

# THERM<sup>o</sup>DISC

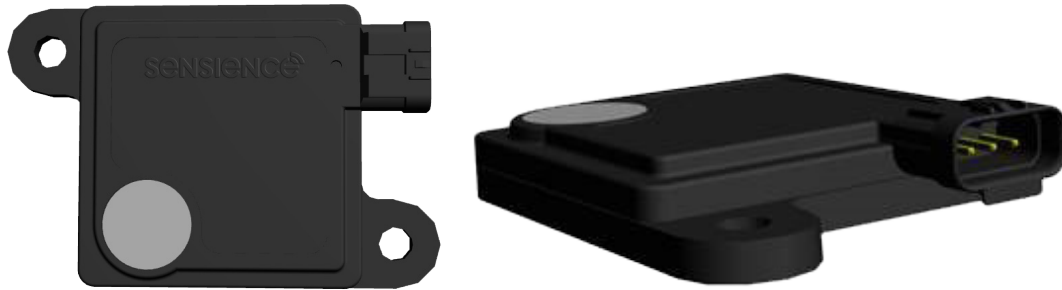
## A2L GAS SENSOR





## A2L Gas Detection Sensor

The **Therm-O-Disc®** A2L Gas Detection Sensor, enabled by patented **NevadaNano\* Technology**, is an all-in-one sensing solution for accurate refrigerant detection systems to save development time and effort while providing high system reliability.



### High Reliability MEMs Technology

- Meets all AHRTI testing requirements including vibration testing, and is proven to be best-in-class
- Proven technology: hundreds of thousands of devices successfully deployed in hazardous environment applications
- Immune to poisoning; no calibration/maintenance
  - Insensitive to poisoning from chemicals listed in UL-60335-2-40 Annex LL
  - No false alarms due to ambient conditions with the built-in environmental sensor for temperature, humidity, and pressure

### Industry Stewardship

- Proven Experience
  - Providing environmental sensing and protection to the HVACR industry for over 70 years
  - 15+ years of successful deployment of flammable gas sensing products
  - Extensive in-house reliability test capability and experience at Therm-O-Disc laboratories
  - Environmental Sustainability
  - Enables hydrofluorocarbon (HFC) phasedown using A2L refrigerants less than 750 GWP
  - Enables air conditioning and refrigeration systems using flammable refrigerants to meet building codes

## THE OPERATING PRINCIPLE

The Molecular Property Spectrometer refrigerant gas sensor's transducer is a micro-machined membrane with a precision nano-calorimeter. The transducer continually samples the air to determine if a gas is present that matches the molecular properties of the refrigerant of interest. Sensor data are processed by patented algorithms to accurately report concentration, across a wide environmental range from -40°C to +80°C and 0 to 100% RH condensing conditions.

## TECHNICAL SPECIFICATIONS

<b>Refrigerant</b>	<ul style="list-style-type: none"><li>• Refrigerant</li><li>• R-32</li><li>• R-454 Blends</li></ul>
<b>Communication Interface</b>	<ul style="list-style-type: none"><li>• RS-485 Modbus® RTU</li><li>• Digital serial UART (3.3V OR 5V)</li><li>• Analog (0-3.3V)</li></ul>
<b>Supply Voltage/Current</b>	<ul style="list-style-type: none"><li>• 5Vdc <math>\pm</math> 10%</li><li>• 30mA max</li></ul>
<b>Agency/Compliance</b>	<ul style="list-style-type: none"><li>• UL 60335-2-40 Annex LL</li></ul>
<b>Operating Temperature</b>	<ul style="list-style-type: none"><li>• -40 TO 80°C</li></ul>
<b>Storage Temperature</b>	<ul style="list-style-type: none"><li>• -40 TO 85°C (unpowered)</li></ul>
<b>Operating Humidity Ranges</b>	<ul style="list-style-type: none"><li>• 0 to 100% RH Condensing</li></ul>
<b>Operating Pressure Ranges</b>	<ul style="list-style-type: none"><li>• 65 TO 110 kPa</li></ul>
<b>Measurement Range</b>	<ul style="list-style-type: none"><li>• 0-100% LFL</li></ul>
<b>Resolution</b>	<ul style="list-style-type: none"><li>• 0.1% LFL</li></ul>
<b>Response Time</b>	<ul style="list-style-type: none"><li>• &lt;10 seconds to 100% LFL step change</li></ul>
<b>Lifetime</b>	<ul style="list-style-type: none"><li>• 15+ years with no calibration required</li></ul>



**A2L Refrigerant  
Leak Detection**



**Long Lifetime Sensor**

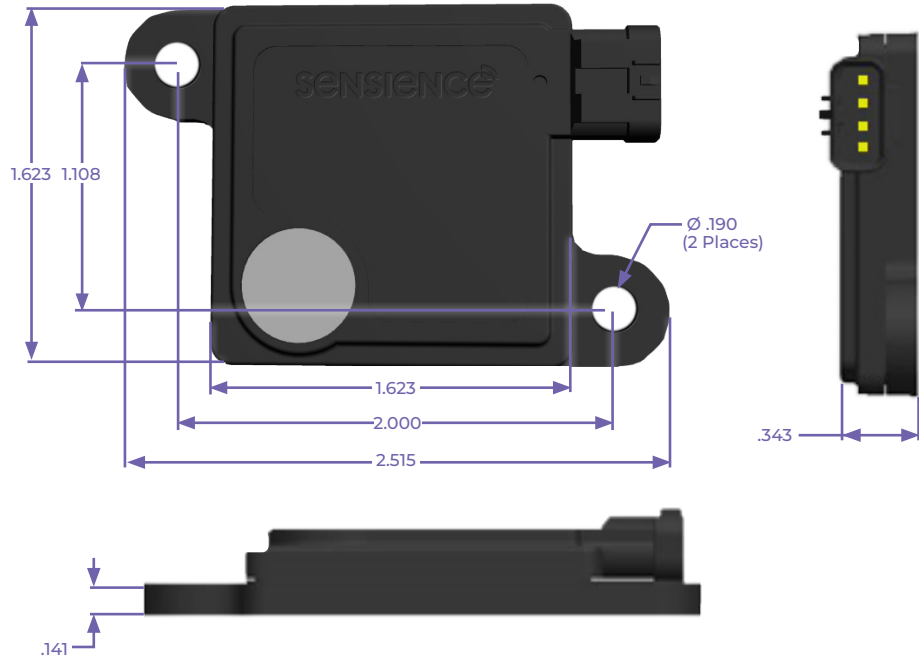


**Immune to Poinsoning  
No Calibration Needed**



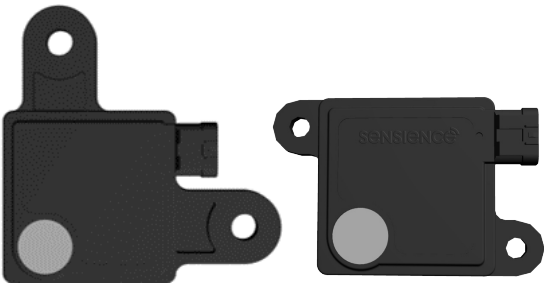
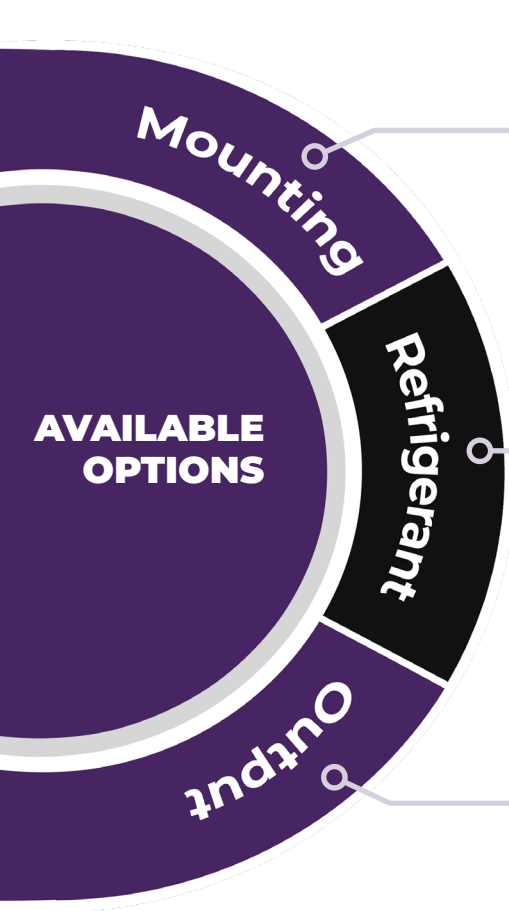
**UL 60335-2-40  
Annex LL Compliant**

Basic Dimensions



30G A2L Refrigerant Sensor:

Flexible Options,  
Easy to Apply



Custom Mounting Configurations Available

R32    R454B    R454C

**RS-485 Modbus RTU** Best for Longer Distances; Temperature, RH, Absolute Pressure also Available.

**UART Serial** Good for Engineering Development Testing

**3.3V Analog** Short to Medium Distance; Only LFL% and Status Codes.

# A2L Gas Sensing Technology Comparison<sup>1</sup>

THERMO DISC

Requirement	Description	MMM	NDIR1	TC	NDIR2	MOS1	MOS2	SOS	MOS3	NDIR3	MOS4	NDIR4
Capable of Sensing A2L Gas		✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓
Capable to be Installed within Unit, Remote, Coil and Duct Work		✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	✓
UL60335-2-40 Annex LL Compatibility		✓	✓	✓	?	✗	✗	✓	✗	?	N/A	?
Voltage Operation	Can Operate with ± 10% Applied Rated Voltage	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
Operation Cycle	Capable of 300 Operation Cycles for Self-resetting and 30 for Non-self Resetting	✓	✓	✓	✓	✓	?	✓	✓	✓	N/A	✓
Not Multipoint device		✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	✓
Setpoint <25% LFL / Output when Exceeded		✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	✓
Preset Setpoint at Factory		✓	✓	✓	✓	✓	✓	✓	✓	?	N/A	✓
Non Adjustable Setpoint by User		✓	✓	✓	✗	✓	✓	✓	✓	?	N/A	✗
IEC 60079-29-1 for Group II Compatibility		✓	✓	✓	✓	✗	?	?	✓	?	?	?
Exposure Resistance	Operational for 480-490 minutes at 100% refrigerant exposure	✓	✓	✓	✓	?	✗	✓	✗	✗	N/A	✓
Nuisance Trips Avoidance	Requirements based on UL/CSA 60335 -2-40 LL 4ADV	✓	✓	✓	✓	✓	?	✓	✓	✗	N/A	✓
Response Time	Requirements based on IEC UL/CSA 60335-2-40, ASHRAE direct systems, machinery rooms and small residential direct systems and JRA 4068T:2016R requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	✗
Condensation Resistance	Requirements based on JRA 4068T:2016R requirements	✓	✓	✓	✓	✓	✗	✓	✗	✗	N/A	✗
Operating Temperatures	Sensor to meet full range as specified by manufacturer with lowest of -40°C	✓	✓	✗	✗	✗	✓	✗	✗	✗	N/A	✗
Accuracy of Setpoint	±20% of setpoint	✓	✓	✓	✓	?	?	✓	✓	?	N/A	✓
Output Signal for Trigger of Action		✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	✓
Vibration Resistance	Tested 1 hour in 3 planes and verified to detect refrigerant of 25% LFL or lower	✓	?	?	?	✓	?	✓	?	?	N/A	?
Self Testing / Hourly Self Test		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Active Trouble Alarm when Failure Detected		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Defined Life	Requirements based on IEC and UL/CSA LL 7	✓	✓	✗	✗	✓	✗	✓	✓	✗	N/A	✗
End of Life Indication	Sensor capability to indicate that replacement is required	✓	✓	✗	✗	✗	✗	✗	✓	✓	N/A	✓

**LEGEND** ✓ Yes ✗ No ? Not Specified

**MMM** Micro Machined Membrane

**SS** Speed of Sound

**NDIR** Nondispersive Infrared

**NA** Not Applicable

**TC** Thermal Conductivity

**LFL** Lower Flammability Limit, as Defined by ASHRAE Standard 34 LFL for R-32 is 14.4% v/v

**MOS** Metal-Oxide Semiconductor

<sup>1</sup> Study is based on AHRTI Report No. 9014.

<sup>2</sup> These are different manufacturers using the same technology.



## Need a Mitigation Board?

Sensience has partnered with ICM Controls® for your control board needs.

### OVERVIEW

Sensience A2L sensing solutions provide reliable A2L refrigerant detection along with complimentary control interfacing options. These solutions allow OEMs to easily add A2L leak detection capability with notification through MODBUS messaging or dry contact control. Additionally, support a mitigation fan control contact provides additional system flexibility.

#### FEATURES

##### FACTORY CONFIGURABLE SETTINGS

- ✓ Flexible LFL Detection Threshold
  - LFL Range (10-20%)
- ✓ Fan Purge Time
- ✓ Minimum Alarm Time

#### OUTPUTS

- ✓ Leak Detection
  - CC Dry Contact Leak Detection
  - SPST, C300 Pilot Duty Rating
- ✓ Mitigation Fan
  - Form C Dry Contacts (COM, NO and NC)
  - SPDT, 2HP @ 277VAC, 1HP @ 125VAC
  - 10,000 Cycles
- ✓ Operating States
  - Status Normal LED
  - Operating Fault LED

#### SPECIFICATIONS

- ✓ Input Voltage:
  - 24 VAC +/- 25%
  - 24 VDC +/- 25%
- ✓ Frequency 50/60Hz

#### OPERATING ENVIRONMENT

- ✓ Operating Temperature:
  - 40C to 70C
- ✓ Storage Temperature:
  - 40C to 85C
- ✓ Relative Humidity:
  - 0%-95%
- ✓ Dimensions: (estimated):
  - Width: 3"
  - Length: 3.5"
  - Height: 1"

For additional information, please email:  
[sensience.com/contact-us/](mailto:sensience.com/contact-us/) or use your  
smartphone to capture the **QR code** below.



A Special Thanks to Our Technology Partners:



NevadaNano



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