

# MINSTER ELECTRONIC DESIGNS LIMITED

AIR QUALITY INSTRUMENTATION – MEASURING AND MONITORING

## WHY IS AIR QUALITY IMPORTANT?

Air pollution is a health hazard that we are all aware of. External emission targets are monitored by governments and organisations across the world. However, the quality of indoor air is rarely monitored even though it can have serious health implications. Indoor air pollution is commonly 10 times higher than outside air due to poor ventilation<sup>1</sup>.

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Inadequate ventilation accounts for 52% of air quality issues<sup>2</sup>, including:

- Headaches
- Fatigue
- Irritability
- Dizziness
- Dryness and irritation of the skin, eyes, nose, and throat

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UK air quality accounts for 36,000 deaths a year<sup>3</sup>. Very poor air quality also increases your risk of:

- Coronary heart disease
- Stroke
- Lung Cancer
- Asthmatic attacks
- Decreased lung function



# SOURCES OF INDOOR AIR POLLUTION

## At Home

- Cleaning products
- Mould and mildew
- Washing detergents
- Biological – dogs, pets and mice
- New carpets, rugs, curtains...
- Sprays and deodorants
- Scented candles
- Gas appliances
- Painting and storage of paints
- Air fresheners
- Insulation
- MDF and fibreglass
- Radon Gas
- Tobacco...etc.

## In The Workplace

- Organic and inorganic processes
- Chemical reactions
- Solvents
- Burning of materials
- Sweeping and collection of loose materials
- Leakage from processes
- Exhaust fumes
- Cutting and grinding...etc.

Thousands of products and compounds release Volatile Organic Compounds (VOC's), into the air. VOC's pollute the air you breathe and can potentially cause serious health issues. Carbon Dioxide (CO<sub>2</sub>), is another important pollutant as it poisons the air and reduces your oxygen intake, leading to physical and mental dysfunction<sup>4</sup>.

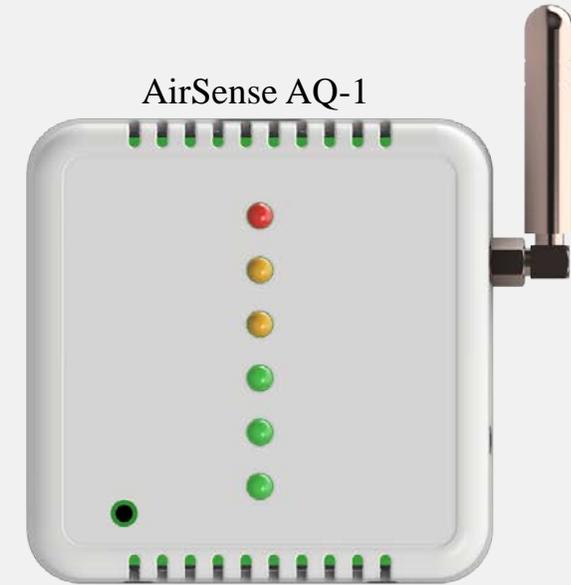
# OUR AIR QUALITY SYSTEM

Figure 1

Renesas IAQ Rating	Reference Level	Key Information	TVOC (mg/m <sup>3</sup> )	Air Quality
≥5.00	5	Unacceptable Conditions (not recommended)	>10.0	<b>Bad</b>
4.00-4.99	4	Significant Comfort Issues (not recommended for exposure > 1 month)	3.0 to 10.0	<b>Poor</b>
3.00-3.99	3	Noticeable Comfort Concerns (not recommended for exposure > 12 months)	1.0 to 3.0	<b>Medium</b>
2.00-2.99	2	Good Quality Air	0.3 to 1.0	<b>Good</b>
≤1.99	1	Clean Hygienic Air (target value)	<0.3	<b>Very Good</b>

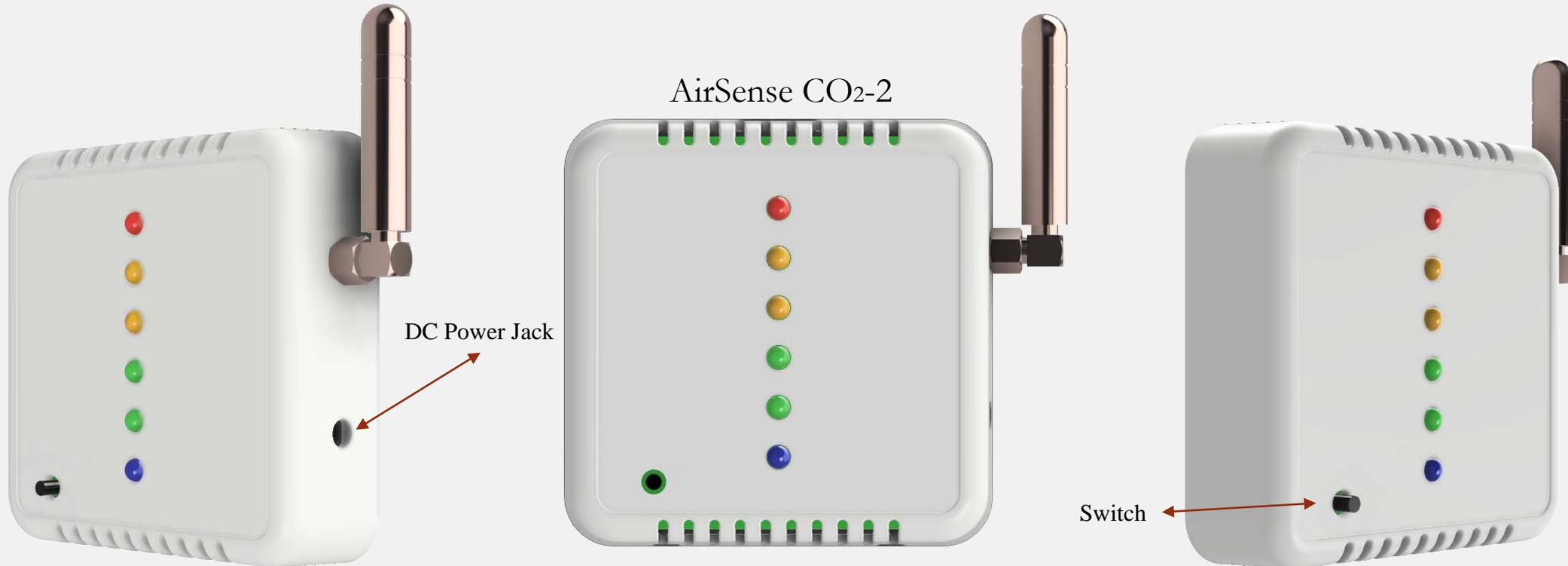
1) Conversion from mg/m<sup>3</sup> to ppm for most common TVOC is by a factor of approximately 0.5; for example, 10mg/m<sup>3</sup> equals approximately 5ppm  
 2) Conversion from ppm to ppb is by a factor 1000; for example, 0.1ppm equals 100ppb

The AirSense AQ Sensor measures harmful pollutants in the air. It uses a sophisticated, intelligent, design to group TVOC, CO<sub>2</sub>, Temperature and Humidity into an indoor air quality rating. This rating is displayed by five LED's from 'Very Good' to 'Bad'.



- Provides a visual display of the general air quality in your environment
- Operating range: -40°C to +70°C
- No airflow required; measures from diffusion of gases
- Measures temperature
- Measures humidity
- RF capability if required
- Switch between air quality and CO<sub>2</sub> mode
- 30 minute calibration initial start-up
- AC/DC plug in adapter

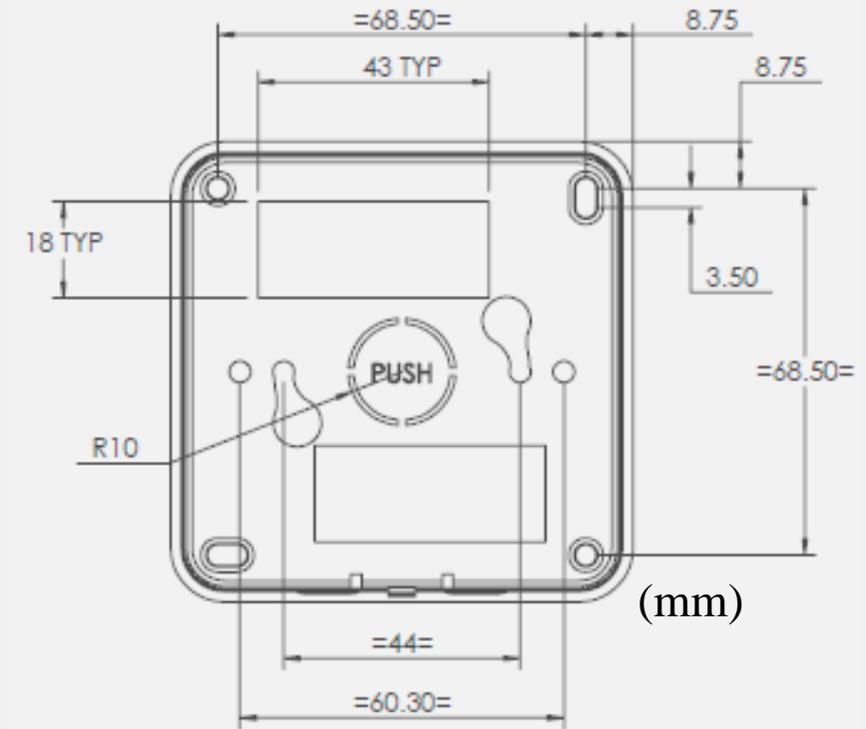
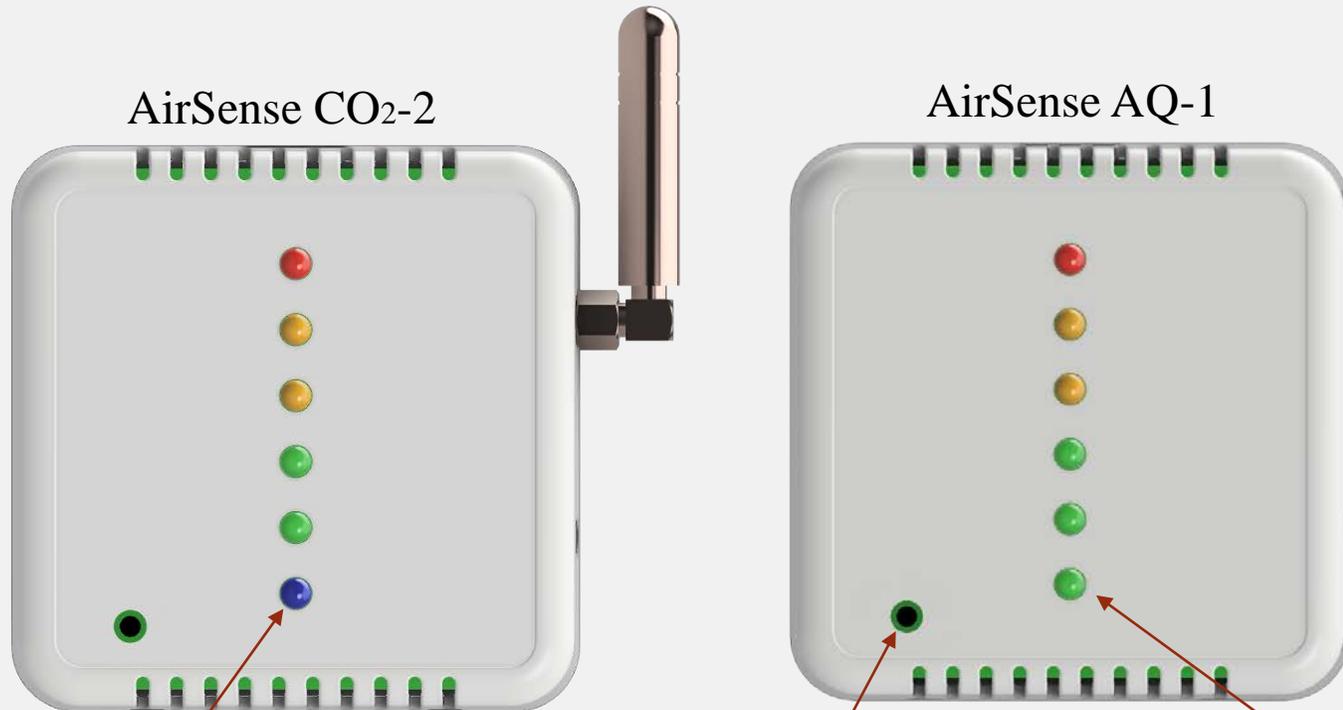
## OUR CO<sub>2</sub> SYSTEM



- ➔ Measures Carbon Dioxide with a range from 400ppm - 10,000ppm with an accuracy of  $\pm (30\text{ppm} + 3\%)$
- ➔ Utilises the AQ sensor technology with an addition of a highly accurate CO<sub>2</sub> sensor
- ➔ Industry standard NDIR sensor with a 15 year lifetime
- ➔ Temperature sensor working range from -40°C - +70°C
- ➔ Humidity sensor working range from 0%RH – 100%RH
- ➔ No calibration required

# OPTIONS AND OPERATION...

## Wall mounting details

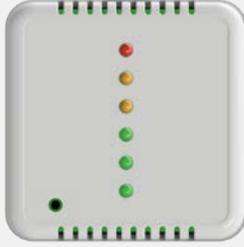
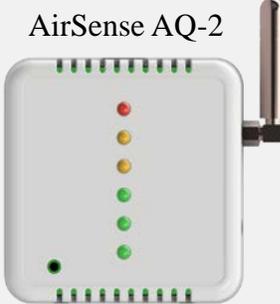
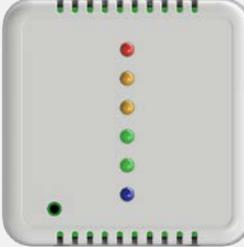
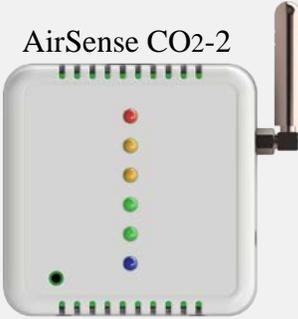


Bottom blue LED indicates CO<sub>2</sub> selected

Toggle switch (push for 5 seconds to toggle CO<sub>2</sub> or air quality)

Bottom green LED indicates air quality selected

# PRODUCT COMPARISON

Product ID				
Air Quality	✓	✓	✓	✓
CO <sub>2</sub> — 3%	✗	✗	✓	✓
RF Capability	✗	✓	✗	✓
Data Viewable on PC APP	✗	✓	✗	✓

The '1' and '2' relate to Non-RF and RF capability, respectively.

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# END NOTES

<sup>1</sup>: Kankaria A, Nongkynrih B, Gupta SK. Indoor air pollution in India: Implications on health and its control. *Indian J Community Med* [serial online] 2014 [cited 2022 Feb 16];39:203-7. Available from: <https://www.ijcm.org.in/text.asp?2014/39/4/203/143019>

<sup>2</sup>: Design and Protocol for Monitoring Indoor Air Quality, ASTM STP 1002 1989 Jan; :63-72. Available from: [NIOSHTIC-2 Publications Search - 00236551 - The NIOSH approach to conducting indoor air quality investigations in office buildings. \(cdc.gov\)](#)

<sup>3</sup>: Associations of long-term average concentrations of nitrogen dioxide with mortality. Available from: [Associations of long Associations of long Associations of long -term term average concentrations of average concentrations of average concentrations of average concentrations of nitrogen dioxide with nitrogen dioxide with nitrogen dioxide with mortality mortality \(publishing.service.gov.uk\)](#)

<sup>4</sup>: Langford, N.J. Carbon Dioxide Poisoning. *Toxicol Rev* 24, 229–235 (2005). Available from: <https://doi.org/10.2165/00139709-200524040-00003>.