

2024
NEW PRODUCTS



innovative gas sensing

Gas Sensing Elements

twenty years of advanced solutions for gas detection



MAK

MEMS ANALOG KATHAROMETER

REMORA®



NEW REFRIGERANT
GAS DETECTION MODULES

IREF

NDIR REFRIGERANT GAS SENSORS



Industrial safety



HVAC-Refrigeration



Laboratories and Medical



Parkings and tunnels



Landfill gas (LFG)/Biogas



Waste water/Water treatment



REFRIGERATED
CABINETS



CHILLERS



ROOFTOP
UNITS



HEAT
PUMPS



REMORA®

REFRIGERATED
TRUCKS/TRAILERS



COLD
ROOMS



MACHINERY
ROOMS



VRF
SYSTEMS



NET REMORA® THE NEW OEM REFRIGERANT SENSOR MODULE

- Oleophobic filter and oil spray cover ensuring maximum protection against dust and contamination
- NDIR gas detection: no false alarm, no regular routine maintenance required
- 15+ years of expected lifetime
- Over 30 different refrigerant gases available
- Supplied ready-to-use with a sensor configured and pre-calibrated from NET detection range
- Easy integration with 4-20mA analogue output and MODBUS protocol on RS-485

PENDING CERTIFICATIONS

REMORA is undergoing the highest level of certification to ensure best-in-class reliability in Refrigerant Leak detection:

- IEC 60335-2-40:2022 Annex LL and IEC 60335-2-89
- EN 61508:2010 Parts 1-7, EN 50402:2017 (SIL2) – available on request
- EN 61326 Part 1, EN 50270 (Electromagnetic compatibility).
- EN 60529:1991 (IP protection)
- EN 14624:2000 and EN 50676:2000

The new **REMORA First** from NET is a complete, ready to use and cost-effective sensor module aimed at making refrigerant leak detection easy, affordable and effective in any application. REMORA gas detection is based on NET range of NDIR sensors, covering over 40 different common refrigerants. NDIR detection ensures unparalleled gas selectivity, poison immunity, fail safe operation, long term stability and extended lifetime (15+years).

NET field-proven, microprocessor-based detection provides a linearized, temperature compensated reading, as well as complete diagnostics information while running constant self-checks and self-calibration routines.

The gas inlet is protected by an oleophobic filter and an oil spray cover to ensure maximum protection against dust and contamination in any possible environment and application scenario.

REMORA has a high-level interface with 4-20mA analogue output and MODBUS protocol on RS-485, as well as local Threshold, Watchdog and fault alarm outputs. The power supply rating is 12...24VDC.

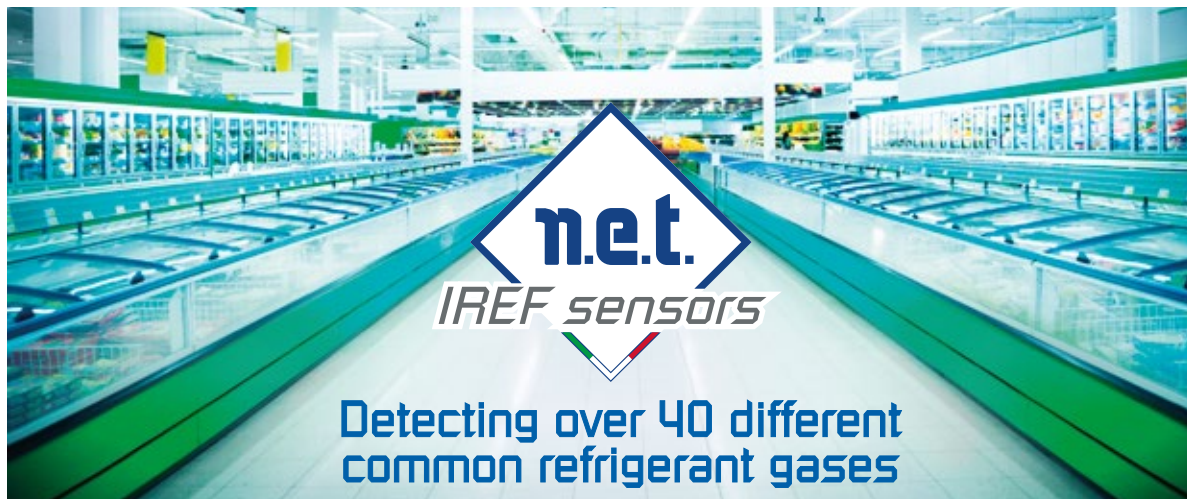
UNDER DEVELOPMENT

Availability with wi-fi module and OEM protocol module

REMORA Absolute and **REMORA Dual Tech** for improved detection of specific gases.



General	Sensing Element:	NDIR sensor
	Operating temperature range	IRNET Pro: -40 +60°C IREF Pro: -20 +50°C IREF Lite: -10 +50°C
	Storage temperature range	-40 +85°C
	Operating humidity range	0-95% non condensing
	Operating pressure range	800-1200 mBar
	Enclosure	25% Glass Reinforced, Flame Retardant, Polyamide 66
	Enclosure Protection	IP65
	Calibration	Individually calibrated with temperature compensation. Test report supplied.
	MTBF	> 15 yrs (IR Source MTTF > 15 years)
Measurement	Sensing method	NDIR
	Range	ppm; %vol
	Response time	T90 <30 seconds
	Accuracy	IRNET PRO / IREF PRO: ±1% of FS range for readings below 25% of range ±2% of FS range for readings below 50% of range ±5% of FS range above 50% of range IREF LITE: ±5% of FS range below 50% F.S ±7% of FS range above 50% F.S
	Resolution	IRNET PRO / IREF PRO: 0.2% of F.S range IREF LITE: 0.5% of F.S range
	Temperature Performance	IRNET PRO / IREF PRO: ±3% of FS range for readings below 50% of range ±5% of FS range above 50% of range IREF LITE: ±7% of FS
	Pressure dependence	0.1 % to 0.2 % value per hPa
	Power Voltage	Nominal 12-24Vdc
	Current Consumption @12V	< 80 mA Idc
	Current Consumption @24V	< 40 mA Idc
Electrical	Warm up time	60 s for full operation @ 25 °C 1 hour for full specification @ 25 °C
	Max output current	24 mA
	Analog output	4-20 mA
Signal Output	Digital communication	Modbus protocol RS485 (Termination resistance of 120Ω normally present)



THE MOST COMPLETE LINE OF REFRIGERANT GAS SENSORS ON THE MARKET TODAY BASED ON NDIR TECHNOLOGY

- NO FALSE ALARMS
- NO REGULAR ROUTINE MAINTENANCE REQUIRED
- 15+ YEARS OF EXPECTED LIFETIME

Innovative Gas Sensing: By constant research and innovation, NET of Italy has developed distinctive and unique technologies and a comprehensive range of sensors for refrigerant gases detection - all microprocessor based, fully calibrated and targeted at different market segments and applications, both commercial and industrial. NET now offers solution to monitor over 40 different refrigerant gases.

DESIGNED FOR USE IN A DETECTOR THAT COMPLIES TO EN 50271. SIL2 (TÜV APPROVED)



IREF PRO
MARKET'S MOST
DEPENDABLE
REFRIGERANT SENSOR

IREF-Pro has been specifically developed for the most accurate detection of low ppm concentrations of HFC and HFO gases. It features a powerful black body light source enabling ppm detection of a comprehensive number of gases. It comes fully calibrated for the target gas and is SIL2 certified.

IREF LITE
THE COST EFFECTIVE A2L
REFRIGERANT SENSOR



IREF-Lite offers a cost-effective alternative to the 'Pro' version, for commercial and light-industrial applications: it is available for A2L refrigerants (R32, R1234yf, R1234ze, R454a, R454b, R454c, R455a) in the flammable range and for gases used in VRF applications (such as R410a, R134a) up to 1%vol.

IREF Zero and IREF LC are low-cost solutions for commercial and residential applications such as VRF or commercial refrigerators. They share the same gas range of IREF Lite and offer an effective refrigerant leak detection option at a very interesting price.
Available only for OEM development



IREF LC
THE NEW LOW COST,
HIGH PERFORMANCE
NDIR OEM SENSOR



IREF ZERO
THE NEW LOW COST,
HIGH PERFORMANCE
NDIR OEM SENSOR

COMPLETE LIST OF DETECTABLE GASES

GAS	TYPE	CLASS
R-1233zd	HCFO	A1
R-1234yf	HFO	A2L
R-1234ze	HFO	A2L
R-123	HCFC	B1
R-125	HFC	A1
R-134a	HFC	A1
R-143a	HFC	A2L
R-152a	HC	A3
R-22	HCFC	A1
R-227ea	HFC	A1
R-245fa •	HFC	A1
R-290	HC (Propane)	A3
R-32	HFC	A2L
R-404a	HFC	A1
R-407a	HFC	A1
R-407c	HFC	A1

GAS	TYPE	CLASS
R-407f	HFC	A1
R-410a	HFC	A1
R-417a	HFC	A1
R-422a	HFC	A1
R-422d	HFC	A1
R-424a	HFC	A1
R-427a	HFC	A1
R-434a	HFC	A1
R-438a	HFC	A1
R-442a	HFC	A1
R-448a	HFC / HFO	A1
R-449a	HFO	A1
R-450a	HFC / HFO	A1
R-452a	HFO	A1
R-452b	HFO	A2L

GAS	TYPE	CLASS
R-453a	HFC	A1
R-454a	HFO	A2L
R-454b	HFO	A2L
R-454c	HFO	A2L
R-455a	HFO	A2L
R-507	HFC	A1
R-513a	HFO	A1
R-514a •	HFO	B1
R-515a	HFO	A1
R-515b	HFO	A1
R-600	HC (Butane)	A3
R-600a	HC (IsoButane)	A3
R-717	Ammonia	B2L
R-744	CO2	A1
R-1270	HC (Propylene)	A3

• Gases in red under test

Sensor Type		PRO	LITE	ZERO/LC
General	Operating temperature range	-20 to +50 °C	-10 to +50 °C	
	Operating humidity range	0-95% non condensing		
	Operating pressure range	800-1200 mBar		
	Weight	34 g	26 g	14 g
	MTBF	≥ 15 years		
	Patent information	MI2013A000478, EPI4001065, US14/219631, CA2.847.491		
	Firmware and digital technology	Designed for use in a detector that complies to EN 50271. SIL2 (TÜV approved)		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	Metal optics treated to increase brightness and prevent oxidation	Special optics treated to increase brightness and prevent oxidation	
	Enclosure	Stainless steel	Aluminium	Plastic
	Calibration	Individually calibrated with temperature compensation. Test report supplied.		
Measurement	Sensing method	NDIR (dual beam technology)		
	Repeatability	±2% of FS range	±3% of FS range	
	Accuracy	±1% of FS range for readings below 25% of range ±2% of FS range for readings below 50% of range ±5% of FS range above 50% of range	±5% of FS range below 50% F.S ±7% of FS range above 50% F.S	
	Resolution	0.2% of F.S range	0.5% of F.S range	
	Long Term Drift	±2% of FS range/year	+3% of FS range/year	
	Temperature Performance	±3% of FS range for readings below 50% of range ±5% of FS range above 50% of range	±7% of FS	
	Pressure dependence	0.1 % to 0.2 % value per hPa		
	Baseline Humidity Error	±0.5% of FS range	±1%	
	Electrical	Response time	T50 ≤ 20 s; T90 ≤ 60 s	T50 ≤ 10 s; T90 ≤ 30 s
Power voltage		3.5 - 5.5 Vdc	4.5 - 5.5 Vdc	
Operating current		110-120 mA Idc	85-115 mA	
Warm up time		60 s for full operation @ 25 °C		
Signal Output	Analog output (standard for voltage mode)	Standard voltage [0.4 V—2 V] dc		
	Digital communication	MODBUS protocol communication (documentation available on request)		



NET MAK® MEMS ANALOG KATHAROMETER

- Detection range: ppm to 100% volume
- Long-term reliability (0.5 % F.S./year)
- No poisoning, no chemical reaction/contamination
- Reliable in harsh environments
- Fast response time
- High resolution
- Long expected lifetime (10+ years)
- Can operate without the presence of Oxygen
- Industry proven technology
- Low working temperature (~2°C above ambient)
- Intrinsically safe, while avoiding condensation
- MEMS membrane sensor: great resistance to mechanical shocks
- Active Environmental compensation (Temperature, RH, Pressure)
- Standard industrial size and footprint
- Standard industrial output (voltage, bridge, Modbus)
- Internal heat cavity, minimizing conduction and natural convection



INTELLIGENT THERMAL CONDUCTIVITY HYDROGEN / A2L SENSOR

With the application of MEMS (Micro Electronic Mechanical Systems) technology, NET is making the power of thermal conductivity gas sensors available for the broadest range of Hydrogen and A2L gas detection applications. By employing very repeatable, high-volume CMOS (Complementary metal-oxide-semiconductor) MEMS technology, the new NET KATHAROMETER GAS TECHNOLOGY is lowering production costs and the typically high power consumption of thermal conductivity sensors.

MAK sensors detect gas concentrations in the air by measuring the change in thermal conductivity of the gas mixture. Thermal conductivity sensors are most effective when detecting gases with low molecular weight, which correspond to greater thermal conductivity.

UNDER DEVELOPMENT

Thermal conductivity technology for general flammable gases MAK 3
and for specific R-290 gas MAK P

Unlike catalytic bead sensors, NET MAK sensors covers the broadest range of detection, working well from ppm level, up until % volume. They can operate without the presence of Oxygen and provide far better long-term stability than sensors triggered by chemical reactions that eventually cause the sensor to degrade.

This, coupled with outstanding resistance to poisoning, results in far greater operating life than for traditional technologies. NET MAK MEMS membrane-based sensors offer far greater resistance to mechanical shocks when compared to traditional thermal conductivity sensors.

COMLIANT WITH

- ISO 26142:2009 – Hydrogen detection apparatus
- ISO 22734-1 – Hydrogen generator using water electrolysis
- ISO/TR 15916:2015 – Basic considerations of the safety of hydrogen systems
- IEC 62282-3-100 – Stationary Fuel Cells power system – Safety
- IEC 60335-2-40 ANNEX LL – and IEC 60335-2-89

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	H ₂
	Weight	14 g
	MTBF	≥ 5 years
	Firmware and digital technology	Designed for use in a detector that complies to EN 50271 SIL2 (pending approval)
	Electromagnetic Compatibility (EMC)	Designed for use in a detector that complies to EN 50270
	Enclosure	Stainless steel
Measurement	Calibration	Individually calibrated with temperature, relative humidity and pressure compensation. Test report supplied.
	Sensing method	Thermal Conductivity
	Measurement range	0 - 4% vol
	Repeatability	±0.05% of FS range
	Accuracy	±3% of FS range below 50% of range ±5% of FS range above 50% of range
	Resolution	10ppm
	Long Term Drift	±0.1% of FS range/year
	Temperature Performance	±5% of FS range below 50% of range ±7% of FS range above 50% of range
Electrical	Response time	T90 ≤ 20s
	Power voltage	3.0 - 5.5 Vdc
	Operating current	30-40 mA Idc
	Warm up time	60 s for full operation @ 25 °C 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)
	Analog output (standard for bridge mode)	[Vcc/2 ± Δ] dc (Δ value is to be specified by the customer)
	Digital communication	MODBUS protocol communication

• Preliminary data for HYDROGEN



AVAILABLE AS COMPLETE REMORA[®] SENSOR MODULE

- 4-20MA ANALOGUE OUTPUT
- RS-485 MODBUS DIGITAL OUTPUT
- 12-24VDC POWER SUPPLY

Innovative Gas Sensing. By constant research and innovation, NET has developed distinctive and unique technologies. Incorporated every day in our products, they enable exceptional benefits for our users.



INFRARED GAS TECHNOLOGY

- Non Dispersive Infrared (NDIR) gas sensing
- Dual wavelength, differential absorption technique
- Very gas-selective, low cross-sensitivity with interferent gases
- Corrosion-resistant and cannot be poisoned
- Fail-safe: events such as beam block or failed detectors or sources are revealed
- Requires no routine calibration

DYNAMIC GAS TECHNOLOGY

- Dependable detection accuracy over a full 0-100% volume range
- The sensor divides the 100% range in 3 different segments uses a different fitting curve for each one
- The set of coefficients for each range segment is individually determined for each sensor through the entire temperature range by an automated procedure



MICROPROCESSOR GAS TECHNOLOGY

- Sensors based on an ARM® Cortex®-M4 core platform with industry-leading low power
- High-level interface, with a standardized, linear output
- No need to process low-level signals and calculations
- Bidirectional communication via digital protocols allows changing of communication and calibration parameters
- Faster response time, with FW accelerator algorithm
- Enhanced dependability and fail-safe operation

BLACK BODY SOURCE TECHNOLOGY

- SF₆, Ethylene and refrigerant gases have absorption bands in the spectrum of 8 to 10 μm.
- Our IREF series use a state-of-the-art MEMS-based IR source, featuring true blackbody radiation band
 - BBS emits in a wide wavelength range (2 to 14 μm)
- MEMS IR sources have superior speed and efficiency, smaller energy consumptions than filament lamps and excellent resistance against shocks and vibration



KATHAROMETER GAS TECHNOLOGY

- CMOS MEMS-based Thermal conductivity gas sensing
- effective when detecting gases with low molecular weight, such as Hydrogen between 0 and 100% volume
- Superior long-term stability and resistance to poisoning
- Low power consumption
- Fast response time
- Active environmental compensation



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