

Why Use Infra-red Gas Detection?



What are refrigerant gases?

Refrigerant gases are used to provide a means of cooling the evaporators in freezers and air conditioning for plant rooms and chiller plants. Historically CFC refrigerant gases such as R11, R12 and R22 have been used. CFC's are ozone depleting gases and are now being phased out and replaced by ozone friendly gases such as R134, R404 and R407.

Why is there a need to detect them?

1. All these gases are toxic at relatively low levels. Prolonged exposure to these gases is hazardous and results in serious health risks. Gas Detection Australia sensors can detect these gases at very low levels, in order to prevent this hazard becoming a danger to life.
2. Air conditioning systems and chillers that are leaking their refrigerant gases are not performing to maximum efficiency. The major use of refrigerant gases is in the re charging of these systems. If leaks are detected early the problem can be alleviated much quicker, saving costs on replacement gas, co maintenance and protecting the environment.
3. Gas detection at low levels (part per million) will give an early warning of leakage, therefore safeguarding life and maintaining the efficiency of the plant.

What type of technology?

There are two basic techniques used for the detection of CFC, HFC and HCFC gases:

1. **Metal oxide semiconductor Sensors. (MOS)**

These use specially doped substrates and are run hot. When the gas passes over the sensor it changes the electrical characteristics of the semi-conductor and hence changes the response from the sensor. The sensors are low cost but suffer from basic problems which make them unreliable in their use:

- a. they are affected by changes in humidity
- b. they are affected by changes in flow of gas across the sensor element
- c. they are affected by changes in temperature
- d. they are affected by other gases (cross-sensitivity) i.e. they are not specific
- e. they drift and require periodic recalibration
- f. they will give false alarms because of the above parameters
- g. the sensor is not self-checking and does not always fail to safety

2. **Non Dispersive Infra-Red (NDIR)**

Most chemicals, including all refrigerant gases absorb infra-red energy. Often these wavelengths are specific to individual chemicals or the wavelengths can be selected to monitor whole groups of chemicals including refrigerants. Monitoring the absorption of infra-red energy at selected wavelengths provides an accurate method of measuring low levels of these gases. The sensors are more expensive but do not suffer the problems associated with cheaper technologies such as:

- a. Immune to changes in
 - i. Humidity
 - ii. Flow of gas
 - iii. Temperature
- b. Are specific to the target gas (not cross sensitive to other common gases or smoke etc.)
- c. They are more reliable and longer lifespan
- d. Do not give false alarms