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CETCI's Solid State vs Non-dispersive Infrared Refrigerant Gas Sensors

For many refrigeration applications, using solid state sensors will provide an economical and reliable gas detection solution. Solid state sensors are reliable if used in a clean area with very little temperature and humidity changes. Solid State refrigerant sensors should not be used where there are other chemicals or gases present (other than refrigerants), such as alcohol based cleaners, fumes from running engines, fuel storage containers, etc.

Using infrared sensor technology will ensure the highest degree of sensor accuracy if monitoring an area where there are other contamination gases or multiple refrigerants in the same area. Infrared refrigerant sensors should not be used in locations that have corrosive chemicals such as chlorine, ammonia and other oxidizers that are present, especially if there is a higher humidity level.

Comparison of CETCI's Solid State Refrigerant Sensors and Infrared Refrigerant Sensors

	CETCI's Solid State Refrigerant Sensors	CETCI's Non-dispersive Infrared Refrigerant Sensors
Mode of Operation	Metal oxide changes resistance in response to the presence of target gas. The change is measured by the electronics of the detector to determine the gas concentration.	Gas molecules absorb the infrared light of the optical sensor at a certain wave length. The wave length is measured by the electronics of the detector to determine the gas concentration.
Specific Refrigerant Gases Detected in CETCI Gas Detectors	R22, R134A, R402A, R404A, R407C, R410A, R422D, R438A, R507A	R22, R32, R123, R134A, R404A, R407A, R407C, R407F, R410A, R427A, R448A, R449A, R507, R422A, R422A, R452A, R513A, HFO1234YF, HFO1234ZE, FO1233ZD
Output	Non-linear	Linearized
Gas Detection Range (gas dependant)	0 – 2,000 ppm	0 – 3,500 ppm (0 – 1,000 ppm for R123)
Sampling Method	Diffusion	Diffusion
Life Expectancy	5-7 years	7 – 10 years
Maintenance	Low	Low
Calibration	Less calibration frequency required, every 12 months recommended.	Establish and maintain zero point and the accuracy of the detector remains intact. Less calibration frequency required, every 12 months recommended.
Sensitivity	High, detects low gas concentrations	High, detects low gas concentrations
Accuracy (gas dependent)	±15%	±5% (if calibrated to specific refrigerant)
Response Time T90	< 2 minutes (target refrigerant dependent)	< 5 minutes
Drift/Aging	Susceptible to temperature and humidity	Less susceptible to temperature and

	changes, require regular calibration to compensate for drift/aging	humidity changes, little drift, moderate aging
Operating Temperature	-20°C to 40°C (-4°F to 104°F)	-30°C to 40°C (-22°F to 104°F)
Response to Temperature Changes	Sensitive to changes in temperature	Short term response to large changes in temperature
Operating Relative Humidity	15 - 90% RH non-condensing	5 - 90% RH non-condensing
Response to RH Changes	Sensitive to changes in humidity	High humidity can affect response and promote corrosion.
Wet Environments	Will shorten lifespan	Water or vapour condensation can impair the optics ability to function.
Dry Environments	Must be calibrated in the environment it will be operating in.	No problem in dry environments
Dirty, Dusty Environments	Will shorten lifespan and requires calibration more often.	Dust and dirt can coat the optics and impair the sensor response.
Time Required to Stabilize	New sensor is stable after 3 minutes; old sensor (ie. 5 yrs) may take 5 minutes.	Typically requires 10 to 20 minutes to equalize after a sudden variation in temperature. May take up to 30 minutes to stabilize from a change in humidity.
Presence/Absence of Oxygen (Air)	Requires oxygen for proper functioning.	No minimum level of oxygen required; operates in the absence of, or enriched presence of oxygen.
Cross Contamination	Non-specific, sensitive to many other gases, vapours and chemicals, susceptible to false alarms	Can be configured for broad range or gas specific, few false alarms. Cross sensitivity to other refrigerants.
Exposure to High Concentrations of Gas (poisoning)	Moderately resistant to poisoning	Will not burnout, immune to poisoning. May require a long time to clear before accurate readings can be taken again.
Continuous Exposure to Gas	Sensor reading will become unreliable after 15 minutes (will read higher than calibrated value).	Does not affect operation
Power Consumption	High	High
Cost	Economical	Can be expensive

Applications for Refrigerant Sensors: Recommendation by Sensor Type

Application	Sensor Type		Reasons
	SS	IR	
Boiler / Machinery Rooms		IR	No false alarms, longer life span, less maintenance
Breweries		IR	No false alarms, longer life span, less maintenance
Chiller Rooms		IR	No false alarms, longer life span, less maintenance
Convenience Stores	SS		IR usually too expensive
Hotels	SS		Requires a small remote sensor on a cable for rooms with air conditioners

Shopping Malls		IR	No false alarms, longer life span, less maintenance
Supermarkets		IR	No false alarms, longer life span, less maintenance
Universities		IR	No false alarms, longer life span, less maintenance
Office Buildings		IR	No false alarms, longer life span, less maintenance
Hospitals		IR	No false alarms, longer life span, less maintenance

NOTE: Ammonia is commonly used as a refrigerant in very low temperature applications such as food/meat processing, ice making plants and ice arenas. Electrochemical sensors are required to ensure accurate monitoring in Ammonia applications.

For more information about our products, check out our website at www.critical-environment.com or to discuss a tailored gas detection solution for your application, contact us at 1-877-940-8741.

About Critical Environment Technologies Canada Inc.
Critical Environment Technologies designs and manufacturers indoor air quality and fixed gas detection systems including self-contained systems, controllers and analog and digital transmitters. CETCI gas detectors are used to detect many different gases; some of the most common are Carbon Monoxide, Carbon Dioxide, Nitrogen Dioxide, Nitric Oxide, Ammonia, Chlorine, Ozone, Refrigerants, Oxygen and combustible gases like Methane, Hydrogen and Propane.

Applications include commercial HVAC, institutional, municipal and light industrial markets worldwide. Many of these applications are for vehicle exhaust, but areas of specialization include refrigeration applications, food processing plants, manufacturing plants, wastewater treatment plants, fisheries, wineries/breweries, pulp and paper mills, recreational facilities, bakeries, greenhouses, and many more.