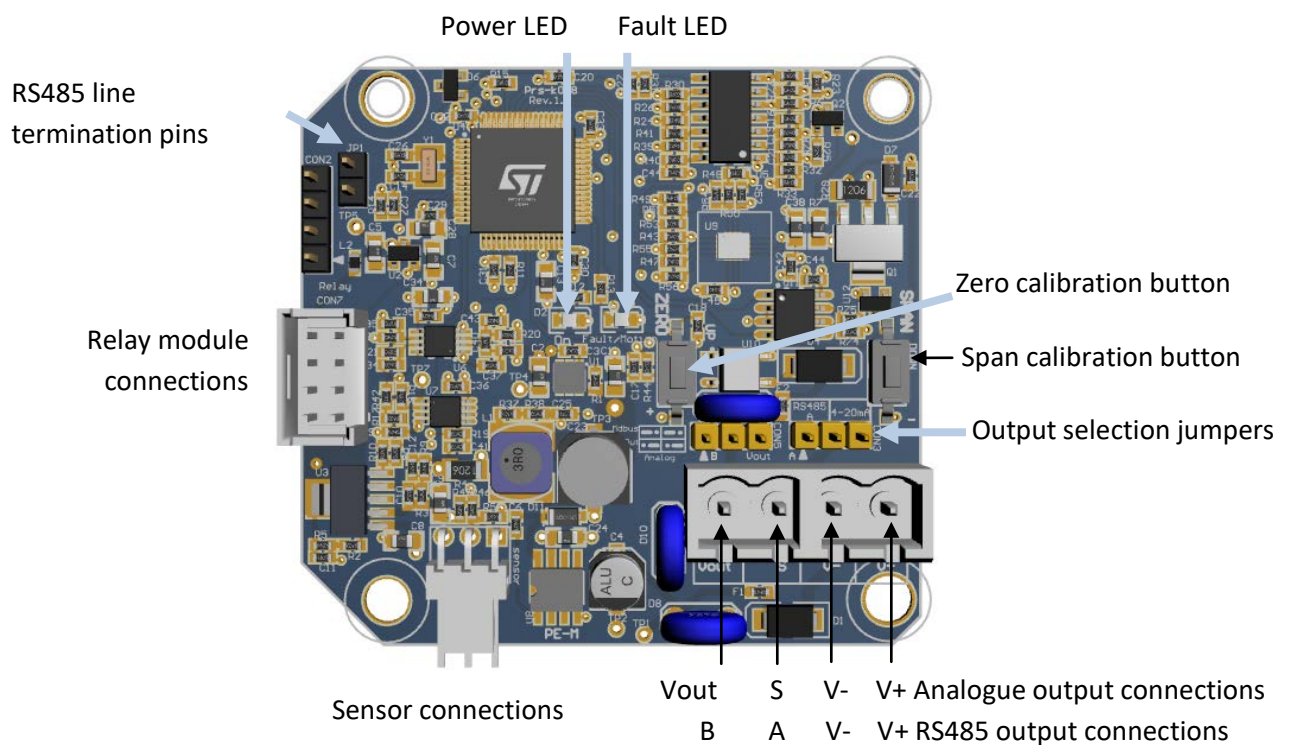
Diagram 8: Detector main board and connections

The output selection pins has two jumpers and their position selects the output type. They are adjusted to analogue output by default. User can adjust them for enabling the RS485 output according to pin position given in table:

Sensor connections are input to detector main board and already connected to sensor inside the sensor head. Only detector connections (Vout, S, V-, V+) should be used to connect outside:

Port	Usage
V +	Power input (+) 12VDC – 24VDC
V -	Power input (-) 12VDC – 24VDC
S	Current Output Signal (4mA – 20mA)
Vout	Shock measurement voltage signal (12-24 VDC)

Table 5 : Detector output ports and their usage

The detector gives 4-20mA analogue current signal from the S port according to the amount of gas measurement. Prosense detectors can be connected to control panels with 4-20mA inputs, which are widely used in the industry. When the detector detects a shock, it generates a voltage signal at the Vout port as much as the input supply. This sign also enables the control functions to be used by using with the appropriate relay or control panel. Signal wiring from detector and the control panel should be carried out by shielded cables. Wires cross section depends on the distance between the control panel and the detector. The details given in power cabling are valid as well for signal output. We recommend using values given in table 4 as cabling best practices.

Please avoid any interruption in case any junctions on wires. The shield is to be grounded from the control panel side only and never connect the shield to the detector. Please make sure clutching or crimping apparatus are not loosen or oxidized.

Detector RS485 Serial Communication:

RS485 Serial communication circuits are integrated on the detector main board. To enable the RS485 serial communication feature and make the terminals usable, the position of the pins on the analogue output terminals must be changed.

The positions of the pins should be adjusted as shown in the figure below:

Pin location	Port specs
	V+ V- S Vout (Default output; S:Analogue current output signal and Vout: DC voltage output signal)
	V+ V- RS485A RS485B (MODBUS – serial communication output signal)

The output port will be changed as below:

Port	Usage
V +	Power input (+) 12VDC – 24VDC
V -	Power input (-) 12VDC – 24VDC
RS485-A	Serial communication MODBUS-A
RS485-B	Serial communication MODBUS-B

4 wire connection should be done to use RS485 serial communication which are 2 for power (V+, V-) and 2 for RS485 (A,B). The total length of the connection line should not exceed 800

meters. The wiring for detectors utilized with RS485 board should be done by using connection cable EIA RS485 2 core wires with section 0.22 / 0.35 mm2 and shielded. Nominal capacity between the wires should be <50pF/m and nominal impedance 120 Ohms. Detectors will be wired in daisy chain (bus) mode. We recommend not using star mode connection due to negative impact of interference. Each detector should have unique address number in the chain. The detectors would not be recognised by control panel if same address given to them. Detectors can have addresses 1 to 63. Address zero (0) is reserved. Detectors will be set to address 1 by default in the factory. Prosense hand terminal or computer tools must be used to adjust detector address.

The last detector in the chain should have 120 Ohms RS485 termination resistor. The resistor is already implemented on the board by default but not activated. User should activate the termination resistor via using the termination pin once the installation completed:

The power connection we recommend to use separate 2 wire cable with specification given earlier in this document (see Electrical Connections section at page11). Once the cabling is completed please check each detector has at least 12 VDC power.

Detector Relay Module:

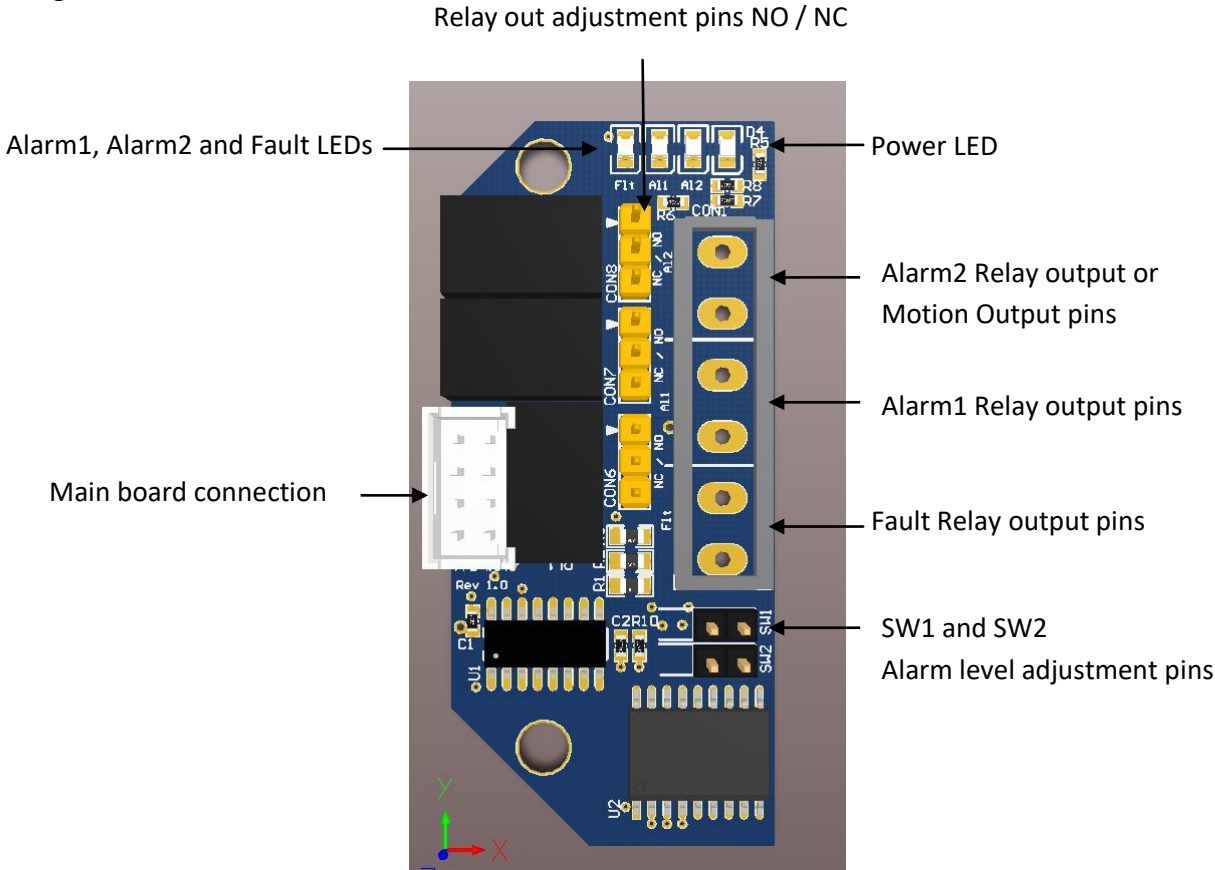Prosense provides optional relay modules for Prosense detectors. The relay module details are given below:

Diagram 9: Relay module

The relay board has 3 relay outputs:

Port	Usage	Energy	Contact
Fault	Fault Relay output	Energised	NO
Al1	Alarm 1 Relay output	Non-Energised	NO
Al2	Alarm 2 Relay output	Non-Energised	NO

Table 6 : Relay module output ports and their usage

All output pins located on Prosense IR detector can be used simultaneously. That means user can use all relay outputs, analogue (4-20mA) output and RS485 digital output at same time if implementation equipment allows their usage.

Each relay has 3 pins to adjust how to behave in case of alarm which are

  NO : Normally Open

  NC : Normally Close

The relay output pin positions shown below:

	Normally Open (NO)
	Normally Close (NC)

Table 7 : Relay output pin positions

The Fault relay is set to NO (Normally Open – Energised) and energised. Hence fault relay LED is always active. It does not mean that there is a fault on detector. If the power LED is active and fault LED is off it means that there is a fault condition on the detector. The fault relay will be de-energized in case of power failure.

The alarm relays set to NO (Normally Open – De-Energised) position at factory.

The alarm levels are also adjustable via using SW1 and SW2 alarm level pins. Alarm levels are defined as percentage in LEL for flammable gases. The alarm levels can be adjusted using jumpers to switch SW1 and SW2. Possible options are given in table 9:

SW1	SW2	Al1 Level	Al2 Level
Open	Open	10 LEL	15 LEL
Open	Closed	10 LEL	20 LEL
Closed	Closed	20 LEL	Motion Sensor Out
Closed	Open	20 LEL	40 LEL

Table 8: Alarm level pin positions

System Status

The Prosense PEK Series detectors have two LEDs on main board. Red LED shows system power status and yellow LED shows fault status. Both LEDs will be illuminated right after applying power. After approximately 3 sec the yellow LED will be turned off and only red LED will continue blinking twice in a second. After 60 second later red LED will start blinking once in a second that means that detector is ready to normal operation.

Status	Power/ Red LED	Fault / Yellow LED
Warm-up	Blinking twice in a second	Blinking in first 3 seconds
Normal operation	Blinking once in a second	Solid off
Fault	Blinking twice in a second	Solid lit
Calibration	Solid lit	Solid off
Shock detection	Blinking once in a second	Blinking twice in a second

Table 9: LED status and meanings

First Time Switch On (Commissioning)

WARNING

The following procedure requires the detector Cover to be removed while carrying out supply voltage checks. Therefore the appropriate permits to work should be sought in preparation. Prior to carrying out any HOT WORK ensure local and site procedures are followed. Ensure that the associated control panel output actuation is inhibited so as to prevent false alarms.

Caution: The following procedure should be followed carefully and only performed by suitably trained personnel

1. Remove the detector cover
2. Configure the detector's analogue output signal and power input connections done correctly
3. Check that all electrical connections are terminated correctly
4. Switch On the external power supply to feed the detector
5. Using a Digital Multi Meter (DMM), check the Supply Voltage at the terminals V+ (24V) and V- (0V), this should be a minimum supply voltage of 12VDC (Maximum supply voltage is 24VDC)
6. Check LED status on detector main board. Both LEDs will be illuminated right after applying power.
7. Wait two minutes and confirm that the yellow LED turned off and only red LED blinking.
8. Switch Off the external power to the detector.
9. Fit the cover and make sure none of the cables cause an obstruction while fitting cover
10. Switch on external power to the detector.

Calibration

It is recommended to periodically carry out calibration to ensure correct operation. Calibration should be done by a person who trained and certified by local or international authorities. Detector should be powered and stabilized for at least 30 minutes before calibration. For Flammable gas calibration use a calibration gas concentration of between 25%LEL and 75%LEL to ensure that the required accuracy can be attained. To calibrate the detector, use an appropriate span gas cylinder, constant flow regulator and Prosense Gas Cap. The flow rates used for calibration gas should be 0.5lt/min. It is recommended to use a compressed air cylinder (20.9%Vol oxygen) to perform the zero calibration if the area where the detector is located contains any residual amount of the target gas. If no residual gas is present then the background air can be used to perform the zero calibration.

Zero Calibration

The detector signal output should be 4 mA when there is no target gas exist on the area or a clean compressed air applied to detector. Use a multimeter to check signal output. If the signal output is different than 4 mA, enable the zero calibration via pressing to the zero calibration button for 10 seconds. Zero calibration button is shown on Diagram 8. After holding it pressed for 10 seconds, the red power LED will be solid lit meaning zero calibration process is started. The detector automatically adjusts the output signal level to 4 mA for the next 30 seconds, assuming the detector is in a fresh air environment. If the ambient air is not clean, clean air cylinder and the calibration head should be used to provide clean air to the sensor head at a constant speed of 0.5lt/min. After 30 seconds, the detector completes the zero calibration process and the power LED flashes once per second at normal speed.

Span Calibration

Span calibration must be done by exposing the detector a known gas. In first step zero calibration should be completed. The current level should be monitored continuously at the detector output using a measuring instrument DMM. Then, the calibration head should be attached to the sensor head and gas should be applied to the sensor using a regulator at a constant flow rate of 0.5lt/min. The span calibration button shown in Diagram-8 must be pressed for 10 seconds to start the span calibration. After holding it pressed for 10 seconds, the red power LED will be solid lit meaning the span calibration process is started. Depending on the concentration level of the gas used for calibration, the current value measured at the detector output will be different. Span calibration lasts 30 seconds. If the value measured from the detector is higher than the reference value while applying gas, the zero calibration button should be pressed until the current level is reduced to the reference value. If the measured value is lower than the reference value, the span calibration button must be pressed until the current level is increased to the reference value. The button functions changes automatically when the span calibration process has started: zero calibration button decreases the current level and span calibration button increases the current level. After 30 seconds, the calibration will be completed automatically and the

adjusted level will be saved. When the span calibration is completed, gas flow should stop and calibration cap should be removed from sensor head.

Maintenance

Proactive Maintenance:

All gas detectors including both for flammable and toxic gases should have to pass a functional test and calibration every three to six months according to EN 60079-17 industrial standards. The test results and calibration reports should be recorded in maintenance books.

Operational Life:

Catalytic flammable gas sensor suffers from a loss of sensitivity when in the presence of poisons or inhibitors, e.g. silicones, sulphides, chlorine, lead or halogenated hydrocarbons. The pellistors are poison resistant to maximize the operational life of the Catalytic flammable sensor. A typical operating life, subject to the presence of poisons/inhibitors is 48-60 months.

Servicing

Important: All replacement actions (sensor, sinter, and sensor head) shall be done by Prosense service personnel as it needs some special steps that should be performed in laboratory environment.

Sensor Replacement:

The Flammable Catalytic and Toxic ECC cells that are used with the Prosense Sensor Head have no serviceable parts. When they have reached the end of their operational life, simply replace the cell or sensor head.

Sinter Replacement:

Due to environmental conditions the metal filter - sinter at sensor head might lost permeability that could negative impact on sensor performance. For example if the installation includes cement or similar dust the sinter would be block the air/gas entry to sensor. The sinter should be checked visually and replaced if necessary. To replace sinter please check Diagram-1 and follow the below procedure:

1- Power of the Prosense detector
2- Loosen the locking grub screw
3- Unscrew the sensor head cap that holds the dirty sinter
4- Screw the sensor head cap including the clean sinter
5- Fix the Locking grub screw

Sensor Head Replacement:

Prosense sensor head is a separate part that can be replaced in the field. The sensor head includes integrated sensor, electronic device and sinter in it. To replace sensor head:

1- Power-Off the Prosense detector
2- Disconnect sensor cables from the detector main board
3- Remove the sensor head from the body

4- Install sensor head

5- Connect the sensor cables to detector main board

6- Power-On Prosense detector

7- Leave detector working at least 4 hours in clean air environment

8- Reset the detector via following steps given in "Resetting the detector" section

It is highly recommended to perform detector calibration after sensor head replacement. If this is not possible please check and adjust span signal level.

Detector Transmitter board replacement:

Prosense detector transmitter is the main logic board including all definitions and configuration. Hence it is necessary to perform reconfiguration and recalibration in case of replacement. The replacement should be done via following steps:

1- Power-Off the detector via disconnecting power cable from control panel or supply

2- Open the detector cover

3- Disconnect sensor, display, power and other external interface cables from the detector main board

4- Remove the screws mounting the board to enclosure.

5- Remove the board

6- Install new board and fix via putting screws

7- Install sensor cables

8- Install power and other external interface cables

9- Power-on detector and check the LEDs according to steps given in "Commissioning" section

10- Leave detector working at least 4 hours in clean air environment

11- Perform detector calibration.

Detector Relay Module replacement:

Prosense relay module is a replaceable part. The replacement should be done via following steps:

1- Power-Off the detector via disconnecting power cable from control panel or supply

2- Open the detector cover

3- Remove relay module output connections

4- Remove screws fixing the relay module

5- Remove relay module.

6- Install relay module while taking care to connectors directly on main board socket.

7- Put the screws to fix the relay module

8- Perform any adjustment necessary about alarm levels and relay operating modes.

9- Install relay module output connections

10- Close the detector cover

11- Power-On detector

12- Check detector and relay settings and adjust if necessary.

Declaration

## Manufacturer Declaration of Conformity

$C\epsilon$

Prosense Teknoloji San Ltd. Şti declares the P, PE, PEK and PES Series products to be in accordance with the following standards and directives.

Name and address of Manufacturer: **Prosense Teknoloji San Ltd Şti**
Cumhuriyet Mah. Mermer Sok No:16
34876 - Kartal – İstanbul – Türkiye

Description of Devices: P, PE, PEK and PES Series Fixed Type Gas Detectors

Ex Designation: ⟨Ex⟩ **II 2G Ex db IIC T5 Gb**

Applied Harmonized international standards:
EN/IEC 60079-0:2018 Equipment – General requirements
EN/IEC 60079-1:2014 Equipment protection by flameproof enclosures 'd'
EN/IEC 50270:2015 Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases and oxygen

Applied European Directives:
2014/34/EU ATEX Directive
2014/30/EU Electromagnetic Compatibility (EMC) Directive

Each P, PE, PEK and PES Series gas detector device which the Production Quality Assurance procedures and Type Examination procedures have been applied has been shown to conform to an approved Type and to the applicable classification rules and essential principles before being supplied. This declaration is being made on the basis of the following certificates:

Quality Management Certificate: *18ISO0073*
Production Quality Assurance Certificate: *ExVeritas 18PQAN0072*
Type Examination Certificate: *IMQ19 ATEX 045 X*
                    IT/IMQ/ExTR18.0009/02

Authorised Signatory: Fırat Celep   Date: **26.12.2020**
                    Production Manager

DEOC.01 Rev No:3.1 Rev Tarihi: 26.12.2020

Safety instruction for hazardous area installation

Prosense P, PE, PEK and PES Series gas detectors are projected and built according to ATEX Directive 2014/34/EU and IECEx rules with reference to standard EN 60079-0, EN 60079-1. "**ATEX**", by the French "**AT**mosphere **EX**plosible", provides the technical requirements to be applied to equipment intended for use in potentially explosive atmospheres. The Prosense P, PE, PEK and PES series gas detectors must be installed and maintenance according to the suitable standards for electrical application in potentially explosive atmospheres (example: EN 60079-14, EN 60079-17 or other national standards).

Read this instruction first and keep this instruction manual always available.

The following instructions apply to equipment covered by ATEX and IECEx certificate number:
1. Prosense P, PE, PEK and PES Series gas detectors may be installed in hazardous area with flammable gases, vapours, and mist, group II, category 2G, maximum superficial permissible temperature 70°C.
Device category 2G, Identification II 2G
Ex db IIC T4 Gb (Tamb = -40÷+70 °C or -40÷+50 °C)
Ex db IIC T5 Gb (Tamb = -40÷+40 °C)

It means: ⟨Ex⟩ (European Community logo for ATEX applications) – group II (potentially explosive atmospheres – surface application – OTHER than mines)

       Category 2G (G => Gas) – Zone 1 and Zone 21
       Ex db => protection mode: explosion proof enclosure
       IIC => define kind of gases
       T4 Gb (Tamb = -40÷+70 °C or -40÷+50 °C)
       T5 Gb (Tamb = -40÷+40 °C) => Temperature class -- Maximum allowable surface temperature.
       IP 65 => Mechanical protection degree – protection against solid, dust and liquid.

2. Suitably trained personnel shall carry out installation in accordance with applicable code practice.

3. The electrical devices must be grounded using their grounding connections. The grounding connection must be ATEX/IECEx certified, suitable for the application required, substances, maximum superficial temperature, and ambient temperature.

4. The user should guarantee periodical cleaning of the places were dust can storage to avoid the paling up to 5 mm.

5. The user should not repair this equipment.

6. The user should guarantee the keeping of the safety characteristic of the device after maintenance of repairing.

7. If the equipment is likely to come into contact with aggressive substances, it is responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.
Aggressive substances: example Acids, liquid, gases with can affected metals

8. To guarantee the respect of the protection degree cable glands, blanking elements and thread adapters shall be certified Ex components according to protection "d" and a blanking element shall not be used with an adapter.

9. Sinter replacement shall be done by an approved technical service personal according to user manual "Sinter replacement" procedure (PRS-UM-P-EN, PRS-UM-PE-EN and PRS-UM-PEK/PES-EN).

10. O-ring is made of Silicone and continuous operating temperature is -50C to 105C

11. If temperature exceeds 70ºC at entry or 80ºC at branching point use suitably rated cable and cable glands or conductors in conduit.

12. Thickness of outer painting is between 40 µm – 80 µm.

13. Maximum power consumption of the detector with optional boards installed is Pmax=2.5W where Imax=100mA and Vmax=24VDC.

14. All electrical connections should be made in accordance with any relevant local or national legislation, standards or codes of practice. Prosense detectors can operate between 12 - 24 VDC.

15. The use of industrial grade, suitably shielded field cable is recommended. The best practices shown that, screened 3 cores (plus screen 90% coverage), suitably mechanically protected copper cable with a suitable explosion-proof gland, or ¾" NPT steel conduit, depending on the distance between signal received or control panel and detector 0.5 to 2.5 mm2 (20 to 13 AWG) conductors can give better results. Ensure the cable gland is installed correctly and fully tightened.

16. Effective Earth/Ground bonding is important to ensure good EMC and RFI immunity. The Earth Screen of the field cable should be "tied to Earth" or connected to Ground at one point only. It is common practise to adopt a STAR EARTH connection regime where all instrumentation Screens are connected at one common point. The Screen at the other end of the cable should be "parked" or terminated into a blank terminal.

17. Each detector has grounding screw which utilizes grounding for detector main PCB to detector body. The screw should be located correctly and fixed for all times. In case of any maintenance activity this screw should be checked and fixed to make sure for proper grounding. It is recommended to utilize a No 14 AWG copper, (Stranded or Solid), wire.

General Specification

Use:

3-wire, 4-20mA, gas detector transmitter for use with directly installed flammable gas sensors; for the protection of personnel and plant from flammable gas hazards.

Electrical Specifications:

Input Voltage Range	12 to 24VDC (24VDC nominal)
Max Power Consumption	Max 2.5 Watts. at 24VDC
Current output	4-20mA
2.0 mA	Fault
4.0 mA to 20.0 mA	Normal gas measurement
2.0 mA to 2.5 mA	Inhibit (during configuration/warming)
21.0 mA	Maximum over range
Terminals	4 x screw terminals suitable for wire diameter 0.5mm2 to 2.5mm2 (20AWG to 13AWG).
Relays (optional)	2 x (1A 30VDC, 0.5A 125VAC, 0.3A 80VDC). Selectable normally open or normally closed (switch). Alarm relays de-energised.

Table 10: Electrical specifications

Detector Body Specifications:

Material	Epoxy painted aluminium alloy
Weight	Aluminium Alloy :1.33kg (with Sensor Header SH10)
Mounting	Wall mounting
Entries	½ NPT or 2 x ½NPT field cable entries, ¾ NPT sensor entry

Table 11: Detector body specifications

Environmental:

IP Rating	IP65 in accordance with EN60529:1992
Operating Temperature	-40ºC to +70ºC / -40ºF to +158ºF
Operating Humidity	Continuous 20-90%RH (non condensing) Intermittent 10-99%RH (non condensing)
Operating Pressure	90-110kPa
Storage Conditions	-30°C to +70°C (-22°F to +158°F)

Table 12: Environmental specifications

Warranty Statement

All products are designed and manufactured to the latest internationally recognized standards by Prosense Technology under a Quality Management system that is certified to ISO 9001. As such Prosense Technology warrants its products against defective parts and workmanship and will repair or (at its option) replace any instruments which are or may become defective under proper use within 12 months from date of commissioning by an approved Prosense Technology representative or 18 months from date of shipment from Prosense Technology, whichever is the sooner. This warranty does not cover disposable batteries or damage caused by accident, abuse, abnormal operating conditions or poisoning of sensor.

Defective goods must be returned to Prosense Technology premises accompanied by a detailed description of any issue. Where return of goods is not practicable Prosense Technology reserves the right to charge for any site attendance where any fault is not found with the equipment. Prosense Technology shall not be liable for any loss or damage whatsoever or howsoever occasioned which may be a direct or indirect result of the use or operation of the Contract Goods by the Buyer or any Party.

This warranty covers instrument and parts sold to the Buyer only by authorized distributors, dealers and representatives as appointed by Prosense Technology. The warranties set out in this clause are not pro rata, i.e. the initial warranty period is not extended by virtue of any works carried out there under.

In no event will Prosense Technology be liable for any incidental damages, consequential damages, special damages, punitive damages, statutory damages, indirect damages, loss of profits, loss of revenues, or loss of use, even if informed of the possibility of such damages. Prosense Technology's liability for any claims arising out of or related to this product will in no case exceed the order value. To the extent permitted by applicable law, these limitations and exclusions will apply regardless of whether liability arises from breach of contract, warranty, tort (including but not limited to negligence), by operation of law, or otherwise.