# IRNET-P POP-S IR

## Ex d IR sensor head for HC detection

DS3617 rev.11 dated 14/06/2018

## Key Features

- Full conformity ATEX and IECEx explosion proof IR sensor head for surface applications
- SIL2 rated, for certified dependability (fail-safe detection)
- Fast T90 response time (T90≤7s), for critical and life-saving applications
- Extended temperature range (-40 to +60 °C), for use in any environment
- Wide operating humidity range
- Individual calibration and testing, for measurements you can trust
- Internal microprocessor, for advanced signal processing
- Standard analogue voltage or customized output
- Digital output with Modbus and UART P2P protocol.
- ModBus or P2P digital communication, for ease of integration
- Supplied within a compact, weatherproof enclosure with rain cover

## General Description

When measurement reliability and response time become critical factors in combustible gas detection, the new Point Open Path IR sensor from N.E.T. is the answer. Specifically developed to keep measurements immune from ambient humidity changes and T90 below 10 seconds, the POP-S -IR significantly improve traditional performances of Infrared sensor to detect Methane, Propane and other Hydrocarbons in LEL range.

The sensor uses an infrared energy source and two pyroelectric detectors, each sensitive to different ranges of wavelengths in the spectrum's infrared portion. A Pyroelectric detector is an infrared sensitive optoelectronic component which is specifically used to detect electromagnetic radiation in a wavelength range from 2 to 14 µm.

The *Active* detector is sensitive in the range of absorption of the target gas, while the *Reference* detector is not. The IR source is directed through a glass window into an open gas chamber. The light is reflected by a mirror at the end of the chamber back into the main enclosure and into the pyroelectric detectors. The presence of target gas in the measurement chamber reduces the intensity reaching the Active detector but not the one reaching the Reference detector. The ratio of the two signals is computed in a combustible gas concentration by the sensor microprocessor through N.E.T.'s proprietary algorithm.

Infrared technology dependability eliminates the need for frequent calibrations and the sensor life is not impacted by exposure to gas, resulting in a dramatic reduction of Total Cost of Ownership.

The differential absorption technique, where the target gas is always monitored with respect to a reference measurement, attenuates the effect of background distortions due to response to other gases, source aging or optical surface contamination. Both Active and Reference channels are equally attenuated when contaminants are present within the IR beam or when the source decays over time.

The analogue output can be set as: standard voltage type [0.4 V—2 V] dc (other voltages are available on request) (fig. 1).

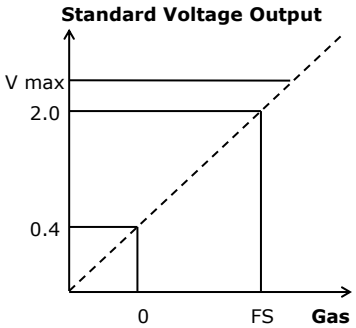
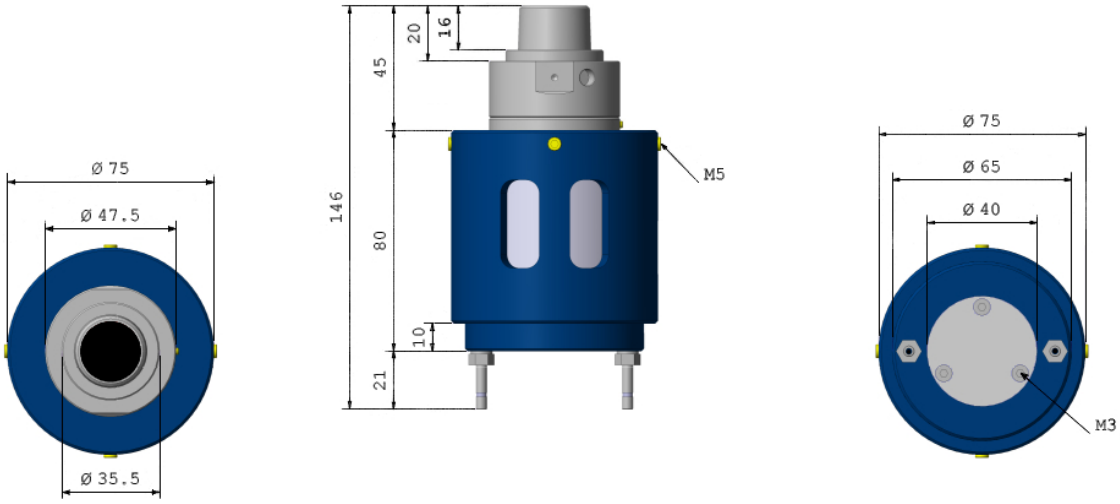


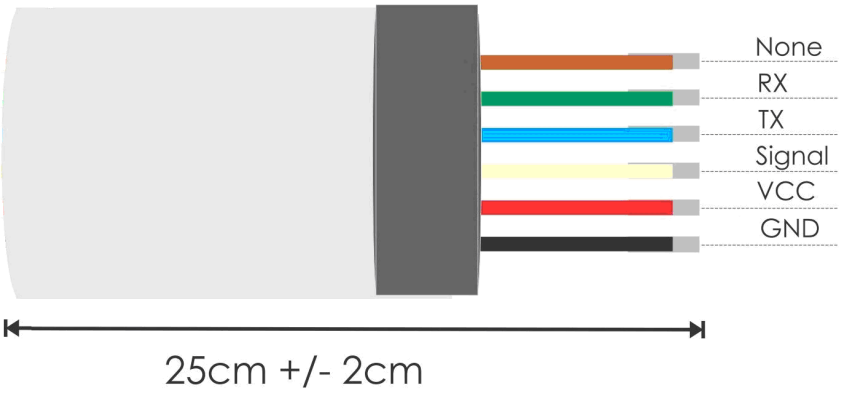

Fig. 1: Characteristics of output voltage

## Mechanical specifications




## Wire Coding

### NETC6's cable




| Wire colours | Meaning |
|---|---|
| Red | Vcc |
| White | Analogue output signal |
| Black | GND |
| Green | Modbus RX |
| Blue | Modbus TX |
| Brown | Not used |

## Certification details

| | | |
|---|---|---|
| SIL Certification | **SIL certification number** | PS-16483-17-L-01 |
| | **Reference standards** | EN 50402:2017 ; EN 61508:2010 parts 1 to 7 |
| | **Systematic and random integrity** | SIL3 capable, SIL2 or SIL3 depending on configuration |
| | **Performance approval** | Designed for use in a detector that complies to IEC EN 60079-29-1 |
| ATEX Certification | **Certificate number:** | CESI 10 ATEX 032X by Notified Body CESI |
| | **Model/identification:** | NETC6 |
| | **Reference standards:** | EN 60079-0, EN 60079-1, EN 60079-28 |
| | **ATEX marking:** | II 2G Ex db op is IIC T6 Gb |
| | **Rating:** | Vmax = 30 Vdc, Imax = 400 mA, Pmax = 0,9 W |
| IECEx Certification | **Certificate number:** | IECEx CES 12.0009X by Notified Body CESI |
| | **Model/identification:** | NETC6 |
| | **Reference standards:** | IEC 60079-0, IEC 60079-1, IEC 60079-28 |
| | **IECEx marking:** | Ex db op is IIC T6 Gb |
| | **Rating:** | Vmax = 30 Vdc, Imax = 400 mA, Pmax = 0,9 W |

## Digital Communication

| | | |
|---|---|---|
| Digital Interface | **Digital signal format** | 8 data bits, 1 stop bit, no parity |
| | **Standard Baud rate** | 38400 bps as Default; 4800,9600,19200 bps |
| | **TX- VOH: output "High" minimum voltage** | 2.4V |
| | **TX- VOL: output "Low" maximum voltage** | 0.4V |
| | **RX- VIH: input "High" minimum voltage** | 2V |
| | **RX- VIL: input "Low" maximum voltage** | 0.8V |

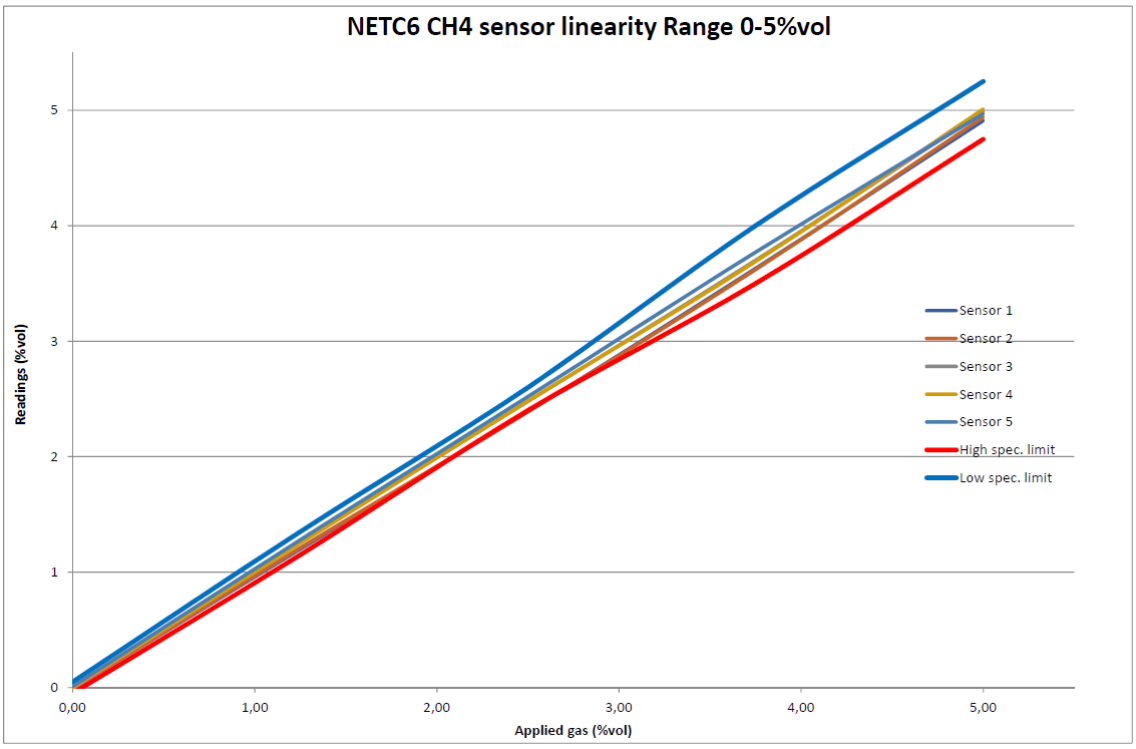
## Warranty and warning

The WARRANTY of NETC6 heads is 3 years from the purchased date against defects in materials or production. This warranty however is not valid for articles that have been broken, repaired by a third person or not used according to the instructions contained in this document or supplied with the products, related to the storage, installation, operation, maintenance, or servicing of the products.

Please keep particular attention to:
- Power the sensor observing the correct voltage and polarity (positive or negative)
- Never solder directly on the pin, use PCB sockets
- Never cut or remove any of the pins
- Use anti-static precautions when handling the sensor
- Never let water or other liquids to enter inside the sensor
- Never expose the sensor to corrosive gases
- The gas flow used for testing should be ≤500 SCCM
- Recalibration of the sensor will void the calibration warranty

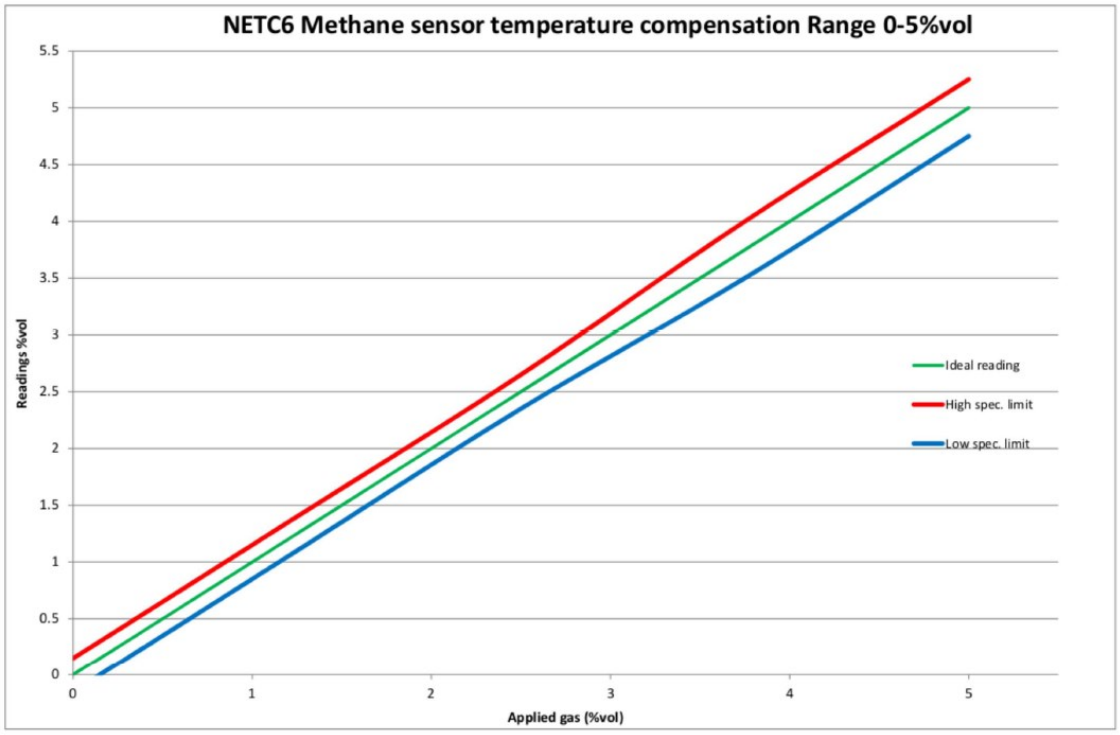
## Linearity

The linearity at room temperature, is: ±1% of FS range for readings below 25% of range; ±2% of FS range for readings below 50% of range and ±5% of FS range above 50% of range. The following graphs show the linearity data for 5 sensors.




## Temperature compensation

Sensors are tested individually in climatic chambers at temperature extremes (-40°C and +60°C) to adjust the internal thermistor compensation. Performances in the temperature range are: ±3% of FS range for readings below 50% of the range and ±5% of FS range above 50% of the range.



# Product specifications

| | | |
|---|---|---|
| General | **Operating temperature range** | -40 to +60 °C |
| | **Storage temperature range** | -40 to +85 °C |
| | **Operating humidity range** | 0-95% non condensing |
| | **Operating pressure range** | 800-1200 mBar |
| | **Gas types** | $CH_4$, $C_3H_8$ |
| | **Weight** | 730 g |
| | **MTBF** | ≥ 5 years |
| | **Firmware and digital technology** | Designed for use in a detector that complies to EN 50271<br>**SIL2 (TÜV approved)** |
| | **Electromagnetic Compatibility (EMC)** | Designed for use in a detector that complies to EN 50270 |
| | **Optics** | Metal optics treated to increase brightness and prevent oxidation |
| | **Enclosure** | Stainless steel |
| | **Calibration** | Individually calibrated with temperature compensation. Test report supplied. |
| Measurement | **Sensing method** | NDIR (dual beam technology) |
| | **Measurement range** | 0 - 100%LEL (4.4%vol CH4, 1.7% vol C3H8)<br>0 - 5% vol CH4<br>0 - 2% vol C3H8 |
| | **Repeatability** | ±2% of FS range |
| | **Accuracy *** | ±1% of FS range for readings below 25% of range<br>±2% of FS range for readings below 50% of range<br>±5% of FS range above 50% of range |
| | **Resolution** | 0.01% vol |
| | **Long Term Drift** | ±3% of FS range/year |
| | **Temperature Performance** | ±3% of FS range for readings below 50% of range<br>±5% of FS range above 50% of range |
| | **Pressure dependence** | 0.1 % to 0.2 % value per hPa |
| | **Zero level Humidity Error** | ±1% of FS range |
| | **Response time (without hydrophobic/dust filter)** | $T_{50} \leq 4$ s; $T_{90} \leq 10$ s |
| | **Response time (with dust filter)** | $T_{50} \leq 6$ s; $T_{90} \leq 15$ s |
| | **Response time (with hydrophobic/dust filter)** | $T_{50} \leq 10$ s; $T_{90} \leq 60$ s |
| Electrical | **Power voltage** | 4.5 - 5.5 Vdc |
| | **Operating current** | 110-120 mA Idc |
| | **Warm up time** | 60 s for full operation @ 25 °C<br>At least 1 hour for full specification @ 25 °C |
| | **Max output current** | ±7.5 mA |
| | **DC output impedance** | 100 Ω |
| | **Max capacitance load** | 1000 pF |
| Signal Output | **Analog output (standard for voltage mode)** | Standard voltage [0.4 V—2 V] dc (other voltages available on request) |
| | **Digital communication** | MODBUS protocol communication (documentation available on request)<br>Compatible UART P2P protocol |

* Test conditions: 25°C ambient temperature and 1000hPa absolute pressure

## Ordering details

When making an order, we kindly ask our customers to specify the basic physical and electrical properties that are needed for their specific application. This is made through the part number here below. The squared fields of the part number below can be modified according to the options on the right. See DS2203 for complete instructions on how to compile the part number for the entire IR series.

NETC6 [2] - IR - [CH4] [L] - [VS] - [F] - [S]

Options available

Sil Certification:
S=With SIL certification
(Left blank)=Without SIL certification

F= version with PTFE filter, mesh and rain cover
Left blank= version with mesh and rain cover

Output:
VS=standard voltage output [0.4 V—2 V] dc
VR=customized rising voltage output

Range:
L=0 - 100% LEL ($CH_4$ (4,4% vol) and $C_3H_8$ (1,7% vol))
2=0 - 2.1% vol (Propane 0-100 % LEL outside of EU)
5=0 - 5% vol (Methane 0-100 % LEL outside of EU)

Gas:
CH4=Methane
PRO=Propane

Thread:
2=3/4" NPT
3=1" NPT
4=M20x 1,5
5=M25x 1,5

*rain cover is present in all products



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