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# User's Manual

# CO<sub>2</sub> Safety System



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## **IMPORTANT**

All persons responsible for the use and maintenance of this equipment must read and understand the safety and operating information contained in this guide. Installation and service of this equipment should be performed only by professionals. The function of the equipment will be impaired if it is not properly installed.

### **The Purpose of CO<sub>2</sub> Detection**

CO<sub>2</sub> is a colorless, odorless gas which normally exists at a concentration of about 0.04% in the air we breathe. CO<sub>2</sub> gas does not support life and in concentrations above 3% it has dangerous effects. According to the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), an Immediate Danger to Life and Health (IDLH) begins at 4% CO<sub>2</sub> concentration.

The equipment that stores and uses CO<sub>2</sub> is designed for normal safe operation when properly maintained. Leaks in combination with poor ventilation may result in High concentrations of CO<sub>2</sub> creating unsafe conditions. CO<sub>2</sub> is 1 ½ times heavier than air. It will concentrate in confined spaces and low areas posing a risk of asphyxiation/suffocation to anyone in or entering those areas.

The CO<sub>2</sub> Safety System continuously monitors CO<sub>2</sub>. The system is designed to monitor CO<sub>2</sub> gas concentration and to provide an alarm at three pre-set elevated levels.

### **CO<sub>2</sub> Concentration Levels (%) and Effects**

<u>(%)</u>	<u>Effect</u>
20.0	Death within a few seconds
10.0	Convulsion, Unconsciousness, Death
7.0	Dizziness, Vomiting, Headache, Reduced blood supply to brain
<b>4.0</b>	<b>IDLH -Immediate Danger to Life and Health</b>
3.0	Normal exhale concentration; increased breath and pulse rates
1.0	Shortness of breath possible
0.5	Maximum for working conditions
0.1-0.3	High values in office
0.04	Fresh air

### **TWA (Time Weighted Average)**

In most countries the hygienic limit value over 8 hours/day or 40 hours/week is 0,5% or 5000 ppm. It is considered unhealthy to be exposed to more than this value during an 8-hour working day. (Pat. Pend.)

# II General Description

## Product Description and Performance

The Carbon Dioxide (CO<sub>2</sub>) Safety System is designed to measure CO<sub>2</sub> concentration in a confined space environment. It is designed to provide an alert in the event that an abnormally high concentration of CO<sub>2</sub> exists in the area being monitored.

The basic CO<sub>2</sub> Safety System is precision instrument comprising one central (display) unit and one sensor unit, each using microelectronic components. The central unit supplies power to the sensor unit. The sensor unit uses infrared analysis for detecting CO<sub>2</sub>. The system provides visible indication of CO<sub>2</sub> levels and temperature at the area where the remote sensor is located.

When installed properly, the CO<sub>2</sub> Safety System will continuously monitor CO<sub>2</sub> concentration and temperature wherever a sensor unit is located. Green light emitting diodes (LEDs) at the central unit indicate normal safe conditions. If ambient conditions at the sensor unit reach a CO<sub>2</sub> concentration level of 1.5% ( preset low alarm ), the central unit will emit an intermittent audible tone and the « low alarm » red LED will blink. If equipped, a remote warning lamp will be activated. This will also happen if the TWA for 8 hours also surpasses 5000 ppm. The difference can be acknowledged on the sensor display.

## Central Unit

- Displays results of sensor unit measurements.
- Controls operation of the system



## Sensor Unit

- Performs the measurement of CO<sub>2</sub> concentration, TWA of CO<sub>2</sub> and temperature.
- Displays measurement results and alarm indications.
- Display alternates between CO<sub>2</sub> (0.0%-10.0%), TWA (ppm) and temperature (0-40°C)
- Red LED lights when CO<sub>2</sub> concentration is at or above 1.5% ( depending on local legislation)



The alarm condition should be verified by pressing once on the reset button located on the left end of the central unit. At the low alarm level the tone may be switched off by pressing the reset button. The visual alarm will continue until the CO<sub>2</sub> level drops below 1.5% (the low alarm). If the low alarm reactivates after pressing the reset button, one person, supervised by another, may check for the leakage cause.

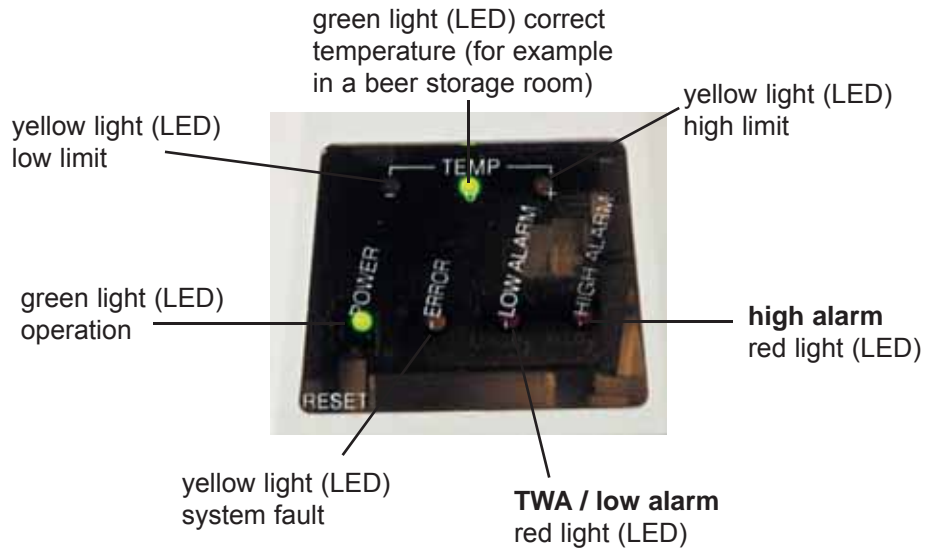
If ambient conditions at the sensor reach a concentration level of 3% the central unit's main alarm will activate emitting a constant audible tone and the two red LED's will blink. If the alarm continues after pressing the reset button once, **the room in which the sensor is located must not be entered! A CO<sub>2</sub> Service agent must be contacted!**

In the even of system fault, the yellow « error » LED blinks. This is most often caused by loose or improper cable connections. The « error » indicator will display unit the fault is corrected.

# General Description II

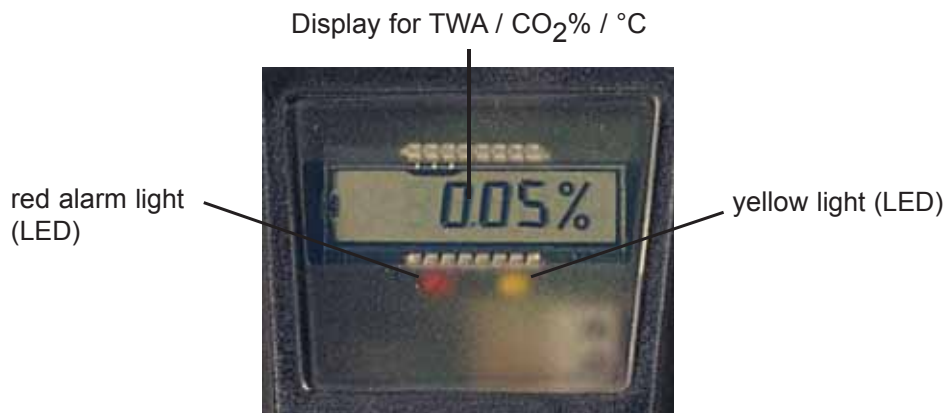
## The Central Unit:

- Displays the results of the sensor unit measurements.
- Controls the operation of the system.



## The Sensor Unit:

- Performs the measurement of CO<sub>2</sub> concentration and temperature (if activated).
- Displays measurement results and alarm indications.
- The display will alternate between TWA ppm, CO<sub>2</sub>% (in a range from 0.0% to 10.0%) and room temperature (in a range from 0-40°C).
- The red light (LED) goes **ON** when CO<sub>2</sub> concentration is at or above pre-set low limit.




# II General Description

The warning signs provided with the CO<sub>2</sub> Safety System.  
The sign for the central unit should be placed next to the central unit.

**CO<sub>2</sub> SAFETY SYSTEM**

**What do you do in case of an ALARM?**

1. Keep calm!
2. Turn off the acoustical alarm by pressing the RESET button on the central unit.
3. Investigate the type of alarm and which sensor is giving the alarm.

INDICATION	CAUSE	ACTION
- two red diodes blink (low and high alarm) - continuous acoustic signal  <b>Note!</b> Number of blinks indicates which sensor is giving the alarm.	<b>MAIN ALARM</b>    <b>TAKE PRECAUTIONS</b>	- <b>Do not enter</b> the dangerous area. - Ensure, to the extent possible, that there is ventilation from the outside. Call and inform the following telephone no: ..... - When the CO <sub>2</sub> level has fallen, correct the cause as described in the <b>pre-alarm</b> section below.
- the red diode blinks (low alarm) - intermittent acoustic signal  <b>Note!</b> Number of blinks indicates which sensor is giving the alarm.	<b>PRE-ALARM</b>	- Enter the area in question <b>only</b> under the supervision of another person. - Open the doors and the windows as much as possible. - Close all CO <sub>2</sub> containers. - Remedy leakage.
- the yellow diode blinks (system fault) - oscillating signal ~~~~~  <b>Note!</b> Number of blinks indicates which sensor is faulty.	<b>SYSTEM FAULT</b>	- Check the wires and the connections to the warning system
<b>Temp</b> - yellow diode (- or +) <b>Note!</b> Number of blinks indicates which sensor is giving the alarm.	<b>INCORRECT TEMPERATURE IN THE COLD STORAGE FOR DRINKS</b>	- Check the cold storage room. - too low temperature + too high temperature

Sensor	Place
1	
2	
3	
4	

The sign for the warning lamp (beacon) should be placed next to the warning lamp.



## Observe the System's Operation

The CO<sub>2</sub> Safety System is packaged with its sensor and central units already connected by conductor cable. It is immediately operational when connected to normal 80-250 VAC grounded power supply. To become familiar with the system's operation, carefully remove its components from the box and plug the power cord into an electrical supply outlet. Notice that an amber and a red light emitting diode (LED) will illuminate briefly on the sensor unit and the green « power » LED will illuminate at the central unit. The red warning beacon, if equipped, will also flash a few times. Finally, the beacon will stop flashing, the sensor unit will alternately display temperature and CO<sub>2</sub> concentrations levels, and the central unit will display two green lights indicating power and temperature functions. The system is in its normal operation mode.

## Determine Proper Location for System Components

- The CO<sub>2</sub> sensor should be placed in the room where CO<sub>2</sub> equipment is being used or where CO<sub>2</sub> is likely to accumulate in the event of leak. **NOTE: CO<sub>2</sub> is a heavy gas and it will collect in low areas and confined spaces.**

- One sensor unit will monitor a room of up to 100m<sup>2</sup> confined area (without natural ventilation or open entry way). **NOTE: If the room has only mechanical ventilation it should have a sensor.**

- The sensor should be installed so it has clear exposure to room air but is away from ventilation inlets or outlets. Its digital display should be visible.

- A warning beacon, if equipped, must be located where its flash is visible at any entrance to the area being monitored. This may require more than one beacon.
- The central (control) unit must be placed outside the room being monitored. It should be located within two meters of an electrical (80V-250V) power supply and where it can be most conveniently observed before entering the area where the sensor is located.

- NOTE: The central unit and sensor unit are connected to each other by conductor cable that may need to be disconnected for purposes of cable routing or installing a longer cable. **When reconnecting cable leads make sure they are securely connected to their proper terminals. Refer to the diagram on page 10 for assistance.**

Try to route all conductor cables for a neat appearance.

## Install the (black) Sensor Unit

Place the sensor unit vertically and at a height within 30cm from the floor. Try to position the unit where it will be out of the way of moving objects and where its digital display is visible. Use the supplied screws and wall anchors as necessary.

If the sensor needs to be disconnected for cable routing or for using a longer cable, follow steps 1 through 4. Reconnect the sensor before mounting it in position.

1. Remove the four Phillips head screws on the cover and remove the cover.
2. Make a note of the lead wire connection terminal locations. Notice that the conductors consists of two twisted pairs.
3. Disconnect the leads. Loosen the external nut on the cable strain relief. Carefully slide the conductor cable from the sensor housing.
4. Route the conductor cable as necessary. Reconnect the cable to the sensor unit. Use the connection diagram on the page 10 and the following connection description as necessary to verify proper connections:

- The power wires connect to terminals #1 / +12V (red) and #2 / -12V (black) respectively.

- The signal wires connect to terminals #4 /B (blue) and #5 /A (white) respectively.

- The bare ground or « drain » wire connects to terminal #3 (GND).

5. Tighten the nut on the cable strain relief.

# III Installation

## Install the (white) Central Unit

Place the central unit vertically in a dry location out of direct sunlight. It should be placed at a height where it can be easily seen but where it is least likely to be damaged by items such as mop handles or boxes being moved. Use the supplied screws and wall anchors as necessary.

- Be sure the reset button on the lower end of the central unit can be pushed without obstructions.
- The power supply plug should not be obstructed when the equipment is mounted.
- **Be sure the central unit is not placed in the risk area that is being monitored!**

If the central unit needs to be disconnected for installation, follow steps 1 - 5 on page 7 as for installing the sensor unit. Refer to the connection diagram on page 10 if necessary to verify the following central unit cable connections:

- The paired red and black power wires connect to terminals (+12V/red) and (MINUS/black) respectively on the PC board of the central unit.
- The paired blue and white wires connect to PC terminals B (blue) and A (white) respectively.
- The bare ground wire connects to the bottom terminal in the position labeled « GND ».

## Install the Warning Beacon

If the CO<sub>2</sub> Safety System is equipped with a warning beacon its power (+) and signal (-) terminals will be connected to sensor terminals #1 (power) and #6 (signal) respectively.

1. Separate the beacon from its mounting base using a counter clockwise twist.
2. Mount the base in a proper location using screws through the knockouts on the « back » of the base. Make sure the conductor wires pass through a cable strain relief in the base and are attached securely to the proper beacon terminals. Refer to the following description and diagram on page 10:

- The (+) terminal on the beacon corresponds with terminal #1 (+12V) on the sensor unit.

- The (-) terminal on the beacon corresponds with signal #6 on the sensor unit.

3. Attach the beacon to its base using a clockwise twist.
4. Tighten the nut on the cable strain relief.

An additional beacon can be added, if necessary, at another entrance to the room being monitored. Simply connect it to the extra pair of terminals in the « first » beacon using two-conductor (20 or 24 AWG) cable (not supplied). Route the cable through a knockout on each base using cable strain reliefs. Make sure the (+) and (-) terminal connections are consistent between beacons.

## Connect the Units (if both were disconnected for installation)

The jacketed conductor cable for this connection consists of two pairs of insulated conductor shielded and with ground. The basic CO<sub>2</sub> Safety System kit is supplied with its components connected to accomplish installation or to meet longer cable requirements, **make sure the conductors are reconnected securely into their proper « spring grip » terminals!**

**- To ensure proper operation, the combined distance between (farthest) warning beacon, sensor unit, and central unit, should not exceed 80m.**

A properly connected system will begin to operate immediately when plugged into to a (80-250V AC) power supply. No additional start-up procedure or adjustment is necessary.

## Review of the System Operation

(Refer to central unit diagram)

Whenever the system's power plug is disconnected and reconnected the sensor will momentarily go into alarm phase until it has made a safe check. This will only take a few seconds. When the self check is complete, the system enters its operation mode and the display in the sensor will show the actual CO<sub>2</sub> concentration (alternating with temperature and TWA indication). The central unit will display a green « POWER » light and green « TEMP » light.

- In the event of an alarm, if more than one sensor has been installed, the number of blinks in rapid succession indicates which sensor is in alarm mode.
- In the event of a system fault the yellow « ERROR » light blinks. This indicates that a conductor wire is not attached securely or to its proper terminal.
- In the event of a « low » alarm (between 1.5% and 3.00% CO<sub>2</sub>) or a TWA alarm (5000 ppm) the central unit emits an alternating tone and the red « LOW ALARM » light blinks. An external lamp will activate if connected. (One person, supervised by another may enter the area and check for CO<sub>2</sub> leaks).
- In the event of a « high » alarm (3% or higher CO<sub>2</sub> level) the central unit emits a constant tone and the « HIGH ALARM » also begins to blink.  
**Do not enter the room where the sensor is located! Call your service agent!**
- To silence the audible alarm, press the reset button once. The visual alarm will remain until the CO<sub>2</sub> level drops below 1.5 % or until the fault has been corrected.
- All functions are checked by pressing the reset button once.

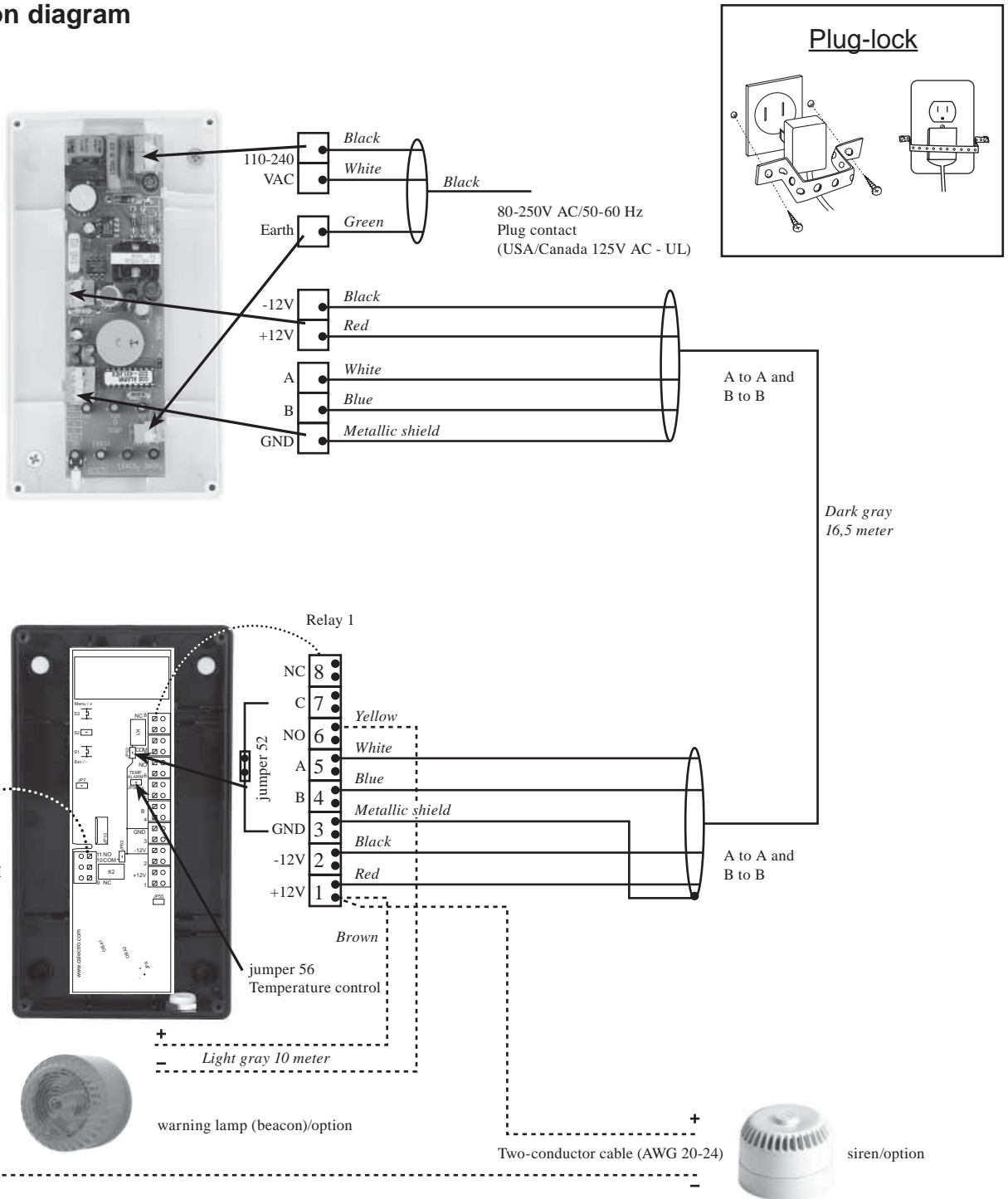
## Optional Temperature Surveillance

Referring to the diagram on page 10, locate Jumper 56 in the sensor unit. The unit is delivered with the jumper in this position. While the jumper is in this position the temperature alarm is not active although the system monitors temperature conditions. Removal of Jumper 56 activates the temperature limit alarm at the central unit.

- If Jumper 56 is removed and the temperature is between 3°C and 8°C at the sensor unit, the green « TEMP » LED will be lighted. If the temperature drops below 3°C, the yellow LED on the left side of the central unit's « TEMP » display will blink. If the temperature exceeds 8°C, the yellow LED on the right side of the « TEMP » display will blink.

# IV Connection Diagrams

## Connection diagram



Jumpers	Connected (default)	Disconnected
JP7	AZC deactivated	AZC activated
JP52	Relay 1 Common to voltage	Relay 1 potential free
JP53	Relay 2 Common to voltage	Relay 2 potential free
JP56	Temp deactivated	Temp activated
JP59	LogiCO2-program	MODBUS

**Note!** This system is provided as a prewired system for wall or similar mounting. The central unit and sensor(s) must be mounted vertically.

# Important Records V

**Proper function of this product is entirely dependent on its correct installation.**

*The three-year warranty as of the date of installation is only valid when this form has been completed.*

Installing Company:

Name of installer:

\_\_\_\_\_

\_\_\_\_\_

The LogiCO2 Safety System has been properly installed and tested by an authorized person.

Operation instructions have been provided by:

\_\_\_\_\_

Date: \_\_\_\_\_

Signature/Installation company:

Signature/Store Manager:

\_\_\_\_\_

\_\_\_\_\_

# V Important Records

## SENSOR PLACE

	A	B	C	D	E	F	G
Room type:							

## FUNCTION TEST

Sensor				
<b>No 1</b>	Date		Name	
<b>No 2</b>	Date		Name	
<b>No 3</b>	Date		Name	
<b>No 4</b>	Date		Name	
<b>No 5</b>	Date		Name	

# Ordering Service and Parts VI

## Service and Maintenance

1. Service or maintenance work on the CO<sub>2</sub> Safety System should be performed only by authorized professional service agents who are familiar with the CO<sub>2</sub> Safety System and all pertinent safety and service procedures. Contact your representative for the name of the authorized service agent (s) in your area.
2. Since this is a safety product we recommend that a thorough function check be performed on the CO<sub>2</sub> Safety System by a qualified professional service agent at least once every year. The check should be done to insure safety and optimal performance of the system.
3. The CO<sub>2</sub> Safety System has no user serviceable parts. All service work should be performed by an authorized professional agent.
4. NOTE: Any attempt to service the equipment by unauthorized persons or to perform unauthorized modifications will void the warranty.
5. **The sensor and central unit housing must NEVER be opened by unauthorized personnel.**

## Ordering Parts or Service

CO <sub>2</sub> Set 1	Part.no. CO2 SET 1 MkIV CE/UL
CO <sub>2</sub> Central Unit	Part.no. CO2 Central Unit CE/UL
CO <sub>2</sub> Sensor	Part.no. CO2 Sensor MkIV CE/UL
Warning lamp	Part.no. BE-R-12VDC
Battery backup	Part.no. CO2 Batt
Sensor cover with filter	Part.no. Sensor cover
Central unit cover	Part.no. Central unit cover

For parts or service contact your local authorized supplier or equipment service agent.

# VII Specifications

## CO<sub>2</sub> SENSOR

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### Product:

Operating principle	Non-dispersive infrared (NDIR) and thermistor
Measurement range - temperature	0...+40°C (+32°F...+102°F)
Measurement range - CO <sub>2</sub>	0-3 Vol.%
Extended range - CO <sub>2</sub>	3-10 Vol.%
Gas sampling mode	Diffusion

### TWA:

Time Weighed Average (TWA) calculation	8 h time span (most recent) with 4 min sample period. (Pat. Pend.)
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### Accuracy:

Temperature:	±1°C (±1.8°F)
Digital resolution	1°C (1.8°F) on display 0.01°C via RS485
CO <sub>2</sub> :	
At full operating temp range (0...+40°C)	+5% of measured value
Digital resolution	0.01 Vol.%
Pressure dependence	+0.21% of reading per mm Hg in relation to calibration value or +1,6% of reading per kPa
Annual zero point drift	<0.01 Vol.% with automatic self calibration feature

### Ambient temperature:

0-40°C (+32°F...102°F)

### General performance:

Compliance with	89/336/EEC
Sensor life expectancy	> 15 years
Operating humidity range	0 to 95% RH (non condensing)
Warm-up time (22°C)	1 min.
Dimensions (LxWxD)	180 x 100 x 52 mm / 7" x 4" x 2"
	Overvoltage Cat II, Pollution degree 2

- Please observe that since this is a safety product we recommend that a function control be carried out once a year

### Power:

Power input	9-30V DC or 19-29V AC
Maximum 50 Hz ripple	5V peak-peak AC sine wave (if within power input range)
Power consumption	≤ 0.8 Watts average of DC (external optional warning lamp not included)
Average current	72 mA @ 12V DC
Peak current	0.6A during 10 ms, 0.2A during 250 ms
Wiring connections	Terminal block, 8x2 poles 0.5-1.5 mm <sup>2</sup>

### Outputs:

Digital interface	RS485 serial port - MODBUS
Display	4 digit LCD display with TWA ppm, CO <sub>2</sub> % and Temp. °C indication
Status lights (LEDs)	Yellow - maintenance & interference Red - alarm

### 2 relays:

Type	1A/50V AC/24V DC, min. 1mA/5V (We recommend that our warning beacon is used)
Setpoint/Hysteresis	1.5 Vol.% CO <sub>2</sub> / 0.01 Vol.% CO <sub>2</sub>

### Ingress protection:

IP 54

### Approval:

EN 50081-1 / EN 50082-2 / CE. The CO<sub>2</sub> Safety System is tested and approved by the German TÜV-Rheinland in accordance with the TRSK 313 and DIN EN 45014. Also available with UL. File No/Control No UL-E 204 905, Control No - 10YN

### Filter:

Insect protection according to EN 54-7:1994

# Specifications VII

## CO<sub>2</sub> CENTRAL UNIT

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<b>Supply:</b>	80-250V AC, 50-60 Hz / 15VA (USA/Canada 125V AC - UL) Overvoltage Cat II
<b>Current consumption:</b>	90/220 mA rms/peak without load
<b>Communication:</b>	RS485 100mA, internal terminated= 120 Ohm 0.3V DC-offset
<b>Acoustic signal-strength:</b>	70 dB (1m) max.
<b>Ambient temperatures:</b>	0-40°C (+32°F...102°F)
<b>Alarm hysteresis:</b>	100 ppm
<b>Humidity:</b>	0-90% non-condensing
<b>Max load (12V):</b>	2,9 VA 0,8 VA continuously
<b>Overload:</b>	Automatic protection (shut down)
<b>Ingress protection:</b>	IP 20
<b>Approval:</b>	EN 50081-1 / EN 50082-2 / CE. The CO <sub>2</sub> Safety System is tested and approved by the German TÜV-Rheinland in accordance with the TRSK 313 and DIN EN 45014. Also available with UL. File No/Control No UL-E 204 905, Control No - 10YN Pollution degree 2
<b>Dimensions (LxWxD)</b>	180 x 100 x 52 mm / 7" x 4" x 2"

## WARNING LAMP (BEACON)

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<b>Nominal voltage:</b>	10-15V DC +/- 1+%
<b>Average current:</b>	170 mA
<b>Flash energy:</b>	1 Joule
<b>Flash frequency:</b>	60/min
<b>Ambient temperature:</b>	-10°C...70°C (14°F...158°F)

## BATTERY BACKUP

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<b>Nominal voltage:</b>	12V DC +/- 10%
<b>Nominal capacity:</b>	1300 mAh
<b>Standard charging current:</b>	50 mAh
<b>Short-circuit protection:</b>	1 A
<b>Dimensions (LxWxD):</b>	180 x 100 x 52 mm / 7" x 4" x 2"

# Warranty VIII

## Warranty Policy

LogiCO2 warrants to the Purchaser of the CO<sub>2</sub> Safety System equipment for 3 years from the installation date, that said equipment shall be free from any defects in workmanship and materials. LogiCO2 also warrants the reliability of the calibration in the CO<sub>2</sub> Safety System for 5 (five) years from the date of the original installation.

Purchaser agrees that as a pre-condition to any LogiCO2 liability hereunder, Purchaser or its appointed agents shall fully inspect all goods immediately upon delivery and shall give LogiCO2 written notice of any claim or defect within ten (10) days after discovery of such defect.

As a further pre-condition to any LogiCO2 liability about hereunder, both parts replacement and labour must be supplied by an approved LogiCO2 service company. LogiCO2 may elect to repair or replace such equipment or any defective component or part thereof which proves to be defective, or to refund the purchase price paid by the original Purchaser. LogiCO2 shall not be liable for defects caused by the effects of normal wear and tear, erosion, corrosion, fire, explosion, missuse, or unauthorized modification.

Alterations or repair by others than those designated and approved by LogiCO2 or operation of such equipment in a manner inconsistent with LogiCO2 accepted practices and all operating instructions, unless pre-authorized in writing by LogiCO2, shall void this Warranty.

LogiCO2's sole and exclusive liability under this Warranty is to the Purchaser and shall not exceed the lesser of the cost of repair, cost of replacement, or refund of the net purchase price paid by the original Purchaser.

LogiCO2 is not liable for any losses (including CO<sub>2</sub>), damages, or costs of delays, including incidental or consequential damages. LogiCO2 specifically makes no warranties or guarantees, expressed or implied, including the warranties of merchantability or fitness for a particular purpose or use, other than those warranties expressed herein.

## Warranty Claims Procedure

All warranty claims must be previously authorized by: LogiCO2 / electronic approval may be obtained by contacting:

**LogiCO2 International S.A.R.L.**

**P.B. 172**

**7502 Mersch**

**Luxembourg**

**e-mail: [info@logico2.com](mailto:info@logico2.com)**

Authorization must be obtained from LogiCO2 prior to shipping any equipment to LogiCO2 facilities.

The customer returning the goods is responsible for all freight, proper packing, and any damage incurred during shipment of the goods back to LogiCO2.



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