



Ax60 Carbon Dioxide Detector

User Manual



This Manual contains installation, operation & maintenance details for the Ax60 series carbon dioxide detector

**Ax60 Carbon Dioxide Detector
User Manual**

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1 Safety information

Warnings, Cautions and Notes

Warnings are used in this Manual to indicate potentially hazardous situations which could result in serious injury or death. Cautions are used in this Manual to indicate potentially hazardous situations which could result in equipment damage or loss of data. Notes are used in this Manual to indicate supplementary information that is not hazard related.

- ⚠ WARNING:** READ THE SAFETY INFORMATION IN THIS MANUAL BEFORE INSTALLING OR USING THE Ax60.

- ⚠ WARNING:** DO NOT TEST THE CO₂ ALARM WHEN IT IS CLOSE TO THE EARS. IT HAS A HIGH VOLUME SOUNDER WITH A SOUND LEVEL OF 88 DECIBELS AT A DISTANCE OF 3 METRES.

- ⚠ WARNING:** DO NOT TEST THE CO₂ ALARM WHEN IT IS CLOSE TO THE EYES. IT HAS A HIGH VISIBILITY STROBE LIGHT WITH A LUMINOUS INTENSITY OF 100 CANDELA.

- ⚠ WARNING:** PERFORM A RISK ASSESSMENT BEFORE INSTALLING CO₂ SENSORS AND CO₂ ALARMS. IDENTIFY POTENTIAL SOURCES OF CO₂ LEAKS AND AREAS OF HUMAN OCCUPATION. DO NOT USE A SINGLE CO₂ SENSOR TO COVER MORE THAN 80M³. USE ADDITIONAL CO₂ SENSORS IF AN AREA HAS A COMPLEX SHAPE, PHYSICAL OBSTACLES, POOR VENTILATION OR ZONES WHERE CO₂ MAY COLLECT.

- ⚠ WARNING:** INSTALL CO₂ SENSORS AT A HEIGHT OF 12" (305MM) TO 18" (457MM) ABOVE FLOOR LEVEL. THIS IS BECAUSE CO₂ IS HEAVIER THAN AIR AND MAY COLLECT AT A LOW LEVEL.

- ⚠ WARNING:** DO NOT OPEN THE CENTRAL DISPLAY, CO₂ SENSOR OR CO₂ ALARM IF THEY ARE CONNECTED TO THE POWER SUPPLY. FIRST DISCONNECT AND ISOLATE THEM FROM LIVE HAZARDOUS VOLTAGE.

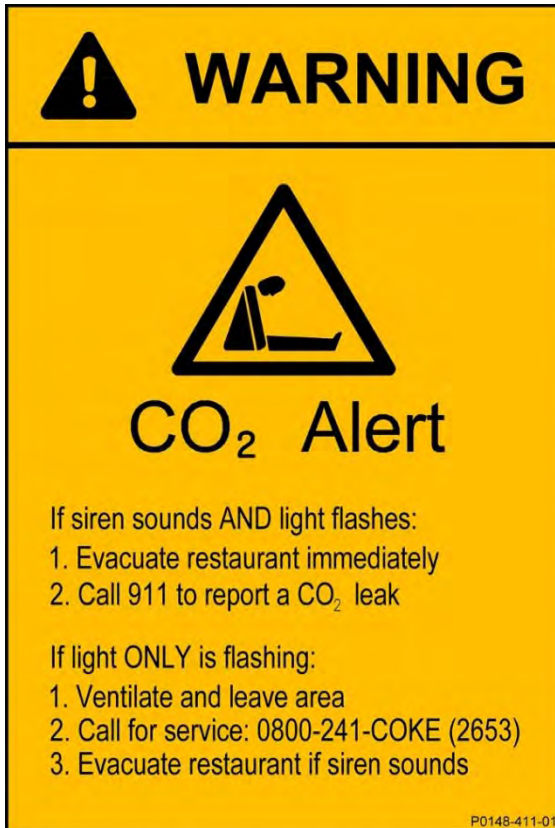
2 Informations de sécurité

Avertissements, mises en garde et notes

Dans ce manuel, les avertissements sont utilisés pour indiquer les situations potentiellement dangereuses pouvant entraîner des blessures graves voire mortelles. Les mises en garde de ce manuel sont utilisées pour indiquer des situations potentiellement dangereuses pouvant endommager le matériel ou engendrer la perte de données. Les notes de ce manuel indiquent des informations supplémentaires n'impliquant aucun danger particulier.

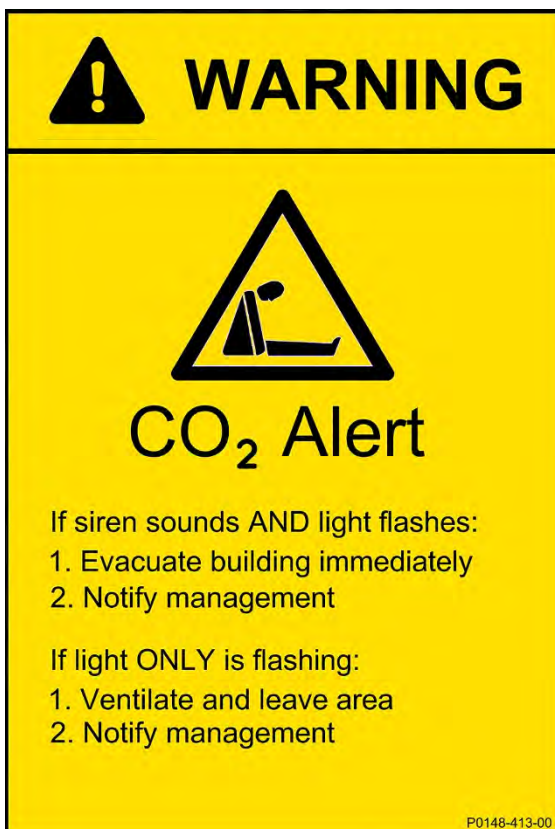
- ⚠ AVERTISSEMENT: LIRE LES INFORMATIONS DE SÉCURITÉ CONTENUES DANS CE MANUEL AVANT D'INSTALLER OU D'UTILISER Ax60.**
- ⚠ AVERTISSEMENT: NE PAS TESTER LE DÉTECTEUR DE CO₂ À PROXIMITÉ DES OREILLES CAR IL POSSÈDE UN ÉMETTEUR TRÈS PUISSANT AVEC UN NIVEAU SONORE DE 88 DÉCIBELS À UNE DISTANCE DE 3 MÈTRES.**
- ⚠ AVERTISSEMENT: NE PAS TESTER LE DÉTECTEUR DE CO₂ À PROXIMITÉ DES YEUX CAR IL POSSÈDE UNE LUMIÈRE STROBOSCOPIQUE AVEC UNE INTENSITÉ LUMINEUSE DE 100 CANDELAS.**
- ⚠ AVERTISSEMENT: EFFECTUER UNE ÉVALUATION DES RISQUES AVANT D'INSTALLER LES CAPTEURS DE CO₂ ET LE DÉTECTEUR DE CO₂. IDENTIFIER LES SOURCES POTENTIELLES DE FUITES DE CO₂ ET LES ZONES D'OCCUPATION HUMAINE. NE PAS UTILISER UN SEUL CAPTEUR DE CO₂ POUR COUVRIR UNE SURFACE DE PLUS DE 80 M³. UTILISER DES CAPTEURS DE CO₂ SUPPLÉMENTAIRES SI UNE ZONE PRÉSENTE UNE FORME COMPLEXE, DES OBSTACLES PHYSIQUES, UNE VENTILATION DE MAUVAISE QUALITÉ OU DES ZONES OÙ LE CO₂ POURRAIT S'ACCUMULER.**
- ⚠ AVERTISSEMENT: INSTALLER DES CAPTEURS DE CO₂ À UNE HAUTEUR COMPRISE ENTRE 30,5 CM À 45,7 CM AU-DESSUS DU SOL, CAR LE CO₂ EST PLUS LOURD QUE L'AIR ET PEUT S'ACCUMULER PRÈS DU SOL.**
- ⚠ AVERTISSEMENT: NE PAS OUVRIR L'ÉCRAN CENTRAL, LE CAPTEUR DE CO₂ OU LE DÉTECTEUR DE CO₂ S'ILS SONT CONNECTÉS À UNE SOURCE D'ALIMENTATION. COMMENCER PAR LES DÉBRANCHER ET LES ISOLER DES DANGERS DES COMPOSANTS SOUS-TENSION.**

3 Hazard labels

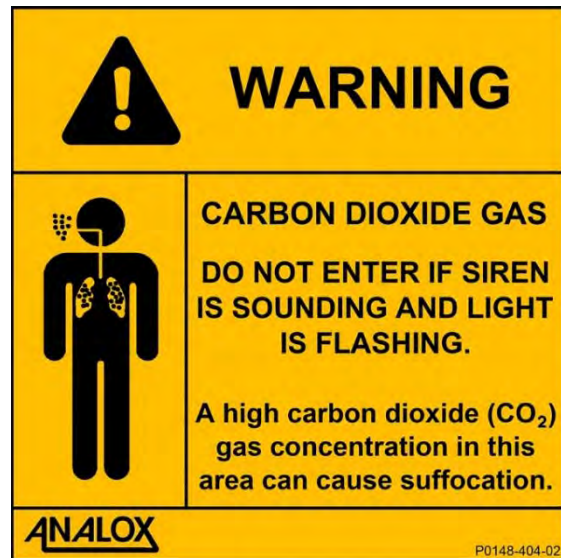


Label 1 (above left) US English; (below left) UK English; (above right) US Spanish

Label 1 should be wall mounted adjacent to the CO₂ Alarm.



Label 2 (below) US and UK English. This label should be wall mounted outside the alarmed area.



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This label describes detailed alarm response procedures in both English and Spanish. Sensor locations and emergency telephone numbers must be added by the end user.

Ax 60 CO₂ Safety System

WHAT TO DO IN CASE OF ALARM

- Hold Accept/Test button until audio alarms are silenced.
- Check table below to determine cause of action.

| UNIT INDICATION | CAUSE | ACTION |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO ₂ CO ₂ *CO ₂ CO ₂ 3: 41600 PPM Alarm LED blinking. | HIGH ALARM! High concentration of CO ₂ caused by leakage | DO NOT ENTER the risk zone! Evacuate the restaurant Call and inform the following Tel No:..... Ensure, to the extent possible, that there is ventilation from the outside |
| OK *ALL OK OK 2: 18450 PPM Alarm LED blinking. | LOW ALARM High concentration of CO ₂ caused by leakage | A service technician should enter the indicated area ONLY under the supervision of another person. Open doors and windows as much as possible. Close all CO ₂ containers. Remedy leak. |
| OK OK*TWA OK 3: 5100 PPM Alarm LED blinking. | TWA ALARM A small CO ₂ leak that has lasted for over 8 hours | Open doors and windows as much as possible. Remedy leak. If the leak is not found, contact service on Tel No:..... |
| *FLT OK OK OK 1: COMMS FAULT Fault LED blinking. | SYSTEM FAULT | Call service Tel No:..... Provide information displayed on units screen. |

- Hold Accept/Test button until unit beeps to cancel the alarm.
- System will return to OK when safe CO₂ levels are reached.

| | |
|-----------|----------|
| Sensor ID | Location |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

System Test

Hold Accept/Test button until 'TESTING ALARM' appears.
All alarms should flash & sound for 5 seconds.

Sistema de Seguridad de Ax 60 CO₂

QUE HACER EN CASO DE ALARMA

- Mantenga pulsado el boton de Accept/Test hasta que se silencien las alarmas sonoras.
- Compruebe la siguiente tabla para determinar la causa de accion.

| INDICACION DE LA UNIDAD | CAUSA | ACCION |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO ₂ CO ₂ *CO ₂ CO ₂ 3: 41600 PPM LED de alarma parpadea. | ALTA ALARMA! Alta concentracion de CO ₂ causadas por fugas | NO ENTRAN en la zona de riesgo! Evacuar el restaurante Llame y informe lo siguiente Tel No:..... Garantizar, en la medida posible, que haya ventilacion desde el exterior |
| OK *ALL OK OK 2: 18450 PPM LED de alarma parpadea. | ALARMA BAJA Alta concentracion de CO ₂ causadas por fugas | Un tecnico de servicio debe entrar en la zona indicada SOLO bajo la supervision de otra persona. Abren las puertas y ventanas lo mas posible. Cierra todos los recipientes de CO ₂ . Repara la fuga. |
| OK OK*TWA OK 3: 5100 PPM LED de alarma parpadea. | ALARMA de TWA Una pequena fuga de CO ₂ que se ha prolongado mas de 8 horas | Abren las puertas y ventanas lo mas posible. Repara la fuga. Si no se encuentra la fuga, contacta el servicio de Tel No:..... |
| *FLT OK OK OK 1: COMMS FAULT LED fallo parpadeando. | FALLO DE SISTEMA | Llame al servicio Tel No:..... Disponga informacion que se muestra en la pantalla de las unidades. |

- Mantenga pulsado el boton Accept/Test hasta que la unidad emite un pitido al cancelar la alarma.
- El Sistema volvera a OK cuando se alcancen los niveles de CO₂ seguras.

| | |
|-----------|-------|
| ID Sensor | Sitio |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

Prueba de Sistema

Mantenga pulsado el boton Accept/Test hasta que aparezca 'TESTING ALARM'.
Todas las alarmas deben parpadear y sonaran durante 5 segundos.

ANALOX

www.analoxsensortechnology.com

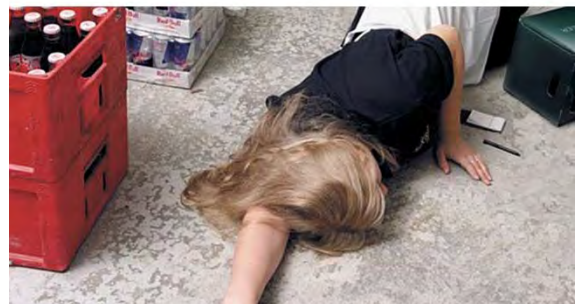
Label 3: This label should be wall-mounted adjacent to the Central Display

4 Carbon dioxide

| |
|---------------------------------------|
| 1,000ppm (0.1%) |
| 5,000ppm (0.5%) |
| 10,000ppm (1%) |
| 15,000ppm (1.5%) |
| 20,000ppm (2%) |
| 30,000ppm (3%) |
| 40,000- 50,000ppm (4-5%) |
| 50,000- 100,000ppm (5-10%) |
| 100,000- 1,000,000ppm (10-100%) |

- 1—1.5% Slight effect on chemical metabolism after exposures of several hours.
- 3% The gas is weakly narcotic at this level, giving rise to deeper breathing, reduced hearing ability, coupled with headache, an increase in blood pressure and pulse rate.
- 4—5% Stimulation of the respiratory centre occurs resulting in deeper and more rapid breathing. Signs of intoxication will become more evident after 30 minutes' exposure.
- 5—10% Breathing becomes more laborious with headache and loss of judgement.
- 10—100% When the CO₂ concentration increases above 10%, unconsciousness will occur in less than one minute. Unless prompt action is taken, further exposure to these high levels will eventually result in death.

Adapted from: 'Carbon Dioxide Physiological Hazards', Safety Info 24/11/E, European Industrial Gases Association.



NOTE: FOR A MORE DETAILED OUTLINE OF THE DANGERS OF CO₂, PLEASE VISIT OUR WEBSITE www.analox.net OR EMAIL US AT info@analox.net

5 Introduction

This User Manual explains how to install, operate and maintain the Ax60 and Ax60K. It is intended for system installers and end users. For information on servicing, refer to the *Ax60 Service Manual P0159-803*, downloadable from <http://www.analox.net/>

5.1 Ax60 overview

The Ax60 is a life-safety device that measures the concentration of carbon dioxide (CO₂) in ambient air. It offers protection for people working in the proximity of high-concentration sources of CO₂ and raises an alarm if the gas reaches unhealthy levels.

The Ax60 warns of an increase in CO₂ by offering three types of alarm. A 'TWA' alarm is triggered by a time-weighted average of 5000 ppm (0.5%) CO₂ during the previous eight hours (i.e. a measurement of the average exposure). A 'low' alarm is triggered by 15,000ppm (1.5%) CO₂. A 'high' alarm is triggered by 30,000ppm (3%) CO₂.

CO₂ has many uses in beverage delivery, food production, fire suppression systems and laboratories. It is stored in liquid form in pressurised gas bottles or solid form (dry ice). The potentially lethal effects of CO₂ are compounded by its physical properties—it is a colourless, odourless gas—and it has been known to cause suffocation without warning. Therefore there is a risk to health wherever CO₂ is stored or used in an enclosed area.

Normal fresh air contains a safe CO₂ level of 400 parts per million (0.04%). An increase to 15,000ppm CO₂ (1.5%) may cause drowsiness, headache and increased breathing. A level of 30,000ppm CO₂ (3%) may cause dizziness. If the level approaches or exceeds 100,000ppm CO₂ (10%) this may lead to unconsciousness and eventually death.

5.1.1 Hard Wired and Quick Connect options

The standard Ax60 is available as either a **Hard Wired** or a **Quick Connect** option. This choice must be made when placing the order. Hard Wired systems are intended to be integrated with the building fabric. Quick Connect systems are pre-wired with Cat5e cables fitted with colour-coded RJ45 connectors for an easier installation. Both options require installers to connect the power supply unit and optional beacon to the Central Display. The main Ax60 components are illustrated below:



Central Display
(maximum of 1
per system)

CO₂ Sensor
(maximum of 4
per system)

CO₂ Alarm
(maximum of 8
per system)

The standard Ax60 comprises one Central Display, up to four CO₂ Sensors and up to eight CO₂ Alarms. An optional high-visibility flashing beacon can also be connected for remote installation up to 50 metres away. This beacon acts as a highly visible but silent repeater, and is illuminated when any CO₂ Sensor triggers an alarm.

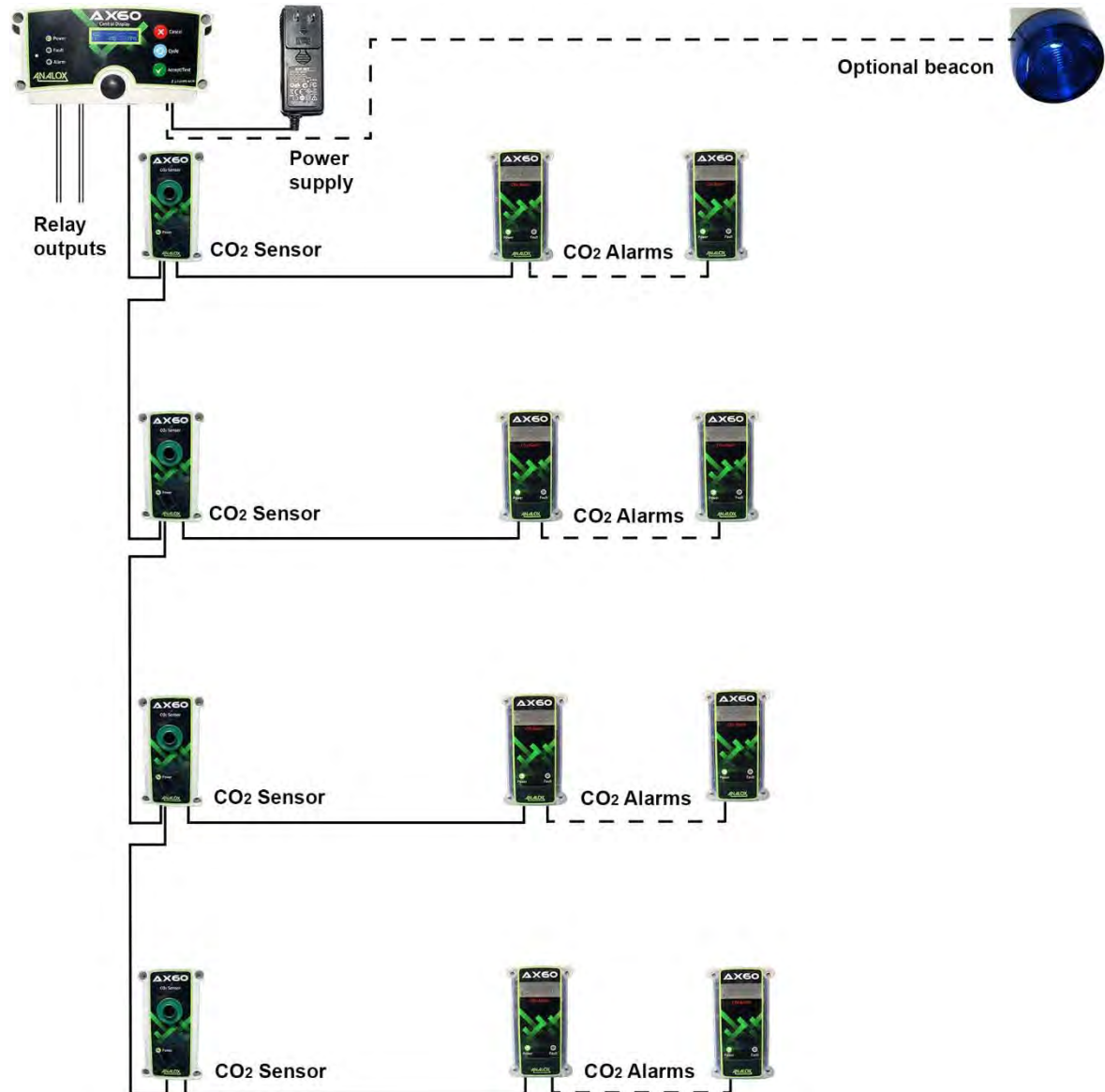
In addition, two relays are available on the Central Display for connection to an external system such as a fire alarm panel or a ventilation fan (via an external mains relay).

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5.1.1.1 Typical arrangement

The Central Display is usually installed in a central location (e.g. a Manager's office) and connected to one or more CO₂ Sensors fitted in remote areas such as store rooms or service corridors. The CO₂ Sensors send alarm signals to one or more CO₂ Alarm units in locations where they can be observed by management or crew. The Central Display monitors the CO₂ Sensors and displays their current status and CO₂ measurements.



5.1.2 Kiosk option

A compact version of the Ax60, the Ax60K **Kiosk**, is available for outdoor kiosks and food-court restaurants. This incorporates a CO₂ Sensor, CO₂ Alarm and power supply. The CO₂ Sensor constantly monitors the air and detects increases in the level of carbon dioxide. If it detects a level of CO₂ above set limits it sends a signal to the CO₂ Alarm. The CO₂ Alarm uses a high-visibility strobe light and high volume sounder to warn of increased levels of CO₂. The warnings vary depending on the amount of CO₂ detected.

The power supply unit (PSU) supplies 24V DC to the CO₂ Sensor, which in turn supplies power to the CO₂ Alarm. The CO₂ Sensor and CO₂ Alarm are pre-wired with 2-metre connecting cables. A cable coupler is supplied to allow the cables to be connected.

6 Checklist

6.1 Packages, consumables and tools

| | |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Package contents (supplied by Analox) | Ax60K Kiosk (K) |
| | <p>1 x CO₂ Sensor, including:</p> <ul style="list-style-type: none"> • 1 x 2m factory fitted Quick Connect (QC) cable with blue RJ45 connector • 1 x 1m factory fitted power cable to power supply unit (PSU) <p>1 x CO₂ Alarm (additional CO₂ Alarms can be ordered) including:</p> <ul style="list-style-type: none"> • 1 x 2m factory fitted QC cable with blue RJ45 connector <p>1 x mains power supply unit (PSU) (plug-in type complete with interchangeable heads to suit the destination country)</p> <p>1 x PSU securing strip</p> <p>1 x RJ45 coupler for connecting the cables</p> <p>1 x hazard labels, information labels, templates and Quick Start Guide</p> |
| | Ax60 Quick Connect (QC) |
| | <p>1 x Central Display, including:</p> <ul style="list-style-type: none"> 1 x 2m factory fitted Quick Connect (QC) cable with white RJ45 connector (for connection to CO₂ Sensor) <p>1 x power supply unit (PSU), either hard-wired type or plug-in type depending on the package ordered</p> <p>1 x PSU securing strip (for plug-in type PSU only)</p> <p>1 to 4 x CO₂ Sensors (depending on the package ordered) each with:</p> <ul style="list-style-type: none"> 1 x 2m factory fitted QC cable with white RJ45 connector (for connection to the Central Display or another CO₂ Sensor) 1 x 2m factory fitted QC cable with blue RJ45 connector (for connection to CO₂ Alarm) 1 x 15m QC extension cable with 2 x white RJ45 connectors (for larger installations) <p>1 to 8 x CO₂ Alarms (depending on the package ordered) each with:</p> <ul style="list-style-type: none"> 1 x 2m factory fitted QC cable with blue RJ45 connector (for connection to CO₂ Sensor) 1 x 15m factory fitted QC extension cable with 2 x white RJ45 connectors (for larger installations) <p>Selection of RJ45 couplers and RJ45 splitters</p> <p>1 x high-visibility optional beacon (if ordered)</p> <p>1 x hazard labels, information labels, templates and Quick Start Guide</p> |
| | Ax60 Hard Wired (HW) |
| | <p>1 x Central Display</p> <p>1 x power supply unit (PSU), either hard-wired type or plug-in type depending on the package ordered</p> <p>1 x PSU securing strip (for plug-in type PSU only)</p> <p>1 to 4 x CO₂ Sensors (depending on the package ordered)</p> <p>1 to 8 x CO₂ Alarms (depending on the package ordered)</p> <p>1 x high-visibility optional beacon (if ordered)</p> <p>Self-adhesive foam gaskets for use in rear-entry cable installations</p> <p>1 x hazard labels, information labels, templates and Quick Start Guide</p> |
| Consumables (depending on package) | <p>Cat5e UTP 24AWG PVC cable, length to suit installation</p> <p>M13 cable glands 5—7mm (nylon), quantity to suit installation</p> <p>Wall plugs and screws (fixing kits), quantity to suit installation</p> |
| Tools required (NOT SUPPLIED) | <p>PZ1 Pozi screwdriver; 3mm flat blade screwdriver</p> <p>Cat5e cable jacket stripper; 24AWG wire stripper</p> <p>Drill and drill bits for wall plugs; spirit level, tape measure, ruler</p> <p>Small hammer, centre punch and pliers for removing knockouts</p> |

7 Installation

NOTE: WHEN THE INSTALLATION IS COMPLETE, FIX THE SUPPLIED HAZARD WARNING/INFORMATION LABELS ON THE APPROPRIATE WALLS AND ENSURE THE LABELS ARE READ AND UNDERSTOOD BY ALL STAFF.

7.1 Kiosk (K)

7.1.1 CO₂ Sensor

Retain the clear protective film on the fascia until the installation is complete. Using the supplied paper template mark out the wall-fixing position for the CO₂ Sensor ensuring it is level. Drill holes in wall, install plugs/dowels then fix the CO₂ Sensor in position.

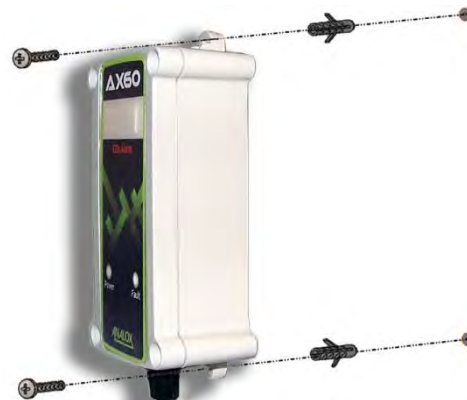
WARNING: CARBON DIOXIDE GAS (CO₂) IS HEAVIER THAN AIR AND SHOULD BE MONITORED FROM A LOW HEIGHT. YOU SHOULD THEREFORE INSTALL THE CO₂ SENSOR AT A HEIGHT OF 12–18" (305–457MM) ABOVE THE FLOOR LEVEL.



7.1.2 CO₂ Alarm

WARNING: SOME KIOSKS AND FOOD COURT RESTAURANTS MAY BE EXPOSED TO HIGH-VOLUME BACKGROUND NOISE. INSTALL THE CO₂ ALARM SO THAT IT IS AUDIBLE & VISIBLE FROM ALL ACCESS AND EGRESS POINTS AND BUSY AREAS.

Retain the clear protective film on the fascia until the installation is complete. Using the supplied paper template mark out the wall-fixing position for the CO₂ Alarm ensuring it is level. Drill holes in wall, install plugs/dowels then fix the CO₂ Alarm in position.



7.1.3 Cables

Route the pre-wired cables from the CO₂ Sensor and CO₂ Alarm securely along the wall. Fit the cable coupler then connect the cables together. Then route the pre-wired cable from the PSU securely along the wall.



7.1.4 Power supply

Fit the appropriate interchangeable plug head for your power socket. Ensure the power supply is off. Insert the plug into the power socket.

Mark out the wall-fixing position for the PSU securing strip. Drill holes in the wall and install wall plugs/dowels. Fix the securing strip firmly over the PSU.



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7.2 Hard Wired (HW) and Quick Connect (QC)

⚠ **CAUTION: SOME ENCLOSURES ARE SUPPLIED UNFASTENED WITH FIXING SCREWS LOOSE. DO NOT OVER-TIGHTEN THE SCREWS WHEN FASTENING THE LIDS ON.**

7.2.1 Central Display

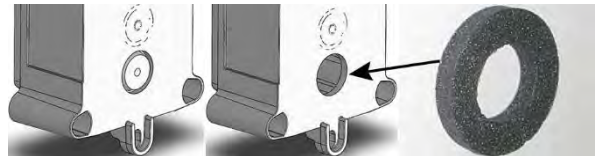
Retain the clear protective film on the fascia until the installation is complete. Using the supplied paper template mark out the wall-fixing position ensuring the Central Display is level. If you are installing cable through the rear of the enclosure, remove the knockout then fit a foam gasket over its aperture to provide a seal against ingress.

⚠ **CAUTION: TO PREVENT DAMAGE TO THE FASCIA AND PRINTED CIRCUIT BOARD (PCB), REMOVE THEM FROM THE ENCLOSURE BEFORE REMOVING KNOCKOUT.**

Drill holes in the wall then fit wall plugs/dowels. Fasten the lid of the enclosure to the base then fix the Central Display in position. Install the cables in position and cut them to length (HW).

Removing the knockout

To remove the knockout, place the enclosure face down on a solid, non-slip surface. Tap the knockout firmly using a hammer and punch. Use pliers to remove sharp edges from the aperture.



7.2.2 CO₂ Sensor

Retain the clear protective film on the fascia until the installation is complete. Using the supplied paper template mark out the wall-fixing position ensuring the CO₂ Sensor is level. (If installing a cable through the rear, remove the knockout.)

⚠ **WARNING: CARBON DIOXIDE GAS (CO₂) IS HEAVIER THAN AIR AND SHOULD BE MONITORED FROM A LOW HEIGHT. YOU SHOULD THEREFORE INSTALL THE CO₂ SENSOR AT A HEIGHT OF 12–18" (305–457MM) ABOVE THE FLOOR LEVEL.**

Drill holes in wall, install wall plugs/dowels then fit the CO₂ Sensor. Install the cables in position and cut them to length (HW).



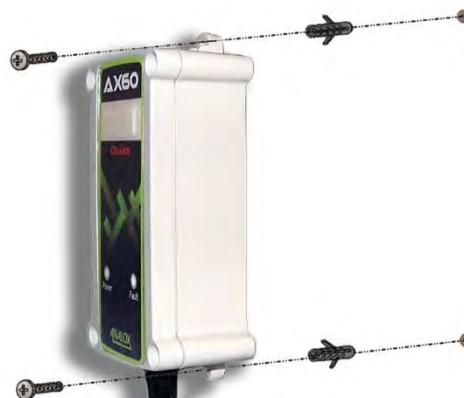
7.2.3 CO₂ Alarm

⚠ **WARNING: LOCATE THE CO₂ ALARM SO AS TO PROVIDE COVERAGE FOR ACCESS AND EGRESS POINTS AND BUSY AREAS.**

Retain the clear protective film on the fascia until the installation is complete.

Using the supplied paper template mark out the wall-fixing position ensuring the CO₂ Alarm is level. (If installing a cable through the rear, remove the knockout.)

Drill holes in wall, install wall plugs/dowels then fit the CO₂ Alarm. Install the cables in position and cut them to length (HW).



8 Connection

8.1 Kiosk (K)

The Ax60K Kiosk option is pre-wired with Cat5e cables and colour-coded RJ45 connectors to allow easy connection. The Kiosk components are shown below.



CO₂ Sensor, pre-wired cables and PSU



CO₂ Alarm, pre-wired cable and coupler

8.1.1 Typical layouts



1 x CO₂ Sensor; 1 x CO₂ Alarm; 1 x PSU



1 x CO₂ Sensor; 2 x CO₂ Alarms; 1 x PSU

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8.2 Quick Connect (QC)

The Ax60 Quick Connect option is pre-wired with Cat5e cables and colour-coded RJ45 connectors for easy connection. The Quick Connect components are shown below.

8.2.1 Central Display



Pre-wired cable for connection to CO₂ Sensor(s)

The Quick Connect Central Display is pre-fitted with two cable glands (see left). The gland on the right has a 2-metre cable fitted with a white RJ45 connector for connection to a CO₂ Sensor.

The empty gland on the left is for the power supply unit cable. A third gland must be fitted if the optional beacon is to be installed. Both of these cables must be fitted by the installer.

If the built-in relays R1 and R2 are being used, another knockout should be removed from the enclosure and an additional gland should be fitted for the relay cables.

8.2.2 CO₂ Sensor



Pre-wired cables for connection to the CO₂ Alarm (left), and to the Central Display (right)

The Quick Connect CO₂ Sensor is fitted with two cable glands and is pre-wired with two cables:

- 2-metre cable with white RJ45 connector for connection to the Central Display
- 2-metre cable with blue RJ45 connector for connection to the CO₂ Alarm(s)

The cable with the white RJ45 connector is connected to the Central Display via a coupler.

The cable with the blue RJ45 connector should be connected to the CO₂ Alarm (which also has a blue connector) via an RJ45 coupler (or an RJ45 splitter if there is more than one CO₂ Alarm).

8.2.3 CO₂ Alarm



Pre-wired cable for connection to a CO₂ Sensor

The Quick Connect CO₂ Alarm is fitted with one cable gland and a 2-metre cable with a blue RJ45 connector. This should be connected to the CO₂ Sensor which is associated with the Alarm, via an RJ45 coupler (or an RJ45 splitter if there is more than one CO₂ Alarm).

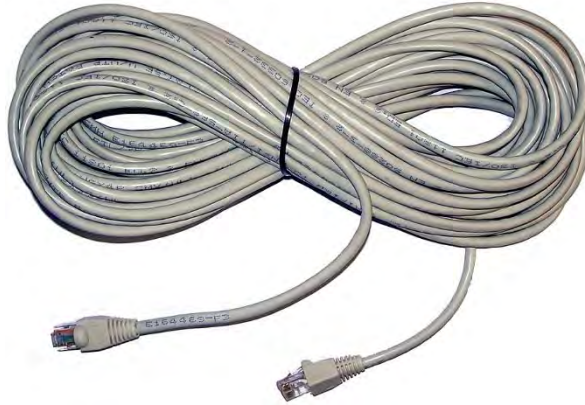
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8.2.4 Cables and connectors

The couplers, splitters, connectors and extension cables supplied with the Ax60 Quick Connect are shown below. These provide enough flexibility for a typical installation.

CAUTION: ENSURE THAT THE MAXIMUM CABLE LENGTH BETWEEN THE CENTRAL DISPLAY AND THE FINAL SENSOR IS NOT MORE THAN 100 METRES.



Extension cables

The extension cables supplied with the Quick Connect are 15 metres long. The cables are fitted with a white RJ45 connector at each end.

One 15m extension cable is supplied with each CO₂ Sensor. One 15m extension cable is supplied with each CO₂ Alarm.

The extension cables are used for installations where a greater cable length is required.

The extension cables may be connected to the 2-metre pre-fitted enclosure cables, using the supplied RJ45 couplers and RJ45 splitters.



RJ45 coupler

The supplied RJ45 coupler (left) is used to connect two white RJ45 connectors. White RJ45 connectors are used for all *Central Display-to-CO₂ Sensor* and *CO₂ Sensor-to-CO₂ Sensor* connections.



The same RJ45 coupler is used to connect the blue RJ45 connectors which are used for all *CO₂ Sensor-to-CO₂ Alarm* connections.



RJ45 splitter

The RJ45 splitter (left) is used to connect two CO₂ Sensors or two CO₂ Alarms on a common cable.

8.2.5 Typical installations

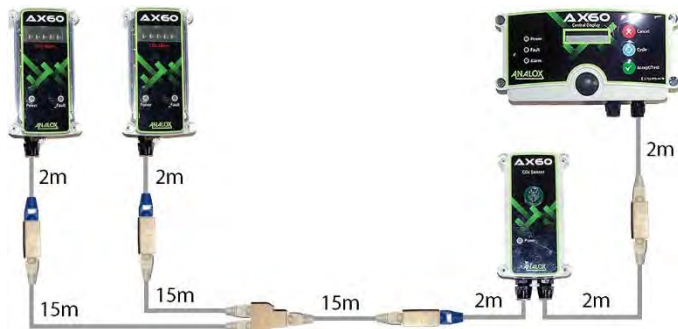
In its simplest form a Quick Connect Ax60 system could incorporate a Central Display, one CO₂ Sensor and one CO₂ Alarm. A larger Ax60 system could incorporate a Central Display, four CO₂ Sensors and eight CO₂ Alarms. Some typical layouts are shown below.



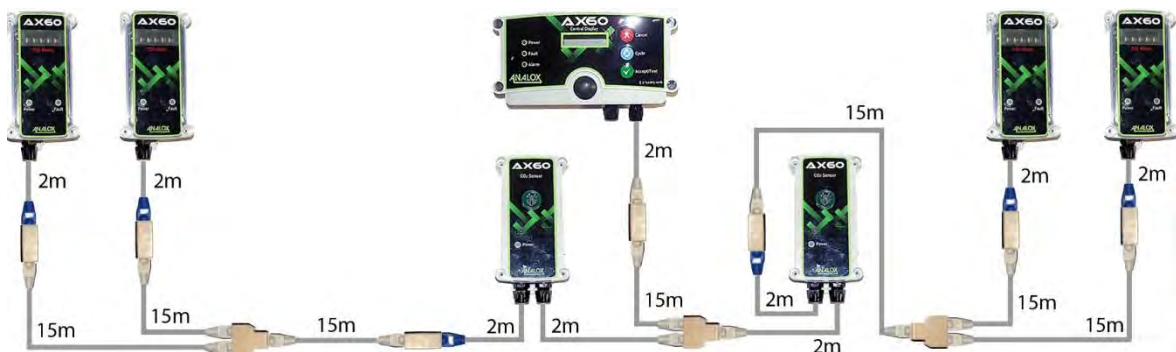
1 x Central Display; 1 x CO₂ Sensor; 1 x CO₂ Alarm

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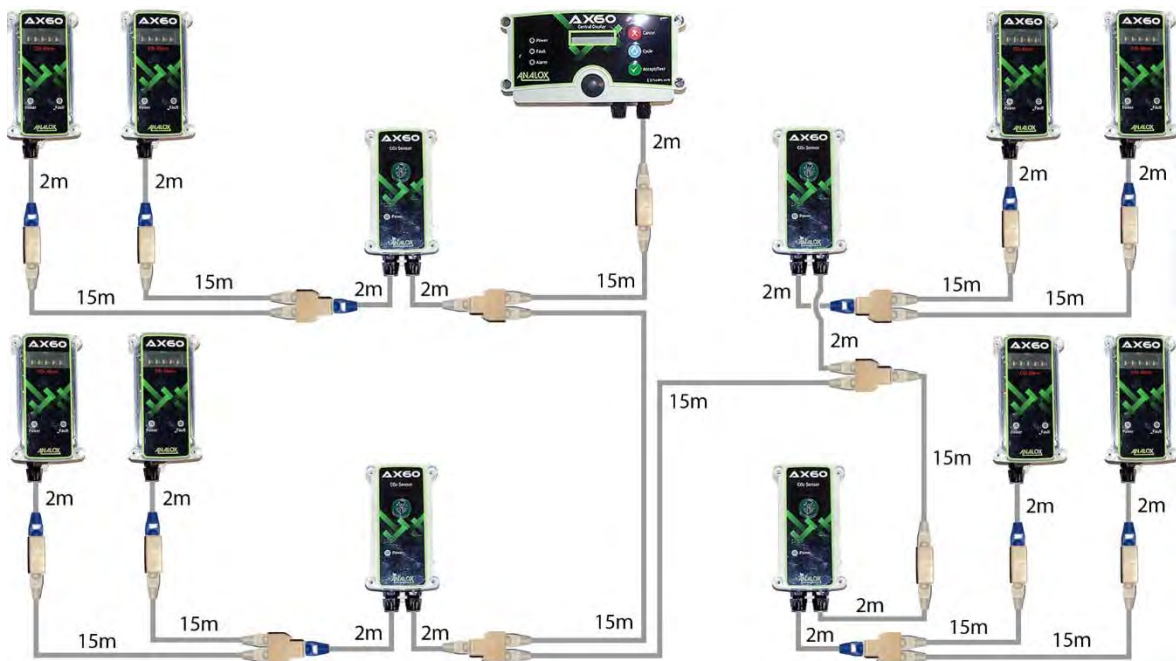
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1 x Central Display; 1 x CO₂ Sensor; 2 x CO₂ Alarms



1 x Central Display; 2 x CO₂ Sensors; 4 x CO₂ Alarms



1 x Central Display; 4 x CO₂ Sensors; 8 x CO₂ Alarms

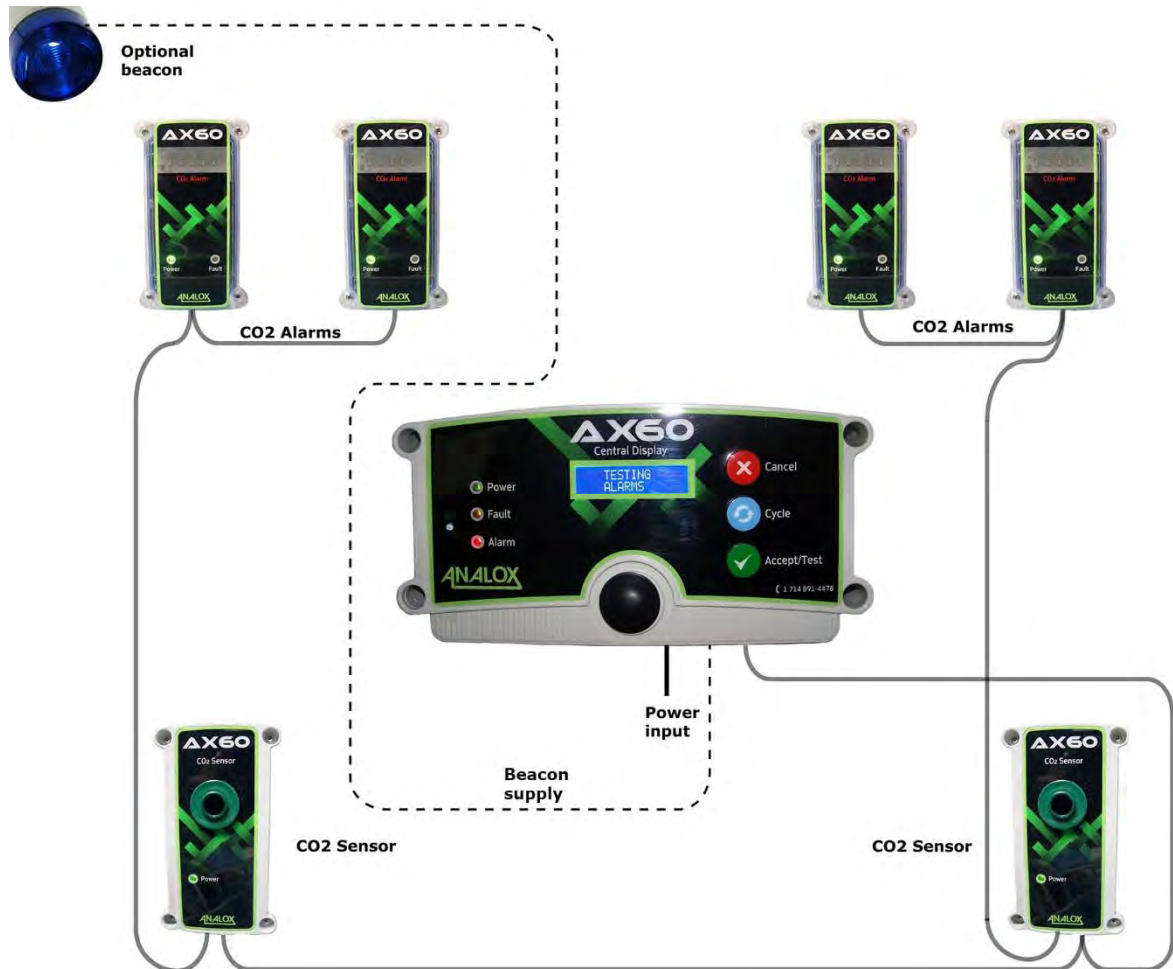
The 2-metre cables shown in the diagrams above are pre-fitted to the enclosures. The supplied 15-metre cables, RJ45 couplers and RJ45 splitters allow the system to be customised to suit the building. Other system layouts are possible, providing that the maximum number of CO₂ sensors (4) and CO₂ alarms (8) are not exceeded.

NOTE: FOR INFORMATION ON CONNECTING THE POWER SUPPLY UNIT, OPTIONAL BEACON AND RELAYS, REFER TO SECTION 8.3 HARD WIRED.

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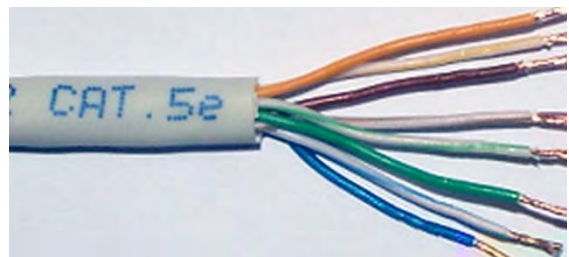
8.3 Hard Wired (HW)

CAUTION: THE RECOMMENDED CABLE ARRANGEMENT IS THE DAISY CHAIN AS SHOWN BELOW. DO NOT USE ANY OTHER CONFIGURATION.



8.3.1 Cable requirements

| Cable type | Wire colour | Abbreviation |
|---------------------------|------------------|--------------|
| Cat5e, UTP, 24AWG, PVC | Orange | ORG |
| | Orange and white | ORG/WHT |
| | Brown | BRN |
| | Brown and white | BRN/WHT |
| | Green and white | GRN/WHT |
| | Green | GRN |
| | Blue and white | BLU/WHT |
| | Blue | BLU |



If you install cables through walls, remove the knockout and fit a foam gasket to maintain ingress protection (see below left). If you install cables along wall surfaces, fit cable glands (below right).

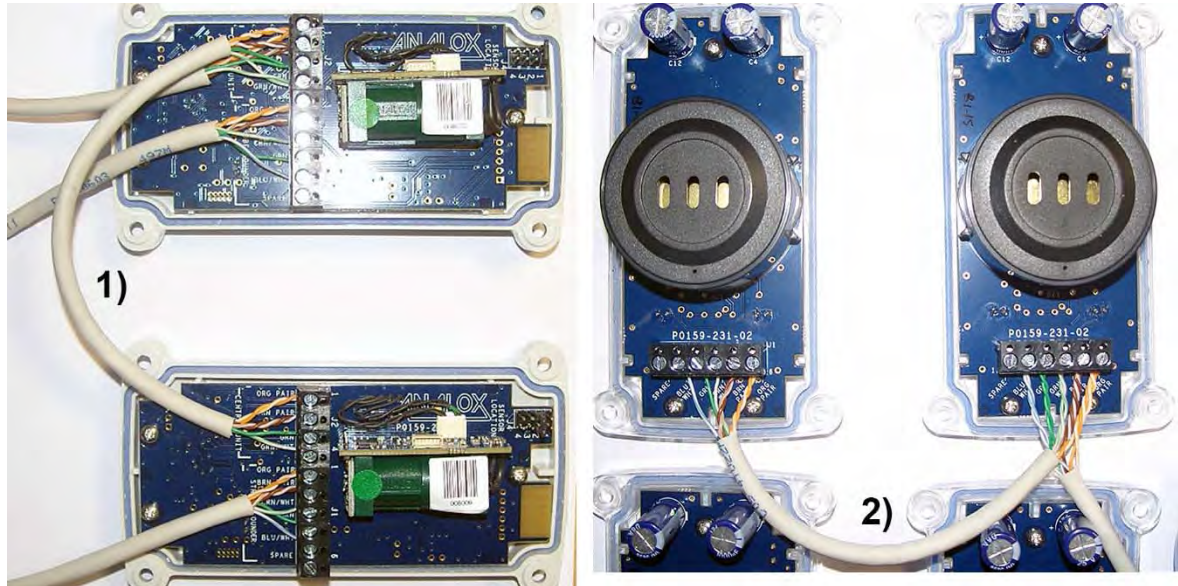


CAUTION: ENSURE THAT THE MAXIMUM CABLE LENGTH BETWEEN THE CENTRAL DISPLAY AND THE FINAL SENSOR IS NOT MORE THAN 100 METRES.

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8.3.2 Sensors and Alarms

The recommended cable arrangement for connecting the CO₂ Sensors and CO₂ Alarms is shown below. For the purposes of this example the enclosures have been removed and the cables have been shortened for convenience. The Central Display is not shown.



1) CO₂ Sensors connected via daisy-chain

2) CO₂ Alarms connected via daisy-chain

8.3.3 Central Display terminals



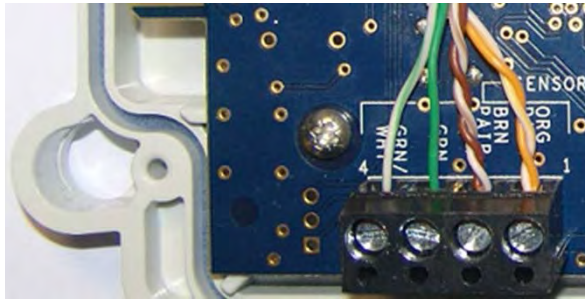
| CO ₂ Sensor | Beacon | Power | Relay 2 | Relay 1 |
|------------------------|---------------------|---------------------|----------------------------------------------------------------------------------------------------------------|---------|
| (see section 8.3.4) | (see section 8.3.6) | (see section 8.3.5) | SPDT relays rated for 30Vdc, 1A max (refer to the Ax60 Service Manual for further information on using Relays) | |

⚠ WARNING: TO COMPLY WITH THE SAFETY STANDARDS IN SECTION 16, CIRCUITS CONNECTED TO RELAYS 1 & 2 MUST BE PROTECTED WITH DOUBLE/REINFORCED INSULATION FROM THE MAINS.

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8.3.4 Central Display to CO₂ Sensor



Cable connections from left to right:

- GRN/WHT (RS485 A, single cable)
- GRN (RS485 B, single cable)
- BRN & BRN/WHT (supply negative, two cables twisted together)
- ORG & ORG/WHT (supply positive, two cables twisted together)

NOTE: THE BLUE AND BLUE/WHITE CABLES CAN BE REMOVED (CUT OFF).

8.3.5 Central Display to power supply unit (PSU)

Two types of PSU are available, to suit different types of installation. One is a plug-in type, the other is a hard-wired type for connection to a fixed power supply (fused spur).

CAUTION: THE HARD-WIRED POWER SUPPLY UNIT SHOULD BE CONNECTED TO A 3A FUSED SPUR, TO ENSURE THAT THE PSU IS PROTECTED FROM POTENTIAL DAMAGE.



PSU, plug-in type (supplied with plug for specific country)

PSU, hard-wired type (for connection to a fixed power supply)

The plug-in PSU is supplied with a securing strip, wall plugs and screws to reduce risk of accidental disconnection or tampering

WARNING: THE POSITIVE AND NEGATIVE POWER CABLES ARE IDENTIFIED DIFFERENTLY DEPENDING ON THE TYPE OF PSU SUPPLIED. READ THE INSTRUCTIONS BELOW BEFORE INSTALLING THE PSU CABLE.

Plug-in type PSU cable identification

- Black with stripe: Positive (24V)
- Black with print: Negative (0V)



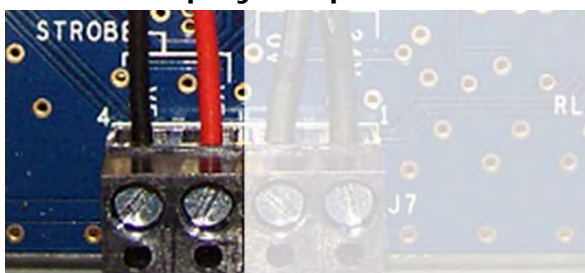
Hard wired type PSU cable identification

- Black with stripe: Negative (0V)
- Black with print: Positive (24V)



NOTE: SURPLUS CABLE CAN BE SHORTENED OR STORED IN THE CENTRAL DISPLAY.

8.3.6 Central Display to optional beacon (labelled 'STROBE' on the PCB)



Cable connections from left to right:

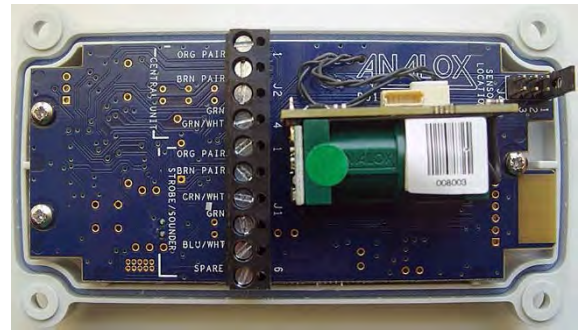
- BLK (0V supply to optional beacon)
- RED (24V supply to optional beacon)

CAUTION: CABLE COLOURS BETWEEN THE CENTRAL DISPLAY AND BEACON MAY VARY. THE INSTALLER MAY USE CAT5E CABLE IF PREFERRED, PROVIDING TWISTED PAIRS ARE USED. 15m CABLE IS SUPPLIED AS STANDARD.

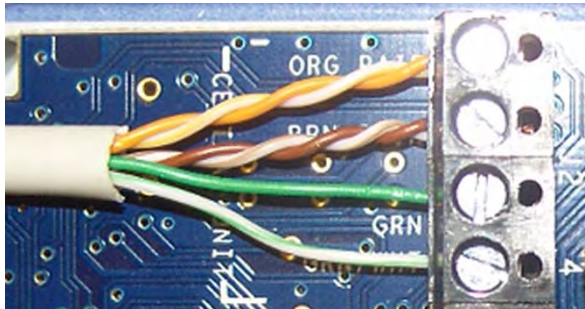
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8.3.7 CO₂ Sensor

- NOTE: THE FOUR UPPER SCREW TERMINALS ARE FOR CONNECTING THE CO₂ SENSOR TO THE CENTRAL DISPLAY. ON THE PCB THESE TERMINALS ARE LABELLED 'CENTRAL UNIT'.
- NOTE: THE SIX LOWER SCREW TERMINALS ARE FOR CONNECTING THE CO₂ SENSOR TO THE CO₂ ALARM. ON THE PCB THESE TERMINALS ARE LABELLED 'STROBE/SOUNDER'.



8.3.8 CO₂ Sensor to Central Display

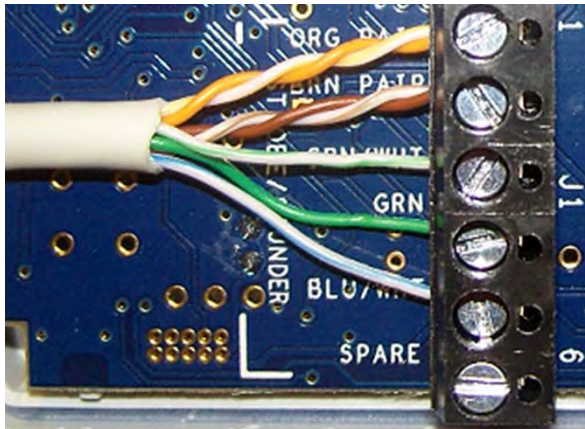


- Cable connections from top to bottom:**
- ORG & ORG/WHT (supply positive, two cables twisted together)
 - BRN & BRN/WHT (supply negative, two cables twisted together)
 - GRN (RS485 B, single cable)
 - GRN/WHT (RS485 A, single cable)

- NOTE: THE BLUE AND BLUE/WHITE CABLES CAN BE REMOVED (CUT OFF).

- NOTE: SENSOR 2 CABLE SHOULD BE DAISY-CHAINED FROM SENSOR 1 TERMINALS.

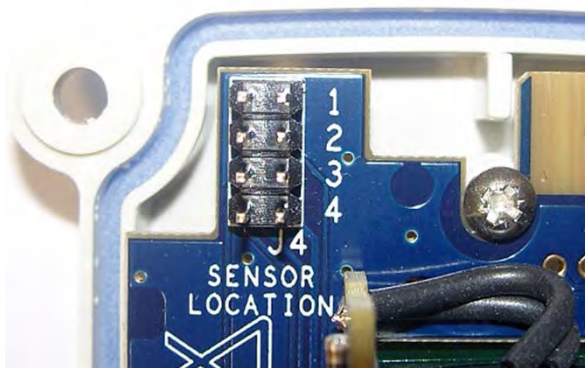
8.3.9 CO₂ Sensor to CO₂ Alarm




- Cable connections from top to bottom:**
- ORG & ORG/WHT (supply positive, two cables twisted together)
 - BRN & BRN/WHT (supply negative, two cables twisted together)
 - GRN/WHT (alarm strobe driver, single cable)
 - GRN (alarm sounder driver, single cable)
 - BLU/WHT ('Fault' LED driver, single cable)

- NOTE: THE BLUE CABLE CAN BE REMOVED (CUT OFF).

8.3.10 CO₂ Sensor jumper locations



Each CO₂ Sensor PCB contains a SENSOR LOCATION selector with 4 jumper links. One jumper link is provided with each sensor—an example is shown here on the right:  By default this jumper link is fitted in SENSOR LOCATION 1.

Each CO₂ Sensor must be given a different SENSOR LOCATION by moving its jumper link. For example, in a 2-sensor system, one sensor's jumper link must be set to SENSOR LOCATION 1, and the other sensor's jumper link must be set to SENSOR LOCATION 2.

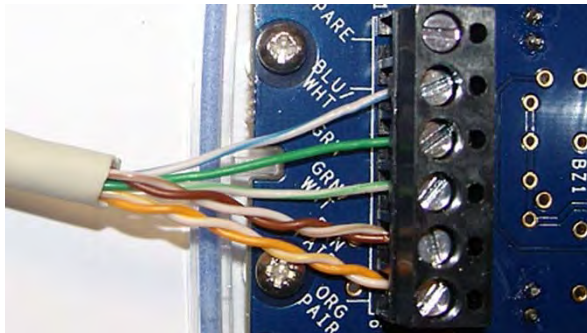
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8.3.11 CO₂ Alarm



◆ **NOTE: ALL CO₂ ALARMS ASSOCIATED WITH A COMMON SENSOR SHOULD BE CONNECTED VIA A DAISY-CHAIN CABLE ARRANGEMENT. FOR EXAMPLE, IF SENSOR 1 IS REQUIRED TO DRIVE TWO ALARMS, ONE CABLE SHOULD BE CONNECTED BETWEEN CO₂ SENSOR 1 AND CO₂ ALARM 1; AND ONE CABLE SHOULD BE CONNECTED BETWEEN CO₂ ALARM 1 AND CO₂ ALARM 2 (SEE THE EXAMPLE IN SECTION 8.3.2).**

8.3.12 CO₂ Alarm to CO₂ Sensor



Cable connections from top to bottom:
BLU/WHT (fault LED driver, single cable)
GRN (alarm sounder driver, single cable)
GRN/WHT (alarm strobe driver, single cable)
BRN & BRN/WHT (supply negative, two cables twisted together)
ORG & ORG/WHT (supply positive, two cables twisted together)

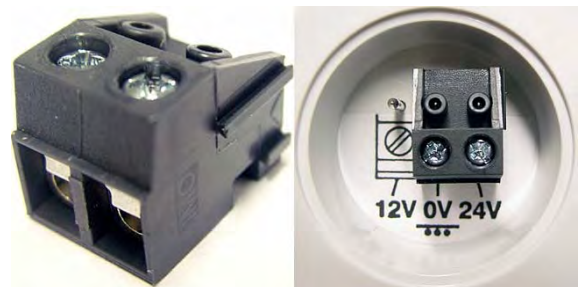
👉 **NOTE: THE BLUE CABLE CAN BE REMOVED (CUT OFF).**

8.3.13 Optional beacon

◆ **CAUTION: ENSURE THE TERMINAL BLOCK ON THE UNDERSIDE OF THE BEACON IS FITTED TO THE 0V AND THE 24V PINS. THEN ENSURE THAT THE POWER CABLES ARE CONNECTED TO THE 0V AND THE 24V SCREW TERMINALS.**



Black cable: 0V supply to Central Display
Red cable: 24V supply to Central Display



(left) The beacon terminal block. Ensure this is fitted on the 0V and 24V terminals (right)

8.3.14 Beacon locking mechanism

The beacon has a locking mechanism to discourage tampering. To lock the beacon onto its base, locate the spigots in position then twist the beacon clockwise. To unlock the beacon, prise open the locking clip as shown below and twist the beacon anti-clockwise.



9 Operation (Kiosk)

9.1 Powering on

- [1] Ensure the components are correctly installed.
- [2] Switch on the mains power at the wall socket. The Ax60K powers on and runs a 5-second self-test, during which:
 - the CO₂ Alarm indicators illuminate
 - the CO₂ Sensor indicators illuminate
 - the CO₂ Sensor internal buzzer sounds

Following a successful power-on, the CO₂ Sensor begins continuously monitoring the air for CO₂. During normal operation the status of the system is indicated as shown below:

| | | |
|-------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------|
| Normal operation with CO₂ at a safe level | CO₂ Sensor indication: | Power indicator flashes once per second. Alarm indicator is off. Buzzer is off. |
| | CO₂ Alarm indication: | Power indicator is on. Fault indicator is off. Strobe light is off. Sounder is off. |

9.2 Understanding alarms

The hazard warning/information labels explain what to do in the event of an alarm. The alarms vary depending on the severity of the CO₂ level. Alarms are indicated as follows:

| | | |
|-----------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| TWA alarm (0.5% over previous 8 hours) | CO₂ Sensor indication: | Power indicator flashes once per second. Alarm indicator flashes ¼ second on, 1¾ seconds off. Buzzer sounds in parallel. |
| | CO₂ Alarm indication: | Power indicator is on. Fault indicator is off. Strobe light is off. Sounder is off. |
| Low alarm (1.5%) | CO₂ Sensor indication: | Power indicator flashes once per second. Alarm indicator flashes 1 second on, 1 second off. Buzzer sounds in parallel. |
| | CO₂ Alarm indication: | Power indicator is on. Fault indicator is off. Strobe light flashes 1 second on, 1 second off. Sounder is off. |
| High alarm (3%) | CO₂ Sensor indication: | Power indicator flashes once per second. Alarm indicator flashes ⅛ second on, ⅛ second off. Buzzer sounds in parallel. |
| | CO₂ Alarm indication: | Power indicator is on. Fault indicator is off. Strobe light and sounder are ½ second on, ½ second off. |

9.2.1 Testing alarms

- [1] Press and hold down the **Accept/Test** button for 5–10 seconds. The Ax60K runs a 5-second alarm test, during which:
 - the CO₂ Alarm indicators illuminate
 - the CO₂ Alarm strobe light illuminates
 - the CO₂ Alarm sounder operates
 - the CO₂ Sensor indicators illuminate
 - the CO₂ Sensor internal buzzer operates
- [2] Either press and hold down **Accept/Test** to stop the alarm test or wait 5 seconds for the alarm test to stop automatically.

9.2.2 Acknowledging/clearing alarms

Press and hold **Accept/Test** until the buzzer sounds once; the alarm is now acknowledged. The buzzer and sounder are muted and the strobe stays on until the alarm is cleared (it clears automatically as soon as the CO₂ level reduces to below the alarm threshold).

◆ **CAUTION: THE Ax60K RETAINS ITS CURRENT ALARM STATE, EVEN AFTER A POWER OUTAGE. IF AN ALARM IS NOT ACKNOWLEDGED BEFORE THE Ax60K IS POWERED OFF, IT RETURNS TO ALARM CONDITION WHEN POWERED ON.**

9.3 Controls and indicators



① Power indicator (green LED)

If the **Power** indicator flashes once per second:

- CO₂ Sensor is receiving power and operating correctly

If the **Power** indicator is off:

- CO₂ Sensor is not receiving power, **or** the CO₂ Sensor has a fault

If the **Power** indicator is continuously on:

- CO₂ Sensor has a fault

② Alarm indicator (red LED)

The **Alarm** indicator has three flash patterns, one for each type of alarm:

- ¼ second on, 1¾ seconds off = TWA alarm (0.5% CO₂ average over 8 hours).
- 1 second on, 1 second off = 1.5% CO₂.
- ⅛ second on, ⅛ second off = 3% CO₂.

If the **Alarm** indicator is continuously on:

- the alarm is acknowledged; the alarm will clear when the CO₂ level reduces.

③ Accept/Test button

To use the **Accept/Test** button, press it firmly and hold it down for a couple of seconds. When you release the button, the buzzer will sound once.

④ Internal buzzer

The internal buzzer sounds briefly when you press **Accept/Test**, continuously for 5 seconds when the Ax60K powers up, once per second to show a fault, and in parallel with the alarms.

⑤ Sensor opening

The sensor opening allows air to flow across the carbon dioxide detector. The sensor opening must be kept clean and free from obstructions.



① Power indicator (green LED)

If the **Power** indicator is on (not flashing):

- CO₂ Alarm is receiving power

NOTE: The CO₂ Alarm receives its power from the CO₂ Sensor.

If the **Power** indicator is off:

- CO₂ Alarm is not receiving power, **or**
- CO₂ Alarm has a fault

NOTE: If the CO₂ Sensor has a fault, the CO₂ Alarm Fault indicator LED will flash.

② Fault indicator (yellow LED)

If the **Fault** indicator is off:

- CO₂ Sensor is functioning correctly

If the **Fault** indicator flashes once per second:

- CO₂ Sensor has a fault

NOTE: The Fault indicator LED does not mean there is a fault on the CO₂ Alarm, it means there is a fault on the CO₂ Sensor.

③ Strobe light

The strobe light is a very bright, visible alarm.

NOTE: The strobe window can be supplied in white, blue or red.

The strobe light has two flash patterns:

- 1 second on, 1 second off = 1.5% CO₂.
- ½ second on, ½ second off = 3% CO₂.

④ Sounder

The sounder is a high-volume audible alarm.

If sounder is ½ second on, ½ second off, the CO₂ Sensor has triggered a high alarm (3%).

10 Operation (HW & QC)

10.1 Central Display

The Central Display is used to configure and operate the system. The three buttons on the front panel allow access to the software functions. The three indicator lamps and the internal buzzer provide information about the system status, as described below.



10.1.1 Indicators and buzzer

| | |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power | Green indicator lamp. Flashes once per second to indicate that the power is on and the unit is operating. |
| Fault | Yellow indicator lamp. Flashes once per second if there is a fault. Accompanied by a fault message (FLT or COMMS FAULT) and buzzer once per second. |
| Alarm | Red indicator lamp. Flashes rapidly when alarm is triggered. Accompanied by an alarm message (TWA, AL1 or CO2) and rapid operation of the buzzer. |
| Buzzer (the small circular aperture on the left of the indicators) | Buzzer sounds briefly each time a button is pressed. Sounds continuously for five seconds when using the TESTING ALARMS function. It sounds rapidly on and off when an alarm is triggered, or once per second for a fault. |

10.1.2 Control buttons

| | |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cancel | To use the Cancel button, press it firmly then release it quickly. The buzzer will sound briefly. Press this button to cancel a menu option or to return to the previous screen. |
| Cycle | To use the Cycle button, press it firmly then release it quickly. The buzzer will sound briefly. Press this button to go to the next option on the screen. |
| Accept/Test | To use the Accept/Test button, press it firmly then release it quickly; the buzzer will sound. A short press is used to select an option or mute an alarm or fault. A longer press is used to acknowledge the alarm—hold the button until the buzzer sounds. The alarm clears when the CO ₂ reduces. To test the alarms, press and hold down Accept/Test until the buzzer sounds. Alarms, indicators and sounders operate for five seconds. |

10.2 CO₂ Sensor

The CO₂ Sensor has a green Power indicator on the bottom left-hand part of the fascia. This is used to indicate the following conditions:



Power indicator

Under normal conditions the Power indicator flashes once per second to indicate that the power is on and the unit is operating.

NOTE: THE CO₂ SENSOR RECEIVES ITS POWER FROM THE CENTRAL DISPLAY, VIA THE CONNECTING CAT5E CABLE.

If the Power indicator is off, this means the CO₂ Sensor is either not receiving power from the Central Display, or the CO₂ Sensor has a fault.

NOTE: CHECK THE CENTRAL DISPLAY; IT MAY BE SHOWING A FAULT CODE.

If the Power indicator lamp is on continuously, this means that there is potentially a more serious CO₂ Sensor fault.

NOTE: CHECK THE CENTRAL DISPLAY; IT MAY BE SHOWING A FAULT CODE.

If a CO₂ Sensor is in fault, any CO₂ Alarms connected to it will also display a fault status (their yellow Fault indicator LEDs will flash).

NOTE: FAULT CODES ARE DESCRIBED IN DETAIL IN THE SERVICE MANUAL.

10.3 CO₂ Alarm

The CO₂ Alarm has both a green Power indicator and an yellow Fault indicator on the bottom part of the fascia. These are used to indicate the following conditions:



Power indicator

Under normal conditions the Power indicator is continuously on (not flashing) to indicate that the power is on and the unit is operating.

NOTE: THE CO₂ ALARM RECEIVES ITS POWER FROM THE CO₂ SENSOR VIA THE CONNECTING CAT5E CABLE.

If the Power indicator is off this means that the CO₂ Alarm is not receiving power.

Fault indicator

Under normal conditions the yellow Fault indicator is off.

NOTE: THE FAULT INDICATOR IS NOT USED TO SHOW FAULTS ON THE CO₂ ALARM, IT IS USED TO SHOW FAULTS ON THE SENSOR CONNECTED TO IT.

If the Fault indicator is flashing it means the CO₂ Sensor connected to the Alarm is in fault.

NOTE: FAULT CODES ARE SHOWN ON THE CENTRAL DISPLAY. FOR FURTHER DETAILS SEE THE SERVICE MANUAL.






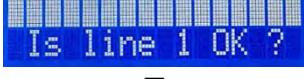






11 Software

This section gives a brief overview of the software. For full details of the menu options relevant to calibration and configuration, refer to the *Ax60 Service Manual P0159-803*.

NOTE: THIS SECTION SPECIFICALLY RELATES TO THE Ax60 STANDARD OPTIONS HW AND QC. HOWEVER, A CENTRAL DISPLAY CAN BE TEMPORARILY CONNECTED TO THE Ax60K KIOSK TO ENABLE A SERVICE ENGINEER TO RECONFIGURE THE SYSTEM.

11.1 Powering up

When you power up the Ax60, the software performs an automatic power-on-self-test (POST) which takes about 30 seconds. The results are shown on the Central Display.

| Operator input | Software response | Central Display text | Optional text / notes |
|-------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Switch on power supply to Ax60 | Displays vendor name and website (default is Analox Ltd) |  | Vendor name may vary |
| No further operator input is required. The POST is an automatic process | Performs a checksum configuration check |  | |
| | Performs a software validation check |  | |
| | Checks the CO ₂ Sensor(s) have been calibrated |  |  |
| | Confirms top line of LCD OK, no pixels are missing |  | No sensors are configured |
| | Confirms bottom line of LCD OK, no pixels missing |  | |
| | Confirms buzzer is off and green LED switches on |  | |
| | Confirms green LED is off and yellow switches on |  | |
| | Confirms yellow LED is off and red switches on |  | |
| | Confirms red LED is off and buzzer switches on |  | |
| | Displays current software. Buzzer switches off |  | |

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| Operator input | Software response | Central Display text | Optional text / notes |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Displays unique serial number of the unit | | |
| Wait for CO ₂ Sensors to warm up... | | | This screen may display for a few seconds to show CO ₂ Sensor warm-up status. It is for information only. It requires no operator input |
| CAUTION: | EACH CO₂ SENSOR MUST HAVE ITS JUMPER SET TO A DIFFERENT LOCATION (E.G. SENSOR 1 = LOCATION 1; SENSOR 2 = LOCATION 2), OTHERWISE THE CENTRAL DISPLAY WILL ANNOUNCE A FAULT. REFER TO SECTION 8.3.10 FOR JUMPER SETTINGS INFORMATION. | | |
| Wait for system status screen... | Displays system status screen. Each CO ₂ Sensor is represented by 'OK' in the top line. For example, a system with two CO ₂ Sensors displays >OK OK. The '>' character identifies which CO ₂ Sensor is highlighted (CO ₂ Sensor 1 is highlighted by default) | | The CO ₂ concentration is by default displayed in ppm (parts per million). The example shown here displays 450 PPM, which is equal to 0.045%. |
| | NOTE: THE SYSTEM STATUS SCREEN DISPLAYS UP TO 4 CO₂ SENSORS. A SPARE CO₂ SENSOR LOCATION DISPLAYS AS: '—' | | |
| Press Cycle | Displays CO ₂ Sensor 2 details (if installed) and the current level of CO ₂ | | In this example, CO ₂ Sensor 2 is not installed |
| Press Cycle | Displays CO ₂ Sensor 3 details (if installed) and the current level of CO ₂ | | In this example, CO ₂ Sensor 3 is not installed |
| Press Cycle | Displays CO ₂ Sensor 4 details (if installed) and the current level of CO ₂ | | In this example, CO ₂ Sensor 4 is not installed |
| Press Cycle | Redisplays the system status screen | | |

11.2 Central Display screen

The Central Display has a two-line screen that provides real-time CO₂ readings from up to four CO₂ Sensors. The top line of the screen shows the status of CO₂ Sensors 1, 2, 3 and 4 (if connected), displayed from left to right. The bottom line of the screen shows the number of the highlighted Sensor, its current reading and the unit of measurement. If a system fault or a communications fault occurs, this is displayed on the bottom line in place of the current reading and unit of measurement. Under normal operating conditions the CO₂ Sensor which is currently highlighted is identified by a chevron ('>') directly to its left. The chevron changes to an asterisk ('*') if the Sensor goes into alarm or fault mode. When the alarm / fault is acknowledged the symbol reverts to a chevron.

Sensor 1 status is currently 'OK'.
Sensor 2 status is currently 'OK'.
Sensor 3 status is currently '----' (this means that Sensor 3 is NOT installed).
Sensor 4 status is currently '----' (this means that Sensor 4 is NOT installed).

A chevron symbol ('>') is used to identify the currently selected CO₂ Sensor, in this example CO₂ Sensor 1. If a CO₂ Sensor is in 'Alarm' or 'Fault', then an asterisk ('*') is used to identify the CO₂ Sensor instead of the chevron symbol.

The number of the selected Sensor (either 1:, 2:, 3:, or 4:). If any of the CO₂ Sensors triggers an alarm, it then becomes the selected Sensor. The screen automatically jumps to the number of the Sensor in alarm.

Unit of measurement; ppm (an abbreviation of 'parts per million') denotes the CO₂ level. Converting to percent is straightforward, e.g. 450 ppm = 0.045%; 15,000 ppm = 1.5%; 30,000 ppm = 3%.

Live CO₂ measurement at the selected Sensor. Alternatively this could display 'COMMS FAULT' or 'FLT ##' if there is a system or Sensor fault.

There are seven possible statuses for each CO₂ Sensor. These are described below:

| Status | Meaning | Example |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| OK | This indicates that a CO ₂ Sensor is functioning correctly. In the example on the right, both CO ₂ Sensor 1 and CO ₂ Sensor 2 are OK. Sensor 1 is currently highlighted ('>') | |
| ---- | This indicates that a CO ₂ Sensor is not installed. In the example on the right, neither Sensor 3 nor Sensor 4 is installed | |
| TWA | This indicates that a CO ₂ Sensor has exceeded the TWA (time weighted average) of 5000ppm (0.5%) CO ₂ in the previous 8 hours; Sensor 1 has triggered a TWA alarm | |
| AL1 | This indicates that a CO ₂ Sensor has exceeded 15000ppm (1.5%) CO ₂ and has triggered a low alarm. In the example on the right, CO ₂ Sensor 1 is in alarm | |
| CO2 | This indicates that a CO ₂ Sensor has exceeded 30000ppm (3%) CO ₂ and has triggered a high alarm. In the example on the right, CO ₂ Sensor 1 is in alarm | |
| FLT ## | This indicates that a CO ₂ Sensor has developed a system fault. In the example on the right, Sensor 1 is in fault state FLT05 (refer to the Service Manual for fault codes) | |
| FLT COMMS | This indicates that a CO ₂ Sensor has developed a comms (communications) fault. In the example on the right, Sensor 1 is in COMMS FAULT (refer to Service Manual) | |

NOTE: UNACKNOWLEDGED ALARMS AND FAULTS ARE INDICATED BY AN ASTERISK.

11.3 Alarms

The Ax60 has three default alarm levels. These are pre-set by Analox and may only be changed by an authorised installer or service engineer. They are described below.

| Alarm | CO ₂ threshold | Annunciation (text, buzzer, indicator, strobe, sounder) | | |
|-------|------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| | | Central Display | CO ₂ Alarm units | Optional beacon |
| TWA | 0.5% (5000ppm) average, 8hrs | Display text: *TWA; buzzer & red LED on | All CO ₂ Alarms off; annunciation by Central Display only | Flashing |
| Low | 1.5% (15,000ppm) | Display text: *AL1; buzzer on; flashing red LED on | CO ₂ Alarm(s) connected to the affected sensor: slowly flashing strobe (1 second on 1 second off), no sounder | Flashing |
| High | 3% (30,000ppm) | Display text: *CO2; buzzer on; flashing red LED & relays on | All connected CO ₂ Alarms: rapidly flashing strobe lights (½ second on ½ second off) and sounders on (½ second on ½ second off) | Flashing |

TWA (time-weighted average), 0.5% CO₂ over the previous eight hours. If the CO₂ level exceeds an average of 0.5% over the previous eight hours the Sensor raises a TWA alarm. The Central Display buzzer will sound and the red indicator flashes rapidly. The optional beacon will flash. The screen displays *TWA. CO₂ Alarms will not operate.

Low alarm, 1.5% CO₂ If a Sensor detects a CO₂ level at or beyond the low threshold of 1.5%, it raises a low alarm and informs the Central Display of the alarm condition. The sounders do not operate at this alarm level, but the strobes begin to flash slowly (1 second on 1 second off). If an optional beacon is installed, this also begins to flash. The Central Display screen now identifies the CO₂ Sensor that originated the low alarm by displaying the text '*AL1'.

High alarm, 3% CO₂ If a Sensor detects a CO₂ level at or beyond the high threshold of 3% the Central Display raises an 'evacuation mode' high alarm. This alarm triggers all the installed CO₂ Alarms to switch on. All sounders now operate (½ second on ½ second off) and strobes begin to flash rapidly (½ second on ½ second off). The Central Display identifies the CO₂ Sensor that originated the alarm by displaying the text '*CO2'. The optional beacon and built-in relays switch on.

11.3.1 Muting, acknowledging and clearing alarms

⚠ CAUTION: THE Ax60K RETAINS ITS CURRENT ALARM STATE, EVEN AFTER A POWER OUTAGE. IF AN ALARM IS NOT ACKNOWLEDGED BEFORE THE Ax60K IS POWERED OFF, IT RETURNS TO ALARM CONDITION WHEN POWERED ON.

To clear alarms, they must first be muted and acknowledged in the following sequence:

1) Mute: To mute (silence) an alarm, briefly press the **Accept/Test** button. The buzzer will sound once and the CO₂ Alarm sounders will be silenced. However, the strobe lights on the CO₂ Alarm and the optional beacon (if this is installed) will continue to flash.

2) Acknowledge: To acknowledge an alarm, press and hold the **Accept/Test** button for approximately two seconds. The buzzer on the Central Display will sound briefly and the text changes: the asterisk is replaced with a chevron, for example '*AL1' becomes '>AL1'.

3) Clear: An alarm that has been muted and acknowledged will automatically clear as soon as the CO₂ reduces to a safe level (there may be a delay before the alarm clears, if the CO₂ level remains high). When the alarm clears, the screen text changes to '>OK'.

11.3.2 Testing alarms

To test the alarms, press and hold down the **Accept/Test** button for two seconds. The indicator LEDs illuminate, the screen displays 'TESTING ALARMS' and the buzzer sounds. Strobes and sounders on the CO₂ Alarm(s) switch on. The optional beacon flashes (if installed). The alarm test is automatically cancelled (switched off) after five seconds.

11.4 Faults

Faults are reported by the Ax60 if there is a problem with the cable connections, power supplies or system components. A basic understanding of how fault types are displayed may be useful when describing them to an authorised technician or a service engineer.

NOTE: THE Ax60 IS DESIGNED TO PRIORITISE ALARMS OVER FAULTS. FOR EXAMPLE, IN A SYSTEM WITH TWO CO₂ SENSORS, IF SENSOR 1 IS IN FAULT AND SENSOR 2 GOES INTO ALARM, THE ALARM TAKES PRIORITY.

11.4.1 Fault types

A fault may be categorised as either a system fault, a communications fault or a Central Display fault. All three types display the text 'FLT' but in different parts of the screen. A Central Display fault is not announced by the CO₂ Sensors or CO₂ Alarms, but by the Central Display only. The table below shows examples of the three different fault types.

| Status | Meaning | Example |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| FLT (system) | This indicates that a CO ₂ Sensor has developed a system fault. In the example on the right, Sensor 1 is in fault state FLT05 (see the Service Manual for fault codes) | |
| FLT (comms) | This indicates that a CO ₂ Sensor has developed a communications fault. In the example on the right, Sensor 1 has a COMMS FAULT (see the Service Manual for fault codes) | |
| FLT (Central Display) | This indicates that the Central Display has developed a fault. In the example on the right, the Central Display is in fault FLT51 (see the Service Manual for fault codes) | |

11.4.2 Muting, acknowledging and clearing faults

Faults are announced by the Central Display buzzer which sounds once per second. CO₂ Alarms do not operate. To clear a fault, it must be muted and acknowledged as below:

- 1) Mute:** To mute (silence) a fault, briefly press the **Accept/Test** button. The internal buzzer will sound once and then be silenced.
- 2) Acknowledge:** To acknowledge a fault, press and hold the **Accept/Test** button for approximately two seconds. The buzzer on the Central Display will sound briefly and the text changes: the asterisk is replaced with a chevron, for example '*FLT' becomes '>FLT'.
- 3) Clear:** A fault that has been muted and acknowledged will automatically clear as soon as the fault is rectified.

NOTE: IF A FAULT IS REPORTED BY MORE THAN ONE CO₂ SENSOR, YOU MUST MUTE, ACKNOWLEDGE AND CLEAR THE FAULT ON THE FIRST SENSOR. THEN PRESS CYCLE TO HIGHLIGHT THE NEXT SENSOR AND REPEAT THE MUTE/ACKNOWLEDGE/CLEAR.

11.4.3 Simultaneous alarms and faults


In a multi-sensor system it is possible for Sensors to be in different states, e.g. Sensor 1 OK; Sensor 2 in alarm level 2; Sensor 3 in fault; Sensor 4 not installed. For example:

| Sensor | Status | Meaning | Example |
|--------|--------|---------------------------------------------------------------------------------------------------------|---------|
| 1 | OK | Sensor 1 is operating normally (OK) | |
| 2 | *CO2 | Sensor 2 is in level 2 alarm (CO ₂), it is unacknowledged (*) and has been highlighted (2:) | |
| 3 | FLT | Sensor 3 is in fault (FLT) and is unacknowledged | |
| 4 | --- | Sensor 4 is not installed | |

12 Configuration

12.1 Sensor hardware settings

In a standard Ax60 system—not including the Kiosk option—each CO₂ sensor must have its jumper link set to a different location e.g. Sensor 1=location 1; Sensor 2=location 2.

The CO₂ Sensor has a hardware setting that is factory configured for a system with only one Sensor. If a system includes two, three, or four Sensors then the hardware must be reconfigured by moving a jumper link () in each Sensor installed in the system.

⚠ WARNING: **DISCONNECT AND ISOLATE THE Ax60 SYSTEM FROM THE MAINS POWER SUPPLY BEFORE OPENING THE CO₂ SENSOR ENCLOSURES.**

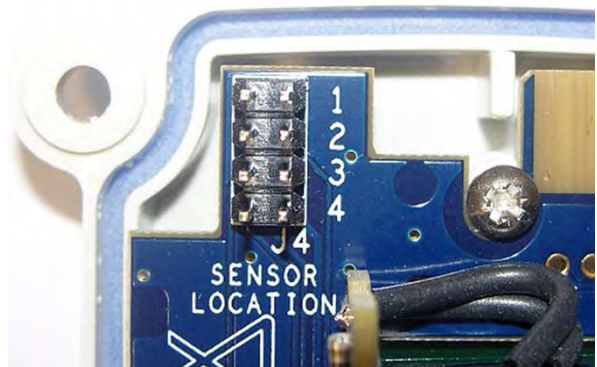
To access the jumper link, open the CO₂ Sensor enclosure. The printed circuit board (PCB) has a SENSOR LOCATION selector with one link, factory installed in LOCATION 1.

For a system with only **one CO₂ Sensor**, the jumper link should be retained in LOCATION 1.

For a system with **two CO₂ Sensors**, the first Sensor's jumper link should be in LOCATION 1 and the second Sensor's link in LOCATION 2.

For a system with **three CO₂ Sensors**, the first Sensor's link should be in LOCATION 1, the second Sensor's link in LOCATION 2 and the third Sensor's link should be in LOCATION 3.

For a system with **four CO₂ Sensors**, the first Sensor's jumper link should be in LOCATION 1, the second Sensor's link in LOCATION 2, the third Sensor's link in LOCATION 3 and the fourth Sensor's link should be in LOCATION 4.



12.2 Sensor software settings

The Central Display software is factory configured for a system that has two Sensors. If the system includes one, three, or four Sensors, the software must be reconfigured. This is done by using the Top-level Menu, Configuration, Attached snrs option. To enter the Top-level menu, press and hold down **Cancel + Cycle** for at least six seconds. Then press the **Cycle** button four times to display the Top-level menu, Configuration option.

📌 NOTE: THE DEFAULT SETTING IS FOR 2 SENSORS. THIS NUMBER CAN BE CHANGED.

| Menu option | Operator input | Menu sub-option | Functional description |
|-------------|----------------|-----------------|------------------------|
|-------------|----------------|-----------------|------------------------|

```
Top-level Menu
Configuration >
```



Press **Accept/Test** to go to Config. Menu Attached snrs ▶

```
Config. Menu
Attached snrs >
```

Press **Accept/Test** to go to Num of sensors? ▶

```
Num. of sensors?
1 >2 3 4
```

The screen displays the number of CO₂ Sensors (default number is '>2')

Press **Cycle** to choose another number. Or press **Accept/Test** ▶

```
Num. of sensors?
1 |2 3 4
```

The screen displays a tick to confirm the number of sensors is now configured

Press **Cancel** to return to Config. Menu, Attached snrs

13 Maintenance

This section describes routine preventive maintenance for the Ax60. For more detailed information on servicing, refer to the *Ax60 Service Manual P0159-803*.

13.1 Faults

Faults are announced by the **Fault** indicator on either the Central Display or the CO₂ Alarm. This indicator is off during normal operation. If it flashes once per second, the system has a fault. Power off the system and call a service engineer.

13.2 Calibration

The Ax60 CO₂ sensor is factory calibrated and does not require periodic calibration adjustment. However, it incorporates a software option that enables an authorised service engineer to adjust the sensor calibration, should this be required by local Health & Safety regulations.

13.3 Cleaning

Analox recommends periodic cleaning of Ax60 enclosures with a slightly damp cloth.

⚠ **CAUTION: THE CO₂ SENSOR UNIT MUST BE PROTECTED FROM INGRESS OF WATER.**

13.4 Protection

CO₂ Sensors should be mounted at low level and are therefore vulnerable to accidental damage. To protect the CO₂ Sensor, Analox recommends fitting a Sensor Protection Kit, part number P0159-4305K, shown below (not to scale). The splashguard is fitted on the outside of the sensor opening. The sensor protector is wall mounted using the fixing kit.



Optional Ax60 Sensor Protection Kit. Available from Analox: part number P0159-4305K

14 Specification

The Ax60 is designed to be compliant with the following standard: IEC 61010-1:2010. It is designed to be safe at least under the conditions listed below.

⚠ WARNING: IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY ANALOX, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.

Notes accompanying the specification text:

- (*) Limited energy circuits according to IEC 61010-1:2010 clause 9.
- (*) Double insulation and reinforced insulation according to IEC 61010-1:2010.
- (**) Please contact Analex for use in condensing environments.
- (***) IP protection was not evaluated by UL.

14.1 Central Display

- When supplied by a limited energy double/reinforced insulation power supply (*)
- Indoor use
- Altitude up to 5000m
- Operating temperature range: -5°C to $+50^{\circ}\text{C}$
- Maximum relative humidity: 95%RH (non-condensing)
- Pollution degree 2
- Operating voltage: 24VDC
- Unit power: $<36\text{W}$
- Ingress Protection: IP54 (***)
- Not for use in corrosive or explosive atmospheres

Features:

- 2 internal SPDT relays, rated for 30VDC, 1A
- Digital communications
- Internal buzzer
- Power/fault/alarm indications
- 16-character x 2-line LCD display
- External beacon drive channel

14.2 CO₂ Sensor

- When supplied by a limited energy double/reinforced insulation power supply (*)
- Indoor/outdoor use
- Range 0 to 5% CO₂
- Warmup time 40 seconds
- Altitude up to 5000m
- Operating temperature range: -5°C to $+50^{\circ}\text{C}$
- Maximum relative humidity: 98%RH (non-condensing) (**)
- Pollution degree 2
- Operating Voltage: 24VDC
- Unit power: $<25\text{W}$
- Ingress Protection: IP55 (***)
- Not for use in corrosive or explosive atmospheres

Features:

- Green power LED
- Digital Communications


14.3 CO₂ Alarm

- When supplied by a limited energy double/reinforced insulation power supply (*)
- Indoor/outdoor use
- Altitude up to 5000m
- Operating temperature range: -5°C to +50°C
- Maximum relative humidity: 98%RH (non-condensing) (**)
- Pollution degree 2
- Operating Voltage: 24VDC
- Unit power: <5W
- Ingress Protection: IP55 (***)
- Not for use in corrosive or explosive atmospheres

Features:

- Sounder: 88dBA @ 3m
- LED Strobe: 100cd
- Green power LED
- Yellow fault LED

14.4 Sensor performance

 **NOTE:** ALL SPECIFICATIONS ASSUME THE AMBIENT PRESSURE IS 1000MBAR. THE CO₂ SENSOR ACTUALLY MEASURES PARTIAL PRESSURE OF CO₂, NOT CONCENTRATION BY VOLUME.

| Parameter | Comments | Min | Max | Units |
|-------------------------|----------------------------------------|-----|-----|---------------------|
| Range | | 0 | 5 | % CO ₂ |
| Accuracy | | 0 | 5 | % of alarm setpoint |
| Temperature sensitivity | Deviation from calibration temperature | | 50 | PPM/°C |
| Response time | To 90% of final value | 30 | | s |
| Warmup time | After power on | 40 | | s |

 **NOTE:** ANALOX HAS A POLICY OF CONTINUOUS IMPROVEMENT AND RESERVES THE RIGHT TO UPGRADE OR CHANGE SPECIFICATIONS WITHOUT PRIOR NOTICE.

14.5 Operation at altitude

The toxic effects of CO₂ are dependent on the partial pressure, or the quantity of gas molecules, not the percentage in the atmosphere; therefore at altitudes above 900 metres (3000 feet) alarms will operate below the factory calibration point. Please refer to our website www.analox.net for details of suitable alarm setpoints and calibration procedures at altitude. Note that this must be performed by an authorised engineer.

14.6 Product disposal

According to WEEE regulation this electronic product cannot be placed in household waste bins.

Please check local regulations for information on the disposal of electronic products in your area.



16 Declaration of conformity

Declaration number: P0159-905-02

Manufacturer's name: Analox Sensor Technology Limited

Manufacturer's address: 15 Ellerbeck Court
Stokesley Business Park
Stokesley
North Yorkshire
TS9 5PT

It is declared that the following product:

Product name: Analox Ax60

Product code: Ax60 Cxxxx
Ax60 Sxxxx
Ax60 Rxxxx

Each component of the Ax60 conforms to all applicable requirements of: EN50270:2006 for Type 1 Equipment
EN 61000-6-3:2007
FCC to class B levels according to title 47 of the Code of Federal Regulations (CFR) part 15 (47CFR15):2008
EN/IEC 61010-1:2010 (UL)
DIN 6653-2:2015 (TUV)

- The above product complies with the requirements of the EMC Directive 2014/30/EU
- The above product complies with the requirements of the Low Voltage Directive 2014/35/EU, as amended
- The above product complies with the requirements of the RoHS2 Directive 2011/65/EU
- The above product complies with the requirements of the WEEE Directive 2012/19/EU

UL The above product is approved for use in the USA and Canada, file number E467381

TUV The above product is certified by TUV to comply with DIN 6653-2:2015 (TUV), certificate reference ID 0000043715


FCC The above product is approved by FCC to class B levels according to title 47 of the Code of Federal Regulations (CFR) part 15 (47CFR15):2008

CE The above product is CE-marked and satisfies the relevant legislative requirements of the European Economic Area (EEA)



Signed on behalf of: Analox Sensor Technology Limited

Date: 11/12/15

Signed: 

Name: Mark Lewis

Position: Managing Director



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



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Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.