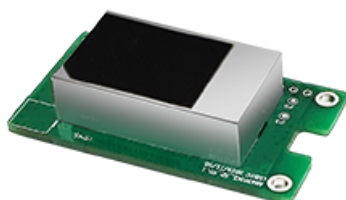# SPECIFICATION

Product Name: NDIR Refrigerant Sensor

Date: August 16,2020

Version：Preliminary Version（OEM based）

NDIR Refrigerant Sensor

Application

▪ Refrigerant Leakage Detection

▪ Automation & Control

▪ Indoor Air Quality

▪ Industrial Health & Safety Alarm

Product Introduction

Cubic Refrigerant Gas Sensors and solutions mainly target the A2L mixtures,e.g. R32 gas concentration, R454A and R454B gas concentration or that of a pure hydrocarbon in the blend, and calculates the air volume concentration of the refrigerant gas and relates it to the avoidance thresholds by levels of LFL (Lower Flammability Limit) or LEL (Lower Explosion Limits). It is based on NDIR (Non-Dispersive Infrared) technology with high accuracy and longer lifespan. This sensor has been developed with standard gas and is efficiently calibrated in the factory by Cubic own gas sensor calibration technology. The sensing solutions can output an alert or directly participate in mitigation or shut-down procedures.

Main Features

▪ Dual Beam NDIR Technology
▪ High Resolution
▪ Up to 0~100% LFL Range
▪ Digital output of gas concentration
▪ Factory calibrated
▪ Internal temperature sensor
▪ Built-in heater to avoid condensation and frost
▪ Fast response, long lifetime
▪ Faults Diagnostics & Error Generation
▪ OEM/ODM sensor detector is available

Principle Of Measurement

Molecule like CO2 and CH2F2(R32) is composed of different types of atoms, it has absorption spectrum in infrared range. Absorption intensity abides by Lambert-Beer's Law. When light wave corresponded to certain gas with absorption spectrum passes through measured gas, the intensity of light wave will be significantly weakened. The intensity attenuation is related to concentration of measured gas. This relation follows Lambert-Beer's Law. Basic working principle of NDIR sensor is as below.
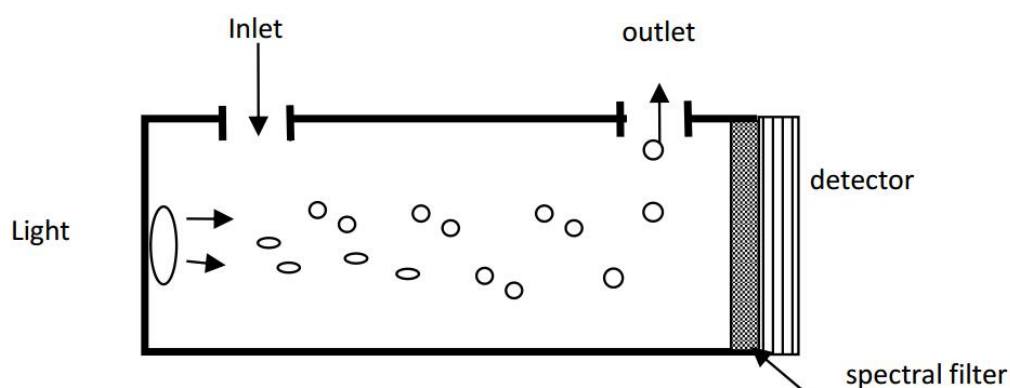
Basic mathematical model：A majority of both organic and inorganic polyatomic gas have specific absorptive wavelength in infrared region. When infrared light passed by, the light transmissivity of this gas molecule to certain wavelength can be expressed by Lambert-Beer Law:

I stands for light transmissivity, $I = I_0 e^{-kpl}$
i stands for light absorption intensity, $i = I_0 - I = I_0(1 - e^{-kpl})$

I_0: incident light intensity.
l: thickness of gaseous medium
p: gas concentration
k: absorption coefficient

Technical Parameters

Miniature NDIR CO2 Sensor SRH Specifications		
Refrigerant	R32	R454B
Detecting principle	Non-dispersive Infrared Technology(NDIR）	Non-dispersive Infrared Technology(NDIR）
Measurement range	0-50%LFL（100%LFL is 14.4%Vol）	0-50%LFL（100%LFL is 11.68%Vol）
Accuracy	0～25%LFL：±0.36%vol ＞25%LFL：≤±20% of reading	0～25%LFL：±0.44%vol ＞25%LFL：≤±20% of reading
Response time	15s	10s
Working temperature	-30℃～60℃	-30℃～60℃
Working current	＜40mA	＜250mA
Communication Port	UART_TTL(3.3V)	UART_TTL(3.3V or 5.0V)
Condensing	100%（Condensing Recovery）	
Frost Sensing	Frost Recovery（Optional）	

Note：Cubic refrigerant sensor is OEM based product ， could customized as client required

After-sales Services And Consultancy

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