CO2 Monitor Operating Instructions

Model: RAD-0100
Doc Rev 7/2012

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1. Product Overview

Thank you for selecting the RAD-0100 CO2 Monitor. It is designed to detect the presence of carbon dioxide in any area to protect people in confined spaces. High concentrations of CO2 in confined spaces are dangerous, and may lead to health problems ranging from headaches and fatigue to asphyxiation and death. The RAD-0100 CO2 Monitor includes a audible alarm and visual indicator which will activate when CO2 concentration reaches a user-defined pre-set level. Detection of high levels of CO2 will also activate a relay that can be used to ventilate the confined space and reduce CO2 concentration in the area. This makes the RAD-0100 CO2 Monitor useful in CO2 storage areas, breweries, wineries, cellars, beverage dispensing areas, restaurants or fast food outlets.

Features:
1. NDIR (Non-Dispersive Infrared) technology is used to measure CO2 concentration up to 50,000 ppm (parts per million).
2. SEU (Sensor Unit) is pre-wired with 3 to 3 RDU (Remote Display Unit) to allow warnings at multiple locations.
3. Large digital LCD display clearly indicates the ambient CO2 concentration and temperature.
4. Relay output can automatically control a fan to ventilate confined spaces.
5. Audible and visual alarm indicators.
6. IP54 Water Protection of SEU (Sensor Unit) except backside when installed on the wall.

2. Package Contents Check & Main Unit View

The RAD-0100 package comprises the following parts:
- Main Unit:
  - SEU (Sensor Unit)
  - RDU (Remote Display Unit)
  - Panel holders
- Network cable connector:
  - 7 meter communication cable
  - User manual
- Accessories:
  - Plug lock 1 pc
  - Screw 10pcs
  - Expansion plug 10 pcs
  - Nail clip 10 pcs
  - Warming paper 1 pc

Caution: Move the rubber cap from position “M” to position “L” when RAD-0100 is first removed from the packaging so that the vent is not blocked while the RAD-0100 is working.

SEU (Sensor Unit)

The SEU should be placed in a room where CO2 is likely to accumulate, or is stored, such as a closet with CO2 canisters. With power, the green OK LED will turn on and the LCD will immediately display the ambient CO2 concentration and temperature.

The SEU has four LED indicators: AL1, AL2, CALI and ReFactSet.

1. AL1 (First Alarm Level)
2. AL2 (Second Alarm Level)
3. CALI (Low CO2 Level)
4. ReFactSet (Recovering Factory Settings)

The SEU has an internal battery that will power the device for at least 5 weeks. The battery can be recharged once the CO2 level is below 5% (50,000 ppm).

3. LCD Display Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL1</td>
<td>First Alarm Level</td>
</tr>
<tr>
<td>AL2</td>
<td>Second Alarm Level</td>
</tr>
<tr>
<td>CALI</td>
<td>Low CO2 Level</td>
</tr>
<tr>
<td>ReFactSet</td>
<td>Recover Factory Settings</td>
</tr>
</tbody>
</table>

4. SEU (Sensor Unit) Instructions

The SEU should be placed in a room where CO2 is likely to accumulate, or is stored, such as a closet with CO2 canisters. With power, the green OK LED will turn on and the LCD will immediately display the ambient CO2 concentration and temperature.

The SEU has 10 buttons:
- Power Button
- Auto Run Button
- Diagnose Button
- Calibration Button
- Factory Reset Button
- Mode Button
- Enter Button
- Communication Cable to RDU

5. RDU (Remote Display Unit) Instructions

The RDU (Remote Display Unit) should be placed outside the room where CO2 is stored or used. The RDU is connected to the SEU with a wire that has a maximum length of 25 feet. The RDU should be placed where it can be conveniently observed by entering the room where the SEU is located. The RDU will be repaired and displays the measurements made by the SEU on an easy-to-read digital LCD along with important safety information.

The AL1, AL2, OK and FLT LEDs function the same on both the SEU and RDU. If the LED concentration of CO2 continues to rise above the second alarm level, the AL2 red LED’s will flash together, and the tempo of the buzzer will increase. Once triggered, the AL2 alarm will remain until the Reset Button on the SEU is pressed.

6. Safety Notes

Your safety is very important. To ensure you use the product correctly and safely, please read these warnings and this User Manual before using the RAD-0100. Otherwise, the protection provided by the equipment may be impaired. These warnings provide important safety information and should be observed at all times.

1. Handle the device carefully; do not subject the product to impact or shock.
2. Disconnect the unit or the adaptor near a heat source. Heat can cause distortion of the unit, which may result in an explosion or fire.
3. Do not touch the exposed electronic circuitry of any device under any circumstances, as there is the danger of electronic shocks.
4. Only use the included power adapter. Improper power adapter or power sources can cause serious damage to the product, resulting in injury or death to the user.
5. When first installing the unit, use the “DIAG” function to verify the communication between SEU and RDU.
6. Make sure the sensor adapter is tightly mounted using the plug lock so that the power adapter cannot be easily and accidentally disconnected.

7. Caring For Your Product

1. Repair: Do not attempt to repair the product or modify the circuitry by yourself. Please contact your local dealer or a qualified repairman if the product needs servicing.
2. Cleaning: Disconnect the power before cleaning. Use a damp cloth. Do not use liquid cleaning agents such as benzene, thinner or aerosols, as these will damage the device.
3. Maintenance: We recommend users to test the communication between the SEU and RDU under “DIAG” function to verify the working conditions for the SEU and RDU. If the four LED’s blink and the buzzer of SEU and RDU sound simultaneously, it indicates that SEU and RDU work normally. When the LCD displays a safety icon “ESCI”, please take immediate protective action to check CO2 concentration. If the concentration of CO2 continues to rise above 5% (50,000 ppm), use the “DIAG” function to check once within two year to make sure that the RAD-0100 CO2 Monitor is working properly.

8. Installation Instructions

Please carefully take out the SEU (Sensor Unit), RDU (Remote Display Unit), panel holders, network cable connector, 7 meter communication cable, plug lock, screws, plug lock, nail cable clips, and warning paper from the package.

Step-by-Step Installation:
1. Choose a suitable location to install the SEU. Fix the panel holder on the wall with the four screws (included). The recommended minimum height is about 4.5 meters (1.5 feet) from floor and close to the manifolds and valves as possible.
2. Put the SEU on the panel holder, making sure that they are connected tightly.
3. Fix a network cable holder in a suitable location outside the monitored space with screws (included). Push the RDU onto the panel holder, and stick the warning paper next to the RDU. Repeat this step for up to 3 total RDU units.
4. The communication cable is pre-wired to the SEU. Route the cable to the first RDU and fixed the communication cable to the wall by nail cable clips. Then plug the cable into the INPUT port on the RDU. Daisy chain cables from the RDU to any additional RDU units.
5. The RAD-0100 CO2 Monitor has one relay output. The relay cable is pre-wired to the SEU. The relay can control a fan or blower to ventilate the monitored space when necessary. The relay will be triggered when the CO2 concentration exceeds the first alarm level.
6. After finishing the installation, plug the AC power adapter into a standard 120VAC electrical supply outlet.
7. Mount the Plug lock by expansion plugs so that the power adapter cannot be disconnected without use of mechanical tools.
8. When the power is connected, the SEU and the RDU will immediately begin to work. Use the “DIAG” function to verify communication between SEU and RDU. The four LED’s will blink and the buzzer will sound on both the SEU & RDU. After that the communication is verified. Test this by verifying that the display is on the same both on SEU & RDU.
CO2 & Temperature specification:

**CO2 Specification**
- Measurement Range: 0 - 50,000 ppm (5%)
- Display Resolution: 10 ppm
- Repeatability: ±20 ppm @400 ppm
- Pressure Dependence: 0.13% of reading per mm Hg
- Response Time: <60 seconds for 90% response to step change
- Pressure Range: 0 ~ 50,000 ppm
- AL1 (First Alarm Level): 0.5 / 1 / 1.5 / 2 %, Default AL1= 1.5%
- AL2 (Second Alarm Level): 1.5 / 2 / 2.5 / 3 / 3.5 / 4 %, Default AL2= 3%
- Warm-Up Time: <60 seconds at 22°C

**Temperature Specification**
- Temperature Range: 0°C to 50°C (32°F to 122°F)
- Display Resolution: 0.1°C (0.1°F)
- Humidity Range: 0 ~ 95% RH non-condensing
- Storage Temperature: -20°C to 60 °C (-4°F to 140°F)

### Power Supply & Relay Output:
- AC adapter: 110/220 VAC
- Voltage: 100 ~ 240 VAC
- Frequency: 50 / 60 Hz
- Peak Input Current: 0.3 A from 6 VDC
- Power: 1.8 W
- AC/DC Voltage: 6VDC
- Output Power: 1.8 W
- SPST, Normally Open

### LCD Display Options
- °C/°F

### ReFactSet
- For SEU, this feature allows you to return the SEU to the default factory settings.

### Fault Codes & Troubleshooting Guide

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Description</th>
<th>SEU Indication</th>
<th>RDU Indication</th>
<th>Suggested Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Er3</td>
<td>The ambient temperature has exceeded the temperature range 0°C to 50°C (32°F to 122°F)</td>
<td>Er3 flash LED blink, Buzzer beep</td>
<td>Er3 flash LED blink, Buzzer beep</td>
<td>Unplug the AC adapter and reconnect it. If the Er3 reappears, contact the dealer.</td>
</tr>
<tr>
<td>2 Er4</td>
<td>Something wrong with sensor or sensor has exceeded its expected life</td>
<td>Er3 flash LED blink, Buzzer beep</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Unplug the AC adapter and reconnect it. If the Er4 reappears, contact the dealer.</td>
</tr>
<tr>
<td>3 Er5</td>
<td>EEPROM System Problem</td>
<td>Er4 flash LED blink, Buzzer beep</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Unplug the AC adapter and reconnect it. If the Er5 or Er6 reappears, contact the dealer.</td>
</tr>
<tr>
<td>4 Er7</td>
<td>Internal Data Transmission Error</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Unplug the AC adapter and reconnect it. Check the RJ45 plug is connected into the INPUT port of RDU. If the “Er7” displays on the RDU only.</td>
</tr>
<tr>
<td>5 Er8</td>
<td>The accuracy of CO2 sensor may deviate from the actual CO2 concentration</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Er7 flash LED blink, Buzzer beep</td>
<td>Unplug the AC adapter and reconnect it. If the “Er8” still appears, contact the dealer. Calibrate the unit. If the “Er8” still appears, contact the dealer.</td>
</tr>
</tbody>
</table>