User Manual

CO₂ High Range Alarm
Complete

LSCONTROL

CO₂ High Range Alarm highlights

CO₂ High Range Alarm complete is a complete CO_2 leakage alarm system for CO₂-cooled cooling and cold stores.

The system consists of a sturdy sensor for mounting 20-70cm from floor level and an alarmbox with visual and auditory alarm signal.

The sensor has a build-in heating element which secures correct measurement in freezing rooms. The sensor uses the widely used ABC algorithm, which ensures long life without calibration. Only the room cannot be used constantly, but must regurlarly get sufficient airflow to lower the CO₂ to fresh air level (400ppm).

The Alarmbox is set with 2 alarm limits, so a warning is given at leakage and incipient problematic CO₂ level and another at high CO₂ concentration associated with danger. Also it has the possibility to connect a 12V DC backup supply and thereby ensure CO₂ monitoring and alarm in case of main supply outage. The Alarmbox is also equipped with 2 potential free relays, which are drawn at 2 different setpoints for alarm. If wanted you can connect external alarmlamps, rotating lights or external sounding devices to these potential free relays.

CO₂ High Range Alarm complete has all you need for CO₂ monitoring and alarm warning.

The complete system is ordered using item number 40840 CO2 Alarm System Complete and consist of item number 49124 CO2 High Range Alarm / ES 1180 and 49125 CO2 sensor High Range 980_1.

Table of Content

Manufacturer Information

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Safety Regulations

Read the entire manual before installation and use of CO_2 High Range Alarm.
If the regulations in this user manual are not followed, it may cause damage to the product and lapse of warranty.

This user manual is primarily for technical personnel who are going to set up and use CO_2 High Range Alarm in an installation.

It is required that the person setting up and installing the product has the necessary practical experience and education within the area where the product is used and also possesses any necessary authorization to set up installation equipment.

Be careful not to damage the product during unpacking.

Make sure to follow rules for tools when mounting.

Contact hazard.
Beware of live parts (230V AC) in the device during installation and setting

Do not touch product with wet hands.

Do not store or use product outside recommended temperature area, and do not expose to UV-light.

Do not wash product with water or any other liquids.

Product is only to be used in non-condensing environment.

Product must not be exposed to direct sunlight.

Make sure to be ESD-discharged before installing the product.

Product must not be disposed of in refuse collection.

Product must be disposed of according to local regulations regarding disposal of small electronic products.

Standards and Directives

CO_2 High Range Alarm complies with the standards and directions below.

- DS/EN 60730-1:2016 - Automatic electrical controls – Part 1: General requirements

- EN 61000-6-1:2007 Immunity. Residential, commercial, and light industry

- EN 61000-6-3:2007 Emission. Residential, commercial, and light industry

- EN 61000-6-3/A1:2011

- EN 61000-6-3/A1/AC:2012

This product complies with the RoHS directive, Directive 2011/65/EU

The manufacturer of this product is registered with the statutory return system under the WEEE directive.

Technical Specifications Alarmbox

Primary Supply Voltage: 100-240V AC

Frequency: 50/60 Hz

Max Main Fuse: 16A

Backup Supply: 12V DC 500mA
(If sensor is to be supplied from backup supply
min. 12,0VDC and max 14VDC is required)

Power Consumption: 3,5-5W

Humidity: 0-80% RH non-condensing

Enclosure: IP 53

Dimensions HxWxD: 120x122x55 mm

Operating Temperature: 0-50°C

Relay: 8A Ac1 (Min 10V, Max 250V AC)

Output Voltage for Sensor: 13V DC

Sound Level at Alarm: >85dB(A) @ 10cm

Technical Specifications CO_2 Sensor

Supply Voltage: 13 VDC ±3% max 5W

Dimensions (HxWxD): 93x93x23mm

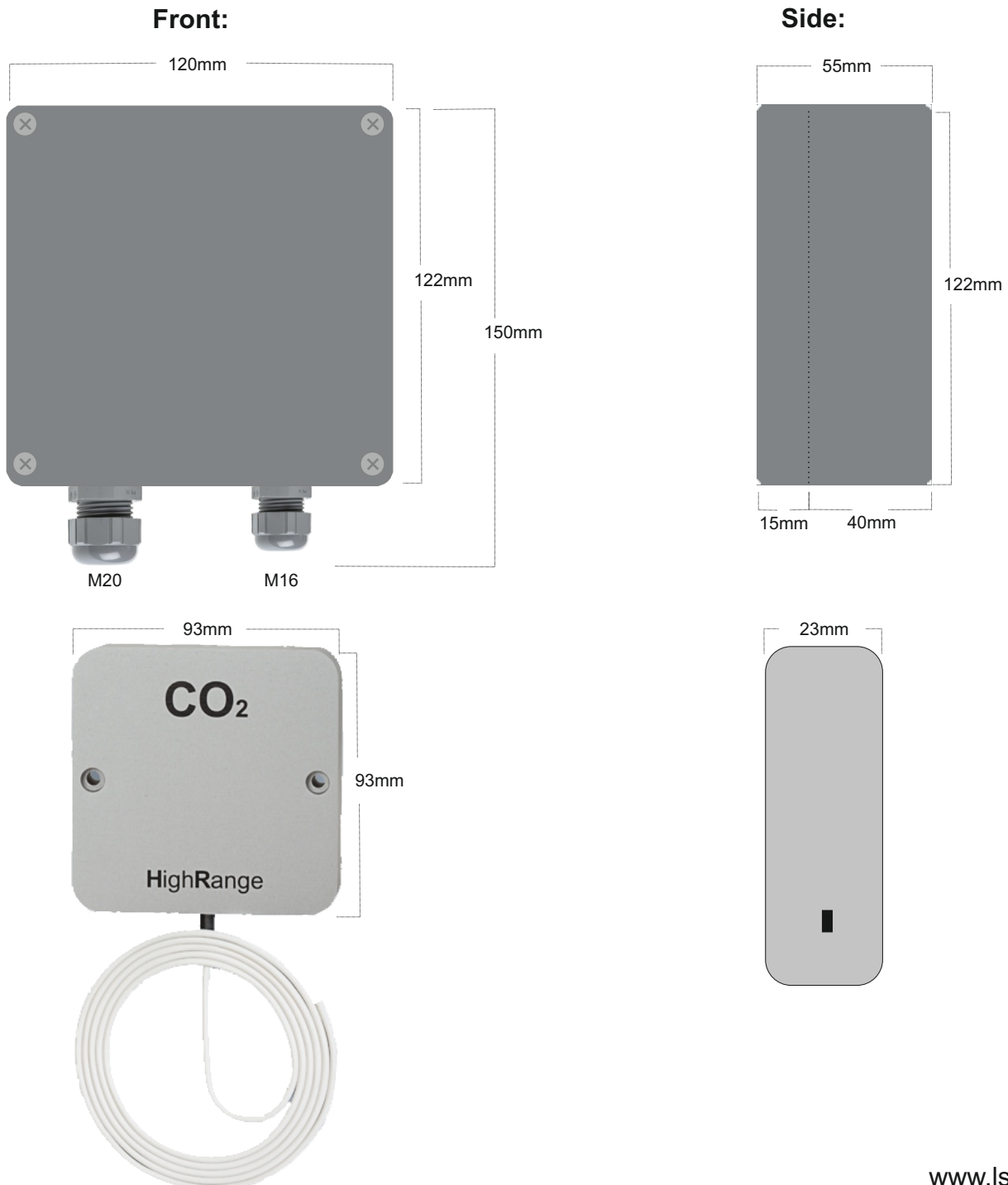Operating Temperature: -25 - +40°C

Power Consumption: 400mA

CO_2 Measurement Area: 0-10.000 ppm
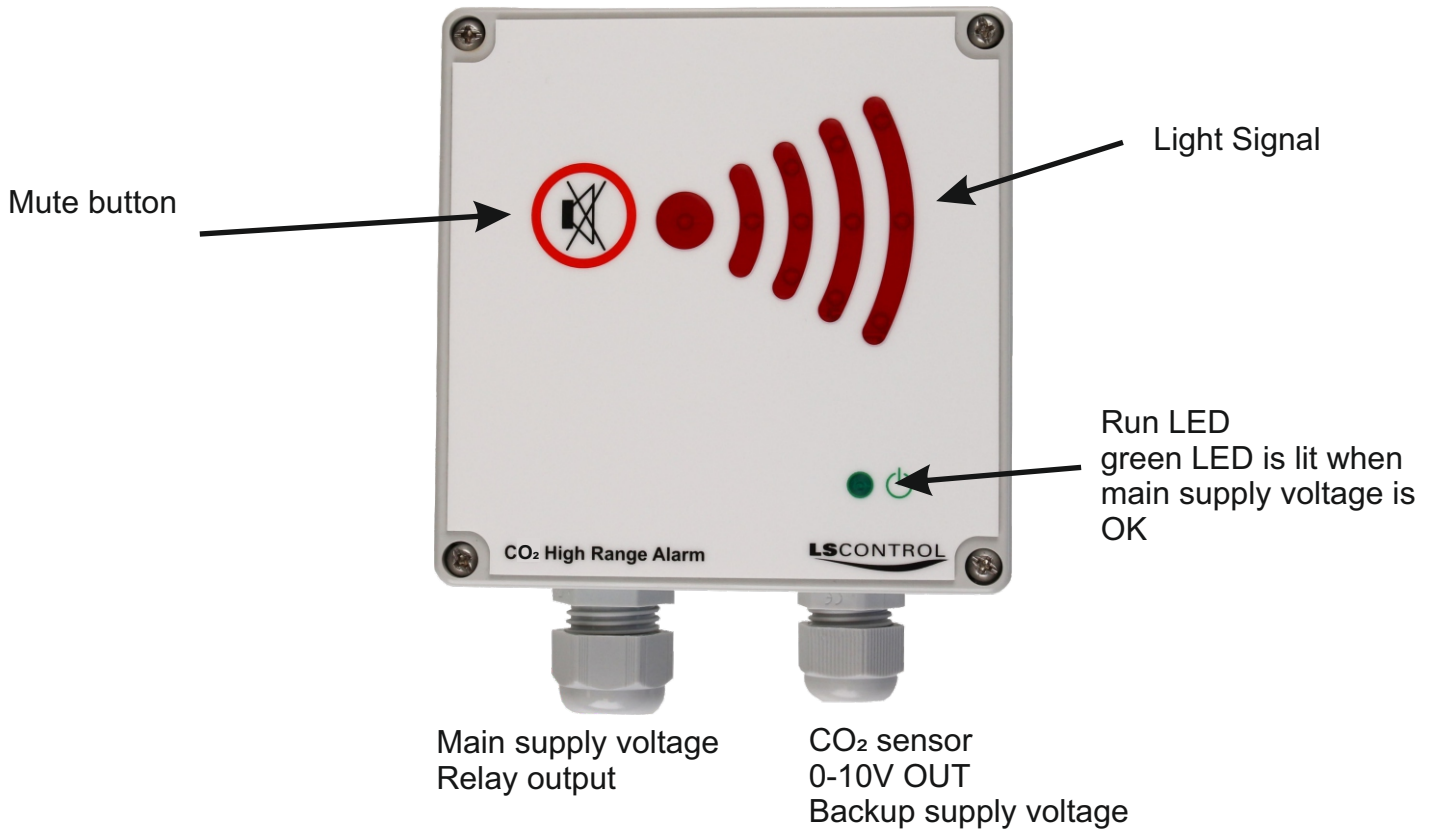
Accuracy: ±5%

Output Signal: 0-10V (max 5mA)

Enclosure: IP43

Size and Measurement

Front:

Side:

120mm

122mm

150mm

M20 M16

55mm

122mm

15mm 40mm

93mm

CO₂

HighRange

93mm

23mm

Product Description

Mute button

Light Signal

Run LED
green LED is lit when
main supply voltage is
OK

CO₂ High Range Alarm

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Main supply voltage
Relay output

CO₂ sensor
0-10V OUT
Backup supply voltage

Run LED
green LED is lit when
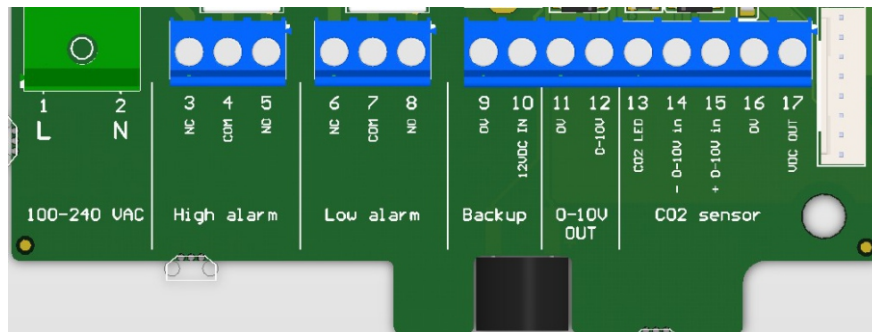supply voltage is OK

CO₂

HighRange

Mounting

CO₂ High Range Alarm (alarmbox) must be mounted clearly visible on a non-vibrating surface. It is fastened by screws using the deep screw holes in the edge of the box.

The CO₂ Sensor must be mounted on a vertical wall with the cable outlet pointing downwards. Since CO₂ in high concentrations fall downwards the sensor must be placed from 20 to max 70cm above floor. Note; after mounting the sensor in cold rooms, the sensor needs a warm-up time of approx. 20min before optimal function.

Please also refer to the Safety Regulations section.

Connection Diagram

Clamp No.	Description	Comment
1	Primary supply voltage 230VAC	Phase Conductor (L)
2	Primary supply voltage 230VAC	Neutral Conductor (N)
3	HIGH alarm potential free relay switch set. Draws when the set point for HIGH alarm is exceeded.	NC (normally closed)
4	HIGH alarm potential free relay switch set. Draws when the set point for HIGH alarm is exceeded.	COM (common)
5	HIGH alarm potential free relay switch set. Draws when the set point for HIGH alarm is exceeded.	NO (normally open)
6	LOW alarm potential free relay switch set. Draws when the set point for LOW alarm is exceeded.	NC (normally closed)
7	LOW alarm potential free relay switch set. Draws when the set point for LOW alarm is exceeded.	COM (common)
8	LOW alarm potential free relay switch set. Draws when the set point for LOW alarm is exceeded.	NO (normally open)
9	Backup supply	0V (GND)
10	Backup supply	12VDC IN
11	0-10V output. 0 ppm = 0V and 10.000 ppm = 10V	0V (GND)
12	0-10V output. 0 ppm = 0V and 10.000 ppm = 10V	0-10V (positive conductor)
13	-	-
14	Connection for CO₂ sensor high range	- 0-10V in minus conductor
15	Connection for Co₂ sensor high range	+ 0-10V in plus conductor
16	Connection for Co₂ sensor high range	0V (GND)
17	Connection for CO₂ sensor high range	13V DC

Connection Diagram

Connecting Supply Voltage

L
N

Primary supply

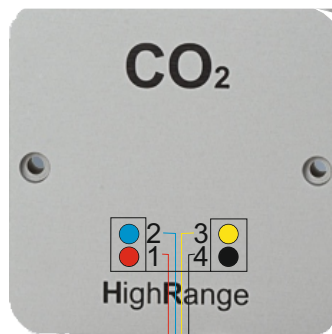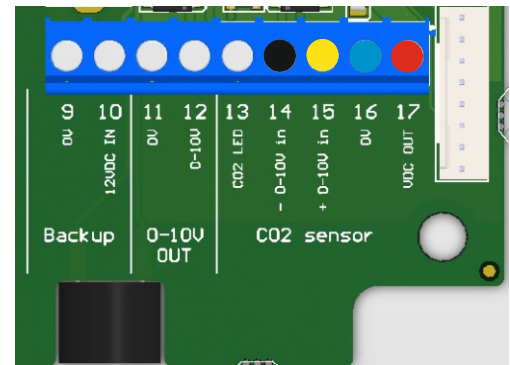Backup supply 12V DC
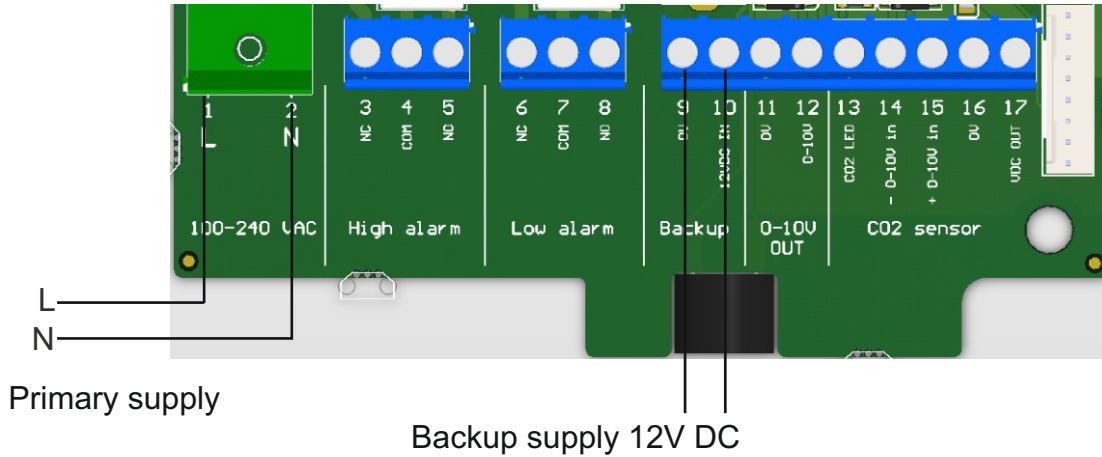
230V AC must be connected to terminal L and N (terminal 1 and 2).

Backup supply 12V DC can be connected to terminal 9 and 10 (0V and 12VDC IN).

Connecting CO₂ Sensor.

**Terminal Section on PCB**

Red
Blue
Yellow
Black

● Black: Terminal 14 (- 0-10V in)
● Yellow: Terminal 15 (+ 0-10V in)
● Blue: Terminal 16 (0V)
● Red: Terminal 17 (VDC OUT)

Red wire from CO₂ sensor (terminal 1) must connect to terminal 17 (VDC OUT) in the alarmbox.
Blue wire from CO₂ sensor (terminal 2) must connect to terminal 16 (0V) in the alarmbox.
Yellow wire from CO₂ sensor (terminal 3) must connect to terminal 15 (+ 0-10V in) in the alarmbox.
Black wire from CO₂ sensor (terminal 4) must connect to terminal 14 (- 0-10V in) in the alarmbox.

Setting-up and adjusting the Alarmbox

Placement of Jumper and Adjustment Screws
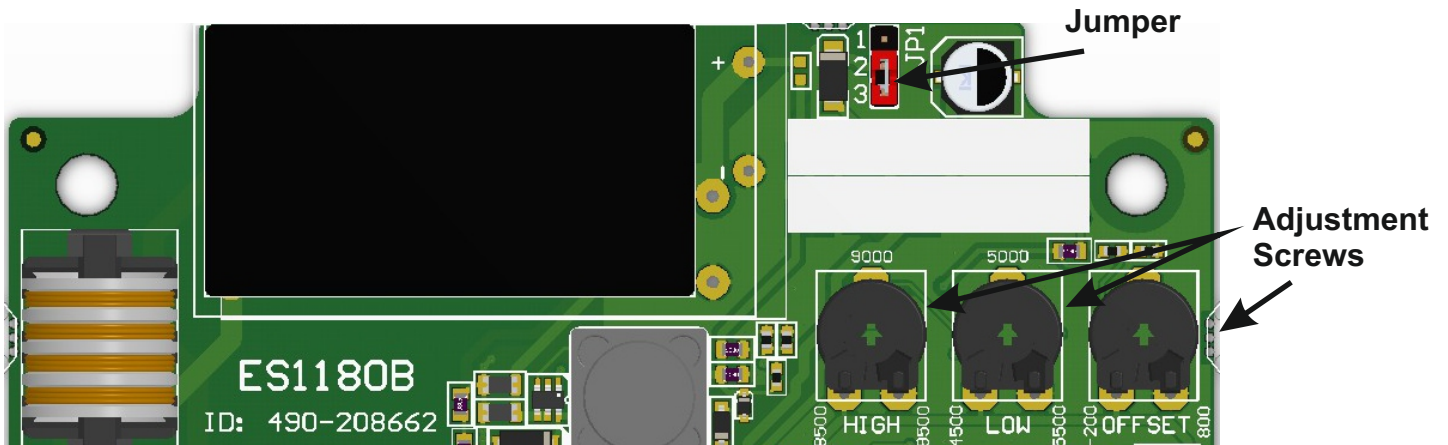
On the PCB you find a jumper which determines whether the CO_2 sensor also should be supplied by the backup supply in case of failure on the primary supply.

You also find 3 adjustment screws to adjust the setpoints for CO_2 level, determining when alarm is given.

Jumper Description

If 12V backup supply is connected the jumper determines whether the backup supply is also to supply the CO_2 sensor and thereby ensure continuous monitoring of the CO_2 level. Or if the 12V backup supply is only to supply the alarmbox and the CO_2 level thus not is monitored.

However it is a prerequisite that the backup supply holds a minimum of 12.0V if the CO_2 sensor is to be supplied by backup supply. Otherwise the sensor will not function correctly. Note; the heating element in the CO_2 sensor uses up to 400mA.

When jumper is placed between 1 and 2 (upper position), the backup supply for the CO_2 sensor is turned OFF. The CO_2 sensor will not be supplied and thus not in operation.

When jumper is placed between 2 and 3 (lower position), the backup supply for the CO_2 sensor is turned ON. The CO_2 sensor will be supplied and thus still in operation.

Manufacturing setting is, jumper placement between 2 and 3. Backup supply for the CO_2 sensor is turned ON.

Note; As the CO_2 sensor is supplied with a heating element and therefore consumes up to 400mA it is required that the backup supply must be min12,0V DC 500mA, if the CO_2 sensor is to be supplied by the backup supply in case of failure in the primary supply. Hence draining a battery relatively fast.

If a battery is used for backup supply you can choose to set the jumper in the 'OFF' position (upper position between 1 and 2). In this position only the control board in the alarmbox is then supplied and an alarm rutine will begin indicating failure on primary supply.

Setting-up and adjusting the Alarmbox

Description of the Adjustment Screws

On the PCB you find 3 adjustment screws. HIGH, LOW and OFFSET.
Both HIGH and LOW setpoint must be set as they each have separate alarm routine. It is not neccessary to adjust the OFFSET unless the CO_2 level in the room deviates a lot from the common atmospheric CO_2 at approx. 400ppm.

LOW:
This adjustment screw sets the setpoint for the first alarm and can be set between 4500ppm and 5500ppm.
If CO_2 level exceeds the set value the alarm light is activated and the relay 'Low alarm' is drawn.
LOW alarm is reset when CO_2 level falls 500ppm below set value.

HIGH:
This adjustment screw sets the setpoint for the second alarm and can be set between 8500ppm and 9500ppm. If CO_2 level exceeds the alarm light and sound is activated. It is not possible to mute the sound alarm at HIGH alarm. Also the 'High alarm' relay is drawn.
HIGH alarm is reset when CO_2 level falls 500ppm below set value.

OFFSET:
The CO_2 sensor is self-calibrating, which means that it automatically over time calibrates to the lowest measured CO_2 concentration. The most common CO_2 concentration in the atmosphere is 400ppm and the sensor will try to calibrate to this level. The OFFSET trimmer is used to adjust a possible permanently lower or higher CO_2 concentration in the room. If the CO_2 level in the room normally is around 700ppm the trimmer is set to 300 so the calibrating will take this into account (400ppm atmospheric + 300ppm trimmer). And otherwise if the room generally has a lower CO_2 concentration at e.g. 300ppm then the trimmer is set to -100. The trimmer can be adjusted between -200 - +800ppm. In ordinary circumstances the OFFSET trimmer is set to 0.
The OFFSET trimmer can also be used for manual calibration of the CO_2 sensor. If e.g. the CO_2 sensor is fed with a known calibration gas with a CO_2 concentration of 1000ppm, then the OFFSET trimmer is adjusted untill 1000mV on the 0-10V output is measured.

Alarm Overview

Supply and Alarm mode	Alarm light	Run LED	Sound	Low Alarm	High Alarm
Primary, No sensor input	Failure	ON	OFF	NC (6)	NC (3)
Primary, Level within Range	off	ON	OFF	NC (6)	NC (3)
Primary, LOW setpoint exceeded	Alarm	ON	OFF	NO (8)	NC (3)
Primary, HIGH setpoint exceeded	Alarm	ON	ON (can NOT be muted)	NO (8)	NO (5)
Backup supply, *	Failure	OFF	ON (can be muted)	NO (8)	NO (5)
Backup supply **, LOW setpoint exceeded	Alarm	OFF	OFF	NC (6)	NO (5)
Backup supply**, HIGH setpoint exceeded	Alarm	OFF	ON (can NOT be muted)	NO (8)	NO (5)

* In case of backup supply due to primary supply is off the alarmbox will give an alarm indicating lack of supply. The CO_2 level is not monitored. Jumper is in position OFF (between 2 and 3).

** In case of backup supply due to primary supply is off, the alarm box still monitors the CO_2 level and gives alarm when setpoints are exceeded. Jumper is in position ON (between 1 and 2).
However, the alarmbox will also give alarm for lack of primary supply.

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Alarm Signals

Failure:

The lights sequence broken up pattern. One full cycle sequenced by half a cycle then a full cycle etc.

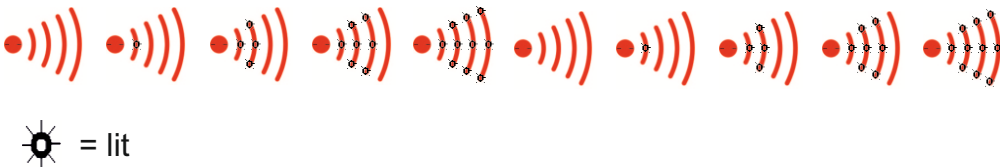Sound signal: 3 beep followed by a pause.

☼ = lit

Alarm:

The lights sequence a full pattern continuously.

Sound signal: continuously beeps.

☼ = lit

Run LED:

Green LED on the front in the lower right corner. Is lit when primary supply is normal.