GREYSTONE
ENERGY SYSTEMS INC

Q4 Controller II

Q4C-II Four Channel
Monitoring and Control System
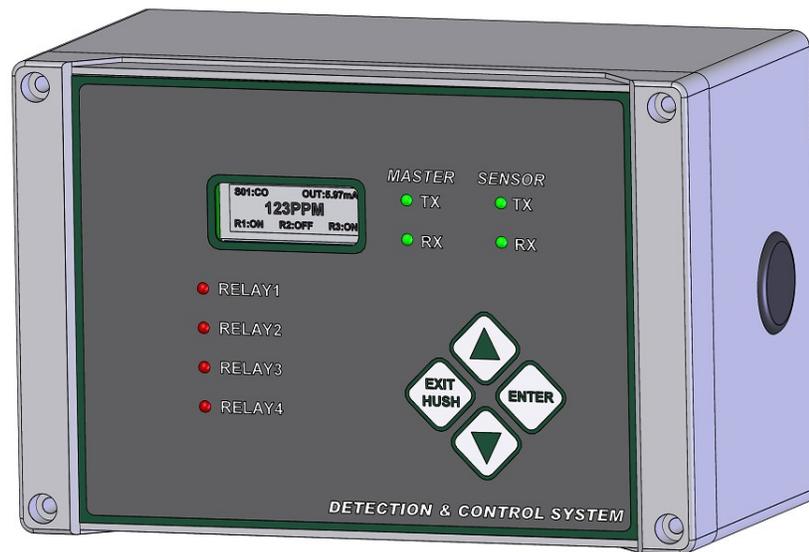
**INSTALLATION
OPERATION AND MAINTENANCE
MANUAL**

Greystone Energy Systems Inc.
PHONE: +1 (506) 853-3057   Web: www.greystoneenergy.com

Table Of Contents

1. Glossary

Actuate/De-Actuate: These terms are used instead of 'make' and 'break' to allow us to distinguish between performing an action due to an environmental condition and whether the contact may be closed ('made') or open ('break') because of our use of double throw contacts, and the option of normally energized relays.

Averaging: When setting alarms, the alarm can be set to operate on the basis of the average signal assigned to that relay. It must be the same gas range.

Baud rate: A measure of the speed at which data is transferred over a digital communication link. Given as bit per second (bps). Generally, the lower the speed, the more reliable.
bps: See Baud rate

Characteristic Impedance: The effects of capacitance and inductance of a pair of wires expressed as an equivalent resistance.

Configuration Database: System configuration requires entering a great deal of information concerning relay operation, sensor type and so on.

Dry Contacts: The relay contacts are supplied without power applied to any output terminal.

Normally Energized: The relay coil is energized in the non-alarm state. This is sometimes referred to as 'fail-safe' because in the case of controller failure or loss of power, the relay contacts will open.

Normally Open Contacts: In the non-alarm state, but under power, the contacts are open.

Latching: A relay once actuated remains actuated even though the condition has been removed. Requires a manual operation to reset.

RS-485 (properly EIA-485): A wiring and electrical standard for digital communication in a multi drop environment. It is a 2-wire system, with a differential signal allowing relative immunity to variations in grounds between devices. RS-485: maximum 32 transceivers per loop, 4000 ft (1300 meters) max. 120 ohm line termination required. (Line termination resistors are available on all M-Series devices via selectable jumpers).

Stub: A short wiring link branching from the main line.

Voting: When more than one sensor and setpoint is assigned to a relay, then voting defines how many must reach the setpoint before the relay actuates.

2. General Information Overview

GES's Four Channel Gas monitoring and Control System is a set of remote digital sensors, such as M-Series sensor/transmitter and Q-Series smart sensor, working with onboard relays and optional BACnet BAC-Box together, they are monitored and controlled by the Q4 Controller. GES sensor/transmitters comprise a group of remote mountable sensors complete with electronics, most of which have both analog and digital communications, and most of which have display and onboard relay options.

The Q4 Four Channel Controller is a microprocessor based and a flexible programmable controller with capability to work with up to four GES digital sensor/transmitters through its RS-485 smart/digital sensor port. With 4 onboard relays, the controller can assign any one (or up to four) of the four digital sensor/transmitters to each relay. The Controller also equips a USB port to allow traditional Windows PC software, M-View, to access the Controller config database. Additional RS-485 port can be programmed through Menu to either work as a Modbus RTU port for BAS or SCADA (as default) or work as a BACnet port to connect GES BAC-Box, which supports BACnet/IP protocol.

Additional features include 24 VDC transistor outputs for strobe light and horn as well as an on-board buzzer.

The enclosure for the Q4 Controller is rated IP66 & NEMA 4, 4X, 12 & 13 and is UL listed. Relay status indicator and RS-485 communication indicator are visible at the front of the enclosure.

Power supply is designed for 24VDC/AC for all devices in the system. GES can supply a transformer for external mounting sized to the application if requested.

NOTE:
WHEN PROGRAMMING THE Q4C WITH A LAPTOP THROUGH USB PORT ENSURE THAT THE LAPTOP IS NOT CONNECTED TO ANY POWER SOURCE. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT WITH DAMAGES TO THE CONTROLLER AND OTHER DEVICES CONNECTED TO IT.

3. Q4C-II Specifications

NOTICE: Installing or using this equipment in a manner not specified by the manufacturer could cause electric shock, bodily injury, or risk of fire.

Specification:	

Power Supply	Voltage: 24VDC nominal, range 18 to 30VDC
	                 24VAC nominal, range 15 to 24VAC 50/60HZ
	Note: Q4C-II has full-wave rectifier and half-wave rectifier circuit on board for flexibility. You will damage devices if you mix half wave and full wave rectifiers on the same AC source. Use extreme caution when sharing a common AC source. Sharing a common DC source is less problematic.
	
	Current: Q4C-II: max. 0.75 A (fuse protected)
	                Strobe & Horn: max. 0.25 A (fuse protected)
	
	Note: No external over-current protection is required. Over-current protection is provided by means of fuses F1 and F2/3. See fuse specification below.

Fuse	F1 on I/O Board for Q4C-II: Polyswitch 750mA F2 / F3 on I/O Board for Strobe/Horn output: Polyswitch 250mA Polyswitch device resets after the fault is cleared and power to the circuit is removed
Enclosure	IP66 & NEMA 4, 4X, 12 & 13 ratings UL listed 508 listed (File # E65324)

On-Board Relays	4 Relays SPDT, Dry contacts, Relay1 to Relay4
	Resistive load:
	      5.0A at 250VAC
	      5.0A at 30VDC
	Inductive load:
	      3.7A at 250VAC
	      3.7A at 30VDC

Environmental conditions	Location: Indoor use only Altitude: Up to 2 000 m Temperature: -20 °C to 50 °C Relative Humidity: 0 to 95% RH (non-condensing) up to 31 °C Decreasing linearly to 80% at 40 °C Pollution Degree: 2, in accordance with IEC 664.
Display & Keypad	LCD display c/w backlight 4x tactile & audible keypad
Panel Indicators	8 Status LEDs RS-485 port TX/RX Status LED for Sensor Network RS-485 port TX/RX Status LED for Modbus or BAC-Box 4 Relay Status LEDs
On-Board Buzzer	Used for internal warning and alarm, 3700 Hz Continuous It's not used for Alarm-Sounding Appliance. For external Alarm-Sounding Appliance, they can be connected to the below Horn/Strobe terminal blocks, the Alarm-Sounding Appliance sound-pressure level should be at least 85dB at 10 feet according standard UL2017 Audibility Test
Horn & Strobe	Two 24 VDC transistor driver are for Horn and Strobe Dedicated 24VDC terminals are supplied for connection to standard strobe and horn set. Strobe driver can be set to 50% duty of pulse or 100% duty ON Maximum of 250mA on the 24VDC power supply
Remote Devices	RS-485 Sensor Ports with GES Controller Protocol - Available GES digital transmitters, such as Q-series digital sensors, M-series digital sensors and QIRF

Modbus Slave Port Or BACnet Port	RS-485 port, default setting is for Modbus protocol
	_ Responds as a Modbus Slave using RTU protocol.
	  Q4-Controller supplies read status information only
	_ Connect to GES BACnet/IP module BAC-Box
	  The BACnet must be enabled in the BACnet MENU

Certification	Pending: Standard UL2017 and CSA 61010-1

4. Installation

4.1 Unpacking the equipment

The Q4 Controller is shipped with the following:

- The Q4 Controller in a NEMA 4X enclosure

- M-View USB Flash Drive

- User Operation Manual

- Installation Drawing

- USB Cable A to B M/M

- Enclosure mounting feet kit

4.2 Type and Location

The Q4 Controller is designed and certified for installation in a fixed location where is not subject to shock and vibration. Please observe the temperature and humidity specifications above for ambient conditions. Observe the possibility of leaks or possible water damage from cleaning done in the area.

The mounting height and location should provide easy access to the wiring terminals and front-panel. Backlighting is provided for the display in case of low lighting conditions.

It is recommended that controllers be installed 5 feet (1.5m) above the floor, at approximate eye level. Securely mount the controller using the appropriate screws.
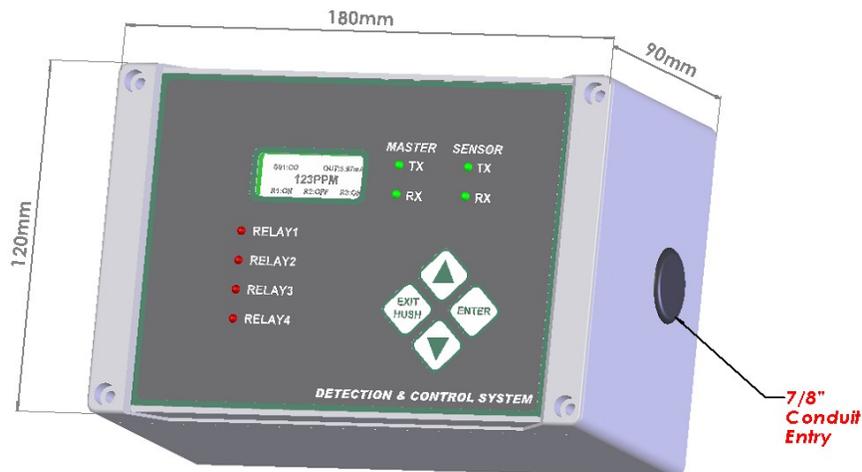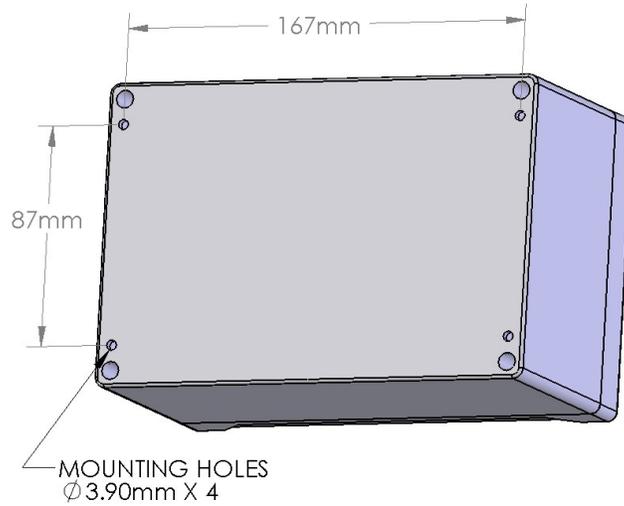
Figure 1: Q4 Controller Physical Dimensions

The controller also comes with a mounting feet kit as an option. The same wall mounting holes can used to install the feet kit.
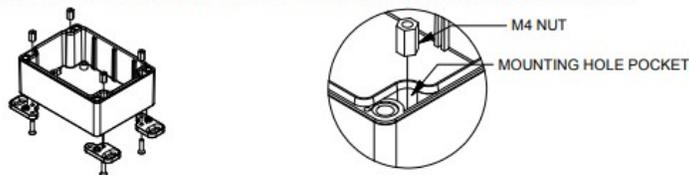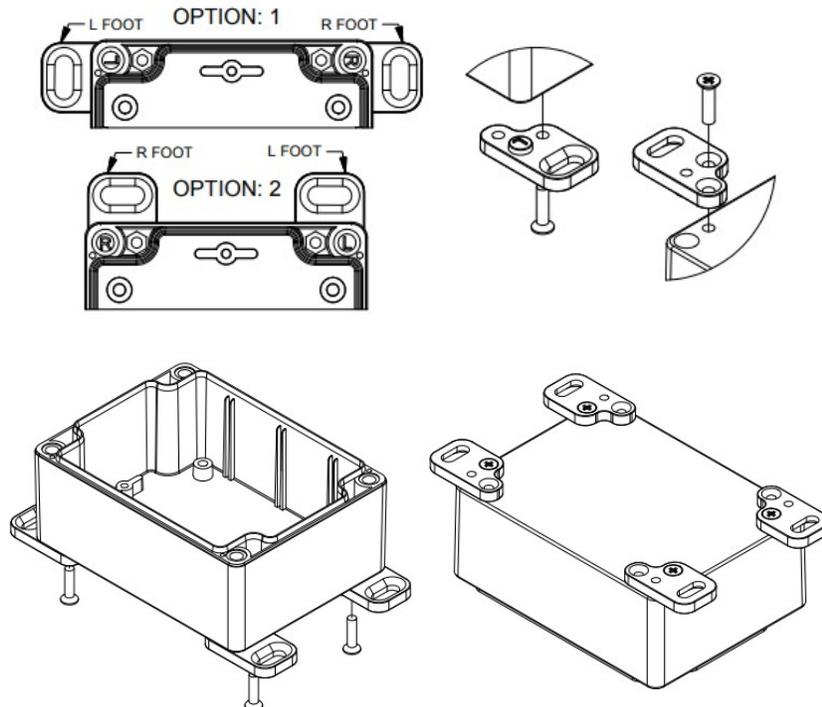
4.3 Cabling

Approved cable conduit and conduit connectors should be used to ensure a safe and reliable installation. Check the local wiring code for more information. Make sure all conduit connectors are screwed in tight and that they are not coming in contact with any bare conductors.

Strain relief should be installed to the enclosure to prevent any mechanical stress from being transmitted to terminals and internal connections.

We recommend using BELDEN 9841 for communications. This wire has 120 ohms input impendence, which will eliminate RS-485 communication problems.

GES warrantees and support only covers installation with proper cable. If in doubt, please contact GES support personnel.

4.4 Connectors

Make sure to observe wiring to the correct terminal blocks. Removable terminal blocks are provided. Make sure there is no confusion about which terminal block to wire to.

Note: **Incorrect wiring to any of the terminals of the Q4 Controller could cause permanent damage to the unit, which is not covered by the warranty. Incorrect wiring could also cause fire, electric shock, or bodily injury. Please observe the polarity on all connections.**

Warning: **Disconnect the main supply when changing any of the wiring to the unit. Be especially cautious when wiring high voltage to the relays. Do not touch sensitive components on the circuit card to prevent static discharge damage to the unit.**

4.5 Power Supply Connection

The Q4 Controller power supply Voltage requirements are nominally 24VAC/DC.

NOTE: Q4-Controller II has full-wave rectifier and half-wave rectifier circuit on board for flexibility. You will damage devices if you mix half wave and full wave rectifiers on the same AC source. Use extreme caution when sharing a common AC source. Sharing a common DC source is less problematic.

GES supplies one standard transformer

- M-Transformer 120 to 24 VAC 200 VA [SKU#: 6500-0024]

4.6 RS-485 Installation

The RS-485 (EIA-485) standard specifies the electrical characteristics for a digital communication link allowing communication between multiple devices on a single link. The RS-485 uses two wires, A+ and B-, and works on the voltage difference between them. If the voltage difference is positive, then that is a "1" if negative then that is a "0".

Connections: Wire terminals A+ to A+ to A+ etc., and B- to B- to B- etc.

Terminator: Q4-Controller supplies two end-of-line resistor on the main board, one for sensor RS-485 port, one for Modbus/BACnet port, they are chosen using a jumper at J3, J4.

- J3/4 1-2: Terminator Disabled/Off (Default)

- J3/4 2-3: Terminator Enabled/On

   Factory default setting is disabled terminator.

Distances: The RS-485 standard allows up to 1300 meters (4000 feet) of line length. It is best to avoid lines of this length if at all possible.

Stubs: Short lengths of cable from the main cable over to a device are called Stubs. When the Baud rate (communication bit rate) is low – e.g. 2400 baud, then it is often possible to use short lengths of a few inches without seriously impairing the signal integrity, especially when overall distances are relatively short; however, this is taking a chance on garbling your signals and is not recommended.

Shield Grounding: There are certain things to keep in mind for the shield.
- The shield must be grounded otherwise it can make the situation worse.
- Ground the shield at only one end to prevent ground loops.
- If you cut the cable then either ground each section of the shield at that point or connect the shields together to ground back at an origin point.

RS-485 Driver Replacement: RS-485 lines in heavy industrial environments are sometimes subjected to magnetic disturbances causing sufficient inducted power surges to damage the driver integrated circuit (IC). The IC U5 and U6 have sockets on the circuit card for ease of replacement in the field.

U5 U6: RS-485 TRANSCEIVER [SKU#: 3200-0044]

TB1, TB5, TB6, TB7
RELAY OUTPUT:
NO: Normally Open
NC: Normally Closed

TB2
24VAC/DC IN
FULL WAVE

TB3
24VAC/DC IN
HALF WAVE

TB4
RS-485
SENSOR PORT

TB8
RS-485
Modbus/BACnet
Port

TB9
Strobe
Output
Max. 250mA

TB10
Horn
Output
Max. 250mA

J3, J4
Terminator Jumper

U5, U6
RS-485
Driver Chip

USB port
for M-View
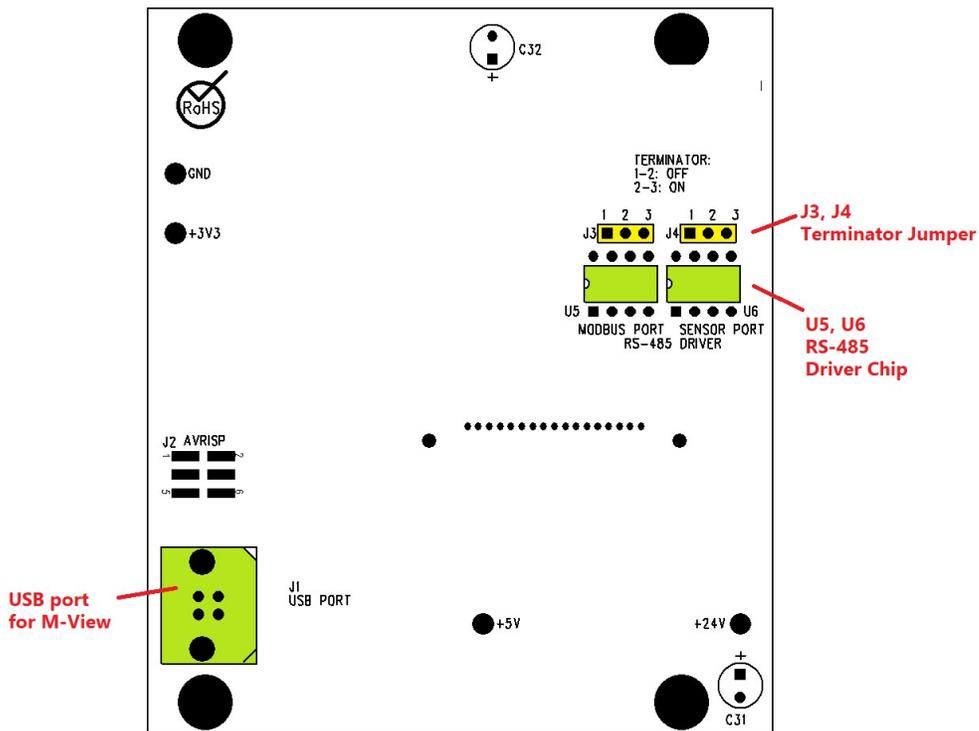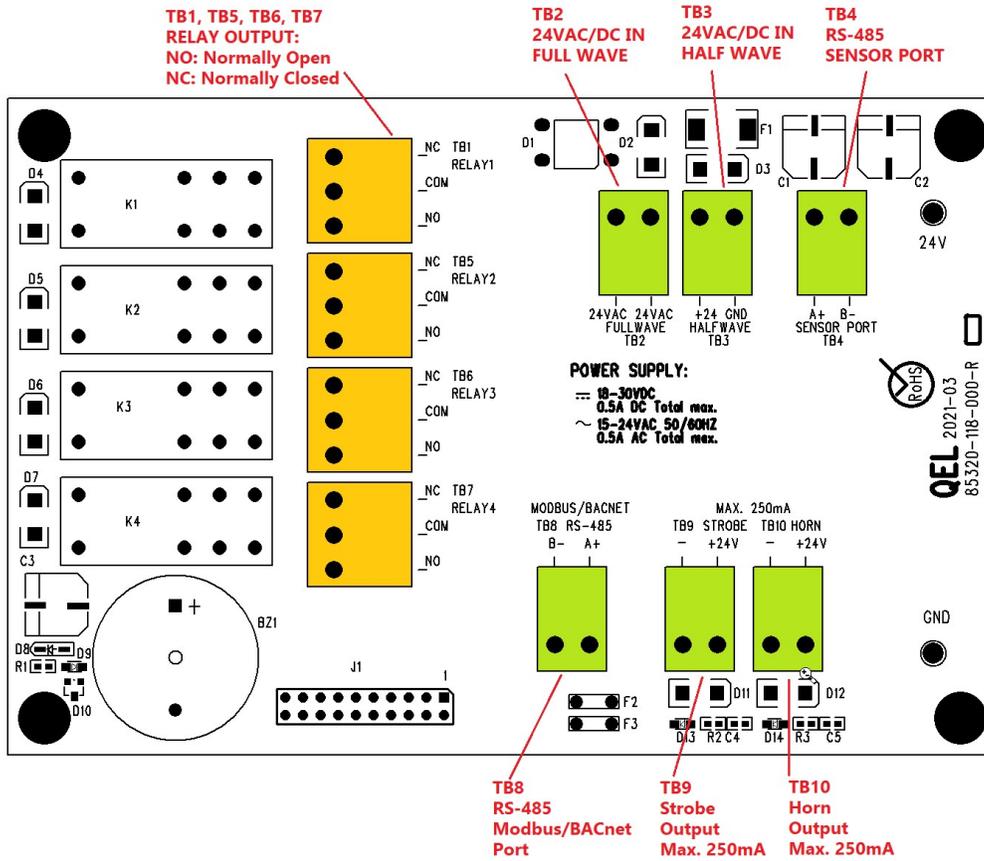
4.7 Sensor Port RS-485 and BAC-Box Installation
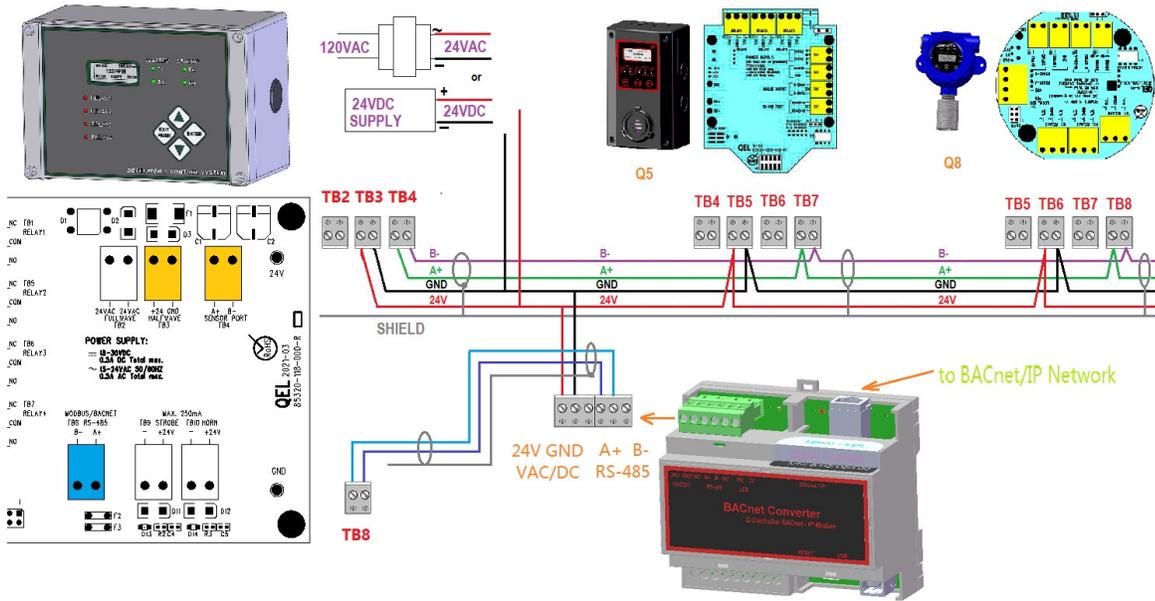
The TB8 can be programmable set to either work with BAC-Box which supports BACnet/IP protocol, or work as Modbus RTU slave protocol, default is Modbus RTU protocol.

4.8 Buzzer, Strobe and Horn Outputs

The Q4 Controller supports strobe and horn outputs. Buzzer1 to buzzer 3 and strobe can be programmed individually, horn output would be actuated if any of buzzers is/are actuated.

- Buzzer 1: Continuous, normally used to be high alarm buzzer

- Buzzer 2: Intermittent 50% duty cycle, normally used to be low alarm buzzer

- Buzzer 3: Double-tap Intermittent, normally used to be fault alarm buzzer
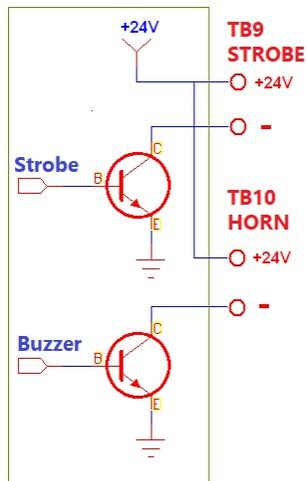
The strobe and horn outputs are 24 VDC transistor outputs

The maximum current is not more than 250mA.

5. Function and Configuration

After the controller powers up, it will show no enabled inputs and outputs on the LCD display, as no input or output is enabled in the factory defaults settings. You need to enter MENU to config the Q4-Controller. The menu is password protected. Default password is 4321.

5.1 Miscellaneous

Setting	Description
Password:	Default password is 4321
Baud Rate:	Modbus RTU RS-485 Port: • default baud rate is 19.2kbps, no parity Sensor RS-485 Port: • default baud rate is 4800bps
LCD Backlight:	The LCD backlight can be set to • Always Off • Always On • AUTO In AUTO mode, the backlight will turn On for 10 seconds after any key has been pressed **Default setting is AUTO mode**

5.2 Relay Configurations

Relay1-4 configurations may be styled in two basic ways: Voting and Averaging. Each method allows certain advantages and limitations. Common functions apply to both styles.

Common Functions	Description
On Delay:	**Delay on Actuation ('Delay on Make'). For each relay, a separate time delay may be set up to 60 minutes before an alarm condition will cause the relay to actuate** **Default is 00 minutes**
Off Delay:	Delay on De-Actuation ('Delay on Break'). For each relay, a separate time delay may be set up to 60 minutes before a return to a non-alarming signal condition will cause the relay to de-actuate **Default is 00 minutes**
Normally De-energized:	Each relay may be individually set to be normally energized or normally de-energized Default is normally de-energized

Latching:	Each relay may be set to latch in actuate status until acknowledged by a front-panel action **Default is non-Latching**
Style:	Normal Relay Style: • Work as normal relay Buzzer Style Relay: • When the relay is used to control a buzzer or horn. Working as a buzzer style will make the relay have the same function as the buzzer. It will be switched off when performing the Hush function **Default is Normal Relay Style**
Enabled	Each relay may be individually set to be enabled or disabled. If it's disabled, the relay will always de-actuate no matter what the current gas concentration **Default is Disabled**
Fault Actuation	When relay is set with Fault Actuation, the relay will be actuated when its assigned sensors report any fault or offline **Default is Disabled**

5.3 Voting Mode

Settings	Description
Voting Number:	For a given list of sensors assigned to a relay actuation list, this number indicates the minimum number of sensors which must pass or equal their alarm "On" concentration before the relay will actuate **Default is 1**
Assign Sensor:	Each relay may be assigned to any one or more of the enabled sensors or AI (Analog Inputs)
On Concentration Reading: **Off Concentration Reading:**	**If On Concentration is great than or equal to Off Concentration:** On Concentration: For each sensor or analog input assigned, set the concentration at or above which the voting number will increase 1 Off Concentration: For each sensor or analog input assigned, set the concentration at or below which the voting number will decrease 1
On Concentration Reading: **Off Concentration Reading:**	**If On Concentration is less than Off Concentration:** On Concentration: For each sensor or analog input assigned, set the concentration below which the voting number will increase 1 Off Concentration: For each sensor or analog input assigned, set the concentration above which the voting number will decrease 1

5.4 Averaging Mode

When working in Averaging mode, the Voting mode is disabled, and the Voting Number is forbidden automatically. Input values to "Average On", "Average Off".

If Average On is great than or equal to Average Off:

Settings	Description
Average On:	The gas concentration at or above which the average of all the sensors assigned to this relay will cause the relay to actuate
Average Off:	The gas concentration at or below which the average of all the sensors assigned to this relay will cause the relay to de-actuate

If Average On is less than Average Off:

Settings	Description
Average On:	The gas concentration at or below which the average of all the sensors assigned to this relay will cause the relay to actuate
Average Off:	The gas concentration at or above which the average of all the sensors assigned to this relay will cause the relay to de-actuate

5.5 Inputs and Outputs Addressing

The term "sensor" used throughout means a digitally communicating sensor unless otherwise stated.

The Q4 Controller can support up to 4 remote digital sensor inputs. 4 relay outputs, 3 buzzers outputs, 1 strobe.

Acceptable addresses:

- Sensors are addressed to Sensor0 to Sensor3 or S0 to S3

- Relays are addressed to Relay1 to Relay4 or R1 to R4

- Buzzers are addressed to Buzzer1 to Buzzer 3 or BZ1 to BZ3

- Strobe is addressed to Strobe or ST

6. Keypad and Menu

All database programming and configuration can be done through the front panel keypad, although this is practical only for short programs and program modifications. The following discussion and flow charts demonstrate the operation and menu pathways. In practice you will find that it is easier to use the keypad and menus than it is to read the reference descriptions. The menus provide prompting at each stage, and only a few rules need be memorized.
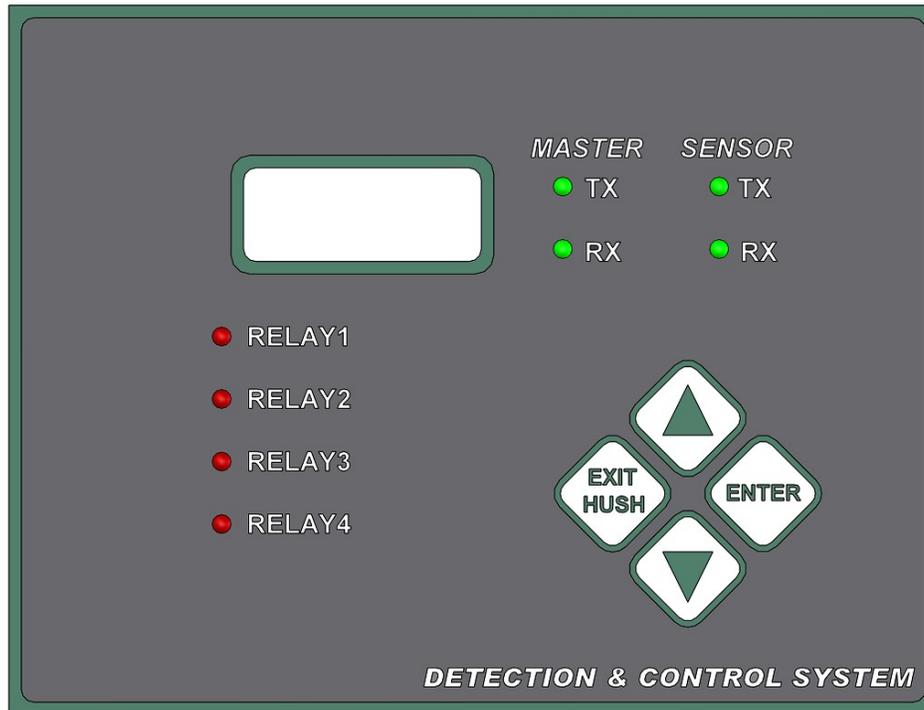
Sensor TX, RX: When the digital sensors are connected to the Q4 Controller, the traffic of the communication can be monitored visually through the two RS-485 indicators. One is RX LED, which indicates the data stream replied from digital sensor and received in the Q4 Controller. The other is TX LED, which indicates the data stream sent out of the Q4 Controller to the digital sensors.

Master TX, RX: When the Q4 Controller is connected to a Modbus device or BAC-Box, the traffic of the communication can be monitored visually through the two RS-485 indicators.

Note: **If the TX LED or the RX LED is always ON, that means the communication has a problem. See Troubleshooting for RS-485.**

Relay1-4 LED: Indicate the status of each relay. When the relay is actuated/closed, the Relay LED is ON. When the relay is de-actuated/open, the relay LED is OFF.

Note: **If you set the relay to be Normally Energized Relay (Fail Safe), the relay LED will turn ON at non-alarm state and turn OFF at alarm state, because the LED reflects the relay coil status.**

6.1 Hold Mode:

Press key [Up] or [Down] to scroll through the display items, at the same time the display goes to "Hold Mode" with display "*" at that row end. The Hold Mode will stop at that point for 3 minutes.

In Hold Mode, press key [Enter], you can check the selected channel running status and its config settings in the controller.

Press key [Exit] exits the hold mode to auto scroll mode (monitoring mode).

6.2 Menu Mode:

Press key [Enter] during monitoring mode but not "Hold Mode", to enter to Menu Mode.
Main Menu is password protected. Default password is 4321.

```
MENU
 > 1. ENTER MAIN MENU
   2. RESET LATCHED
   3. RESET PASSWORD
   4. CHECK DATABASE
   5. UNHUSH BUZZERS
```

- Menu "Enter Main Menu"
  - Once the password is accepted, you will enter to main menu tree

- Menu "Reset Latched"
  - To acknowledge a latched condition. All latched relays for which the alarm condition has been removed will reset. If the alarm condition (e.g., high gas concentration) is still present the relay(s) will not reset.

- Menu "Reset Password"
  - If you forgot the main menu password, you could reset the menu password to default password "4321" by entering a correct active code. For the active code, contact GES.

- Menu "Check Database"
  - You can always to verify the input and output config database integrity. For example, if you accidently assigned a non-existed input (disabled input) to an output, it would show a warning here.

- Menu "Unhush Buzzers"
  - Remove Hush status from hushed outputs, the output will be alarmed again after On Delay minutes.

6.3 Menu "System Setting"

The Menu system setup contains general settings for monitor operations, communications.

Settings	Description
Backlight:	Can be set to "Always ON", "Always OFF", "AUTO" **Default setting is AUTO mode**
Modbus Address:	The slave device address in Modbus RTU protocol **Default is 3**
Modbus Baud Rate:	Baud rate for Modbus port **Default is 19200bps**
Modbus Parity:	Parity bit for Modbus port **Default is no parity**
Change Password:	The new password can be any combination of up to four digits **Default password is 4321**
Key Beeper:	Beeping or not when the keypad is pressed **Default is ON**
Strobe Out:	When the strobe is actuated, it can be set with either 100% duty cycle ON or 50% duty cycle ON, so the strobe can be flashed by the strobe relay ON and OFF at 50% duty cycle **Default is 100% duty ON**
Broadcast QRP:	Broadcast running status to remote display panel **Default is OFF**

6.4 Menu "Zero CAL"

All GES digital sensors can be calibrated at the sensor side by one-person operation. Q4 Controller provides Remote Zeroing and Span Calibration functions for these sensors which location is not accessible, so the remote calibration is a choice. Remote Zeroing Calibration is also very convenient to zeroing a drifted digital sensor remotely.

Note: **Please check digital sensor specification, not every GES digital sensor supports remote calibration commands.**

Only enabled sensor can be remote calibrated.

Procedure:
- Select a Sensor and then press [Enter] button
- The LCD will display current reading of the sensor and inquire if "Zeroing" now?
- Apply zero gas to the sensor and wait until the reading is stable
- Press [Enter] to Zero the sensor
- If no error happens, it will display "Accepted" that means the calibration is successful and the calibration information is accepted. Otherwise, it will display error information

6.5 Menu "Span Calibration"

Procedure:
- Select a Sensor and then press [Enter] button
- The LCD will display current reading of the sensor and inquire if "Span CAL"?
- Apply calibration gas which concentration is defined at sensor side to the sensor head and wait until the reading is stable
- Press [Enter] to Span Calibration
- If no error happens, it will display "Accepted" that means the calibration is successful and the calibration information is accepted. Otherwise, it will display error information

6.6 Menu "Sensor Setting"

For digital sensor 0 to sensor 3 configuration

To assign a sensor input to any of relays, buzzers, and strobe, the sensor must already have been enabled in the sensor settings.

Only the enabled sensors will be polled and monitored by the controller. The sensor's gas type and measurement unit will be read out of each enabled sensor.

Settings	Description
Enable:	The Q4 Controller must be told that a sensor is attached to the control system

6.7 Menu "Relay 1 - 4"

For on-board Relay1 to Relay4 configuration

Settings	Description
Enable:	The Controller must be told which relays are active
Work style:	Normal Relay Style or Buzzer Relay Style
Normally Energized	Normally De-Energized or Normally Energized
Latched	See relay configuration in 5.2
Voting Mode:	See relay configuration in 5.2
Averaging Mode:	See relay configuration in 5.2
On Delay (Minutes):	See relay configuration in 5.2
Off Delay (Minutes):	See relay configuration in 5.2
Fault Acturation:	See relay configuration in 5.2

6.8 Menu "Buzzer / Strobe"

Settings	Description
Enable:	The Controller must be told which channels are active
Voting Mode:	See relay configuration in 5.2
Averaging Mode:	See relay configuration in 5.2
On Delay (Minutes):	See relay configuration in 5.2
Off Delay (Minutes):	See relay configuration in 5.2
Fault Acturation:	See relay configuration in 5.2

6.9 Menu "Assign Output"

Each output can be assigned their own inputs with the alarm settings associated with the input as applied to the output only.

Settings	Description
Select Channel:	Available outputs: • Relay1 to Relay4 • Buzzer and Strobe
Assigned Input:	Available inputs: • Digital Sensor 0 to Sensor 3
On Concentration:	When the sensor is assigned to a Relay or Buzzer/Strobe • When the relay is working with voting mode, the sensor's On Concentration is needed. See relay configuration in 5.3 • When the relay is working with averaging mode, the sensor's On Concentration is not needed.
Off Concentration:	See above, only for relay/buzzer/strobe voting mode

6.10 Menu "I/O Setting"

For system installation testing, it is necessary to force relay, buzzer and strobe actions.

The Relay Testing forces an actuate vs. de-actuate action, not an energized vs. non-energized action. Therefore, the user must be aware of those relays which have been defined as normally energized or normally de-energized.

Settings	Description
Sensor & Modbus:	For Factory Testing only Set Sensor port and Modbus port to be 19.2K Modbus RTU protocol with no parity. For Factory RS-485 Tester to quick test the RS-485 ports
Relay 1-4 Test:	Manually actuate / de-actuate Relay1 to Relay4
Buzzer & Strobe:	Manually actuate / de-actuate Buzzer1 to Buzzer3 and Strobe

6.11 Menu "Output Disable"

To disable the Q4 Controller functions for calibration. When operation is disabled, the relay, strobe, etc., status will freeze in whatever state they are already in.

6.12 Menu "BACnet"

To support BACnet BAC-Box, the setting of "BACnet" must be Enabled. When it's enabled, the Modbus protocol is disabled automatically.

BAC-Box supports DHCP and static IP both IP address assignments. Each device must have a unique IP address and unique BACnet ID# on a network. Your system administrator generally provides the IP address and corresponding subnet mask and gateway if static IP address is selected.

6.13 Q4C-II Modbus RTU protocol

Please contact GES customer service for the Modbus protocol.

7. How to Create a Database

The base concept is to tell the Q4-Controller it has sensors and what their addresses are. Then tell the controller it has relays and how they will function. Finally tell the controller how the sensors and relays work together.

Following these steps will help you to create your database quickly and easily:

1. Requirements Analysis.

   Before you create your database, you should write out a requirements analysis.
   A. How many remote sensors are there in your system? For each digital sensor, assign a unique address to each one
   B. What kind of relay style? (Normally Energized? Latching? voting mode or average mode? time delay? How many minutes? List assigned sensors)
   C. Setup for Buzzer, Horn and Strobe. (Voting mode or Average mode? Does it need time delay? How many minutes? List assigned sensors)
   D. Do you need a Modbus RTU or BACnet /IP to report the controller running status to other DCS
   E. Setup system settings, such as password and LCD Backlight mode

2. Enter the database.

The database can be input using M-View which is a database setup software with a friendly Man Machine Interface running on a PC computer, it supports downloading and uploading the database to/from Q4 Controller. The database can also be input through the keypad on Q4 Controller.

   A. Input data for all remote sensors.
   B. Setup all relay styles.
   C. Setup buzzers and strobe
   D. Setup system settings.

8. Computer Interface: Programming and Auditing

NOTE: WHEN PROGRAMMING THE CONTROLLER WITH A LAPTOP ENSURE THAT THE LAPTOP IS NOT CONNECTED TO ANY POWER SOURCE. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT WITH DAMAGES TO THE CONTROLLER AND OTHER DEVICES CONNECTED TO IT.

The controller can be fully configured and programmed from the keypad; however, for even moderately complex networks this task becomes tedious. Therefore, we have supplied an interface and computer program (**M-View**) to allow all database programming to be setup on a computer (laptop) and downloaded to the M-Controller.

USB A male to USB B male cable is included in the controller shipping package.
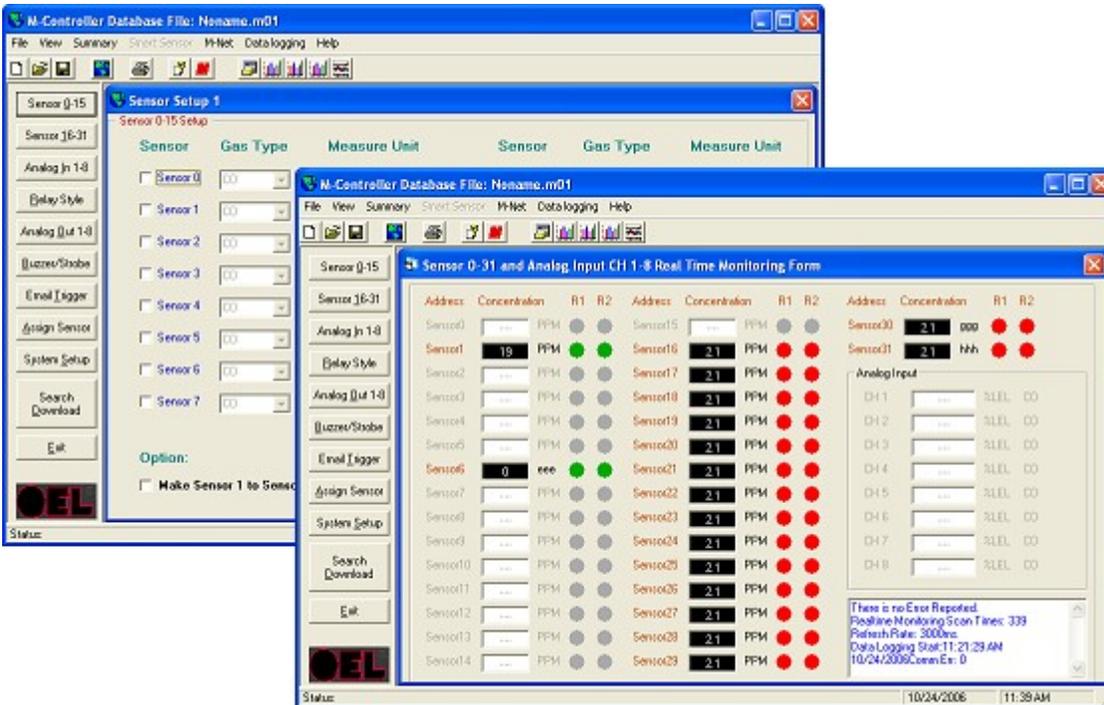
8.1 M-View Installation

The M-View software has been designed as an easy-to-use configuration software package, greatly reducing the lengthy task of entering individual keystrokes through the keypad to quick configuration with the mouse. M-View allows for both programming and audit control, as you may download, upload, and save programs to disk.

To install M-View, insert the USB Flash drive into the computer and run Setup.exe. Follow the instructions on the screen.

If your computer installed previous version M-View, the setup program will remove it first, then run Setup.exe again to install the latest version M-View.

9. Troubleshooting

Q4 Controller has advanced features and functions. Before assuming that unexpected behavior is caused by a system defect or breakdown, the operator should use this manual to become thoroughly familiar with the controller operation. This troubleshooting guide is intended as an aid in identifying the cause of unexpected behavior and determining whether the behavior is due to normal operation or an internal or external problem.

Identify the symptom or unexpected behavior you are observing from the symptoms listed in the table. A probable cause is provided, and a suggested solution is proposed including references to manual sections that provide information that may be of assistance.

SYMPTOMS	PROBABLE CAUSE	SUGGESTED SOLUTION
LCD Display does not come on	• No power supply • LCD has problem • Program has crashed	• Check power / ground connections • Change LCD • Reprogram
M-View reports "Q4 Controller is offline"	• Q4 Controller is not turned on • USB is not recognized by PC computer	• Turn on Q4 Controller • Unplug the USB cable and plug again • Check Q4 Controller is connected properly. Be sure that the port on the computer is active.
Q4 Controller reports "Vote no Sensor!" or "AV no Sensor!"	• No sensor was assigned to the output (relay, buzzer, or strobe)	• Assign sensor to the output
Q4 Controller reports "Sensor Offline"	• Comm setting is wrong • Connection is wrong • Remote Device is in Fault • End-of-line matching resistors are not properly set.	• Check the remote baud rate in Q4 Controller System Setting is same as the baud rate in Digital Sensor, 4800bps is default. • Check connection between Q4 Controller and Digital Sensor. Make sure all have power on and no shorts or opens in wiring. Be certain that polarity for RS-485 connections is correct. A-A and B-B • Examine remote devices • Review end-of-line resistor settings

WARRANTY STATEMENT

The information contained in this manual is based upon data considered accurate; however, no warranty is expressed or implied regarding the accuracy of this data. All GES equipment is warranted against defects in material and workmanship for a period of two years from date of shipment with the following exceptions:

    Electrochemical Sensors (Toxic)   Six Months
    Catalytic Sensors (Combustible)   One Year

During the warranty period we will repair or replace, at our discretion, any components or complete units that prove, in our opinion, to be defective. We are not liable for consequential or incidental damage to auxiliary interfaced equipment.

A returned material authorization number should be obtained from the factory prior to returning any goods. All return shipments must be shipped freight prepaid and a copy of the maintenance records should accompany the unit concerned.

Warranty should be considered F.O.B. the factory. Labour and travel time are chargeable for any field site visits required for warranty work.

LIMITED LIABILITY

All GES systems shall be installed by a qualified technician/electrician and maintained in strict accordance with data provided for individual systems in the form of installation/maintenance manuals. GES assumes no responsibility for improper installation, maintenance, etc., and stresses the importance of reading all manuals. GES shall not be responsible for any liability arising from auxiliary interfaced equipment nor any damage resulting from the installation or operation of this equipment.

GES's total liability is contained as above with no other liability expressed or implied, as the purchaser is entirely responsible for installation and maintenance of systems.

This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for GES any liability in connection with the sales of our products other than that set forth herein.

NOTE: Due to on-going product development, GES reserves the right to change specifications without notice and will assume no responsibility for any costs as a result of modifications.

For further information or assistance, contact:

Greystone Energy Systems, Inc.
150 English Drive, Moncton,
New Brunswick, Canada E1E 4G7
5935 Ottawa Street, PO Box 749
Ph: +1 (506) 853-3057 Fax: +1 (506) 853-6014
North America: 1-800-561-5611
E-mail: mail@greystoneenergy.com