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**User's Manual**

**MVE CO<sub>2</sub> Safety System**



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## IMPORTANT

All persons responsible for the use and monitoring of this equipment must read and understand the safety and operating information contained in this manual. Installation and service of this and other CO<sub>2</sub> equipment (including the delivery of CO<sub>2</sub>) should be performed only by qualified professionals familiar with CO<sub>2</sub>, CO<sub>2</sub> pressure vessels, and all pertinent safety procedures. The safety protection may be impaired if the equipment is used in the manner not specified by the manufacturer.

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

MVE Bulk (CO<sub>2</sub>) Systems are designed for the safe storage and use of carbon dioxide refrigerated liquid. Under certain use conditions CO<sub>2</sub> may vent from the equipment. The systems have built-in ventilation circuits that are routed to fresh air locations when they are installed properly. Abnormal situations may result in the escape of CO<sub>2</sub> gas to room environment. As an added safety feature Chart recommends the use of CO<sub>2</sub> gas monitoring equipment where CO<sub>2</sub> systems are in use. The MVE CO<sub>2</sub> Safety System continuously monitors temperature and CO<sub>2</sub> concentration in specific room locations. It is designed to detect increases in CO<sub>2</sub> gas concentration.

Carbon Dioxide (CO<sub>2</sub>) is a colorless, odorless, nontoxic gas which normally comprises 0.04% of the air we breathe. However, CO<sub>2</sub> gas does not support life and in concentrations above 3% has suffocating effects causing symptoms such as headache, sweating, rapid breathing, increased heart rate, shortness of breath or dizziness. Air having CO<sub>2</sub> concentrations higher than 5% can cause unconsciousness or death within a few minutes. CO<sub>2</sub> gas is heavier than air, so high concentrations will be found in lower spaces of confined areas or in basements posing a risk of suffocation to anyone in those areas.

### **The Effect of Carbon Dioxide**

#### CONCENTRATION

#### (%VOLUME) EFFECT

20.0	Death within a few seconds
10.0	Convulsion, Unconsciousness, Death
7.0	Dizziness, Vomiting, Headache, Reduced blood supply to brain
3.0	Normal exhale concentration: higher breath rate and pulse rate
1.0	Shortness of breath possible
0.5	Maximum for working conditions
0.1-0.3	High values in offices
0.04	Fresh air

### **First Aid and Emergency Action**

#### If inhaled:

- Move to fresh air immediately
- If not breathing, give artificial respiration
- If breathing is difficult, give oxygen  
Get immediate medical attention

#### In case of frostbite:

- End exposure at once
- Do not rub or pour water on area
- Get immediate medical attention

#### Rescue:

- Do not attempt a rescue in areas of high CO<sub>2</sub> concentrations without proper lifesupport or rescue equipment. Do not become the next victim.
- Thoroughly ventilate areas of high CO<sub>2</sub> concentration before entering.

#### Spills or Leaks:

- Evacuate all personnel immediately from affected areas.
- Thoroughly ventilate the area of the spill or leak before entering.
- CO<sub>2</sub> is heavier than air and displaces oxygen and will collect in low or confined areas.

### **For more information, contact**

Local CO<sub>2</sub> supplier or Compressed Gas Association,  
1725 Jefferson Davis Highway, Suite 1004,  
Arlington, VA 22202-4100 USA,  
Telephone: (703) 412-0900  
Fax: (703)412-0128

# II General Description

## Product Description and Performance

The MVE standard CO<sub>2</sub> detection system is a precision instrument comprised of one central (display) unit and one sensor unit each using microelectronic components. The central unit supplies power to the sensor unit. The system also provides visible and audible indication of CO<sub>2</sub> levels and temperature at the remote sensor location. The remote sensor uses an infrared sensor for detecting CO<sub>2</sub>. An integrated temperature sensor can also be activated to monitor temperature at the sensor's location.

When installed properly the MVE CO<sub>2</sub> detection system will continuously monitor CO<sub>2</sub> concentration and temperature wherever the sensor unit is located. Normal safe conditions are indicated at the central unit by lighted green LED's (light emitting diodes).

If ambient conditions at the sensor unit reach a CO<sub>2</sub> concentration level of 1.5%, the central unit will emit an intermittent audible tone and the "low alarm" red LED will blink. If equipped, a remote warning lamp or fan will be activated. The alarm condition should be double-checked by pressing once on the reset button located on the lower left end of the central unit. If the alarm reactivates, one person, supervised by another, may check for the leakage location.

### **A CO<sub>2</sub> service agent should be contacted!**

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 event of a system fault an oscillating tone sounds and the yellow LED blinks. The tone can be switched off by pressing the reset button. The system should be checked for loose cable connections. Note: To switch off the alarm tone at the central unit, the reset button is pushed. The visual alarm will continue until the fault is corrected or, in the event of a CO<sub>2</sub> alarm, until the CO<sub>2</sub> level drops below 1.5%.

## Installation

Determine the location for the sensor unit and for the central unit. The central unit should be placed in an area remote from the storage tank area. The sensor unit should be placed in the same room with the CO<sub>2</sub> storage tank(s).

**Proper location of the sensor unit is critical for reliable CO<sub>2</sub> detection.**

### **Install the sensor unit**

- The sensor unit should be placed in an area with a clear exposure to room air.
- Mount the unit in a vertical position, 1 to 3 feet from the floor, making sure that the digital display is clearly visible.

**Note! CO<sub>2</sub> is a heavy gas that collects at the lowest point in a room.**

- Note: This unit is shipped with "jumper 2" in place as seen on the sensor diagram on page (8). In this position the jumper completes a circuit to operate a remote warning lamp. If this jumper is removed the relay is potential free.

### **Install the central unit:**

- Place the unit vertically in a dry location out of direct sunlight where it can be easily **seen and heard**.
- Be sure that the reset button on the lower end of the unit can be pushed without obstruction.
- The plug (power supply) should not be obstructed when the equipment is mounted.

**Note! Do not place the central unit in risk area.**

# General Description II

## Connect the units:

### (For the authorized installer only)

- Be sure the conductor cable connections between the units match the wiring diagram on page (8). Be careful to keep conductor wire color consistent between the terminals of each unit (positive to positive; negative to negative).
- Be certain that the cables are securely fastened. Loose communication cables will cause a fault alarm indicated by the yellow LED. A power failure to the sensor will also cause a fault alarm at the central unit.
- When supplied as a system with one sensor no additional set-up is required. If additional sensors are needed or a sensor needs to be changed, please follow the instructions located on the inside of the central unit's cover.

## Operation of the system (refer to central unit diagram)

- To start the system connect the power plug to a grounded supply socket. The sensor will momentarily go into alarm phase until it has made a self check, which will take only a few seconds. It will then be ready for operation, and the display in the sensor will show the actual CO<sub>2</sub> concentration in the room and the central unit will have the green light indication that it is connected to the power source.
- In the event of an alarm, if more than one sensor has been installed, the number of blinks indicates which sensor is in alarm mode.
- In the event of a system fault an oscillating signal sounds and the yellow LED blinks.
- In the event of a "low" alarm (1.5% CO<sub>2</sub>) the central unit emits an alternating tone and the red LED blinks. (If jumper 2 is in place an external lamp will activate.) One supervised person may check for CO<sub>2</sub> leakage.
- In the event of a "high" alarm (3% CO<sub>2</sub>) the central unit emits a constant tone and the two red LED's blink. **Do not enter the room where the sensor is located.**
- 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

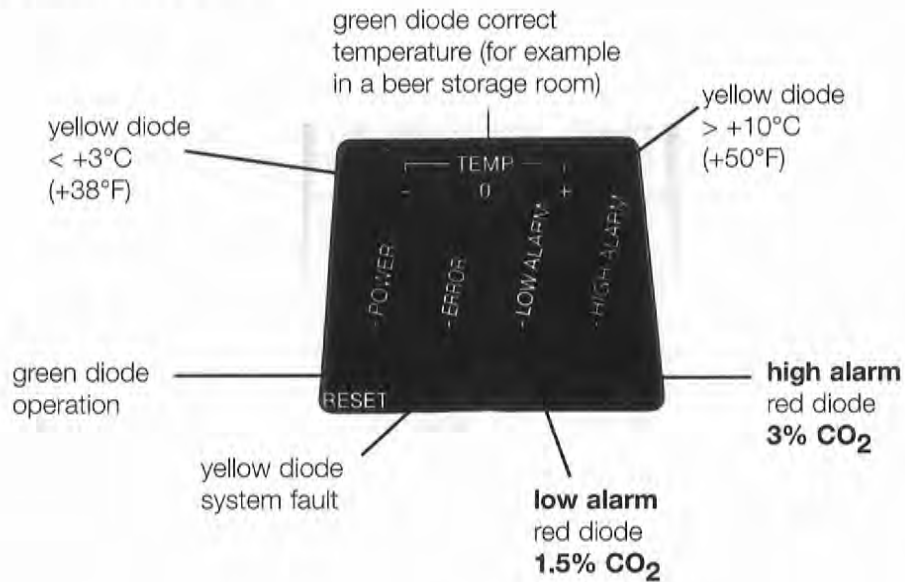
While referring to the diagram on page (8), locate jumper 1 in the sensor unit. The unit is shipped with the jumper in this position. When the jumper is in this position the temperature sensor is deactivated. Removal of jumper 1 activates the temperature sensor at the central unit.

When the temperature is between 38°F and 50°F, the green LED will be lighted. If the temperature falls below 38°F the yellow LED on the upper left side of the central unit's display begins to blink. If the temperature exceeds 50°F the yellow LED on the upper right side of the central unit's display begins to blink.

# II General Description

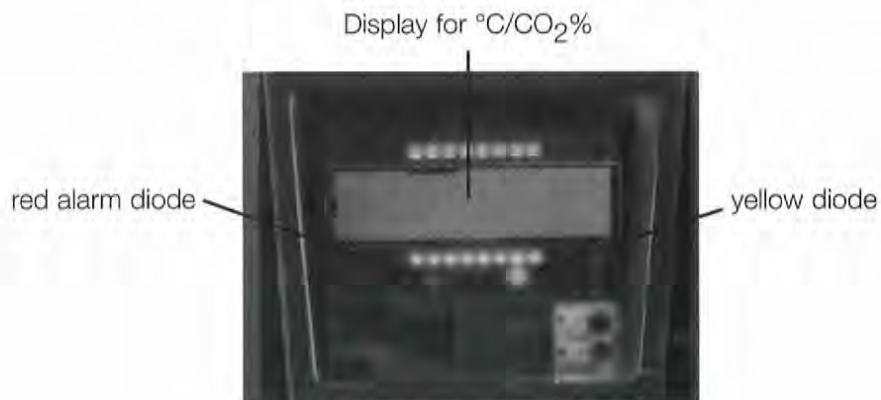
## The Central Unit:

- 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 CO<sub>2</sub>% (in a range from 0.0% to 10.0%) and room temperature (in a range from 32° to 122°F).
- The red LED goes **ON** when CO<sub>2</sub> concentration is at or above 1.5%.

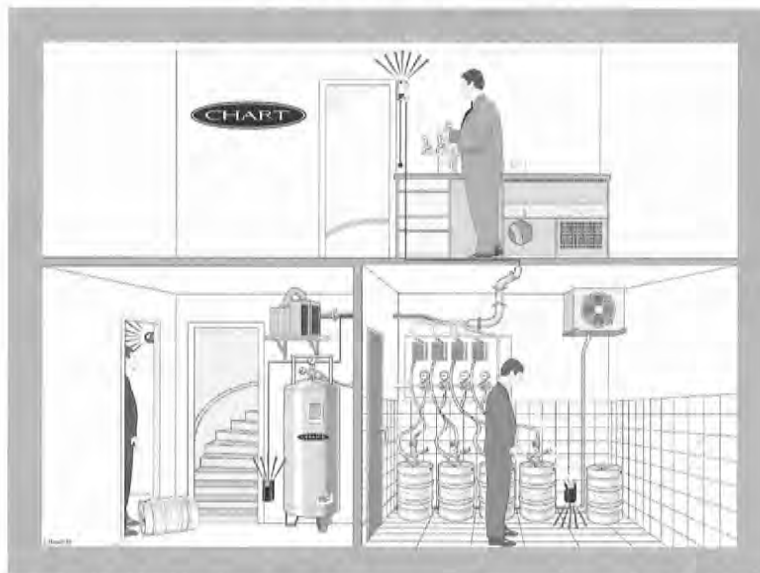


# General Description II

The warning sign provided with the CO<sub>2</sub> Safety System should be placed next to the central unit.  
The delivered sign is also written in Spanish.

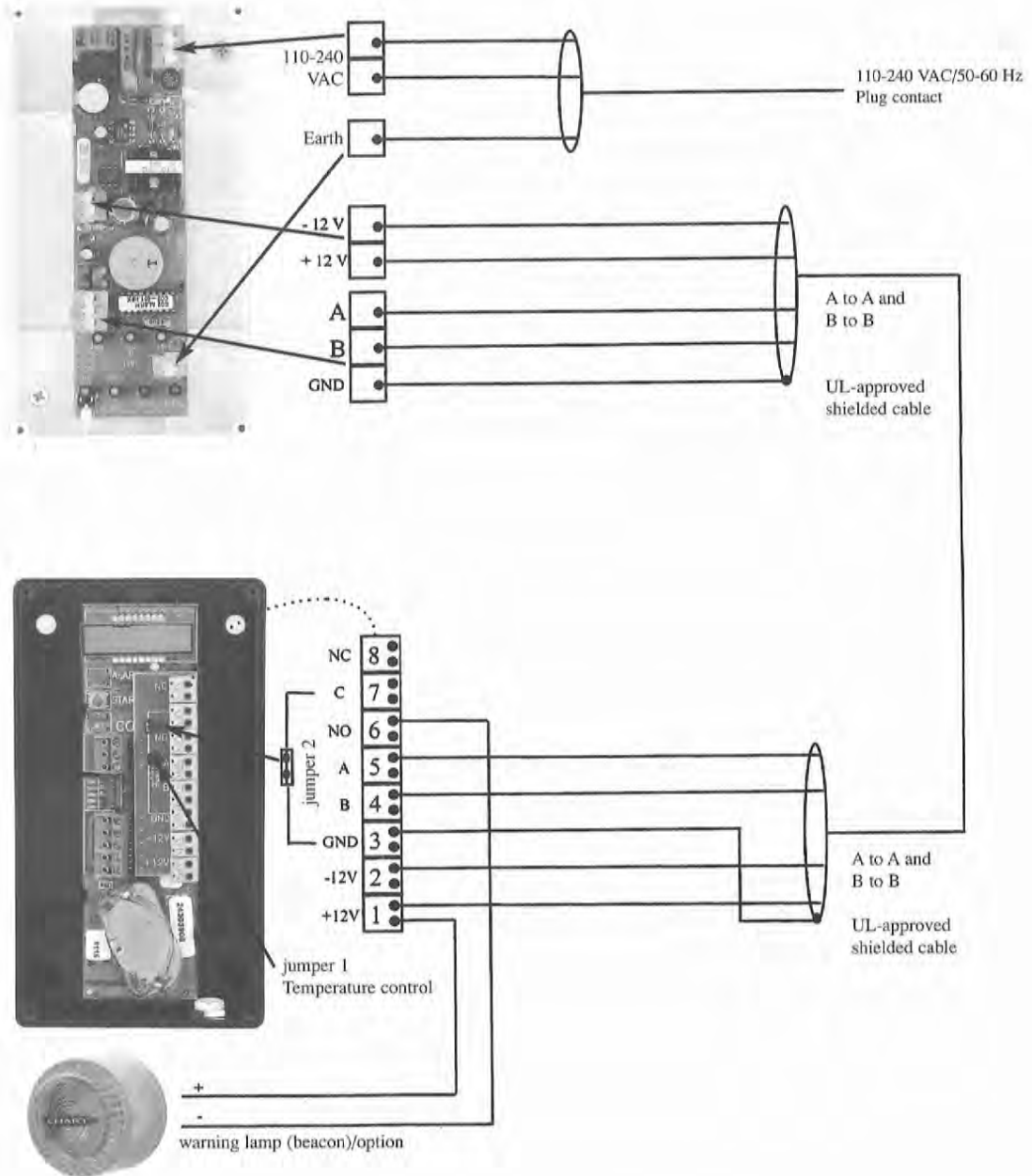
<b>CO<sub>2</sub> SAFETY SYSTEM</b>		
<b>What do you do in case of an ALARM?</b>		
<ol style="list-style-type: none"> <li>1. Keep calm!</li> <li>2. Turn off the acoustic alarm by pressing the RESET button on the central unit.</li> <li>3. Investigate the type of alarm and which sensor is giving the alarm.</li> </ol>		
INDICATION	CAUSE	ACTION
<ul style="list-style-type: none"> <li>- two red diodes blink (1,5 % and 3,0 % CO<sub>2</sub>)</li> <li>- continuous acoustic signal</li> </ul> <p><b>Note!</b> Number of blinks indicates which sensor is giving the alarm.</p>	<p style="text-align: center;"><b>!</b></p> <p style="text-align: center;"><b>TAKE PRECAUTIONS</b></p>	<ul style="list-style-type: none"> <li>- Do not enter the dangerous area.</li> <li>- Ensure, to the extent possible, that there is ventilation from the outside. Call and inform the following telephone no:  +34 91 490 00 00</li> <li>- When the CO<sub>2</sub> level has fallen, correct the cause, as described in the <b>pre-alarm</b> section below.</li> </ul>
<ul style="list-style-type: none"> <li>- the red diode blinks (1,5 % CO<sub>2</sub>)</li> <li>- intermittent acoustic signal</li> </ul> <p><b>Note!</b> Number of blinks indicates which sensor is giving the alarm.</p>	<b>PRE-ALARM</b>	<ul style="list-style-type: none"> <li>- Enter the area in question <b>only</b> under the supervision of another person.</li> <li>- Open the doors and the windows as much as possible.</li> <li>- Close all CO<sub>2</sub> containers.</li> <li>- Remedy leak-aps.</li> </ul>
<ul style="list-style-type: none"> <li>- the yellow diode blinks (system fault)</li> <li>- oscillating signal</li> </ul> <p><b>Note!</b> Number of blinks indicates which sensor is faulty.</p>	<b>SYSTEM FAULT</b>	<ul style="list-style-type: none"> <li>- Check the wires and the connections to the warning system</li> </ul>
<p><b>Temp</b> - yellow diode (- or +)</p> <p><b>Note!</b> Number of blinks indicates which sensor is giving the alarm.</p>	<b>INCORRECT TEMPERATURE IN THE COLD STORAGE FOR DRINKS</b>	<ul style="list-style-type: none"> <li>- Check the cold storage room.                             <ul style="list-style-type: none"> <li>- below 3°C</li> <li>+ above 10°C</li> </ul> </li> </ul>
Sensor	Place	
1		
2		
3		
4		

## Example of a cellar installation



# III Connection Diagrams

## Connection diagram - with one sensor



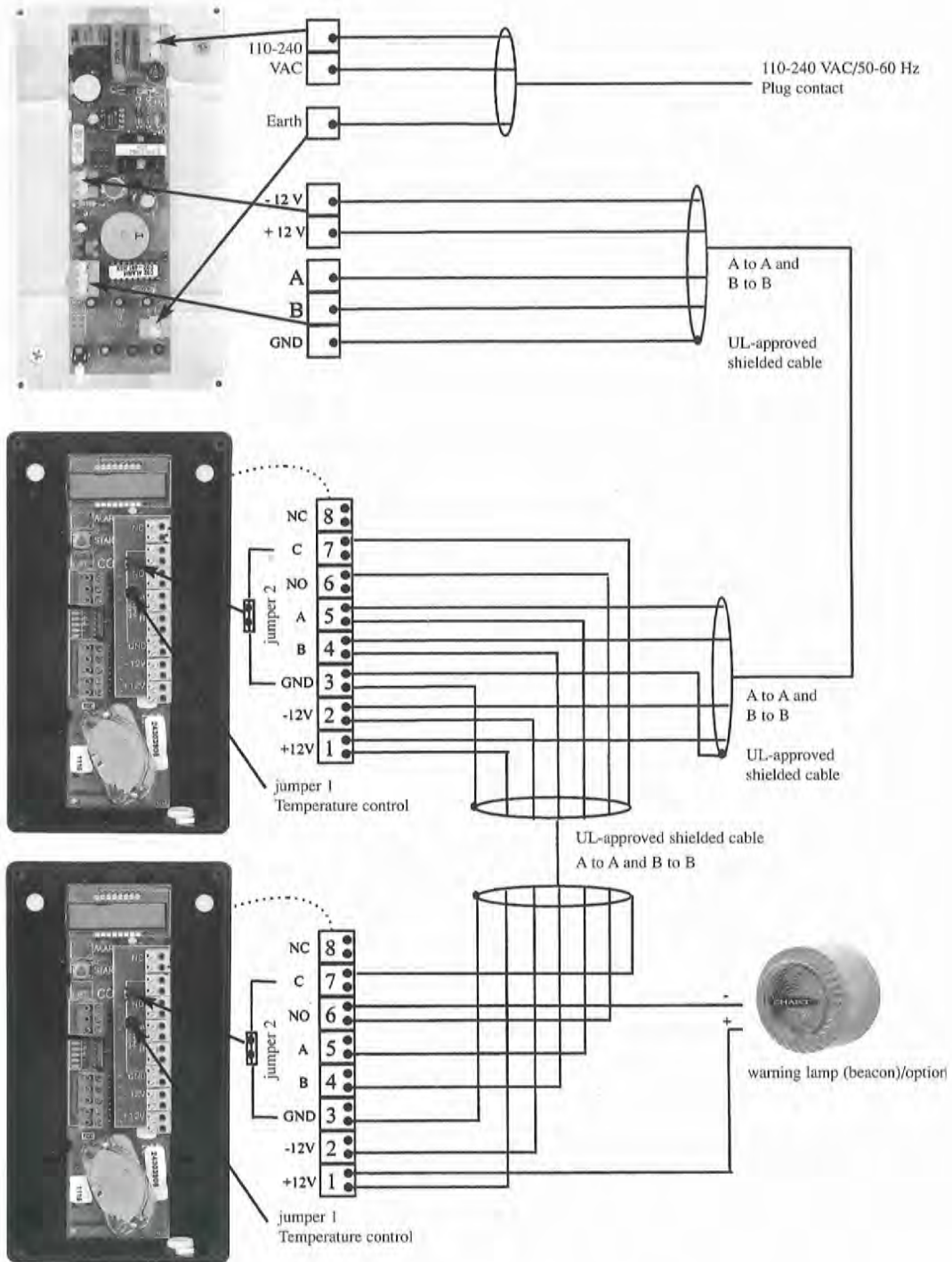
**Note!**

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



# Connection Diagrams III

## Connection diagram - with two sensors



### Note!

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

# IV Important Records

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***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 MVE 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:

\_\_\_\_\_

\_\_\_\_\_

# Important Records IV

## SENSOR PLACE

Sensor No.	Room/Place

## FUNCTION TEST

	SENSOR 1	SENSOR 2	SENSOR 3	SENSOR 4
Date				
Name				
Date				
Name				
Date				
Name				

**Note!** The sensors have a five year calibration guarantee. A label on each sensor indicates the factory calibration.

# V Specifications

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

### Product:

Operating principle	Non-dispersive infrared (NDIR) and thermistor
Measurement range - temperature	0...+50°C (+32°C.....+122°F)
Measurement range - CO <sub>2</sub>	0-4 Vol.%
Extended range - CO <sub>2</sub>	3-10 Vol.%
Gas sampling mode	Diffusion

### 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...+50°C)	±0.05 Vol.%
Digital resolution	0.01 Vol.% RS485
Temperature dependence	≤ 0.005 Vol.% /°C at zero gas level ≤ 0.015 Vol.% /°C at 3 Vol.% CO <sub>2</sub>
Pressure dependence	+0.19% of reading per mm Hg in relation to calibration value
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
Maintenance interval	5 years
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

### Power:

Power input	11±3V DC
Maximum 50 Hz ripple	5V peak-peak AC sine wave (if within power input range)
Power consumption	≤ 0.8 Watts average (external optional warning lamp not included)
Average current	72 mA
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 with network capabilities for up to 20 units
Display	4 digit LCD display with % CO <sub>2</sub> and °C indication
Status LEDs	Yellow - maintenance & interference Red - alarm

### Relay:

Type	Dual, 1A/50VAC/24VDC, min. 1mA/5V (Use only Chart warning lamp)
Setpoint/Hysteresis	1.5 Vol.% CO <sub>2</sub> / 0.01 Vol.% CO <sub>2</sub>

### Ingress protection:

IP 54

# Specifications V

<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. File No/Control No UL-E 204 905, Control No - 10YN
<b>Filter:</b>	Insect protection according to EN 54-7:1994

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

<b>Supply:</b>	110-240 VAC, 50-60 Hz / 15VA Overvoltage Cat II
<b>Current consumption:</b>	90/220 mA rms/peak without load
<b>Communication:</b>	RS485 100mA, internal terminated= 120 Ohm 0.3 VDC-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. 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"

# VI Ordering Service and Parts

## Service and Maintenance

1. Service or maintenance work on the CO<sub>2</sub> Safety System should be performed only by Chart trained and authorized professional service agents who are familiar with the CO<sub>2</sub> Safety System and all pertinent safety and service procedures. Contact your Chart representative for the name of the authorized service agent (s) in your area.
2. Before calling for service or troubleshooting assistance, please have the following information at hand:
  - Description of the problem
  - Any special observations (for example: unusual frosting, events related to the problem, etc.)
3. Chart recommends 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 two years. The check should be done to insure safety and optimal performance of the system.
4. The CO<sub>2</sub> Safety System has no user serviceable parts. All service work should be performed by an authorized professional agent.
5. NOTE: Any attempt to service the equipment by unauthorized persons or to perform unauthorized modifications will void the warranty.
6. **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. 11057467
Central Unit	Part.no. 11057504
CO <sub>2</sub> Sensor	Part.no. 11057491
Warning lamp	Part.no. 11057483

For parts or service contact your local authorized Chart CO<sub>2</sub> supplier or equipment service agent.

### Important Telephone Numbers

<u>Company</u>	<u>Contact Person</u>	<u>Phone Number</u>
CO <sub>2</sub> Supplier	_____	_____
	<u>After-Hours/Emergency Number</u>	
CO <sub>2</sub> Service Agent	_____	_____
CO <sub>2</sub> Installer	_____	_____
Chart Customer Service	(612) 882-5000 or (800) 247-4446 (toll free in US)	
Chart Technical Service	(612) 882-5000 or (800) 253-1769 (toll free in US)	

# Warranty VII

## Warranty Policy

Chart Ind. Inc. Warrants to the Purchaser the CO<sub>2</sub> Safety System equipment for 3 years from the Chart invoice date, that said equipment shall be free from any defects in workmanship and materials. Chart 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 Chart invoice.

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

As a further pre-condition to any Chart liability hereunder, both parts replacement and labor must be supplied by an approved Chart service company. Chart 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. Chart 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 Chart or operation of such equipment in a manner inconsistent with Chart accepted practices and all operating instructions, unless pre-authorized in writing by Chart, shall void this Warranty.

Chart'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. Chart is not liable for any losses (including CO<sub>2</sub>), damages, or costs of delays, including incidental or consequential damages. Chart 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: Chart, Inc. Telephonic / electronic approval may be obtained by contacting Restaurant Products Technical Services at:

Telephone: 612-882-5000  
800-253-1769  
(toll free in US)

Facsimile: 612-882-5185

or by writing to:

**Chart, Inc.**  
**MVE Technical/Customer Services**  
**3505 County Road 42 West**  
**Burnsville, MN 55306-3803**  
**USA**

Authorization must be obtained from Chart prior to shipping any equipment to Chart facilities. If approved, a Return Material Authorization (RMA) number will be provided. The RMA number must be prominently indicated on the packing slip and any packaging which accompanies the goods being returned. The customer returning the goods is responsible for all freight, proper packing, and any damage incurred during shipment of the goods back to Chart.



Chart Industries • 3505 County Road 42 West • Burnsville, MN 55306-3803

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