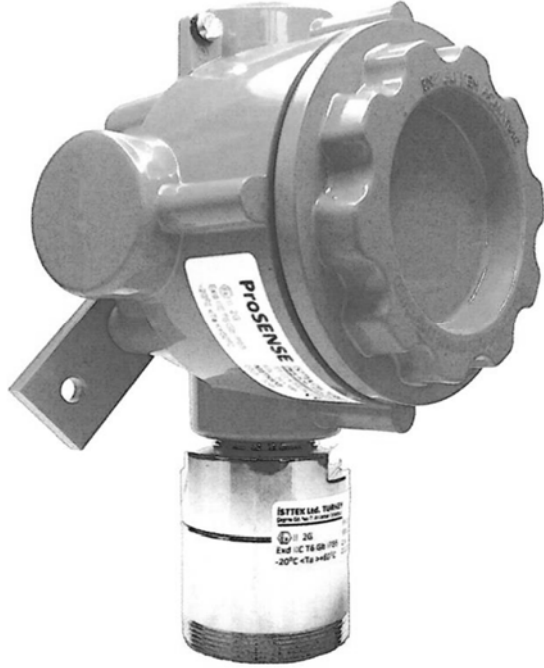




PROSENSE PE Series Gas Detectors Installation and User Manual



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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 PE 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 particule 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 rules 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 and 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 PE series detector comprises a gas sensor type Ex-proof (protection type flameproof enclosure db type). PE Series detector 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 PE series detector based on heat produced by reaction on the oxidation of a flammable gas when pellistor sensor used. 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 PE series 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 gases. The construction of Prosense 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 can be configured with optional relay board features three programmable relays for controlling external equipment e.g. alarms, sirens, valves or switches. The detector provides an industry standard 3-wire, 4-20mA source or sink output for connection to a dedicated gas detection control system or PLC.

Prosense detectors comprises of the main parts as shown below:

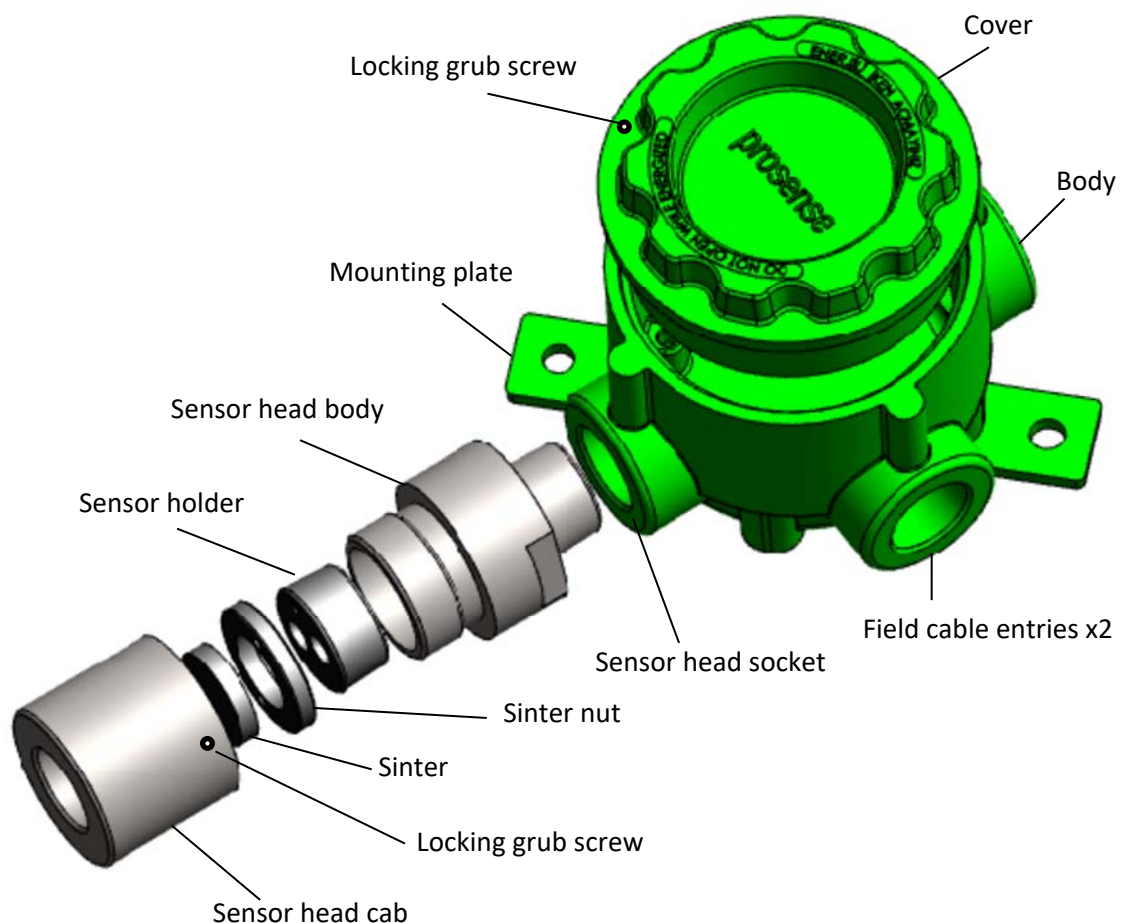


Diagram 1: Exploded view

Detector Body

The detector enclosure has three threaded entries. The two cable entries either side of 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.

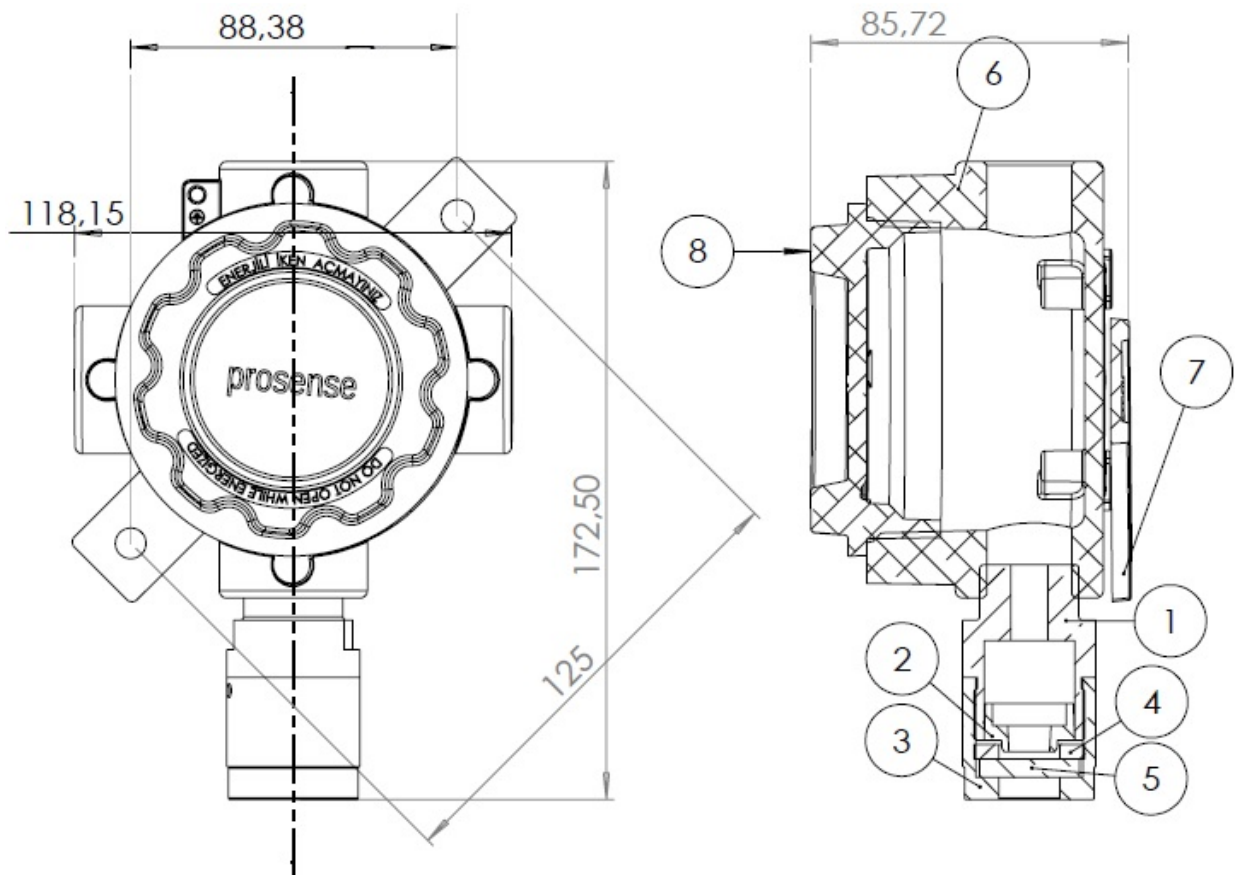


Diagram 2: Detector body size and Sensor Head components

- 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 PE Series detectors equipped with catalytic sensors. Sensor head (SH10) 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.

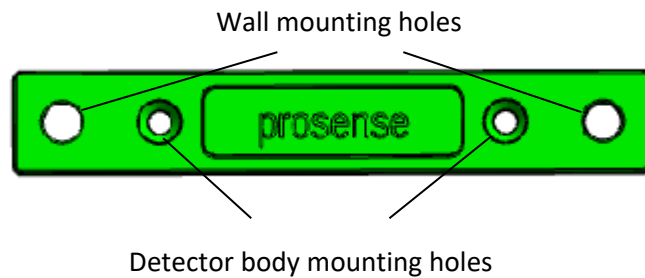


Diagram 3: Detector mounting plate

The mounting plate installed in below position at factory:

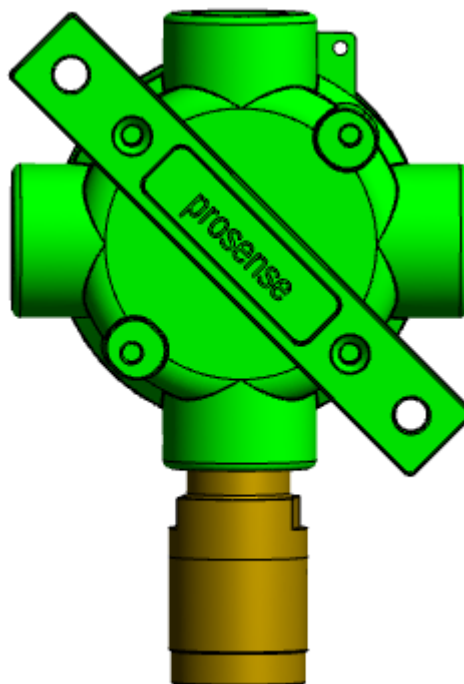


Diagram 4: Default installation of mounting plate

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 | Current Output Signal (4mA – 20mA) |

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

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;

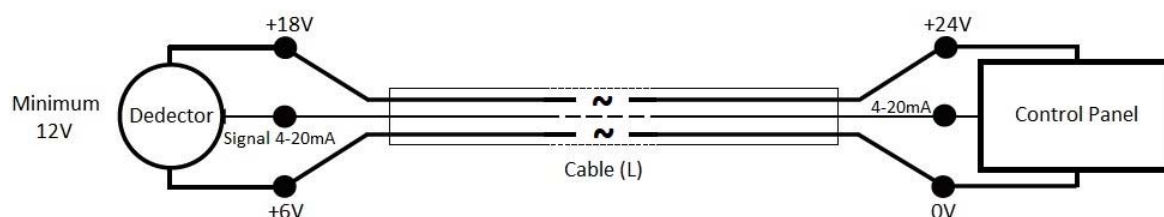


Diagram 5: Field cabling

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

optional relay modules installed and all relays are active is 2.5W. The current required to drive the detector at the minimum voltage is $(I = P / V)$: $2.5 / 12 = 210\text{mA}$ (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 |
|--------------------------------------|----------------------------------|--|------------------------------------|
| 0.5mm ² | 20AWG | 36.8 Ω/km | ~500 |
| 1.0mm ² | 17AWG | 19.5 Ω/km | ~800 |
| 1.5mm ² | 16AWG | 12.7 Ω/km | ~1200 |
| 2.0mm ² | 14AWG | 10.1 Ω/km | ~1500 |
| 2.5mm ² | 13AWG | 8.0 Ω/km | ~1800 |

Table 3 : Typical cable details and maximum distance for cabling

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.

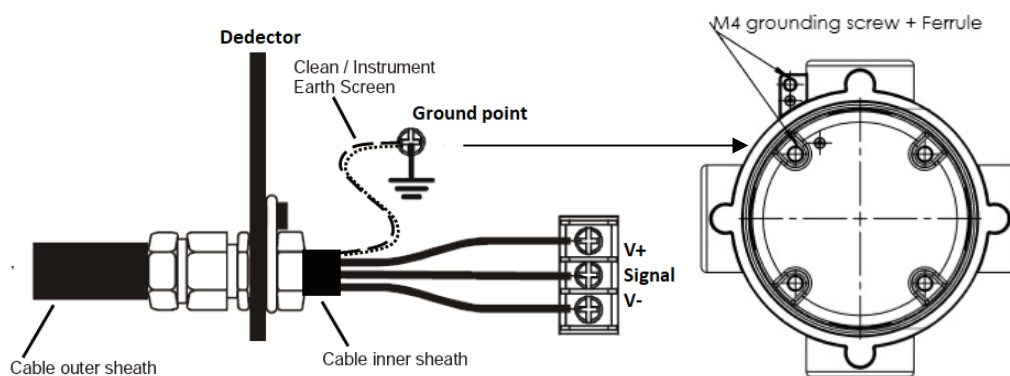


Diagram 6: Grounding

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.

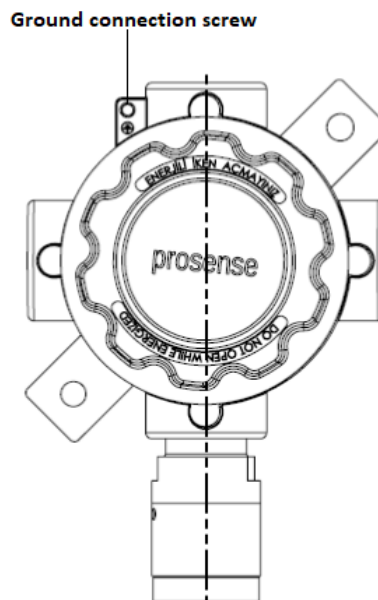


Diagram 7: Detector grounding screw

The following diagrams show how to install the wire into the ground screw of the enclosure.

1. Loosen grounding screw
2. Insert grounding cable
3. Fasten grounding screw

Default Configuration

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

| Function | Value/Setting | Meaning |
|---------------|-------------------|------------------------|
| Signal output | 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 | Maximum over range |

Table 4 : Detector default configuration details

Detector Main board and connection details given in Diagram 8:

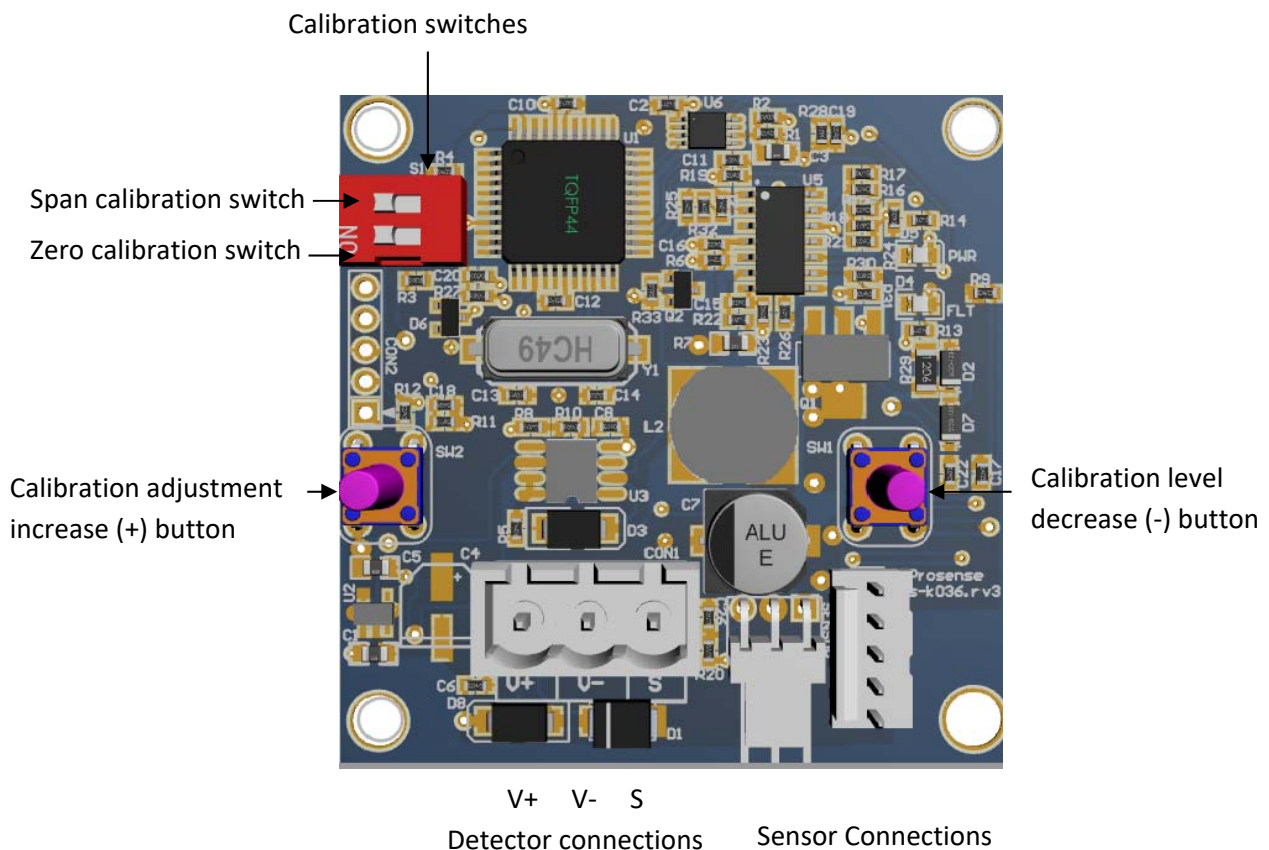


Diagram 8: Detector main board and connections

Sensor connections are input to detector main board and already connected to sensor inside the sensor head. Only detector connections (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) |

Table 5 : Detector output ports and their usage

The default configuration provides single 4-20mA signal output. Prosense detectors can be connected to control panels on the market having 4-20mA input signal. 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 clenching or crimping apparatus are not loosen or oxidized.

Detector Relay Module:

Prosense provides optional relay modules for PE series detectors. Relay module preconfigured to provide fault and one alarm output. User can adjust relay to use as two alarm relays without fault relay output. The relay module details are given below:

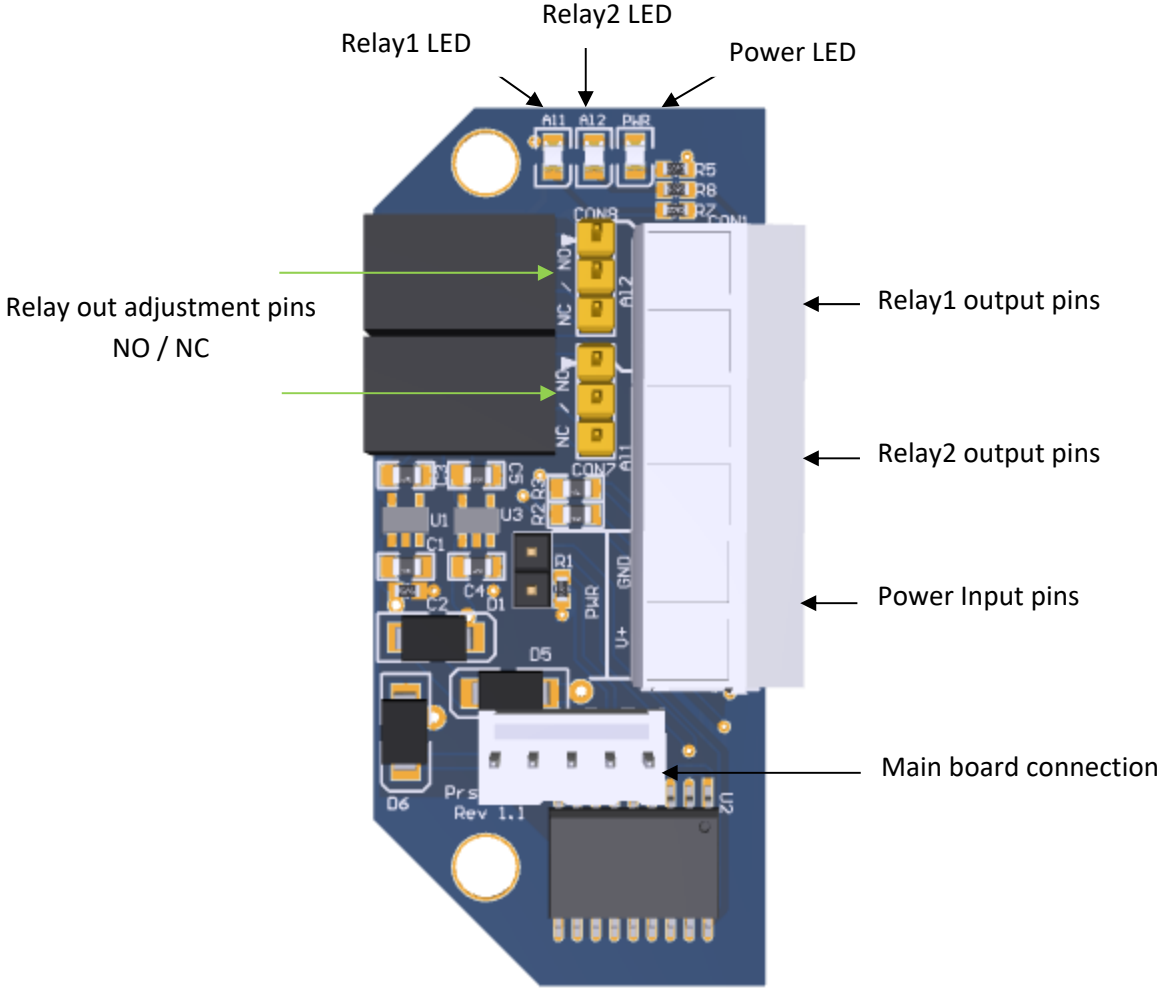


Diagram 9: Relay board and connections

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 6 : Relay output pin positions

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

The relay board has 2 relay outputs and power input on relay module:

| Port | Usage | Energy | Contact | Level |
|-------|----------------------|---------------|---------|----------|
| Power | V+ and GND | 12 - 24 VDC | - | - |
| AI1 | Alarm 1 Relay output | Non-Energised | NO | 20 % LEL |
| AI2 | Fault Relay Output | Non-Energised | NO | Fault |

Table 7 : Relay module ports and their usage

Relay functions and alarm level are predefined in factory. These settings can be changed by user via using the switches according to below options:

| Options | SW Status | | Relay Functions and Alarm levels | |
|---------------------------|-----------|-----|----------------------------------|----------------|
| | SW1 | SW2 | Relay1 | Relay2 |
| Fault and Alarm (default) | ON | ON | Fault | Alarm 20 % LEL |
| Alarm1 and Alarm2 | OFF | OFF | Alarm 20 % LEL | Alarm 40 % LEL |
| Alarm1 and Alarm2 | OFF | ON | Alarm 20 % LEL | Alarm 40 % LEL |
| Alarm1 and Alarm2 | ON | OFF | Alarm 20 % LEL | Alarm 40 % LEL |

Table 8 : Relay function options

Important: The Relay module must be installed on top of main board and it will de-activate the default 4-20mA ports. Hence the detector must be powered through relay module and 4-20 mA port will be unavailable once the relay module installed. The allocation of relay module is demonstrated in below diagram:

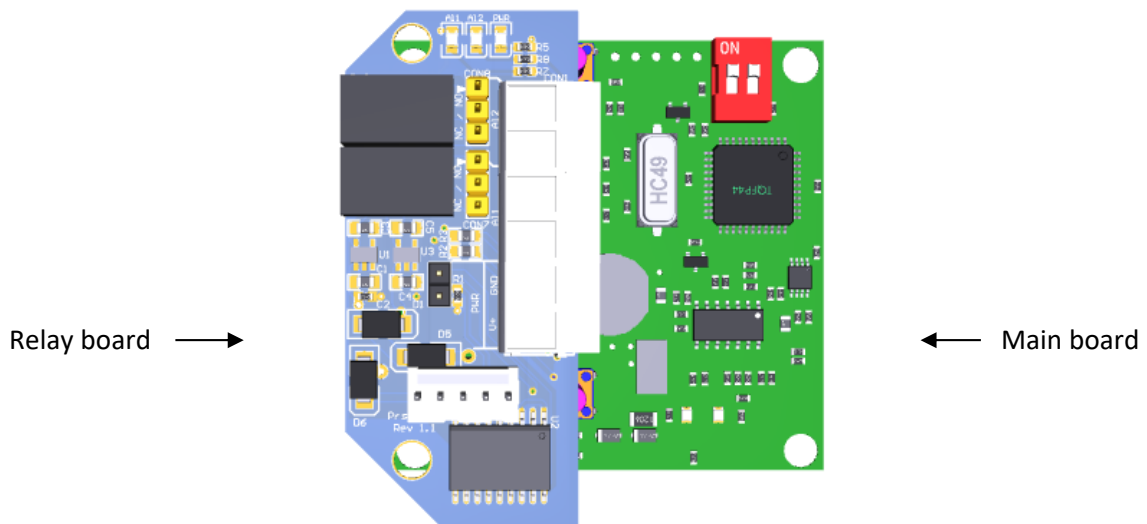


Diagram 10: Relay board is installed on main board

Relay module has three LEDs on it which shows power and relay statuses. If all works normal the power LED will be solid green and other LEDs will be off. In case an alarm or fault condition detected related relays and assigned LEDs will be activated in solid red color. Table 8 shows relay function assignment.

System Status

The Prosense PE 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 90 sec the yellow LED will be turned off and only red LED will continue blinking. This status means that detector is ready to normal operation. There will be 2mA signal output during warm-up time. Following warm-up time the signal current will be 4mA.

Here is the LED status table:

| LED | Warm-up | Normal Operation | Fault | Calibration* |
|----------------|----------|------------------|----------|--------------|
| Power / Red | Blinking | Blinking | Blinking | Blinking |
| Fault / Yellow | Blinking | Solid Off | Solid On | Solid On |

Table 9: LED status and meanings

*calibration operation would progress a short while not more than 30 seconds

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. During the calibration phases the detector output is inhibited (default 2mA) to avoid false alarms. 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 0.5 L/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.

Important: Any optional board is installed on detector should be removed prior the calibration as some of the features masked or unavailable with them when installed.

To calibrate the detector follow the procedure below.

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 switches on calibration switches via moving it to ON position. Zero calibration switch is shown on Diagram 8. If the signal output higher than 4 mA, press calibration adjustment decrease (-) button till output lowers to 4mA level. If the signal output lower than 4 mA press calibration adjustment increase (+) button till output reaches to 4mA level. Alternatively, after enabling the zero calibration switch press both calibration adjustment buttons at same time. The fault LED should be illuminated for a short while and zero signal level will automatically adjusted to 4mA. When the zero calibration completed switch off the zero calibration switch on calibration switches dip-switch.

Span Calibration

To perform Span calibration apply gas to detector via using the Gas Cap while detector is energised and working enable the span calibration switch on calibration switches via moving it to ON position. Span calibration switch is shown on Diagram 8. The output signal level varies depending on the used gas for calibration and gas concentration. If the signal output higher than expected reference value, press calibration adjustment decrease (-) button till output lowers to reference value. If the signal output lower than reference level, press calibration adjustment increase (+) button till output reaches to reference level. When the span calibration completed switch off the zero calibration switch.

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 36 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 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.

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.

Resetting the Detector:

It may be necessary to reset the detector when it has been reinstalled to different location or following the sensor head replacement.

To reset Prosense detector:

- 1- Make sure there is no gas exist that may affect on sensor. It is recommended to use clean air cylinder during reset.
- 2- Put ON position both Zero and Span switches on Calibration dip-switch
- 3- Press Calibration increase (+) and calibration decrease (-) buttons at same time
- 4- The power LED will stop blinking and fault LED will start blinking in fast mode. When LED status confirmed release the buttons.
- 5- Put ON position both Zero and Span switches on Calibration dip-switch and wait for at least 2 minutes to detector return back to normal operation.

Important: It is important to perform calibration following the reset operation to make sure detector working correctly on given range. If calibration is not done following the reset operation the detector will not work correctly.

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 | 3 x screw terminals suitable for wire diameter 0.5mm ² to 2.5mm ² (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 and ¾ NPT (or 2 x ¼ NPT) field cable entries, ¾ NPT sensor entry |

Table 11: Detector body specifications

Environmental:

| | |
|-----------------------|--|
| IP Rating | IP65 in accordance with EN60529:1992 |
| Operating Temperature | -40°C to +70°C / -40°F to +158°F |
| 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

Safety instruction for hazardous area installation

Prosense P and PE series gas detectors are projected and built according to ATEX Directive 2014/34/EU and IECEx standards with reference to standard EN 60079-0, EN 60079-1. "ATEX", by the French "ATmosphere EXplosible", provides the technical requirements to be applied to equipment intended for use in potentially explosive atmospheres. The Prosense P, PE, PEK and PES Series 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 and PE series gas detectors may be installed in hazardous area with flammable gases, vapors, 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:  (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, ambient temperature.

4. The user should guarantee periodical cleaning of the places where dust can accumulate to avoid the piling 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 PE series and PE series user manual "Sinter replacement" procedure (PRS-UM-P-EN and PRS-UM-PE-EN).

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

11. If temperature exceeds 70°C at entry or 80°C 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 $P_{max}=2.5W$ where $I_{max}=100mA$ and $V_{max}=24VDC$.
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.



[1] EU-TYPE EXAMINATION CERTIFICATE

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres - Directive 2014/34/EU** Annex III - MODULE B: EU-TYPE EXAMINATION

[3] EU-type Examination Certificate number: **IMQ 19 ATEX 045 X**

[4] **PRODUCT: Gas detector**
TYPE/SERIES: P** and P****PE Series**

[5] **MANUFACTURER: Prosense Teknoloji San. Ltd. Sti.**

[6] **ADDRESS: Yukari M. Harman Sokak No. 42 – TR-Kartal Istanbul**

[7] This equipment and any acceptable variation thereto are specified in the annex to this certificate and the documents therein referred to.

[8] IMQ, notified body N° 0051, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in Report No.:

ATI9-0035328-01

[9] Compliance with Essential Health and Safety Requirements, except in respect of those listed at item 18 of the annex, has been assured by compliance with:

EN 60079-0:2018; EN 60079-1:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the equipment or protective system shall include the following:

II 2G Ex db IIC T5/T4 Gb

This document is composed of 4 pages including 1 annex

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PREVIOUS ISSUE: -

B.U. PRODUCT CONFORMITY ASSESSMENT
CERTIFICATION SECTOR – MANAGER

This Certificate may only be reproduced in its entirety and without any change. It is subject to the general rules for assessing conformity to community Directives for which IMQ operates as Notified Body and to the particular rules for the aforementioned Directive.



PRD N° 005 B

Ministero degli Affari di Molise
Bozza (Brescia) S.p.A. (Italy) (IAT)
Specialty of IAT, Molise (Italy)
Ministero degli Affari di Molise

IMQ S.p.A. - con Socio Unico | Via Quintiliano 43 | Italia - 20138 Milano | www.imq.it



[13] **Annex**

[14] EU-type Examination Certificate number: **IMQ 19 ATEX 045 X**

[15] **Description of product:**

P**** and **P****PE Series** gas detectors are equipment designed to detect toxic compounds in industrial environments and classified areas.

They are composed by:

- a gas sensor, contained in a metallic flameproof enclosure and protected by a sinter metal element,
- a metallic flameproof junction box, containing terminals for electric connections and electronic circuits for amplification / conversion / transmission of signals.

The metallic flameproof junction box has up to three threaded openings for cable entry, and one threaded opening on bottom side where the gas sensor metallic flameproof enclosure is fastened.

[15.1] **Models/Series Identification:**

P**** and **P****PE Series** gas detectors model coding system:

P – (XY) (W) (Z) (PE)

| (XY) Gas Type | | | |
|-------------------|-----------------------|------------------------|-----------------------|
| 30. LPG | 42. Ethol | 54. Dioxane | 66. Sulfur dioxide |
| 31. Methane | 43. Iso propanol | 55. Ethane | 67. Nitrick oxide |
| 32. Petrol vapour | 44. Carbon monoxide | 56. Butyle alcohol | 68. Nitrogen dioxide |
| 33. n Butane | 45. Acetone | 57. Stylen | 69. Chlorine |
| 34. Propane | 46. Methyl ethy keton | 58. Propylene | 70. Hydrocarbon |
| 35. Hexane | 47. Ethyl acetate | 59. Xylene | 71. Carbondioxide |
| 36. Hydrogen | 48. Ammonia | 60. Acetylene | 72. Freon Gas |
| 37. Pentane | 49. Ethylene | 61. Benzene | 73. JP8 |
| 38. Touen | 50. Acetic acid | 62. Ethylene oxide | 74. Formaldehyde |
| 39. Methanol | 51. Butyl acetat | 63. Vinyl acetat (VAM) | 75. HCN |
| 40. Heptane | 52. Cyclo hexane | 64. Hydrogen sulfide | 76. Hydrogen peroxide |
| 41. Octane | 53. Cyclo pentane | 65. Oxygen | 77. Nonane |

| (W) Sensor Head |
|-----------------|
| 1. SH10 |
| 2. SH20 |
| 3. SH30 |

| (Z) Sensor Type |
|--------------------|
| 1. Semiconductor |
| 2. Catalytic |
| 3. Infrared |
| 4. Electrochemical |
| 5. Pellistor |

Final PE code applies only to gas detectors with SH10 sensor head.

[15.2] **Ratings:** Vin: 12 -24 Vdc ; Pmax: 2,5 W max

[15.3] **Safety Ratings:** -

[15.4] **Ambient temperature and temperature classes:**

| Ambient temperature | Temperature class |
|---------------------|-------------------|
| -40 °C ÷ +40 °C | T5 |
| -40 °C ÷ +50 °C | T4 |
| -40 °C ÷ +70 °C | T4 |

[15.5] **Degree of protection (IP code):** IP65 (EN 60529)

Mod. 3686/4



PRD N° 005 B

Member degli Accordi di Mutuo Riconoscimento (IA, IM, IL, IAC, IAS, IAW, IAW, IAW) and IAC Mutual Recognition Agreements



[13] Annex

[14] EU-type Examination Certificate number: **IMQ 19 ATEX 045 X**

[15.6] **Warnings:** -

[16] **Report:** AT19-0035328-01

[14.1] **Routine (factory) tests:**

The manufacturer shall carry out the routine test prescribed at clause 27 of the EN 60079-0.

[14.2] **Conformity with the documentation:**

The manufacturer shall carry out the verifications or tests necessary to ensure that the product complies with the documentation.

Marking the equipment in accordance with Clause 29 of EN 60079-0, the manufacturer attests on his own responsibility that:

- the equipment has been constructed in accordance with the applicable requirements of the relevant standards in safety matters;
- the routine verifications and routine tests in 28.1 of EN 60079-0 have been successfully completed with positive results.

[14.3] **Installation conditions:**

Above referred equipment is foreseen to be installed in locations where there are environmental conditions as clearly specified at clause 1, par. 2 of EN 60079-0.

Installation and use in atmospheric and environmental conditions that are out of above mentioned intervals require special considerations and additional measures by the side of installer or user. These should be specified to the manufacturer by the user.

It is not required by applicable standard listed in [9] that the certification body confirm suitability for the adverse conditions.

This equipment shall be installed and maintained according to installation and maintenance standards EN 60079-14 and EN 60079-17, and strictly in compliance with details listed in manufacturer's use and safety instructions.

[17] **Special Condition of use (X):**

P** and P****PE Series** gas detectors must be installed only with sensor head pointing downwards.

Cable glands and thread adapters used for entry into the enclosure, as well as blanking elements, shall be certified as Ex Components according to protection "d", and suitable for the ambient temperature range specified above.

Electrical components/devices installed inside the junction box must not exceed a total power consumption of 2,5 W in order to ensure compliance with the declared maximum temperature rise.

Sinter disc and sensor head cap is considered a mounting component and must be replaced as a single unit.

Mod. 3686/4

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PRD N° 005 B

Member degli Accordi di Mutuo Riconoscimento (A.A., M.I. e E.A.C.)
Signatory of E.A., M.I. and E.A.C.
Mutual Recognition Agreements



[13] Annex

[14] EU-type Examination Certificate number: **IMQ 19 ATEX 045 X**

[18] **Essential Health and safety Requirements:**
This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed in [9].
This Certificate **does not** cover hazards coming from environmental conditions different from those clearly and precisely indicated and covered in clause 1 of EN 60079-0.

ESHR 1.2.7 According Annex VII of the Directive

ESHR 1.4 Not verified.

ESHR 1.5 Not verified.

ESHR 3 Not applied.

In addition to the Essential Health and Safety Requirements (EHSRs) covered by the standards listed at [9], the following are considered relevant to this product, and conformity is demonstrated in the report:
None

[19] **Descriptive documents:** DL-AT19-0035328-01, rev. 0, dated 2019-08-07.

[20] **Certification Validity Conditions:**

The use of this Certificate is subject to the Certification Scheme and to the Regulation applicable to holders of IMQ Certificates.

The validity of this certificate is subject to the condition that the manufacturer complies with the results of the document review and of the pertinent requirement if any included, recorded in the relevant copy of documentation as per 19.

One copy of the mentioned documentation is kept in IMQ file.

[21] **Variations**

First issue.

Declaration





Manufacturer Declaration of Conformity



Prosense Teknoloji San Ltd. Şti declares the P and PE 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 and PE Series Fixed Type Gas Detectors

Ex Designation:  II 2G Ex db IIC T5 Gb ;  II 2G Ex db IIC T6 Gb

Applied Harmonized international standards:

EN 60079-0:2018 Equipment – General requirements
EN 60079-1:2014 Equipment protection by flameproof enclosures 'd'
EN 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 and PE 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:

Production Quality Assurance Certificate: ExVeritas 18PQAN0072

Type Examination Certificate: IMQ19 ATEX 045 X
IEP 12 ATEX 082

Authorised Signatory: **Fırat Celep**
Production Manager

Date: **26.02.2020**

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.