AGS
AMERICAN GAS SAFETY

MERLIN CO2-TFT

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 100-240VAC or 12-24V.
- ✓ End of Life notification for CO$_2$ sensing element.
- ✓ Automatically switch between ventilation programs when gas is used.
- ✓ Boost, Mute and Wake Up button.

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Installation, Operation & Maintenance Manual

Please read this manual carefully and retain for future use.

The Merlin CO2-TFT 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 fans reducing CO$_2$ and/or temperature.

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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 guide – contact your supplier.

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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.

Three Year Manufacturer's Warranty

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 manufacture. 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.

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.

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). 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.

CONTENTS

INSTALLATION

Planning

Area of coverage

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.

Areas to avoid

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.

Take in to account the design of the air flow within the zone area. Avoid conditions such as; condensation; vibration; extreme temperatures and draft zones.

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Multiple monitors may be required to adequately protect property and/or persons!

Typical Positioning

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.

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

These recommended heights may vary based on air flow and temperature conditions in addition to the proposed application and location.

Installation Arrangement

Fixing

Unpack all the parts!

Designed for surface mounting, it must be installed by a licensed, insured contractor.

1. Carefully remove the rear cover from the unit by releasing the two latching clips located at the bottom of the case.
2. Using the rear cover - mark the screw holes to the wall.
   Ensure the wall surface is flat to prevent base distortion.
3. There are two pre-fractured areas for cable entry provided on the inside of the rear cover which may be cut away as required.
4. After executing the mounting and the connections – replace the rear cover ensuring the two clips are latched.
5. Make a note of the installation date on the label located on the side of the unit.

Board Overview

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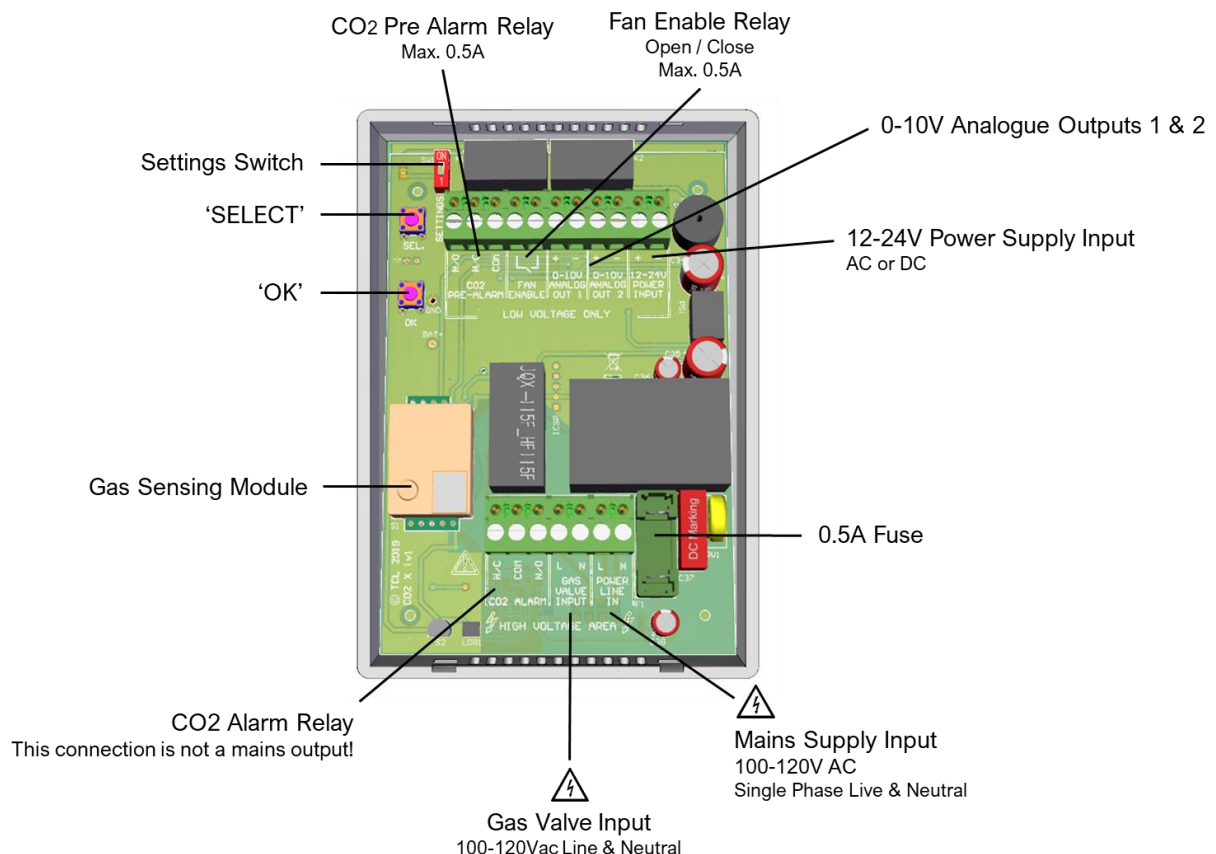
Wiring of different circuits shall be separated by means of routing, clamping or barrier!

All wiring is to be installed within flexible tubing to maintain segregation between circuits!
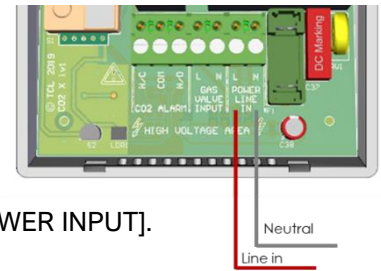
Any damage attempting to remove the circuit board parts may void any warranty!

Any damage to the device whilst installing and making connections may void any warranty!

Wiring your CO2-TFT

MAINS POWER CONNECTION
100-120V AC Single phase mains power should be supplied to the [POWER/LINE IN] connector (Line & Neutral).

The CO2-TFT can also be powered from 12-24V supply – see [12-24V POWER INPUT].

Neutral

Line in

GAS VALVE INPUT
It is possible for your CO2-TFT 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 your CO2-TFT to Natural or Mechanical ventilation mode – *see settings for ventilation types.*

When gas is supplied/in use – the CO2-TFT will receive a signal from the gas valve and display the [GAS IN USE] message. The CO2-TFT will configure itself automatically to operate in 'Kitchen' mode until the gas supply is turned off – see section 'Settings' for configuration.

Gas Solenoid Valve

Merlin Panel
[Gas Valve] Terminal

Neutral

Line In

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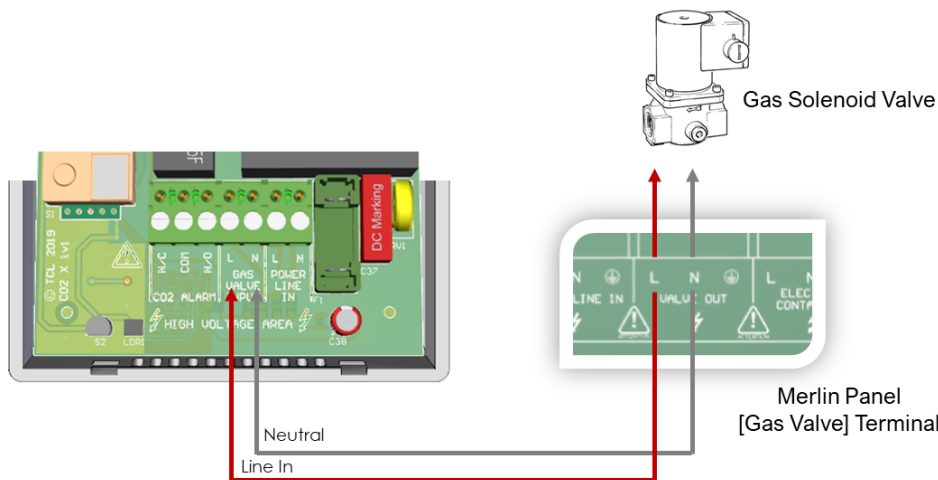
This feature is recommended for teaching areas with gas appliances such as laboratories and food technology rooms.

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.

NC / COM / NO
To Merlin Panel
or to BMS
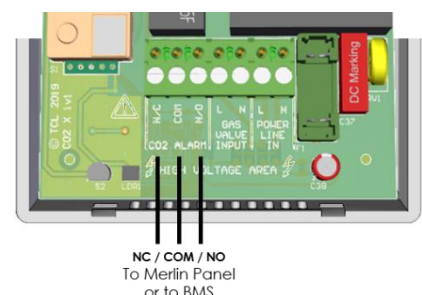
CO2 PRE-ALARM

This relay can send a signal to a Building Management System (BMS) or Merlin panel when CO_2 reaches pre-alarm level.


NC / COM / NO
To Merlin Panel
or to BMS
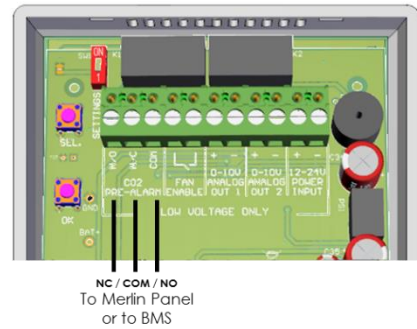
FAN ENABLE

The [FAN ENABLE] 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 / > 73.4°F / 23°C
N/O: <550ppm / < 71.6°F / 22°C

These levels cannot be altered.

Fan Speed
Controller Switch
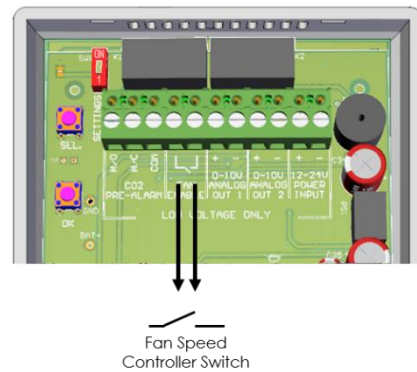
0-10V ANALOGUE OUT 1 & OUTPUT 2

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 0 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).

Fan Speed   Or   Merlin Panel
Controller   0-10V terminal
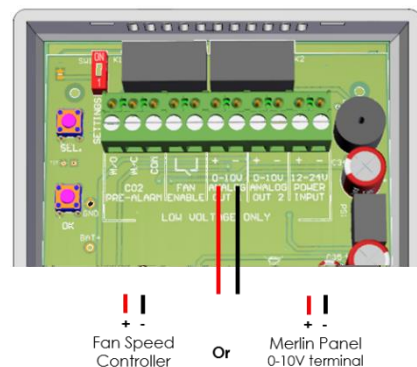
12-24V POWER

To power the CO2-X with 12-24V power – this should be supplied to the [12-24V POWER INPUT] connector (+ / -).

This connection can be either AC or DC.

12-24V Power Supply
+ -
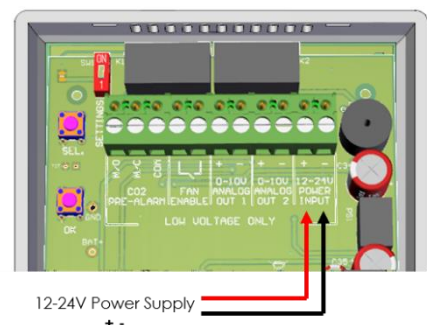
Configuration Settings

There is a settings switch on the CO2-TFT 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.

VENT. TYPE	NAT.	BUZZER	ON	SCREEN SAVER	OFF
MIN. 0-10 OUT 1	1	TEMP. UNITS	°C		
MIN. 0-10 OUT 2	1	BOOST (MIN.)	1		
0-10V OUT 1	TEMP.	FAN ENABLE	CO2		
0-10V OUT 2	CO2	BRIGHTNESS	MED	FACTORY RESET	

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

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

Menu Overview

VENT. TYPE
- NAT. (Natural mode) – Recommended for buildings without mechanical ventilation.
- MECH. (Mechanical mode) – Recommended for buildings with mechanical ventilation.
- KITCH. (Kitchen mode) – Recommended for kitchen environments.

MIN 0-10 OUT 1 & 2

Minimum voltage output from the 0-10V Analogue out 1 & 2 terminals.

0-10V OUT 1 & 2

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

BUZZER

The buzzer will operate as selected in KITCHEN ventilation type only. You can select the buzzer to beep three times every 15 seconds, every 10 minutes or not at all when the alarm status is reached.

TEMP. UNITS

Select between measuring the temperature in degrees °Celsius or °Fahrenheit.

BOOST (MIN.)

Analogue outputs will run at optimum capacity (10V) for time specified.

Select from 1 – 10 minutes. Outputs return to normal after the specified boost time.

FAN ENABLE

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 the greatest.

BRIGHTNESS

There are three (3) levels of screen backlight brightness: LOW, MED and HIGH.

SCREEN SAVER

If ON is selected, the display will remain off and wake up at pre-alarm/ alarm status. To wake up the screen for ten seconds press the touch button. If OFF is selected the display will remain on.

FACTORY RESET

Restores all settings to factory set condition.

Optional Configurations

NAT. - Natural Ventilation Mode

Green: <1300ppm <23 °C/ 73.4°F
Yellow: ≥1300ppm >23 °C/ 73.4°F
Red: ≥1500ppm >25 °C/ 77.0°F
CO₂ Pre-alarm relay switch: 1300ppm
CO₂ Alarm relay switch: 1500ppm

0-10V Analogue Output: Linear Progression.
  o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
  o   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

Green: <800ppm   <23 °C/ 73.4°F
Yellow: ≥800ppm   >23 °C/ 73.4°F
Red: ≥1000ppm   >25 °C/ 77.0°F
CO₂ Pre-alarm relay switch: 800ppm
CO₂ Alarm relay switch: 1000ppm

0-10V Analogue Output: Linear Progression.
  o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
  o   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

Green: <1500ppm   <23 °C/ 73.4°F
Yellow: ≥1500ppm   >23 °C/ 73.4°F
Red: ≥2800ppm   >25 °C/ 77.0°F
CO₂ Pre-alarm relay switch: 2800ppm
CO₂ Alarm relay switch**:   4500ppm

0-10V Analogue Output: Linear Progression.
  o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
  o   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

MIN 0-10 OUT 1
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**

BUZZER
Kitchen Vent Type Mode
CO₂ >2800ppm Only. Select:
ON – 3 beeps every 15 seconds
10MINS – 3 beeps every 10 minutes
OFF

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

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

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

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

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

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

SCREEN SAVER
ON – screen will switch off until temperature or CO₂ levels reach pre alarm/ alarm status.
OFF – screen constantly on.

Factory Set Condition

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

Specification

| Product:	Dual Power Carbon Dioxide & Temperature Monitor
Model:	CO2-TFT
Visual Indicators	CO_2 gas level / Temperature level / Measurement value / Boost / End of life / Sensor fault / Gas in use / Mute / Average CO_2 level
Display	1.8" TFT – Thin Film Transistor
Screen Brightness	Low, Medium, High
Initial Stabilisation Time	One (1) Minute
Power Supply	100-120V AC 50-60Hz (Max 2.16VA without load) or 12-24V AC or DC (25V AC/DC Max)
Gas Valve Input	100-120V AC
CO_2 Pre Alarm Relay Output	Max 0.5A Signal
CO_2 Alarm Relay	Max 3A @ 120V
Fan Enable Relay Output	Max 0.5A Signal
Consumption	2.16 W Max
Internal Fuse	0.5A / 250V AC
Operating Temp	32 – 104°F / 0-95% RH Non-Condensing
Alarm (Buzzer) Sound (dB)	65 dB (300mm distance in quiet conditions)
CO2 Sensor	
Sensor Type	NDIR. Intelligent Infrared CO_2 Module. ABC Logic Auto Calibration
Measuring Range	400-5000ppm
Accuracy @ 25°C / 77°F	± 100ppm
Gas Sensor Signal Update	Every three seconds
CO_2 Average Signal Update	Every ten minutes
Expected Life	10 Years
Temperature Sensor	
Sensor Type	Linear Active Thermistor Integrated Circuit
Measuring Range	0-95 °C / 32-203°F
Accuracy @ 25°C / 77°F	± 2°
Resolution	0.1 °C/°F
Dimensions (H x W x D)	140 x 95 x 30mm / 5.5 x 3.74 x 1.18"
Net Weight	256g / 9.03oz

OPERATION

First Power Up

On connecting power, the CO2-TFT monitor enters a stabilisation phase for approximately 60 seconds – during this period, your device not yet ready for operation.
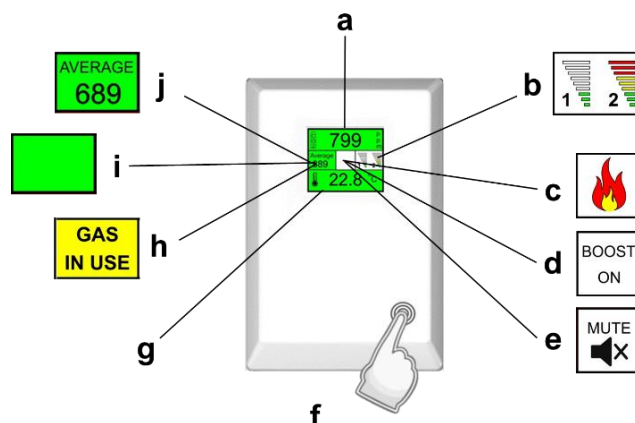
a. **CARBON DIOXIDE READING.** Current CO_2 gas level in parts per million (ppm).

b. **0-10V ANALOGUE OUTPUT PROGRESS BARS**. 0-10V analogue outputs 1 and 2.

c. **FLAME ICON** appears only when the CO2-TFT 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 outputs 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. **TOUCH BUTTON** used to activate 'Boost' or 'Mute' dependant on the status and also to view the screen for 10 seconds during screen saver mode.

g. **TEMPERATURE READING.** Current temperature in degrees Celsius or Fahrenheit. The temperature will increase its accuracy over a 30 minute period upon power up.

h. **GAS IN USE MESSAGE** appears only when the CO2-TFT receives a signal from a gas valve and gas supply is open/on. When the gas valve is closed, this message will not be displayed. Appears with Flame icon.

i. **BLANK** (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.

j. **AVERAGE CO_2 CALCULATION.** 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 in Natural or Mechanical ventilation type modes only.

Traffic Light Indicator

Your CO2-TFT displays both current CO_2 and temperature levels in a traffic light style indication.
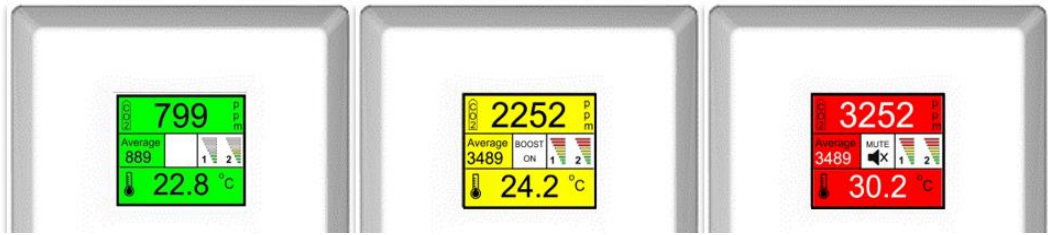
SAFE	**ATTENTION!**	**DANGER!**
Safe CO_2 levels or temperature will be displayed **GREEN.**	Low CO_2 levels or temperature will be displayed **YELLOW.**	High CO_2 levels or temperature will be displayed **RED.**

Alarms & Configuration

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The alarm thresholds and configuration will depend on which ventilation mode your CO2-TFT has been set to. There is no audio alarm for high temperatures!

NAT. - Natural Ventilation Mode

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.
- o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
- o   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

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.
- o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
- o   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 (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.
- o   Min output (1-5V) from 600ppm   23 °C/ 73.4°F
- o   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

Screen Saver Mode

If the screen saver mode is switched on (see settings), the CO2-TFT 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 Life

This message indicates that the CO2-TFT 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.

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The expected lifecycle of 10 years may vary depending on environmental conditions.

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.

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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 ±75ppm.

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-TFT

The aim of the test is to make sure the CO2-TFT 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.

QUICK TIPS

To increase reaction time, cover the escape vents.

Alternatively, enclose the device and apply gas i.e. in an air tight bag or container.

Always give at least five (5) minutes between testing the same unit.

If in doubt, contact your supplier.

Notes (blank)

Installation Details

Please pass this manual to the system owner / user.

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

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