S&S™
NORTHERN

CO2X

Carbon Dioxide & Temperature Monitor

✓ CO_2 measured and displayed in parts per million (PPM).
✓ Temperature can be displayed in degrees Celsius (°C) or Fahrenheit (°F).
✓ 0-10V Signal Output progress bar display.
✓ Monitor, record and display average CO_2 concentration over 8-hour periods.
✓ User friendly settings menu.
✓ Pre-alarm and alarm relay output.
✓ Fan controller enabled relay output.
✓ Dual power input 100-240VAC or Low 12-24VDC.
✓ End of Life notification for CO_2 sensing element.
✓ Automatically switch between ventilation programs when gas is used.
✓ Boost, Mute and Wake Up feature.

UK CA CE

📖 **Installation, Operation & Maintenance**

Please read this manual carefully and retain for future use.

The Merlin CO2-X is designed to monitor carbon dioxide (CO_2) in the air and temperature.

The monitor has a digital traffic light style display indicating the carbon dioxide levels and temperature in the area. When CO_2 gas or temperature reaches alarm state – this device is able to automatically drive ventilation reducing CO_2 and/or temperature.

⚠ *The information contained within this manual should be referenced for typical installation and operation only.*
⚠ *For specific requirements that may deviate from the information in this manual – contact your supplier.*

Content

⚠

Important Warning Statements

Please take the time to thoroughly read this user's guide which should be retained for future reference.

The expected lifetime of the gas sensor elements is 10 years upon initial power up.

The device will display a message to indicate its end of life and should immediately be replaced.
It is recommended that this device be commissioned upon installation and serviced annually.
Do not apply lighter gas or other aerosols to the device – this will cause extreme damage.
High concentrations of alcohol found in many products may damage, deteriorate or affect the gas sensing elements.
This device is designed to monitor carbon dioxide gas and temperature only. It is NOT designed to detect smoke, fire or other gases and should NOT be used as such.
Never ignore your device when in alarm.
This device requires a continual supply of electrical power – it will not work without power.
This device should not be used to substitute proper installation, use and/or maintenance of fuel burning appliances including appropriate ventilation and exhaust systems.
This device does not prevent dangerous gasses from occurring or accumulating.
Actuation of your alarm indicates the presence of dangerous levels of CO_2 or high temperature.
This unit may not fully safeguard individuals with specific medical conditions. If in doubt, consult a doctor/physician.
Your product should reach you in perfect condition, if you suspect it is damaged, contact your supplier.

Manufacturer's Warranty

Warranty coverage: The manufacturer warrants to the original consumer purchaser, that this product will be free of defects in material and workmanship for a period of three (3) years from date of purchase.

The manufacturer's liability hereunder is limited to replacement of the product with repaired product at the discretion of the manufacturer. This warranty is void if the product has been damaged by accident, unreasonable use, neglect, tampering or other causes not arising from defects in material or workmanship. This warranty extends to the original consumer purchaser of the product only. **Warranty disclaimers:** Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and intended operational purpose, are limited in duration to the above warranty period. In no event shall the manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion. This warranty does not affect your statutory rights. **Warranty Performance**: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned together with proof of purchase date. The replacement product will be in warranty for the remainder of the original warranty period or for six months – whichever is the greatest.

Information on waste disposal for consumers of electrical & electronic equipment.

When this product has reached the end of its life, it must be treated as Waste Electrical & Electronics Equipment (WEEE). Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Please contact your supplier or local authority for details of recycling schemes in your area.

Alternatively, S&S Northern products can be securely packaged and returned clearly marked for disposal.

Installation

Typical Location & Positioning

Consider the coverage required and function of the area. Emphasis should be placed on airflow patterns and correct placement, not perceived detecting ranges. The target gas will only be identified when contact is made with the sensing element itself. Your monitor should be installed in populated areas that risk high concentrations of CO_2 gas or varied temperatures e.g., educational and government buildings including laboratories and commercial kitchens.

Take in to account the design of the airflow within the zone area. Avoid conditions such as; condensation; vibration; extreme temperatures and draft zones. Avoid conditions of any other environmental factors that could potentially impede the accuracy and operation of the detectors such as; condensation; vibration; extreme temperatures, pressure, presence of other gases, electromagnetic interference and draft zones. Avoid positioning near draft areas (windows and door entrances). Where possible, monitors must be fixed in such a position as to allow natural air circulation. These recommended heights may vary based on airflow and temperature conditions in addition to the proposed application and location.

Laboratories/educational buildings: Seated head height
Commercial kitchens: 1700mm (5.6ft) from ground level

⚠ **Multiple monitors may be required to adequately protect property and/or persons!**
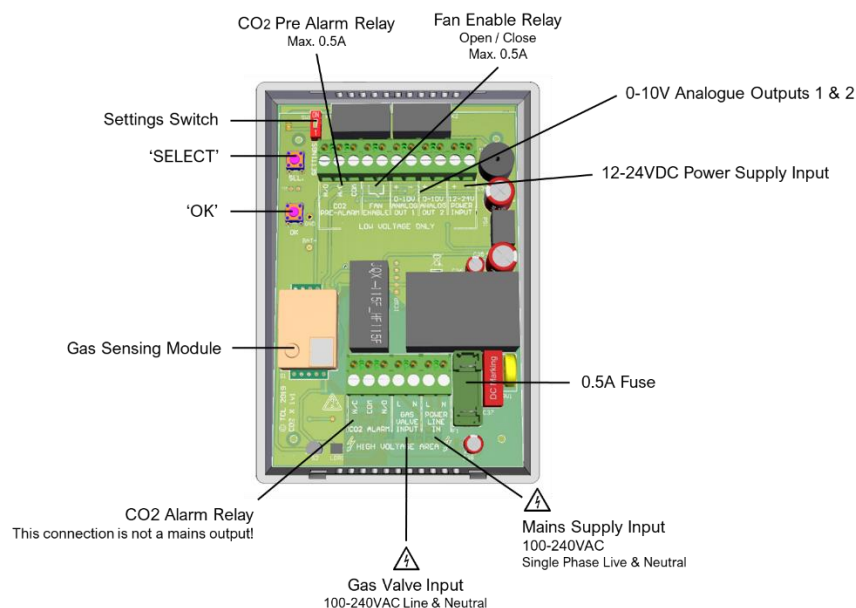
Access & Mounting

The monitors are designed for surface mounting and must be installed by a licensed, insured contractor or competent person. A deeper back enclosure is supplied to accommodate wiring where required.
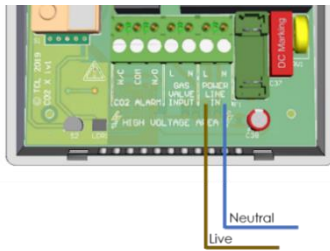
Carefully remove the rear cover from the unit by releasing the two latching clips located at the bottom of the case. To do this – use a small flat head screwdriver.

Using the rear cover - mark the screw holes to the wall and ensure the wall surface is flat to prevent base distortion. There are two pre-fractured areas for cable entry provided on the inside of the rear cover, which may be cut away as required. After executing the mounting and the connections – replace the rear cover ensuring the two clips are latched. Make a note of the installation date on the label located on the side of the unit.
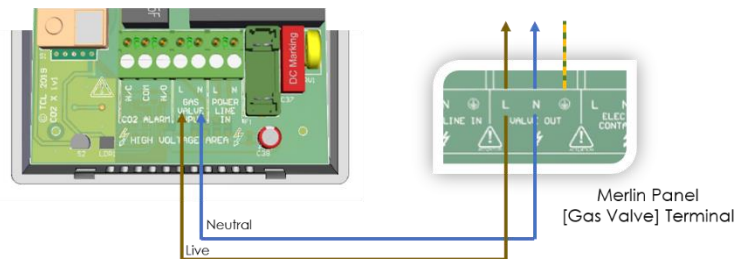
Board Overview

Wiring your CO2-X

MAINS POWER/LINE IN
(100-240VAC option)
Single-phase mains power is supplied to the [POWER/LINE IN] connector.
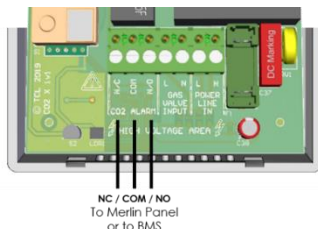LIVE & NEUTRAL ONLY.

GAS VALVE INPUT

It is possible for your CO2-X to receive a signal from a gas solenoid valve via Live & Neutral terminals on our merlin panels when wired parallel. To receive a signal you must ensure that you configure the CO2X to Natural or Mechanical ventilation mode – *see settings for ventilation types.*

When gas is supplied/in use – the CO2X will receive a signal from the gas valve and display the [GAS IN USE] message. The CO2X will configure itself automatically to operate in 'Kitchen' mode until the gas supply is turned off – see 'Settings' for configuration.
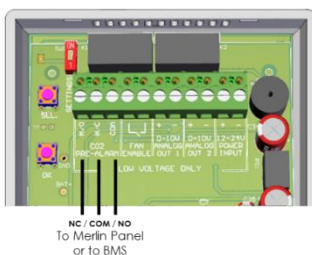
⚠️
Recommended for teaching areas with gas appliances such as laboratories and food technology rooms.
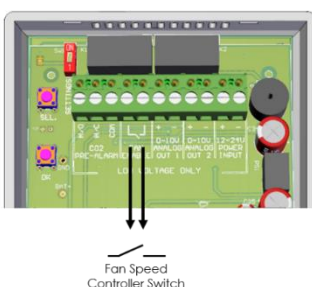
CO2 ALARM (Not a mains output)
This terminal can also connect to a building management system (BMS) or to a Merlin panel to send an alarm signal upon alarm levels of CO_2. This terminal can also switch the Live (energise/ de-energise) a gas valve upon alarm levels of carbon dioxide.

CO2 PRE-ALARM
This relay can send a signal to a Building Management System (BMS) or Merlin panel when CO2 reaches pre-alarm level.

FAN ENABLE
This relay output can be connected to a fan switch which can energise fans via a signal. This relay will switch on a fan from the current CO_2 level only, by current temperature only or by the status of both (whichever is greatest) as follows: **N/C: >600ppm / >23°C (73.4°F) N/O: <550ppm / <22°C (71.6°F)**
These levels cannot be altered.

0-10V ANALOGUE OUTPUT 1 & OUTPUT 2

These connections are used to regulate external fan speed controllers (supplied separately). Connect direct to fan speed controllers or via your Merlin panel [0-10V] terminal if available. Minimum voltage output can be configured in settings menu from zero to 5 volts.

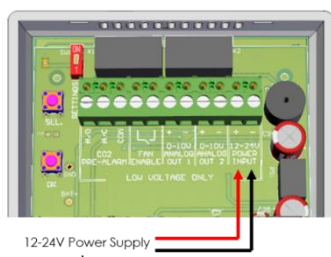0-10V output can be driven by the status of current CO_2 level only, by current temperature only or by the status of both levels (whichever is greatest).

12-24VDC POWER

To power the CO2X with 12-24v power – this should be supplied to the [12-24V POWER INPUT] connector (+ / -).

This 12-24V connection can be AC <u>if not using with the 0-10V outputs.</u>

Configuration Settings

There is a settings switch on the CO2-X board. Switch it on to prompt the on-screen menu. Navigate the menu using the buttons on the board. When changes have been made – turn the settings switch off.

[SEL.] button
- Scroll through functions (highlighted red).
- Change the desired setting when highlighted.

[OK] button
- Highlights setting (red).
- Press to save desired setting.

Configuration

NAT. - Natural Ventilation Mode (Recommended for buildings without mechanical ventilation).

Pre Alarm: $\geq$1300ppm >23 °C/ 73.4°F	**0-10V Analogue Output: Linear Progression.**
Alarm: $\geq$1500ppm >25 °C/ 77.0°F	Min output (1-5V) from 600ppm 23 °C/ 73.4°F
CO_2 **Pre-alarm** relay switch: 1300ppm	Max output (10V) from 1500ppm 27 °C/ 80.6°F
CO_2 **Alarm** relay switch: 1500ppm	**Boost** from: 400 - 1499ppm 0°C/32°F – 26.9°C/ 80.4°F

MECH. - Mechanical Ventilation Mode (Recommended for buildings with mechanical ventilation).

Pre Alarm: $\geq$800ppm >23 °C/ 73.4°F	**0-10V Analogue Output: Linear Progression.**
Alarm: $\geq$1000ppm >25 °C/ 77.0°F	Min output (1-5V) from 600ppm 23 °C/ 73.4°F
CO_2 **Pre-alarm** relay switch: 800ppm	Max output (10V) from 1000ppm 27 °C/ 80.6°F
CO_2 **Alarm** relay switch: 1000ppm	**Boost** from: 400 - 999ppm 0°C/32°F – 26.9°C/ 80.4°F

KITCH. – Kitchen/Gas in Use Ventilation Mode (Recommended for kitchen environments).

Pre Alarm: $\geq$1500ppm >23 °C/ 73.4°F	**0-10V Analogue Output: Linear Progression.**
Alarm: $\geq$2800ppm >25 °C/ 77.0°F	Min output (1-5V) from 600ppm 23 °C/ 73.4°F
CO_2 **Pre-alarm** relay switch: 2800ppm	Max output (10V) from 2800ppm 27 °C/ 80.6°F
CO_2 **Alarm** relay switch**:** 4500ppm	**Boost** from: 400 - 2799ppm 0°C/32°F – 26.9°C/ 80.4°F
	Buzzer / Mute from: >2800ppm

MIN 0-10 OUT 1
Analogue output minimum voltage.
Select: **0, 1, 2, 3, 4, 5** volt/s

MIN 0-10 OUT 2
Analogue output minimum voltage.
Select: **0, 1, 2, 3, 4, 5** volt/s

0-10V OUT 1
0-10V analogue output energised by.
Select: **CO2 / TEMPERATURE / DUAL**

0-10V OUT 2
0-10V analogue output energised by.
Select: **CO2 / TEMPERATURE / DUAL**

BUZZER
Kitchen Vent Type Mode
CO_2 >2800ppm Only. Select:
ON – 3 beeps every 15 seconds
10MINS – 3 beeps every 10 minutes
OFF

TEMP. UNITS
Temperature measurement
Select: **°C** Celsius **/ °F** Fahrenheit

BOOST (MIN.)
Analogue outputs at optimum voltage
(10V) for number of minutes. Boost can be activated only if analogue outputs are set to either CO2 or DUAL mode only.
Select: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10** minute/s

FAN ENABLE
Fan switch is energised by. Select:
CO2 (ON >600ppm   OFF <550ppm)
TEMPERATURE (ON >23°C OFF <22°C)
DUAL (Whichever is greatest)

BRIGHTNESS
Brightness of the screen display. Select:
LOW / MEDIUM / HIGH

SCREEN SAVER
ON – screen will switch off until temperature or CO_2 levels reach pre alarm/ alarm status.
OFF – screen constantly on.

TEMP. ADJUSTMENT
Adjust the temperature display by up to ± 5°C or 9°F in increments of **0.1°**

LINEAR 0-10V
OFF – default settings as in the configuration above
ON – linear 0-10V output
If MIN 0-10 OUT will be set for **0** (menu page 1), then
0-10 V output will be linear for:
Temperature from 0-50 °C
CO2 from 400 to 5000 ppm
If MIN 0-10 OUT will be set for **5** (menu page 1), then
5-10 V output will be linear for:
Temperature from 0-50 °C
CO2 from 400 to 5000 ppm

FACTORY RESET
Return to default condition.
YES / NO

Factory Set Condition

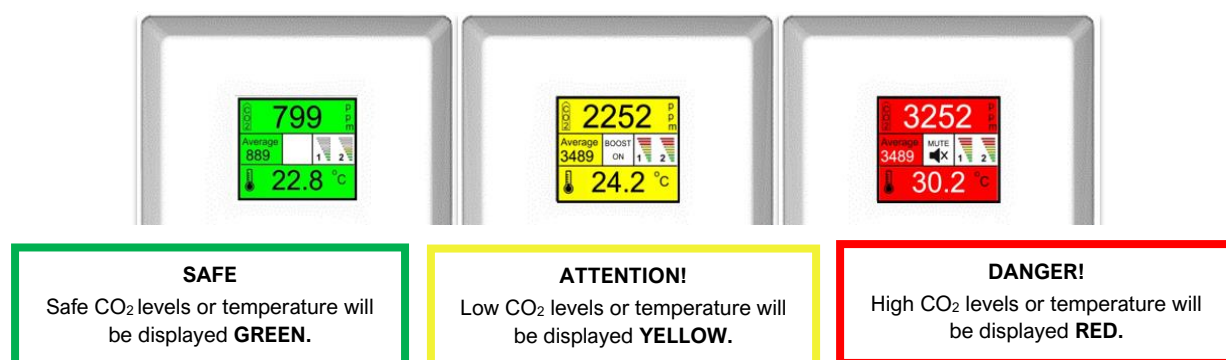| VENT. TYPE	KITCH.	BUZZER	ON	SCREEN SAVER	OFF
MIN 0-10 OUT 1	1	**TEMP. UNITS**	°C	**TEMP. ADJUSTMENT**	0.0°C/F
MIN 0-10 OUT 2	1	**BOOST (MIN.)**	1	**LINEAR 0-10V**	OFF
0-10V OUT 1	TEMP	**FAN ENABLE**	CO2		
0-10V OUT 2	CO2	**BRIGHTNESS**	MED	**FACTORY RESET**	

Operation

Initial Power-Up & Indicators

On connecting power, the CO2-X monitor enters a stabilisation phase for approximately 60 seconds – during this period, your device not yet ready for operation.

a. **CARBON DIOXIDE READING**
Current CO_2 gas level in parts per million (ppm).

b. **0-10V ANALOGUE OUTPUT LEVEL**
0-10V analogue outputs one and two.

c. **FLAME ICON**
Appears only when the CO2-X receives a signal from a gas valve and gas supply is open/on and set to Natural or Mechanical Ventilation Type mode.

d. **BOOST ON**
Message appears when BOOST is activated - press and hold the touch button (f) for three (3) seconds. The analogue outputs will run at optimum voltage (10V) for a pre-set number of minutes. Boost can only be activated if either analogue output is set to CO2 or DUAL mode only.

e. **MUTE**
Message appears when the touch button (f) is pressed. The audible alarm buzzer must be set to on or every 10 minutes and can only occur when gas is in use or KITCH. Ventilation mode is selected and when CO_2 levels rise above 2800ppm.

f. **VENTILATION MODE**
Displayed under normal operation. K (Kitchen) / M (Mechanical) / N (Natural). The mode determines the configuration and alarm levels.

g. **TOUCH BUTTON**
To activate Boost or Mute feature and to view the screen for 10 seconds during screen saver mode.

h. **TEMPERATURE READING**

i. **GAS IN USE MESSAGE**
Appears only when the CO2-X receives a signal from a gas valve and gas supply is open/on.
When the gas valve is closed, this message is not displayed.
Appears with Flame Icon.

j. **BLANK – see K.**
(Natural or Mechanical mode), this is left blank when the current CO_2 reading is below 550ppm.
In kitchen ventilation mode – this is constantly left blank.

k. **AVERAGE CO_2**
The monitor will display the average CO_2 reading over periods of 8 hours and appear only when current CO_2 levels reach or exceed 600ppm.
Natural or Mechanical ventilation type modes only.

Traffic Light Indicator

Your CO2-X displays both current CO_2 and temperature levels in a traffic light style indication.

SAFE	ATTENTION!	DANGER!
Safe CO_2 levels or temperature will be displayed **GREEN.**	Low CO_2 levels or temperature will be displayed **YELLOW.**	High CO_2 levels or temperature will be displayed **RED.**

Alarms & Configuration

NAT. - Natural Ventilation Mode **(N)**

Green: <1300ppm   <23 °C/ 73.4°F
Yellow: ≥1300ppm   >23 °C/ 73.4°F
Red: ≥1500ppm   >25 °C/ 77.0°F
CO_2 Pre-alarm relay switch: 1300ppm
CO_2 Alarm relay switch: 1500ppm

0-10V Analogue Output Progression.
 Min output (1-5V) from 600ppm   23 °C/ 73.4°F
 Max output (10V) from 1500ppm   27 °C/ 80.6°F
Boost from: 400 - 1499ppm   0°C/32°F – 26.9°C/80.4°F

MECH. - Mechanical Ventilation Mode **(M)**

Green: <800ppm   <23 °C/ 73.4°F
Yellow: ≥800ppm   >23 °C/ 73.4°F
Red: ≥1000ppm   >25 °C/ 77.0°F
CO_2 Pre-alarm relay switch: 800ppm
CO_2 Alarm relay switch: 1000ppm

0-10V Analogue Output Progression.
 Min output (1-5V) from 600ppm   23 °C/ 73.4°F
 Max output (10V) from 1000ppm   27 °C/ 80.6°F
Boost from: 400 - 999ppm   0°C/32°F – 26.9°C/80.4°F

KITCH. – Kitchen/Gas in Use Ventilation Mode **(K) Default**

Green: <1500ppm   <23 °C/ 73.4°F
Yellow: ≥1500ppm   >23 °C/ 73.4°F
Red: ≥2800ppm   >25 °C/ 77.0°F
CO_2 Pre-alarm relay switch: 2800ppm
CO_2 Alarm relay switch: 4500ppm

0-10V Analogue Output Progression.
 Min output (1-5V) from 600ppm   23 °C/ 73.4°F
 Max output (10V) from 2800ppm   27 °C/ 80.6°F
Boost from: 400 - 2799ppm   0°C/32°F – 26.9°C/80.4°F
Buzzer alarm/ Mute from: >2800ppm

The alarm thresholds and configuration will depend on which ventilation mode your CO2X has been set.
There is no audio alarm for high temperatures.

Screen Saver Mode

If the screen saver mode is switched on (see settings), the CO2-X monitor screen will switch off when both CO_2 and Temperature levels are at safe levels (green). No readings or messages will be visible during this time. The screen will exit screen the saver mode when either the CO_2 or Temperature changes status (yellow or red).
To view the screen during this mode, press the touch button, the screen will be visible for 10 seconds.

End of Operational Life (EOL)

END OF LIFE This message indicates that the CO2-X monitor has reached its expected operational lifecycle. No gas or temperature levels will be displayed. The expected lifetime is 10 years.

Contact your supplier and replace the unit immediately.
The expected lifecycle of 10 years may vary depending on environmental conditions.

General Maintenance

Cleaning

Keep your detector in good working order follow these basic principles.

- Carefully remove any accumulated dust from the outer enclosure using a slightly damp cloth.
- Never use detergents or solvents to clean your device – this may permenantly or temporarily damage the gas sensing elements.
- Never spray air fresheners, hair spray, paint or other aerosols near the device.
- Never paint the device. Paint will seal vents and interfere with the device.

⚠️
High concentrations of alcohol found in many products may damage, deteriorate or affect the gas sensing elements – such as; wine; deodorants; stain removers; thinners etc.

Auto-Calibration

Our CO_2 sensors are designed to automatically recalibrate using background CO_2 levels ±100ppm.
For maintenance purposes, the device should be exposed to fresh air intermittently to aid with this process. Inaccuracies that do not resolve over a 24 hour period may require temporary removal of the device, from site, for an extended exposure to fresh air.

Testing your CO2-X

The aim of the test is to make sure the CO2-X is working at its optimum by briefly exposing a level of carbon dioxide to send the device into an alarm state ensuring all system outputs/relays activate then it is working safely.
If the system fails to operate as intended in an alarm state, the device must not be used until a full inspection and service has been conducted.

To do this, simply breathe near or into the device. To increase reaction time, cover the escape vents.
If in doubt, contact your supplier.

General Specification

General	
Product:	CO2X
Indicators (1.8" TFT Screen)	Green (Safe), Yellow (Special State) & Red (Alarm). Detected CO2 Level. Time Weighted Average CO2 Level (TWA). Temperature. Mute. Ventilation Boost Active. End of Life.
Screen Brightness	Low – Medium – High (Plus Screen Saver)
Mounting	Wall Mounting
Electrical	
Max. Power Consumption	2.16W
Power Voltage Input Range	100-240V AC 50-60Hz or 12-24VDC
Gas Valve Input	100–240VAC
CO_2 Pre Alarm Relay Output	Max 0.5A Signal
CO_2 Alarm Relay	Max 3A @ 240V
Fan Enable Relay Output	Max 0.5A Signal
Terminal Wire ratings	Copper 18AWG (0.75mm2) Min. 14 x screw terminals.
Internal Fuse	0.5A / 250V AC
Construction	
Dimensions (H x W x D)	140 x 95 x 30mm / 5.51 x 3.74 x 1.18"
Unit Weight (Approx.)	0.08kg
Housing Material	Polylac - PA765
Environmental	
Ingress Protection	IP40
Storage Conditions	Dry. Temp: -10 ~ 50°C / 14~ 122°F : 30 ~ 80% rh
Compliance	
CE / UKCA	BS EN 50270 / BS EN 61010-1
Temperature Sensor Specification	
Sensor Type	Linear Active Thermistor Integrated Circuit
Measuring Range	0-95 °C / 0-203°F
Accuracy @ 25°C / 77°F	± 2°C
Resolution	0.1 °C/°F
Carbon Dioxide Sensor Specification	
Factory Conditions	25° ± 5°C - 77° ± 41°F (40-70% RH)
Sensor Operating Temperature	-10C° ~ 50°C (14 ~ 122°F)
Sensor Operating Humidity	Continuous 30-80% rh Non-Condensing
Sensor Operating Pressure	Normal Atmospheric Pressure ± 10%

Gas Sensor	Indicating Range	Steps	Accuracy	Response (t90)	Ventilation	Alarm: 1 (Pre alarm relay)	Alarm: 2 (Latching relay)	*EOL (Years)
NDIR. Intelligent Infrared CO2 Module. ABC Logic Auto Calibration								
Carbon Dioxide (CO2)	400-5000ppm	1	±100ppm	<90s	Kitchen	▲2800ppm	▲4500ppm	10
					Natural	▲1300ppm	▲1500ppm	
					Mechanical	▲800ppm	▲1000ppm	

▲ Rising Alarm

*EOL – Expected Operational Life

Installation Details

Please pass this manual to the system owner / user.

Date of Installation:	
Installation Location:	
Organisation:	
Stamp/Signature of the installer:	

Every effort is made to ensure the accuracy of this document; however, S&S Northern can assume no responsibility for any errors or omissions in this document or their consequences. S&S Northern would greatly appreciate being informed of any errors or omissions that may be found in the content of this document. For information not covered in this document, or if there is a requirement to send comments/corrections, please contact S&S Northern using the contact details given below.

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