



PROSENSE PPS Series Gas Detectors Installation and User Manual

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.

Contents

For Your Safety 4

- Strictly follow the Instructions for Use..... 4
- Maintenance 4
- Use in areas subject to explosion hazards 4
- Liability for proper function or damage 4
- Intended Use 4

Introduction..... 6

Detector body..... 7

Sensor Head: 8

Installation:..... 8

Mounting the detector:..... 9

Cabling and Connections 10

PPS Series CO and NO2 Detectors Connections 12

PPS Series LPG Detectors Connections 14

PPS Series LPG Detectors Relay Connections 15

System Status 16

General specification..... 17

Spare parts 18

Declaration 19

Warranty statement..... 20

For Your Safety

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.

Maintenance

It is recommended to obtain a service contract Prosense to carry out all repairs. Only authentic Prosense spare parts should be used for maintenance.

Use in areas subject to explosion hazards

PPS series detectors are not suitable to use in explosive atmosphere as they are not certified by ATEX norms.

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 PPS series detectors are intended to be used for stationary, continuous monitoring for toxic and combustible gas/air in closed area car parks below the Lower Explosion Limit (LEL) resp. below 10 % of the LEL under atmospheric conditions.

Not to be used in oxygen enriched 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 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

Catalytic sensors used to detect flammable gases. The measuring method based on heat produced by reaction on the catalytic oxidation of a flammable gas. In case of high gas concentrations there is not enough oxygen in the sensor to perform oxidation process correctly. Hence the measuring signal decreases at high gas concentrations and even can lead to measuring signal within the measuring range again. A connected controller must be operated with alarm devices, outputs, and alarm thresholds operating as latched if the measuring range is exceeded. In this case do not reset latching alarms without having ensured a safe condition by means of an independent gas concentrations measurement.

2. Minimum oxygen concentration

The measuring principle of heat of reaction needs a minimum oxygen concentration of 12 % by vol., 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 PPS series detectors 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 should 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 conditional are safe.

Important Remark

The detector has been factory-tested before delivery. The commissioning has to be terminated by a function test of the complete gas detection system.

Introduction

Prosense developed a complete solution for closed area car parks like underground parking areas and road tunnels. Vehicles release CO and NO₂ during initial start-up. These gases tend to accumulate a lot in parking area and in enclosed spaces. CO and NO₂ gases must be constantly monitored in these areas for health and safety reasons. If the ventilation in these areas not adequate, CO and NO₂ gases can reach high concentration levels and cause a number of damages including nausea and vomiting due to the high concentrations and can cause to death.

Nowadays high number of vehicles is using LPG instead of gasoline. LPG is a mixture of flammable gases like propane and butane. If there is any leakage on vehicles LPG can easily accumulate in enclosed areas and reach to the explosion level.

Prosense provides special detectors to monitor CO, NO₂ and LPG gas concentration in enclosed car parking areas. Detectors equipped with high quality electrochemical sensors for the toxic gas detection that can show excellent output in ppm range for Carbon monoxide and Nitrogen dioxide gases. Detectors equipped with high quality catalytic sensors for LPG detection.

PPS series detectors have on board RS 485 (Modbus) communication protocol that provides a great advantage for cabling and installation. Prosense PPS series gas detectors can connect to Prosense PPS-Manager gas control panel which has been developed specifically for car parks. PPS Manager Series gas control panels with flexible structure capacity and expandable even after installation.

PPS Manager Gas control panel can have up to 4 zone modules and each zone can monitor up to 32 detectors. A fully populated PPS-Manager gas control support up to 128 different detectors. Toxic and flammable gas detectors should be installed separate zone modules. PPS automatically recognize the detectors. There is no need to make any special settings for each of detector.

Prosense PPS series comprises a gas detector body and sensors head for detecting flammable and toxic gases.

Detector body

Prosense detectors comprises of the main parts as shown below:

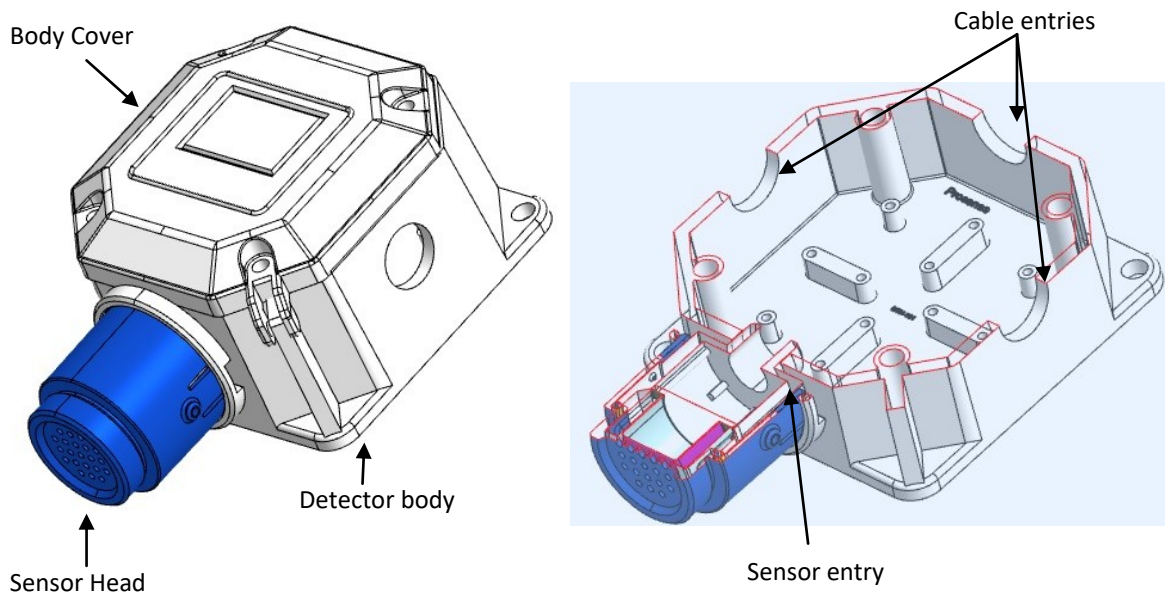


Diagram 1: Exploded view

The detector enclosure has four threaded entries. The three 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. The body has integrated mounting screw locations on housing.

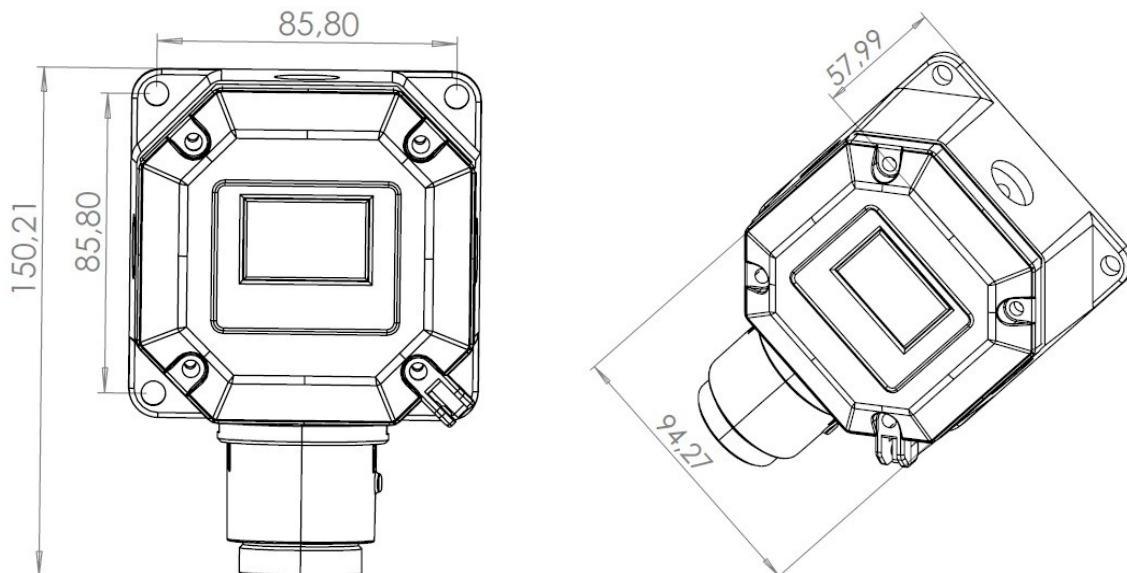


Diagram 2: Detector body and Sensor Head size

Sensor Head:

The Prosense PPS series sensor head designed to detect flammable and toxic gases. Sensor head may include electrocatalytic technologies or a wide range of toxic gas sensors based on electrochemical cell (ECC) technology.

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. The density of which is higher than air such as NO₂ the sensor head must be located where gas accumulate.

Table 1 gives best practice recommendations on where to install the PPS series detectors depending of the gas type.

Gas	Recommended mounting location
LPG	30cm from floor
CO	150cm from floor
NO ₂	30cm from floor

Table 1: Recommended detector installation location

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 integrated mounting screw holes on the body. The correct mounting position is given in diagram4:

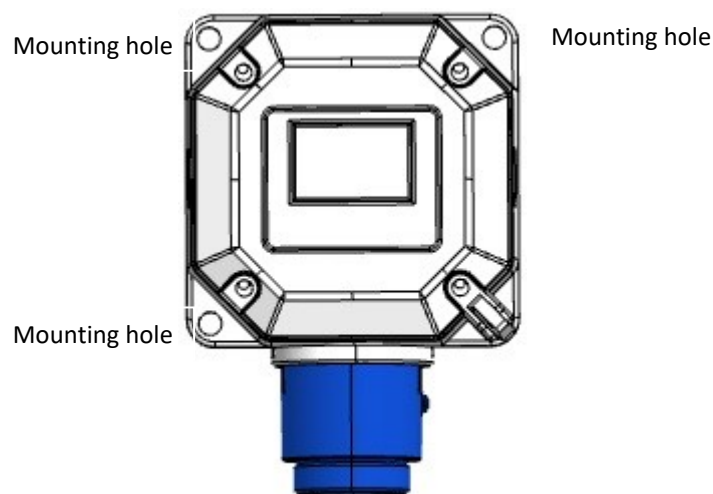


Diagram 3: Mounting holes on body

Cabling and 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 - 18 VDC. The connection socket is located on the main board. Socket shape and locations are different for CO, NO2 and LPG detectors. User should consider the cable length when performing installation in the field. The Prosense detector requires a power supply between 12VDC and 18VDC. 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 use of industrial grade, suitably shielded field cable is recommended. The best practices shown that, screened 4 cores (plus screen 90% coverage), suitably mechanically protected copper cable with a suitable explosion-proof gland, or ¾" NPT steel conduit, gives good results depending on the distance between signal received or control panel and detector. It is recommended to use 1.5 mm² (16 AWG) cable. The total distance from PPS Manager Panel zone module to last detector should not exceed 800m. Ensure the cable gland is installed correctly and fully tightened.

Detectors and PPS Manager Control panel communicates via RS485 communication protocol. Each PPS panel zone module can manage up to 32 PPS series CO, NO2 and LPG detectors via RS485 serial connection.

Important: PPS series LPG detectors power consumption is higher than CO and NO2 detectors. It is highly recommended to provide power directly from power-supply to PPS Series LPG detectors. The zone module can only provide power up to 4 PPS Series LPG detectors. If more than PPS series LPG detectors will be used the power should be provided directly from power supply.

V+, V-(GND), A and B ports must be connected via using four-wire cable. Detector connections supply 16VDC power to detector and read the output signal of detector from A and B ports. Thus connections should be made correctly with extra care to do not mix ports and not cause any damage on the detectors. Detector power connection should be done with 1.5mm² cross section cable. The total distance between control panel and detectors should not exceed 800m. Detector connections should be made with 4 core cable wire that 2 for power and 2 for RS485 and pin definitions are as follows:

Port	Usage	Details
V+	output	+16VDC (Only for panel and detectors, do not use for any other device)
A	input	RS485 port A
B	input	RS485 port B
V-	output	-VDC (GND)

Table 2: Connection pins and definitions

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.

The V+, V- ports and A, B ports are located on same socket in PPS panel zone module. These ports are formed together on Prosense PPS series detectors on detector main board. The connections should be done with care to do not mix power and RS485 ports. All detectors will be connected through one cable via hopping one detector to another till the last detector on the line.

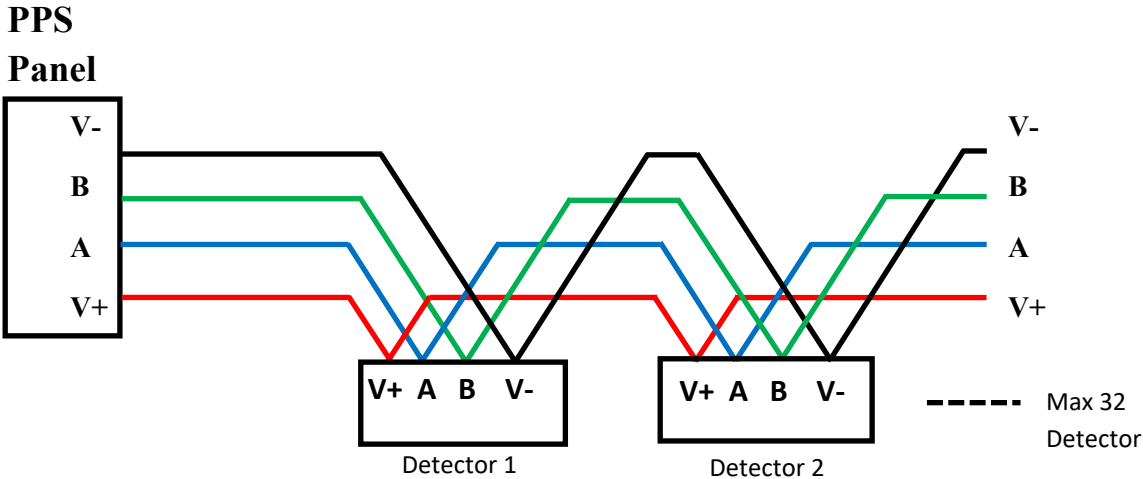


Diagram 4: Panel to detector connections

There should be one master device and up to 32 slave devices in RS485 communication. The master is DP32 control panel and detectors will be the slave devices:

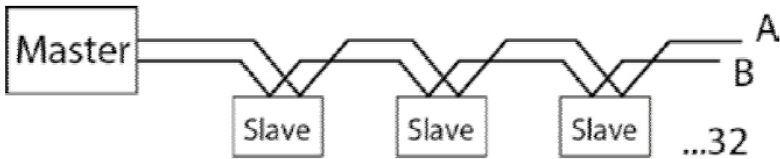


Diagram 5: RS485 communication

Each detector connected to same PPS panel should have unique address. Detectors having same address would not be recognised by control panel. PPS panel can communicate up to 32 detectors. In case less than 32 detectors connected, control panel would not show non-existent detectors. Unused detectors should be deactivated on channel settings menu steps.

The **last** detector at the RS485 serial line should have the end of line resistor to enable the total communication line. Otherwise control panel may not communicate to all, some or none of the detectors. The end of line resistor controlled by end of line pins located on Prosense PPS series detectors and can be enabled via putting the jumper on end of line pins.

PPS Series CO and NO2 Detectors Connections

Prosense PPS series detectors has onboard RS485 Modbus serial communication module. The board has 4 ports thus the detector connection should be made by 4 wire that 2 for power and 2 for RS485. The total length of the connection line should not exceed 800 meters.

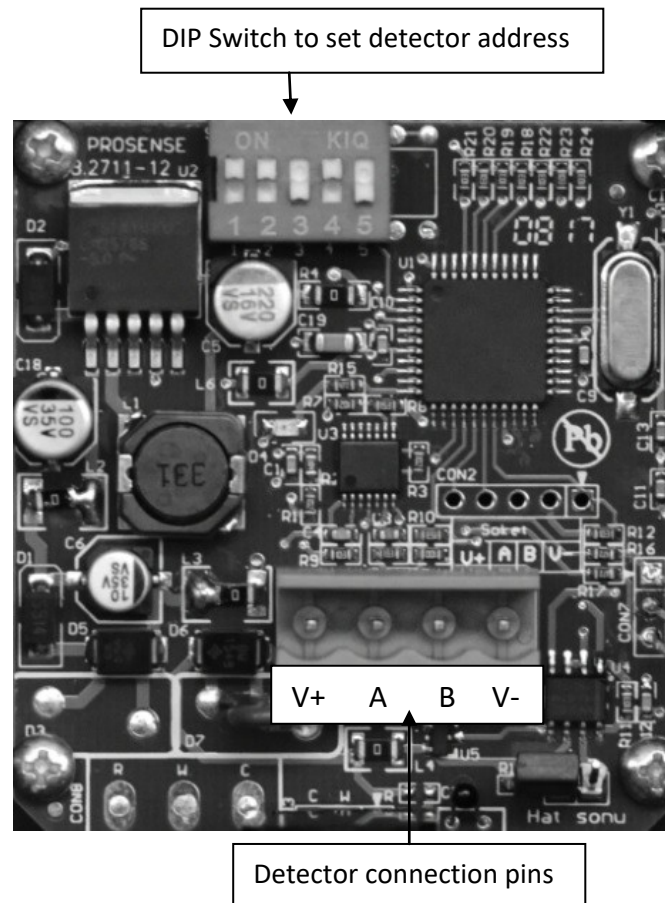


Diagram 6: CO and NO2 detector main board

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. The address of detector can be adjusted via using DIP-Switch set on the board:

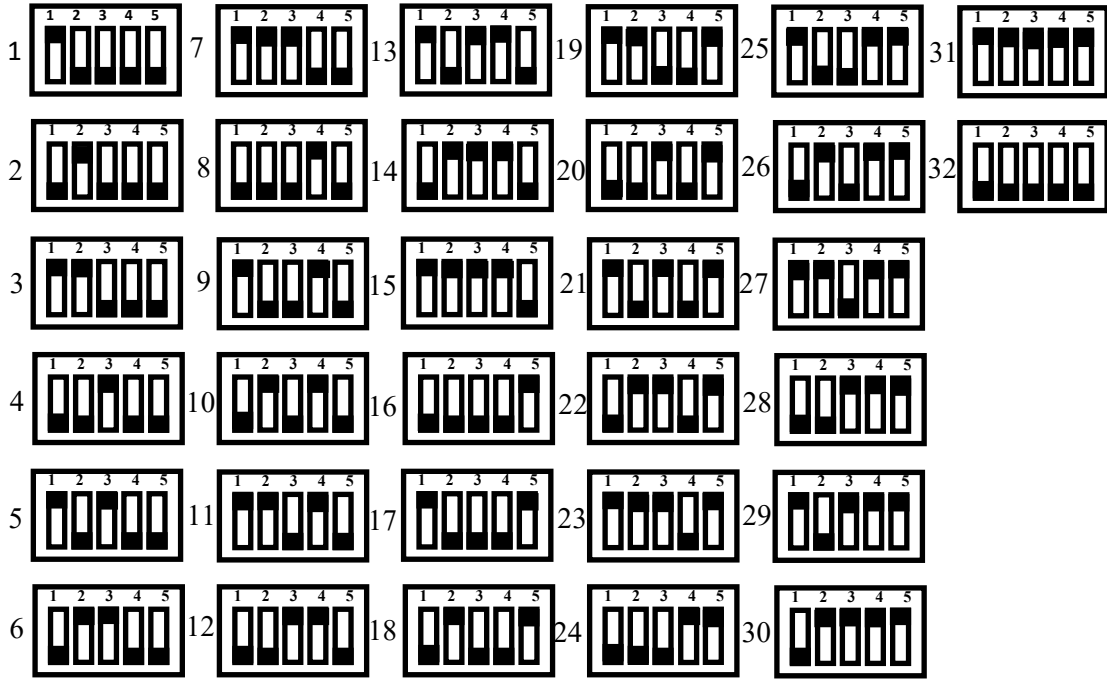
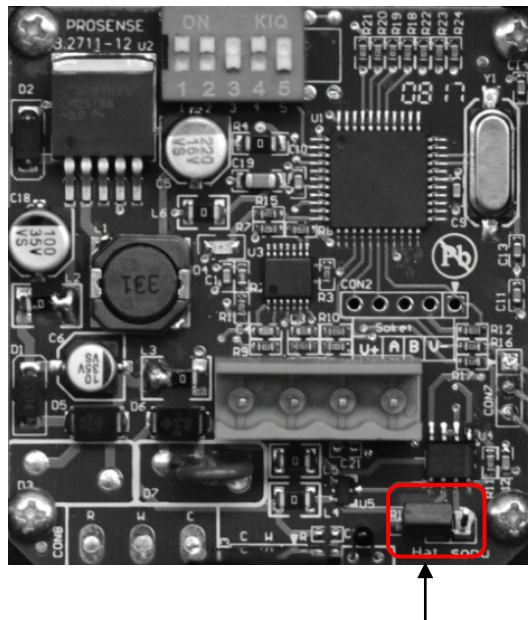


Diagram 7: RS485 Modbus serial communication address and switch position

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:



End of Line jumper enabled

Diagram 8: RS485 Modbus serial communication module end of line jumper

Important: Only the last detector on the serial bus should have end of line pin.

PPS Series LPG Detectors Connections

PPS Series LPG detectors have a different main board than CO and NO2 detectors. PPS series LPG detectors communicates to PPS Manager via RS 485 communication protocol. Also it has two relay outputs additionally that can manage some other devices in case of alarm.

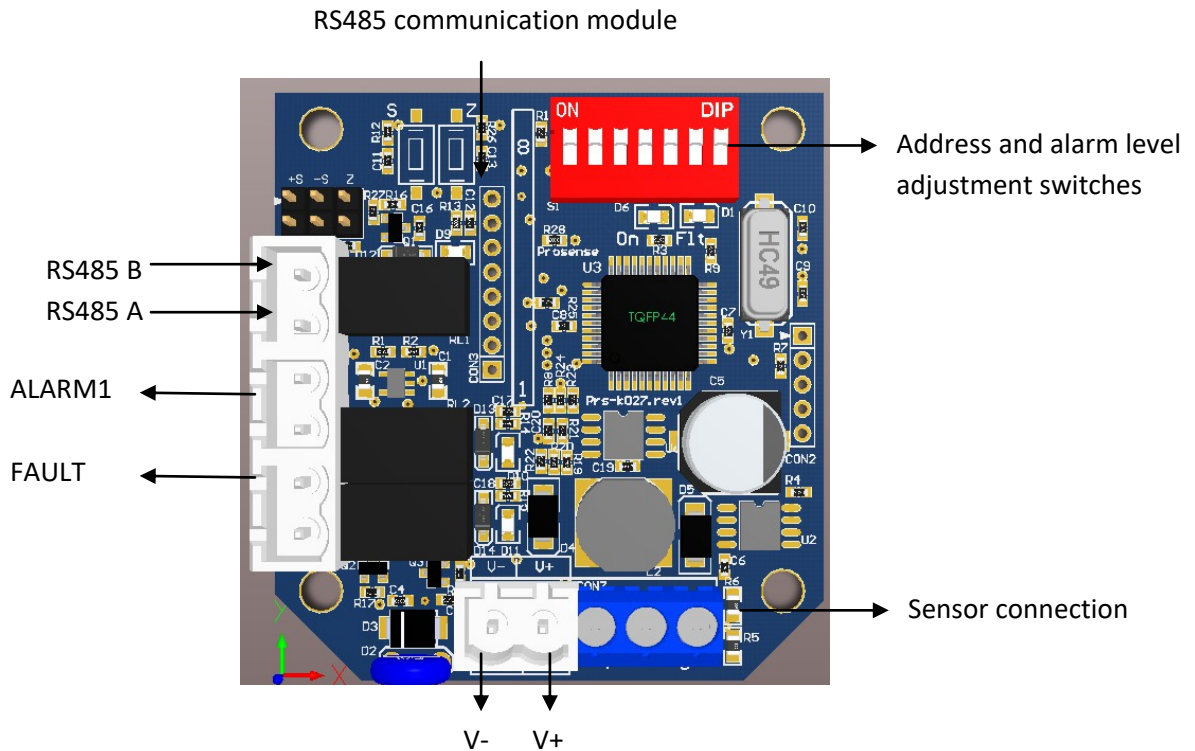


Diagram 9: PPS Series LPG detector main board

Important: The last detector at the communication line should have line termination resistor (120 Ohm) to enable communication for all detectors on the line. Unlike CO and NO detectors the resistor is not implemented on the board and user should connect it physically during the installation.

Important: It is highly recommended to provide power directly from power-supply to PPS Series LPG detectors. The zone module can only provide power up to 4 PPS Series LPG detectors. If more than PPS series LPG detectors will be used the power should be provided directly from power supply.

Similar to CO and NO2 detectors PPS series LPG detectors has a dip-switch to assign address to the detector. Each detector must have unique address to communicate to PPS Manager. Detectors having same address would not be recognised by the PPS Manager. The address should be set via using first 5 switches on the dip-switch.

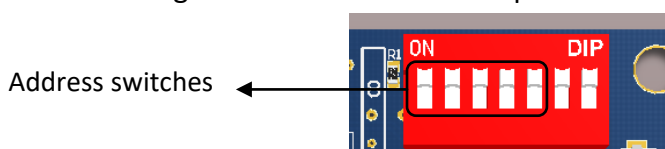


Diagram 10: PPS Series LPG detector address switches

PPS Series LPG Detectors Relay Connections

Main board used in PPS Series LPG gas detector has three integrated relays which are fault, alarm1 and alarm2. But when address module installed the fault relay will be deactivated, alarm2 relay will be assigned as fault relay and alarm1 relay will be unchanged. PPS Series LPG detector can be used as independent gas detector without address module. In this case the address module should be removed and the main board will have three integrated relays which are fault, alarm1 and alarm2. Relays would not activate together. Alarm1 relay will be activated and Alarm2 relay will be de-active when alarm1 threshold level exceeded. If Alarm2 relay activated due to Alarm2 threshold level reached while Alarm 1 relay was active, Alarm 1 relay will be deactivated. Fault relay will be activated only on fault conditions.

Relays are not energised and only works as NO (Normally Open) status. It is not possible to adjust relay activation method.

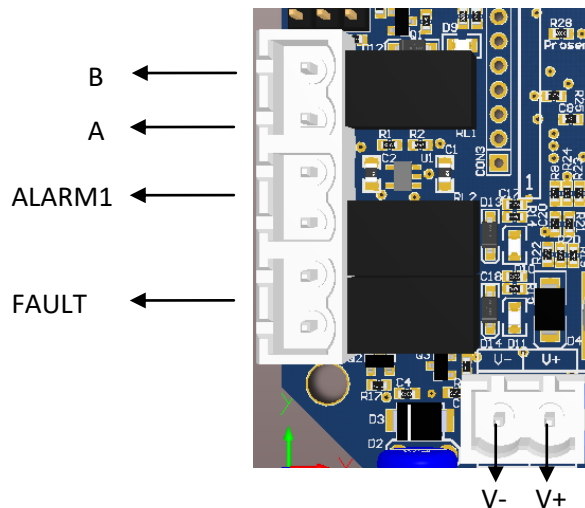


Diagram 11: PPS Series LPG detector connections

Alarm levels are adjustable to predefined levels. Switches 6 and 7 should be used to change alarm levels.

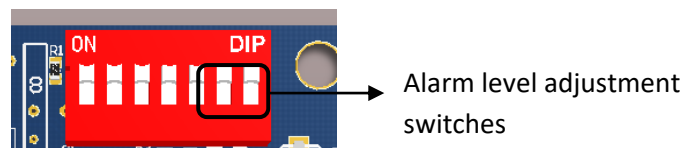


Diagram 12: PPS Series LPG detector alarm level adjustment switches

Alarm levels and related switch positions are given in table-3:

Switch 6	Switch 7	Alarm1	Alarm2
OFF	OFF	10	15
OFF	ON	10	20
ON	OFF	30	40
ON	ON	40	60

Table 3: PPS Series LPG detector alarm levels

System Status

Prosense PPS Series CO and NO2 detectors have one red LED on main board. This LED will start blinking following power applied. It takes 60 seconds to detector to be ready to normal operation. The LED will continue blinking if there is no fault. The LED will stop or steady on in case of any problem.

Prosense PPS Series LPG detectors have two LEDs on main board. Red LED shows system power status and yellow LED shows fault status. Both LEDs will start blinking right after power applied. After approximately 90 seconds the yellow LED will be turned off and only red LED will continue blinking. This status means that detector is ready to normal operation.

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. If it is connected to PPS Manager, cables should be installed according to PPS Panel user manual as panel can provide both power and communication connections to the detectors.
5. Using a Digital Multi Meter (DMM), check the Supply Voltage at the terminals V+ and V- this should be a minimum supply voltage of 12VDC (Maximum supply voltage is 24VDC). PPS Manager provides around 16VDC power to detectors.
6. Check LED status on detector main board. LED status should be like explained above after applying power depending of the detector model.
7. Wait two minutes and confirm detector LED status pointing normal operation. If detectors used with PPS Manager Panel, panel should recognise each detector correctly with their address.
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.

General specification

PPS Series CO and NO2 Detector Electrical Specifications:

Input Voltage Range	12 to 18VDC (16VDC nominal)
Max Power Consumption	0.25 Watts
Terminals	4 x screw terminals suitable for wire diameter 1.5mm ² to 2.5mm ²
Communication	RS485, Modbus RTU
Sensor	Electrochemical

Table 4: PPS Series CO and NO2 detectors electrical specifications

PPS Series LPG Detector Electrical Specifications:

Input Voltage Range	12 to 18VDC (16VDC nominal)
Max Power Consumption	0.96 Watts at 16VDC - normal condition 1.60 Watts at 16VDC - alarm and fault condition
Terminals	4 x 2 x screw terminals suitable for wire diameter 1.5mm ² to 2.5mm ²
Relays	3 x (1A 30VDC, 0.5A 125VAC, 0.3A 80VDC). Selectable normally open and de-energized
Communication	RS485, Modbus RTU
Sensor	Catalytic

Table 5: PPS Series LPG detectors electrical specifications

Detector Body Specifications:

Material	Plastic (CO and NO2 grey, LPG black)
Weight	Plastic junction box: 230g (with Sensor Header)
Mounting	Wall mounting
Entries	PG11

Table 6: Detector body specifications

Environmental:

IP Rating	IP54 (plastic junction box)
Operating Temperature	-10°C to +50°C / 14°F to +120°F
Operating Humidity	Continuous 20-90%RH (non condensing)
Operating Pressure	90-110kPa
Storage Conditions	-10°C to +50°C (14°F to +120°F)

Table 7: Environmental specifications

Spare parts

PPS Series Spare Part List	
Product Code	Description
UPY-00T-CO	PPS-CO Transmitter
UPY-00T-NO2	PPS-NO2 Transmitter
UPY-00T-LPG	PPS-LPG Transmitter
UPY-00S-CO	PPS-CO Sensor
UPY-00S-NO2	PPS-NO2 Sensor
UPY-00S-LPG	PPS-LPG Sensor
UPY-00B-ABS	PPS ABS Housing (without Door)
UPY-00K-ABS	PPS ABS Housing Door
UPY-00K-KP	PPS Manager Panel Door
UPY-00B-KP	PPS Manager Panel Enclosure
UPY-00T-KP	PPS Manager Zone Module
UPY-00G-KP	PPS Manager Power Module

Declaration



Manufacturer Declaration of Conformity



Prosense Teknoloji San Ltd. Şti declares the PPS 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: PPS Series Fixed Type Gas Detectors

Applied Harmonized international standards:

EN 50270:2015 Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases and oxygen

Applied European Directives:

2014 / 30 / EU Electromagnetic Compatibility (EMC)

Each PPS Series gas detector device which 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

Authorised Signatory: **Firat 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 on 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.