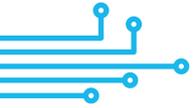


SGX

SENSORTECH

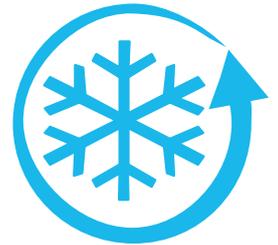
An Amphenol Company



INIR4-R290

Key applications

- R290 leakage detection
- Residential gas monitoring
- Heat pumps
- Refrigeration
- Chill cabinets
- Vending machines
- Cold storage systems
- Air Conditioning



F-gas Regulation
Kigali Amendment

Refrigerant (A3) R290 leakage detection sensor

Datasheet

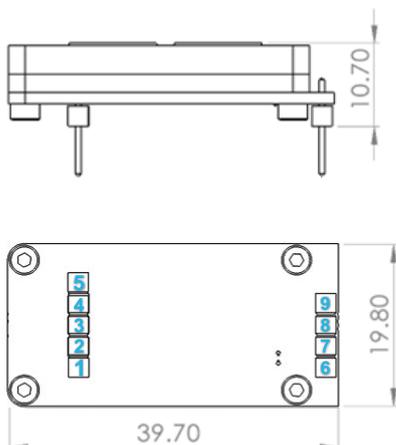
The **INIR4** is a user-friendly digital Gas Sensor, which is designed to use the latest SGX Sensortech's Non-Dispersive Infra-Red (NDIR) technology. It has been primarily designed for the purpose of gas leakage detection in both industrial and residential environments. Designed with the latest generation of power efficient CORTEX microcontrollers allows for high flexibility and functionality. Temperature compensation, good accuracy and simple implementation into end-user system make this sensor a perfect solution for gas leakage detection.



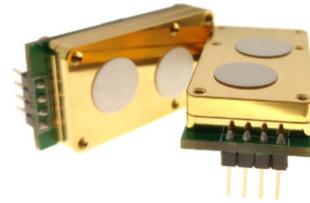
Quality, Safety, Responsibility

Functional specifications

Power Supply	Min	Typical	Max
Supply Voltage	3.2 VDC	5 VDC	5.25 VDC
Average Current Consumption	30mA	32mA	35mA*
*Inrush Current can be up to 60mA			
Logic Outputs Level	LOW Voltage Level (VOL): 0.6V Maximum HIGH Voltage Level (VOH): 2.0V Minimum 1.6mA source current maximum		
Logic Inputs Level	LOW Voltage Level (VINL): 0.4V Maximum HIGH Voltage Level (VINH): 2.0V Minimum		
Humidity (non-condensing)			
Operating Humidity	0%	50%	99%
Storage Humidity	0%	50%	90%
Temperature			
Operating Temp.	-20°C	+20°C	+60°C
Storage Temp.	-20°C	+20°C	+60°C
Temp. Cycle Limits		0.8°C/min	1.3°C/min
Pressure (Compensation will be required)			
Operating Pressure	60kPa	-	120kPa
Storage Pressure	60kPa	-	120kPa
Output			
PWM output	100Hz, 10-90% duty cycle for 0-2.1% R290 (5% duty cycle used for error indication) 0-2.8V amplitude		
Serial communication			
Digital signal format	8 data bits, 1 stop bit, no parity		
Standard baud rate	38400 as default		
Dimensions			
Length (L)		39.7 mm	
Width (W)		19.8 mm	
Height (H)		10.7 mm	
Weight		15 g	



NOTE: All Dimensions in mm. All tolerances Linear +/- 0.1mm and Angular 0.5° unless otherwise stated.



Features

- **Factory calibrated** for up to 2.1% Propane
- **Linear approximation** for 100% of range
- **High Resolution** up to 50 ppm
- **Detectivity Level** at 200ppm
- **Temperature compensated**
- Serial port communication
- PWM output
- 0V/2.8V Alarm output
- **Dual channel operation**
- Full **Faults Diagnostics & Error Generation**
- **Typical Low power** consumption < 100mW (Average) in measurement mode, <30mW in standby mode.
- **Evaluation Kit** available including **PC software** for easy testing and calibration functions
- Meets UL 60335-2-40 / IEC 60079-29-1 / IEC60335-2-40 requirements

Pin Configuration (Bottom View)

Pin	Name	Description
1	+2.8V	Voltage output
2	RXD	Data received by the INIR4
3	TXD	Data transmitted by the INIR4
4	N/C	Not connected
5	N/C	Not connected
6	VCC	3.2 Volts - 5.25 Volts DC input to INIR4
7	GND	GND Plane - 0V reference for INIR4
8	ALARM	Alarm out
9	PWM	PWM Out (0-2.8V), 5-90% modulation

Design Considerations & Applications

Warm-Up Time

The Warm-Up Time for the INIR4 sensor is 60 seconds after each power "ON" or every time when we are changing from Configuration to Normal/Engineering Mode. During this time data is not valid.

The Warm-Up time is not including the period that the sensor needs to reach the ambient temperature. The sensor though is capable of producing readings during the Warm-Up but with a higher error than stated in specifications.

Calibration

For calibration process please read the appropriate Application Note 1, "Integrated IR Protocol & Calibration".

For optimum performance please use following cylinders:

Nitrogen or air
1.05% Propane for Span Cal

Always do Zero Calibration first followed by High Span.

Gas Flow Rate

For valid evaluation and to keep tests consistent it is recommended to use 450 – 500 cc/min. flow rate to minimize any effects due to pressure variations in the INIR4.

Digital Interface/Communication

Sensor can operate both in connection to computer as well as a standalone alarming component. The digital communication is realized using UART (RS232 TTL).

Sensor is compatible with INIR4 development kit software.

Faults Monitoring/Error States

The Error monitoring and Fault generation happens every second transmitted by the UART. Regularly check all the Faults generated from the INIR4 to ensure errorless communication and rise appropriate alarms depending on the Fault code. Faults are also indicated using PWM signal (with 5% duty cycle in alarm mode).

PWM Output

PWM Output duty cycle is updated once per second. Frequency is 100Hz as standard, but can be adjusted to customer requirements.

The sensor will give 10% duty cycle for 0% and 90% duty cycle for 100% of the concentration range.

Alarm Output

Alarm level can be configured with the software provided with the sensor. The default alarm level is 20% LEL (0.42% volume Propane).

Condensation, Dust & Extreme Conditions

Using the INIR4 in extreme environmental conditions may affect its performance. Typically, the module has a high corrosion resistance and temperature compensated linearized output.

Pressure Compensation

INIR4 is not equipped with pressure compensation. Based on application environment external pressure compensation might be required.

Typical performance characteristics

All Characteristics are related to a calibrated sensor and conditions: Temperature 20°C, Relative Humidity 10%RH, Pressure 101kPa, 500 to 1000 ml/min Gas Flow, averaging of 12 values, unless otherwise stated.

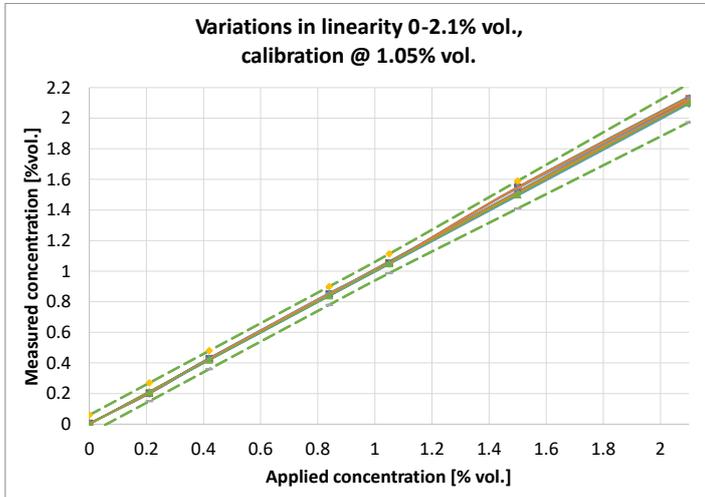
Test	INIR4-R290
Stabilisation or Warm-up Time (EN)*	0%vol. \pm 0.1%vol. in 60 seconds
Calibration Curve (EN) or Basic Error (AQ)	0 to 100% of full range -> 0.1%vol. or \pm 10% of Reading whichever is greater
Short Term Stability (EN) of the Displayed Value(AQ)	0%vol. = \pm 0.05%vol. 2.1%vol. = \pm 0.1%vol.
Minimum Resolution (AQ)	From 0 to 2.1% vol. -> \pm 0.005%vol.
Long Term Stability (EN) or Working Stability (AQ)	0%vol. = \pm 0.2%vol. / Month 2.1%vol. = \pm 0.2%vol. / Month
Temperature Error (with Compensation) (-20°C to +60°C, relative to 20°C)	0%vol. to 2.1%vol. = \pm 0.2%vol.
Humidity Error (10%RH to 90%RH, relative to 45%RH)	0%vol. = \pm 0.1%vol. 2.1%vol. = \pm 0.3%vol.
Response Time (without dust filter)	T90 <30s
Power Supply Variations (at \pm 5% of Nominal Voltage)	The Performance of the INIR4 is not affected by power supply variations as long as the power supply provides DC Regulated voltage according to specifications.
Power Supply Rejection Ration (PSRR) (at \pm 5% of Nominal Voltage)	at 1 MHz -> 50 dB, at 100 kHz -> 68 dB, at 10 kHz -> 88 dB
Uncertainty Error of Calibration	\pm 0.15% vol. Error of the Actual Reading

* Wait for 45 mins for the Sensor to warm up and reach the Ambient Temperature before power on.

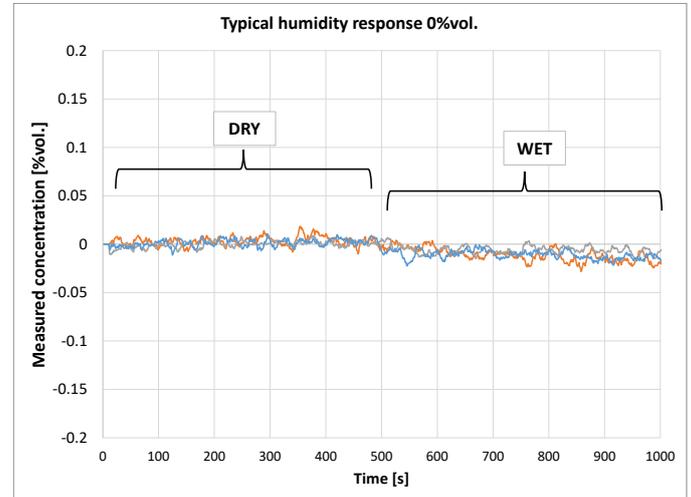
Typical performance data

All Characteristics are related to a calibrated sensor and conditions, Temperature 20°C, Relative Humidity 10%RH, Pressure 101kPa, 500 to 1000 ml/min Gas Flow, averaging of 12 values, unless otherwise stated.

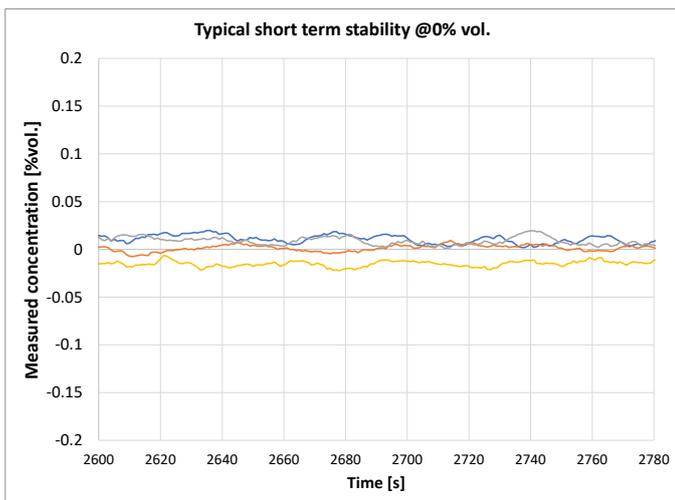
Typical linearity 0-2.1% Propane



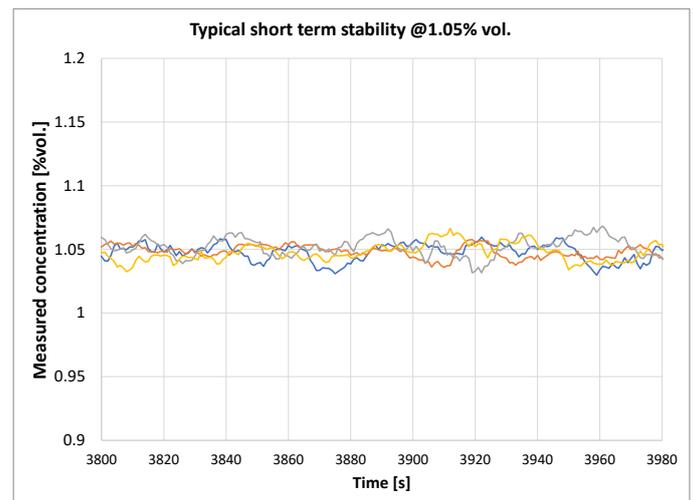
Typical humidity response



Typical Short Term Stability @0% Propane



Typical Short Term Stability @1.05% Propane



Intended use

This device has been designed to be used as a gas detection component, but it the design is not certified for use in explosive atmospheres.

ROHS compliance

Under the EU Directives, compliance testing is necessary for Pb, Cd, Hg, Cr (VI) and Br. The RoHS directive is effective since July 1, 2006. The regulations prohibit the use of these hazardous substances in new products sold after July 2003.



WEEE directive

WEEE (Waste from Electrical and Electronic Equipment) is a directive that controls how electric and electronic equipment is handled and recycled effective since August 13, 2005. INIR4 clustered as component and SGX do not need to have a recycling scheme in place, but manufacturers may need to ensure WEEE compliance for their systems.



Handling precautions

- Do not drop the sensor on the floor as this could cause damage to the pins or internal components.
- Avoid mechanical force against pins. Protect from dust and sprayed acidic particles.
- Do not immerse in water or other fluids.



ESD precaution

ESD (Electrostatic Discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary subjected circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Warning! Plugging or Unplugging the Sensor while in operation may damage the device beyond repair. Always power down the instrument when performing maintenance.



Sensor Development Kit (SDK)

Sensor Development Kit is used as an efficient way to test and integrate the SGX Sensortech sensors into any application. SDK includes everything needed to run INIR4 including an integration board and a PC application.



Warranty & Warning

The **WARRANTY** for all the INIR4 Gas Sensors is 2 years from the purchased date based on use according to this document and the INIR Application Note.

Warranty period or any extended warranties would be confirmed with the order confirmation.

The warranty is invalidated if the sensor is used under conditions other than those specified in this datasheet.

In addition, please pay attention to the following conditions as they will void immediately the **WARRANTY**:

1. Do not allow water condensing into the sensor or deep the sensor into water.
2. Do not change label or cover it with other stickers.
3. Do not over voltage or overcurrent the sensor; always observe the correct polarity of the input.
4. Do not solder directly onto the pins, pads or the external body of the sensor.
5. Do not drop on the floor or hit it with tools.
6. Do not open, cut or break sensor apart.
7. Do not expose the sensor to high levels of dust.
8. Do not expose the sensor to corrosive gases or operate under corrosive environments.
9. Do not paint or mark the sensor externally.
10. Do not use in acid environment or operate under gases containing acid vapours or particles.
11. Do not custom modify the sensor.
12. Do not clean the with acid.

INIR4-R290

DISCLAIMER:

SGX Europe Sp. z o.o. reserves the right to change design features and specifications without prior notification. We do not accept any legal responsibility for customer applications of our sensors. SGX Europe Sp. z o.o. accepts no liability for any consequential losses, injury or damage resulting from the use of this document, the information contained within or from any omissions or errors herein. This document does not constitute an offer for sale and the data contained is for guidance only and may not be taken as warranty. Any use of the given data must be assessed and determined by the user thereof to be in accordance with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

SGX Europe Sp. z o.o. sensors are designed to operate in a wide range of harsh environments and conditions. However, it is important that exposure to high concentrations of solvent vapours is to be avoided, both during storage, fitting into instruments and operation. When using sensors on printed circuit boards (PCBs), degreasing agents should be used prior to the sensor being fitted. SGX Europe Sp. z o.o. makes every effort to ensure the reliability of its products. Where life safety is a performance requirement of the product, we recommend that all sensors and instruments using these sensors are checked for response to gas before use.

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