



**GREER
SYSTEMS**

**IC Series Precision Gas Detector
Version 1.4**

Your Installation, Operation and Maintenance Manual



**Manual 204-0118-15
Revision 1.14
1/25/06**

Introduction:

Your IC Series gas detector features service-oriented functions required for dependable operation and field serviceability. Optimized software provides lockout control, dual user selectable contact closures, automated calibration procedures, and sensor swap out and conditioning modes. Onboard serial communications board provides real-time PPM concentration, span and zero values, step-by-step onscreen calibration and sensor change-out procedures, total detector runtime and sensor element PPM exposure, plus much more. The onboard LED's provides visual indication of the detectors status using Greer Systems' VeriCheck™ system. This system provides detector status and current milliamp output at a glance.

Your IC Series gas detector utilizes an electrochemical sensor element that is particularly sensitive to the stated gas. This sensitivity manifests itself in a large change in the sensors output in the presence of the target gas. As in any electrochemical gas detector product, it is vitally important that the end user or service organization realize that regular checks, re-zeroing and maintenance is an integral part of electrochemical based sensing technology.

Your IC will provide an output signal of 4 to 20 milliamp, representative of the gas concentration it senses. The circuitry is designed so that the output will never rise above 20 milliamp, regardless of the saturation of the sensor by the gas it is detecting. The circuit will also prevent the output from going below 4 milliamp, except during a power or sensor failure or when the electrochemical sensor is about to expire.

Your IC Series gas detector offers serial communications via the on-board DB9 Connector. This feature allows access to the service-oriented functions required for dependable operation and field serviceability via Greer Systems Handheld PPC or a standard PC.

Installation

Your IC unit consists of a 5" X 5" X 3" painted aluminum NEMA-4 rated enclosure with gasketed cover. The electronics are mounted on the base of the enclosure. All wiring is to terminal screws or a removable plug-in style connector.

Your sensor element is mounted in a ¾" inch adapter and installed through a standard ¾ inch hole. A terminal strip is provided on the circuit board for connection of the sensor, power and output signals. The sensor must be installed in a non-condensing environment. The operating temperature of the sensor element and the electronics must be maintained between -10°F and 125°F. A low temperature product is available (model ICEE-H for Ammonia) contact your Dealer or Greer Systems for more information.

The input power wire connected to the 12-24 Volt AC/DC inputs must provide a minimum of 12 Volts AC or 15 DC as 1.0 amp measured at the IC terminal strip. A 4 conductor stranded cable is recommended. Maximum cable lengths are listed below. Greer Systems recommends the use of 2 twisted pairs with a shield whenever possible.

Cable Length	Wire Size
Less than 10'	20 AWG stranded 4 conductor*
Less than 1,000'	18 AWG stranded 4 conductor, 2 twisted pairs, shield with drain*

**Under no circumstances should the IC low voltage signal wires be in a common conduit, tray, etc. with power wiring over 48 Volts. If a shielded cable is used, the shield or drain must be terminated only at the monitor's location.*

Multiple IC Detectors may be powered from a common 12-24 Volt AC/DC power supply including Greer Systems controllers.

Reading from LEFT to RIGHT each unit's input power must be wired with same polarity, i.e. every IC's Pin 3 must be connected to the same terminal of the supply transformer, and every Pin 4 must be connected to the second terminal of the supply. If DC supplies are used, all system must have positive on Pin 4 and negative on Pin 3. A field-mounted transformer may be used near the sensor assembly to provide local 12-24 Volt AC/DC power for the unit.

Caution: Regardless of the source, the power transformed for the IC(s) should not be used to power other devices.

The IC Series has 5 different modes of operation:

1. Operation Mode
2. Lockout Mode
3. Reset Mode
4. Warning Mode
5. Fault Mode

Operation Mode:

Operation mode provides active signaling via the output or optional contact closure when the target gas is detected. In Operation Mode, the LED will illuminate green indicating a functional status and will pulse according to the milliamp output using our VeriCheck™ system.

Lockout Mode:

Service mode is a software feature that allows testing, isolation, and sensor element swap on the detector in place, without triggering events in a control system. In Lockout Mode, the detectors output is locked at 4 milliamps and holds the contact closures in their default state. Lockout Mode is automatically activated whenever the detector enters Reset or Calibration mode. Calibration mode provides additional sequence of operations required to calibrate your detector. Sensor Swap Mode provides additional sequence of operations required to change your detectors sensor element.

Reset Mode:

Reset Mode provides a 24hour lockout to condition and bias a new sensor element. Once reset mode is engaged, your unit will be in lockout mode for 24 hours.

Early Warning Mode:

Early Warning Mode provides sensor alerting via milliamp output and visual LED indication when the sensor element is close to its minimum reaction range. The detector is still functional and will react to the presence of the target gas. The reaction levels should be considered questionable and the sensor element should be replaced as soon as possible.

Fault Mode:

Fault mode occurs when the sensor element no longer has sufficient span to be considered reliable. This is indicated by output and visual LED indication. The detector **will not** react to the presence of the target gas.

Serial Communications:

All IC Series gas detectors feature onboard serial communications that provides access to the advanced features of the detector. The features available are:

1. Real-time PPM values
2. Cell reaction, span, and zero values
3. Selectable PPM range (0-100, 0-250 PPM)
4. Contact closure state and set points

5. Total hours of operation
6. Total hours the sensor has been exposed to the target gas
7. Access to Calibration Mode
8. Access to Service/Lockout Mode

Establishing Communications

The IC Series gas detector communicates via standard RS-232C serial protocol accessible by any serial communications software, such as HyperTerminal available on all Windows Based computers. Hookup is established by utilizing a 6ft serial cable DB9. Set your serial terminal to the following parameters:

9600 baud

8 bits

no parity

1 stop bit

xon, xoff

Send line ends with line feeds

Echo typed characters locally

After establishing connection with the IC unit, type “?” for a complete list of available commands. NOTE: IC units require statements to have all capitol letters. We recommend turning on your PC’s caps lock.

Example: in all caps type **INFO**

Below is an example of the IC units response:

INFO

ZERO = 7

note: this is cells clean value.

SPAN = 121

note: this is cells exposed value

CELL = 6

RELAY 1 = 35

note: relay 1 has been set for a trip point of 35ppm.

RELAY 1 IS NOT TRIPPED

RELAY 2 = 100

note: relay 2 has been set for a trip point of 100 ppm.

RELAY 2 IS NOT TRIPPED

OPERATIONAL MODE IS NORMAL

RANGE IS 100 PPM

note: this shows the units range has been set @ 100 ppm.

FAULT CONDITIONS ARE:

NO FAULTS PRESENT

CONFIGERING YOUR DETECTOR

Changing sensor range:

The IC detector is capable of scaling it outputs within 2 user selectable ranges, 100 and 250 PPM. Factory default is 250 PPM. To alter your detectors range type ‘**RANGE100**’ or ‘**RANGE250**’ (enter) <CR>

Setting Contact Closures:

The IC detector has two (2) FORM C contact closures with user selectable set points. To alter your contact closures set points type '**R1=**' for relay 1 or '**R2=**' for relay 2 followed by your 3 digit set point.

Example: To set relay 1 to a 50 PPM set point type '**R1=050**'

NOTE: you must use a 3-digit set point. Values under 100 must include a leading zero.

Sensor Element Change-Out Procedures

NOTE: Sensor element change-out requires a replacement electrochemical element (PN 010-2100-01). Additionally, calibration requires the use of calibrated span gas and zero gas at a constant flow rate. The Greer Systems' Calibration Kit (PN 010-0122-15) provides all of the required equipment to calibrate your detector.

1. While the detector is in Operation Mode, enter Reset Mode by typing '**RESET**' and pressing enter. The serial output will lock the detectors output and contact closure to their default clean.
2. The detector is now ready for sensor element change-out as indicated by the LED flashing. The system has started a 24-hour countdown cycle to provide sufficient time to condition and bias the electrochemical sensor element.
3. After the 24-hour conditioning cycle has expired, the detector will automatically enter Calibration mode, indicated by the flashing red LED (ready for span setting, step #2 in Calibration Procedures).

Calibration Procedures

NOTE: Proper calibration requires the use of calibrated span gas and zero gas at a constant flow rate. The Greer Systems' Calibration Kit (PN 010-0122-15) provides all of the required equipment to calibrate your detector.

1. While the detector is in Operation Mode, install the sensor adaptor cup over the sensor element and open the flow regulator to the 100PPM NH₃ bottle. Expose the sensor element for 2 minutes, and then type "**SPAN**" and press the ENTER key <CR>. The LED will illuminate solid green on SPAN entry
2. The detector now requires a 15minute cycle to allow the sensor element to rest, indicated by the pulsing red and amber LED's. After the 15 minute countdown timer has expired, the amber LED will no longer pulse.
3. The detector is now ready to set the zero value, indicated by the red flashing LED. Install the sensor adaptor cup over the sensor element and open the flow regulator to the zero air bottle. Expose the sensor element for 1 minute, and then type "**ZERO**" <CR>

The detector is now in Operation Mode

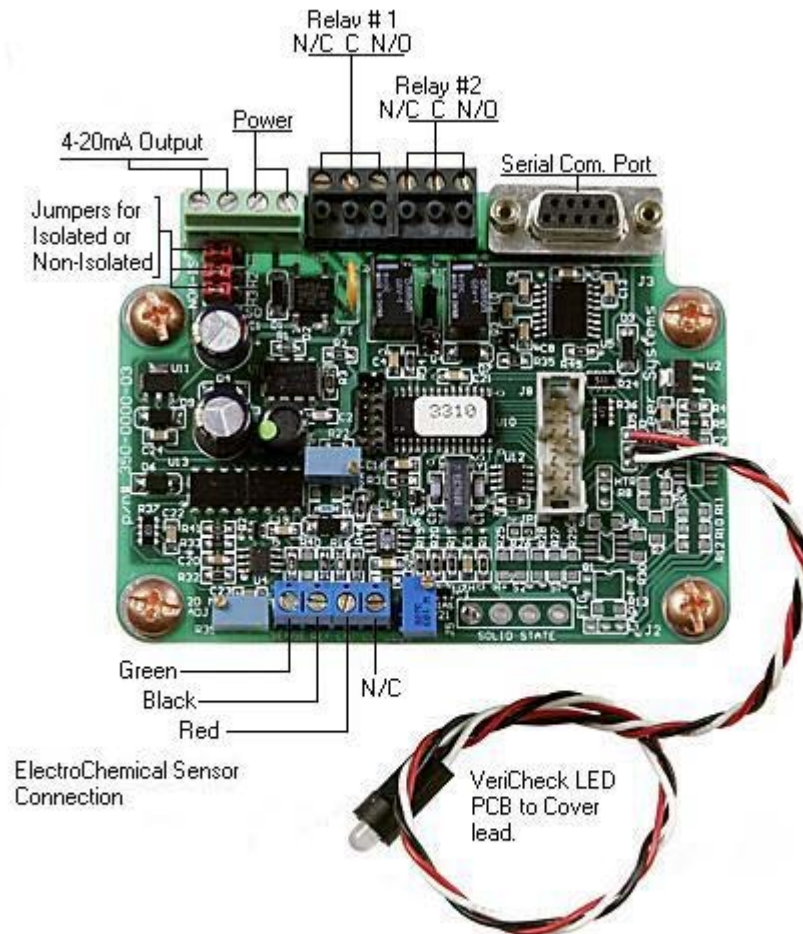
Clearing Ambient readings

NOTE: The ICEE series employs an onboard diagnosis of the sensor element during calibration and re-zeroing. Re-Zeroing is a function that allows for field adjustment of the 4-milliamp signal. electrochemical sensors will drift 2% of baseline yearly. We highly recommend using a calibrated zero gas (PN 011-0128-15)

1. Verify the ambient conditions around the detector. Area should clear of any ammonia vapors.
2. While the detector is in Operation Mode, install the calibration cup onto the sensor fitting and open the fixed flow regulator to the Zero-Gas.
3. Wait one minute for the sensor element to clear.
4. Type '**ZERO**' and depress the enter key to set the units zero value
5. The detector is now in operation mode with a new baseline value, as indicated by the green LED illumination indicating a functional status.

If the sensor element has drifted too far since its last calibration, the detector enters a fault mode (indicated by the red LED). A full calibration of the detector is required to return the detector to operational status.

Interior PCB Layout and Designation



SPECIFICATIONS

Sensor Type: Electrochemical

Sensor Life: Approximately 2 years.

Detection range: 0-100 or 0-250 PPM; user selectable

Output: 4-20mA, isolated or non-isolated and linear

Output Adjustment: via serial interface

Temperature: +14°F to +104°F(-10C to +40C) Heated enclosure for temps below 32°F available

Humidity: 15-90% non condensing.

Storage Temp:+ 41°F to +68°F (+5C to +20C)

Respond Speed: < 45 seconds to full scale

Maximum Loop: 500 Ohms at 12 Volts; 1000 Ohms at 24 Volts

Case: NEMA-4 aluminum enclosure with gasketed cover

Case Size: 5" X 5" X 3

Weight: 3 lb.

Wiring Access: Provided left or right side $\frac{3}{4}$ " hole

Power Required: 12-24V AC/DC

Power Consumption: < 1.0amp

Fuse: Onboard auto-reset 1.5 amp

Contact Closure:

Resistive Load: .5amp @ 120vac, 1amp @ 24vac

Inductive Load: .2amp @ 120vac, .4amp @ 24vac

Max Capacity: 62.50va 30watt

Replacement Sensor Kit: Part number 010-3390-09

Serial Communications Kit: Part number 010-0047-50

Calibration Kit: Part Number 000-0700-08

This manual is intended to provide the user of the Greer Systems gas sensor systems with necessary information to install and operate the gas detector units. Failure to install or operate the units in accordance with the information in this manual could result in unsatisfactory and/or unreliable operation. The user and installer are advised to read this manual carefully and adhere to the instructions.