Nano Environmental Technology SIL2 Innovative Gas Sensing

IREF ZERO-ppm (Remora)

The low-cost, high-performance NDIR refrigerant sensor for OEM refrigerant detection in ppm range

DS4712 rev.0 dated 24/06/2020

BBS BLACK BODY gas technology

IR INFRARED gas technology

µPROCESSOR gas technology

Key Features

- OEM version
- Customizable connection type
- No field calibration to reduce maintenance costs
- Superior gas selectivity, to avoid false and undetected alarms
- MTBF of more than 10 years, for greater sensor lifetime
- The most comprehensive range of targeted gases on the market
- Temperature range (-10 to +50 °C), for use in commercial and residential settings
- Fast T90 response time, for critical and life-saving applications
- ModBus or analogue output, for ease of integration
- Internal microprocessor, for advanced signal processing

General Description

N.E.T. IREF ZERO will make the gas selectivity, accuracy, poison immunity and extended lifetime of NDIR technology affordable for any setting, dramatically improving gas detection performances in the HVAC-R market, improving occupants' safety and lowering cost-of-ownership.

The IREF ZERO series from N.E.T. include solutions for R134a, R-410a, R32, R1234yf, R1234ze, R404a, R407c in ppm range.

N.E.T. IREF series of sensors implements N.E.T. advanced NDIR, black body and microprocessor technology to eclipse classic semiconductor (MOS) sensor performances, reducing maintenance costs (no field calibration required), increasing sensor lifetime and making your leak detection fail-safe, while offering the best gas selectivity available and a fast response time.

All N.E.T. IR sensors run on a microprocessor-based platform for internal signal processing, providing a linearized and temperature compensated output in digital and analogue format – the ideal solution for instrument manufacturers, even without any specialist knowledge in IR technology.

N.E.T. IR sensor series apply NDIR (Non Dispersive Infrared) detection technique. This technique is based on the fact each gas has an unique and well defined light absorption curve in the infrared spectrum that can be used to identify the specific gas. The concentration can be determined by using a suitable infrared source and analysing the quantity of energy absorbed from the gas inside the optical path.

Infrared gas sensors employ a dual wavelength technique, using an IR energy source aimed at two pyroelectric detectors, each sensitive to different ranges of wavelengths in the spectrum's infrared portion. 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.

The analogue output can be set as standard voltage type [0.4 V—2 V] dc or Threshold mode that provides a user-programmable threshold output consisting of different voltage levels – by default, 20%FS=1V (1000ppm), 40%FS=2V (2000ppm). The user can freely select the output level, the corresponding output and the hysteresis of the thresholds through Modbus RTU commands.

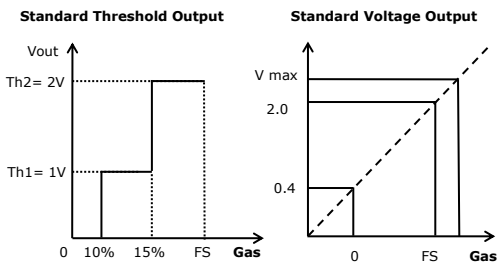

Fig. 1: Characteristics of output voltage

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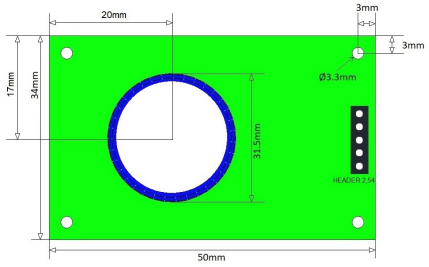
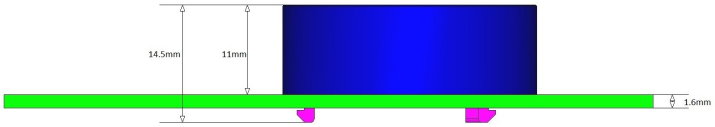
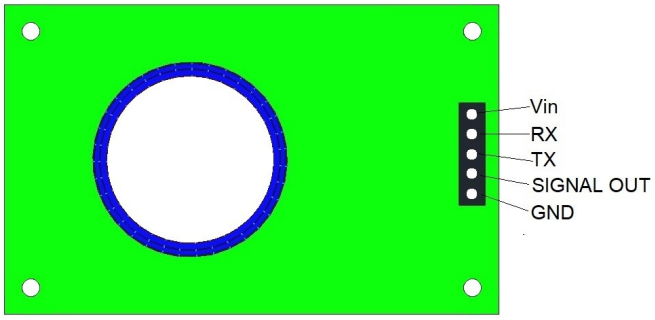
Mechanical specifications





I/O Connections



Digital Communication

Digital Interface	**Digital signal format**	8 data bits, 1 stop bit, no parity
	Standard Baud rate	4800 bps ad Default; 9600,19200,38400 bps
	TX- VOH: output "High" minimum voltage	2.8V
	TX- VOL: output "Low" maximum voltage	0.5V
	RX- VIH: input "High" minimum voltage	2.3V
	RX- VIL: input "Low" maximum voltage	1.15V

Warranty and warning

The WARRANTY of IREF-ZERO sensors is 1 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
- It is forbidden to solder on the electronic components
- Use anti-static precautions when handling the sensor
- Never let water or other liquids to enter in contact with 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

Product specifications

General	**Operating temperature range**	-10 to +50 °C
	Storage temperature range	-40 to +85 °C
	Maximum temperature cycle variations	± 1°C/min
	Operating humidity range	0-95% non condensing
	Operating pressure range	800-1200 mBar
	Gas types	R410a,R32,R1234yf;R1234ze;R134a;R407c;R404a (Others on request)
	Weight	14 g
	MTBF	≥ 10 years
	Patent information	MI2013A000478, EP14001065, US14/219631, CA2.847.491
	Firmware and digital technology	Designed for use in a detector that complies to EN 50271 (SIL1)
	Electromagnetic Compatibility (EMC)	Designed for use in a detector that complies to EN 50270
	Optics	Special optics treated to increase brightness and prevent oxidation
	Enclosure	Plastic (Aluminum on request)
	Calibration	Individually calibrated with temperature compensation. Test report supplied.
Measurement	**Sensing method**	NDIR (dual beam technology)
	Measurement range	0 - 5000ppm
	Repeatability	±3% of FS range
	Accuracy *	±5% of FS range below 50% F.S ±7% of FS range above 50% F.S
	Resolution	0.5% of F.S range
	Long Term Zero Stability	+3% of FS range/year
	Temperature Performance	±7% of FS
	Zero level Humidity Error	±1%
	Response time	T_{50}≤ 10 s; T_{90} ≤ 30 s
Electrical	**Power voltage**	4.5 - 5.5 Vdc
	Operating current	85-115 mA
	Warm up time	60 s for full operation @ 25 °C At least 1 hour for full specification @ 25 °C
	Max output current	±1mA
	DC output impedance	0Ω
	Max capacitance load	100 pF
Signal Output	**Threshold mode Analog output**	Standard Threshold levels: [1V] Threshold 1 ;[2V] Threshold 2
	Threshold digital levels	Standard Threshold levels: [20%F.S] Threshold 1 ;[40%F.S] Threshold 2
	Analog output (standard for voltage mode)	Standard Voltage [0.4 V—2 V] dc
	Digital communication	MODBUS protocol communication (documentation available on request)

* 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.

IFZ32 - [R32] L - NC [TH] N

Options available :

Output:
VS=Standard Voltage output [0.4 V—2 V] dc
TH=Standard Threshold mode

Range:
P= 5000ppm

GAS:
R32
134=R134a
410=R410a
1YF=R1234yf
1ZE=R1234ze
47C=R407c
404=R404a

Take into account that in case of aluminum enclosure, it will be connected to ground.

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