

DETECTING A2L REFRIGERANT LEAKS IN HVAC/R SYSTEMS

Challenge

For decades, a variety of HVAC systems have utilized HFC refrigerants in their designs. While effective in managing the heating and cooling of various spaces – and not harmful to the planet's ozone layer - these refrigerants also have a high global warming potential (GWP).

That greenhouse gas effect led to the development of the Kigali Amendment of the United Nations' Montreal Protocol – a global agreement to phase down the use of HFCs and help avoid 0.5°C of global warming by the year 2100.

Phase down guidelines vary between countries, but in the United States – which ratified the amendment in September 2022 – and other industrialized nations, the commitment was to reduce HFC consumption by 85 percent by 2036.

In many system designs, HFC refrigerants are being replaced by hydrofluoroolefins (HFOs), which have a far lower GWP. However, because HFOs are classified as slightly flammable (A2L categorization), UL requirements (specifically UL/IEC 60335-2-40) mandate sensors to detect leaks and mitigation features to prevent a potential buildup of gas.

With traditional split HVAC systems, the most likely area for A2L refrigerants to collect and require mitigation would be near the evaporator coil at the base of a structure's interior air handler.

The challenge for OEMs is that this also places any leak detection sensor into an environment which experiences wide swings in temperature and humidity, condensation, as well as exposure to harsh cleaning solvents which might foul some sensor modalities.

Solution




The Sensata Resonix™ RGD sensor provides a best-in-class solution for dealing with this unfriendly sensing environment.

Rather than utilizing thermal conductivity or other technologies, the sensor instead constantly monitors the acoustic resonance of the surrounding air. By compensating for temperature and humidity on a constant basis, it can detect when A2L gases are present.

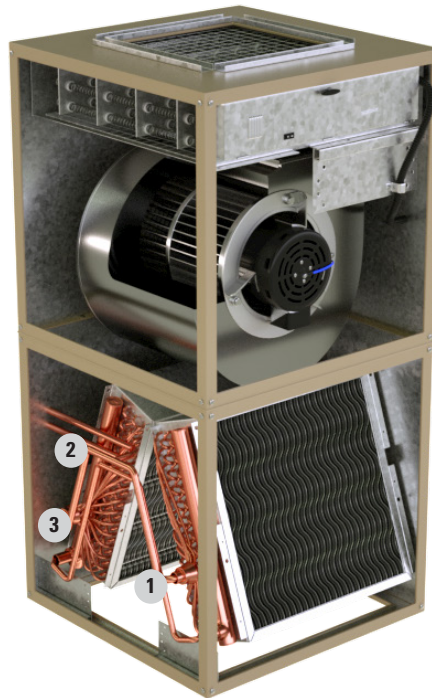
When the level of A2L gas reaches the minimum threshold programmed into the system, the sensor can trigger a mitigation system (such as a fan or other device) to manage the buildup appropriately. With a fast response time that exceeds UL requirements, it delivers improved system safety and design flexibility.

The Sensata Resonix sensor is also designed with the needs of HVAC systems in mind – it has low 40mA power consumption, and carries a 15+ year lifetime with no calibration or re-zeroing needed for the lifetime of the sensor. It is also designed with IP54 protection, and is immune to poisoning from fouling gases or cleaners.

RECOMMENDED PRODUCTS

Reference on Diagram	Product	Features	Function
1	 Sensata Resonix RGD Sensor	<ul style="list-style-type: none"> Comply to UL60335-2-40 ed.4 Works with R32, R454A, R454B, R454C and R455A refrigerants 15+ year lifetime 	Detect A2L refrigerant leaks and help trigger mitigation
2	 2CP Series Pressure Sensor	<ul style="list-style-type: none"> Durable ceramic capacitive sensor Pressure ranges from 0-15 psi through 0-750 psi Accurate performance over wide temperatures 	Monitor high and low pressures in system; input to controller
3	 3NT Thermostat	<ul style="list-style-type: none"> Operating temperatures from -20 to 135°C Fast thermal response Reliable 100K cycle life 	Temperature cutoff switch

DIAGRAM



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