GREYSTONE
ENERGY SYSTEMS INC

Q6
Dual-Sensor Gas Monitor

Q6R

Q6M

INSTALLATION
OPERATION AND MAINTENANCE
MANUAL

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READ BEFORE OPERATING

All individuals who have or will have the responsibility of using, maintaining, or servicing this product must carefully read this manual. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions.

The Q6 is a state-of-the-art dual-sensor gas monitor that can operate as an independent, stand-alone system or as part of an integrated system. The Q6 connects with digital interface to GES Q-Controller or M-Controller, or any PLC/DCS through Modbus RTU protocol. Setup procedures are simplified with user friendly touchable buttons and LCD menus.

- Q6M: Q6 Main unit with smart sensor, relay, display and keypad
- Q6R: Q6 Remote unit with smart sensor only

1. Specifications

1.1 Electrical/Mechanical Specifications

Input Power: 24VDC nominal, range 18 to 30VDC, 0.3A DC Total Max.
24VAC nominal, range 15 to 24VAC, 0.3A AC Total Max.
(AC must not be grounded if connects to M-Controller)

Fuse: F2 on Main Board: Polyswitch 750mA
Polyswitch device resets after the fault is cleared and power to the circuit is removed.

Sensor: Combustible gases: Catalytic or NDIR
Toxic gases and Oxygen: Electrochemical
Carbon Dioxide: Non-Dispersive Infra-Red (NDIR)

Sampling: Diffusion or Pump-through

Panel Indicators: 5 Status LED's
- RS-485 TX Status (Green)
- RS-485 RX Status (Green)
- Relay1 Status (Red)
- Relay2 Status (Red)
- Relay2 Status (Red)

Display: LCD graphic display c/w backlight

Keypad: 3 capacitive touch sensing Keys: F1, F2, F3

Relays: 3 Relays SPDT, Dry contacts
- 1.0A maximum at 30 VDC (resistive load)
- 0.3A maximum at 125VAC (resistive load)

Buzzer: 55 dB at 10 feet, 2700 Hz

Buzzer 1, 2, 3: Programmable tone
Tone: chirp once / chirp twice / 50% duty cycle / constant ON

Output Signal: RS-485 with GES Controller Protocol
- Available Controller: M-Controller, Q4 Controller and Q-Controller

RS-485 with Modbus RTU protocol

Enclosure Rating: IP 66 & NEMA 4, 4X, 12 & 13

Operating Temperature: -40°C to 50°C, depends on sensor specification

Ambient Humidity: 5% to 95% RH (non-condensing)

Storage Temperature: 0°C to 25°C, depends on sensor specification

Size: 150mm X 90mm X 65mm

Weight: Less than 0.5lbs

1.2 Sensor Specifications

Code	Gas	Symbol	Gas Density	Span	Operating Temperature
16	Methane	CH4	Lighter	0 - 100%LEL	-10°C to +50°C
17	Propane	C3H8	Heavier	0 - 100%LEL	-10°C to +50°C
18	Hydrogen	H2	Lighter	0 - 100%LEL	-10°C to +50°C
*19	Combustible	LEL		0 - 100%LEL	-10°C to +50°C
*20	Ethylene	C2H4	Slightly Lighter	0 - 100%LEL	-10°C to +50°C
*21	Iso-Butane	C4H10	Heavier	0 - 100%LEL	-10°C to +50°C
*22	Iso-Pentane	C5H12	Lighter	0 - 100%LEL	-10°C to +50°C
*23	Methanol	CH3OH	Lighter	0 - 100%LEL	-10°C to +50°C
*24	Benzene	C6H6	Lighter	0 - 100%LEL	-10°C to +50°C
*25	Acetone	CH3CO	Lighter	0 - 100%LEL	-10°C to +50°C
*26	Butanol, n-Butane	BUTAN	Heavier	0 - 100%LEL	-10°C to +50°C

Code	Gas	Symbol	Gas Density	Span	Operating Temperature
0	Oxygen	O2		0 - 25%VOL	-30°C to +55°C

Code	Gas	Symbol	Gas Density	Span	Operating Temperature
1	Carbon Monoxide	CO	Slightly Lighter	0 – 250ppm	-20°C to +50°C
1	Carbon Monoxide	CO	Slightly Lighter	0 – 1000ppm	-20°C to +50°C
2	Hydrogen Sulfide	H2S	Heavier	0 – 25ppm	-20°C to +50°C
2	Hydrogen Sulfide	H2S	Heavier	0 – 100ppm	-20°C to +50°C
3	Sulphur Dioxide	SO2	Heavier	0 – 6ppm	-20°C to +50°C
5	Nitrogen Dioxide	NO2	Heavier	0 – 10ppm	-20°C to +50°C
6	Hydrogen	H2	Lighter	0 – 1000ppm	-20°C to +50°C
6	Hydrogen	H2	Lighter	0 – 2000ppm	-20°C to +50°C
7	Hydrogen Cyanide	HCN	Lighter	0 – 50ppm	-20°C to +50°C
9	Ammonia	NH3	Lighter	0 – 100ppm	-30°C to +50°C
9	Ammonia	NH3	Lighter	0 – 1000ppm	-30°C to +50°C
11	Ozone	O3	Heavier	0 – 1ppm	-20°C to +40°C
13	Chlorine	Cl2	Heavier	0 – 5ppm	-20°C to +50°C
14	Chlorine Dioxide	ClO2	Heavier	0 – 2ppm	-20°C to +40°C
96	Arsine	AsH3	Heavier	0 – 1ppm	-20°C to +40°C
97	Phosphine	PH3	Heavier	0 – 5ppm	-20°C to +40°C
97	Phosphine	PH3	Heavier	0 – 1ppm	-20°C to +40°C

98	Silane	SiH4	Heavier	0 – 50ppm	-20°C to +40°C
99	Germane	GeH4	Heavier	0 – 2ppm	-20°C to +40°C
100	Diborane	B2H6	Slightly Lighter	0 – 2ppm	-20°C to +40°C
4	Nitric Oxide	NO	Slighter Heavier	0 –100ppm	-20°C to +50°C
8	Hydrogen Chloride	HCl	Heavier	0 – 30ppm	-20°C to +40°C
12	Ethylene Oxide	ETO	Heavier	0 – 20ppm	-20°C to +50°C
101	Hydrogen Bromide	HBr	Heavier	0 – 30ppm	-20°C to +40°C

Code	Gas	Symbol	Gas Density	Span	Operating Temperature
15	Carbon Dioxide	IR-CO2	Heavier	0 – 5000ppm	-20°C to +50°C
15	Carbon Dioxide	IR-CO2	Heavier	0 – 5%VOL	-20°C to +50°C
15	Carbon Dioxide	IR-CO2	Heavier	0 – 20%VOL	-20°C to +50°C
15	Carbon Dioxide	IR-CO2	Heavier	0 – 100%VOL	-20°C to +50°C
16	Methane	IR-CH4	Lighter	0 – 100%LEL	-20°C to +50°C
16	Methane	IR-CH4	Lighter	0 – 100%VOL	-20°C to +50°C

*NOTE: Mounting Heights   - Low = 9-18 inches (0.25-0.5 meters) from floor
    - Mid = 4-6 feet (1.25-1.75 meters) from floor
    - High = 9-18 inches (0.25-0.5 meters) from ceiling

2. Installation

2.1 Enclosures Physical Dimensions
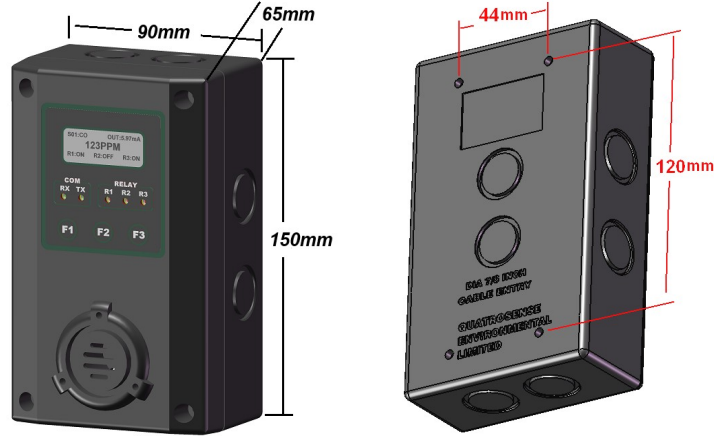
The enclosure is a NEMA 4 rated enclosure and can be wall mounted with 4 screws. To maintain the NEMA rating, it is important that the conduit opening is sealed upon installation.

2.2 Location

The transmitter should be mounted where the gas to be measured is most likely to be present. This location will be dependent on the source of the target gas and whether that gas is lighter or heavier than air. Air circulation and mixture should also be taken into account.

CO gas is lighter than regular air, it can be mounted on the walls at least a couple of feet below the height of the ceiling. As the monitor Q6M has a digital read-out, placing it at about eye level is strong recommended. The Q6R is the remote unit, so it can be placed at any location according the target gas source.

The location should be accessible for the purposes of routine re-calibration and periodic sensor replacement. Sufficient room should be left to allow the enclosure cover to be removed and the connection of the calibration adapter to the sensor chamber. For sensor element replacement there will need to be enough room to remove enclosure cover and the sensor board assembly.

NOTE: The monitor can also be installed in limited outdoor environment - An ambient air environment that is not climate controlled and is not in direct contact with the elements of nature, such as wind, rain, sleet or snow. Examples of limited outdoor environments include parking garages, construction complexes, sports venues, boats and recreational vehicles.
NOTE: Avoid mounting the monitor near 600 VAC switchgear and other sources of radio frequency and/or electromagnetic interference. While RFI/EMI protection is built in to the monitor, excessive levels of interference may cause instability in the output signal.

2.3 Terminals
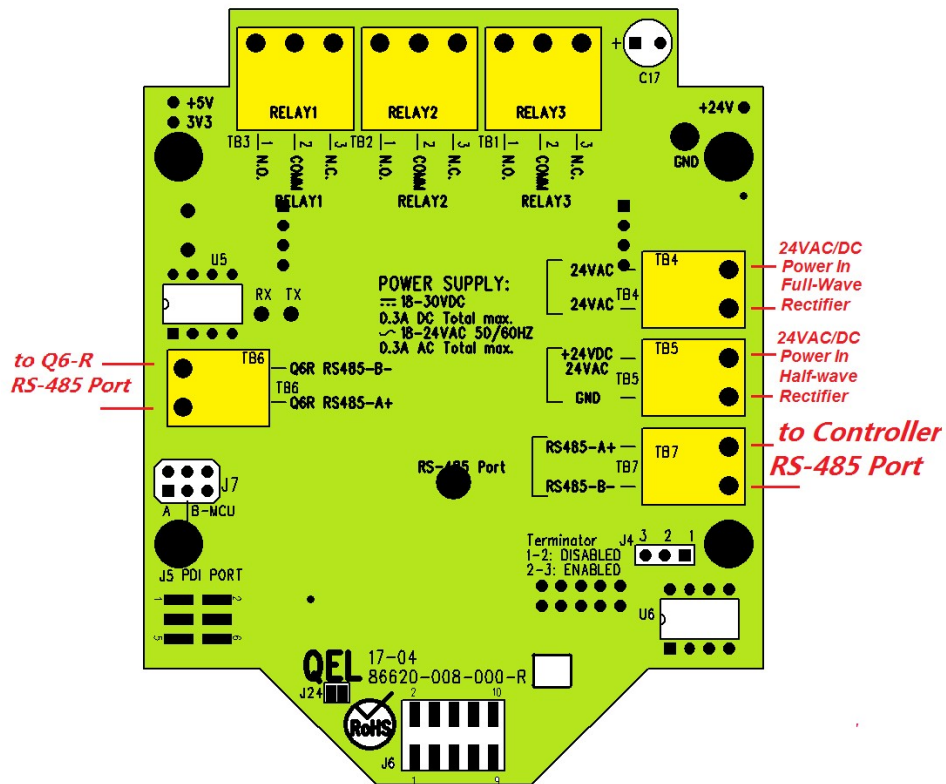
Q6M Terminals
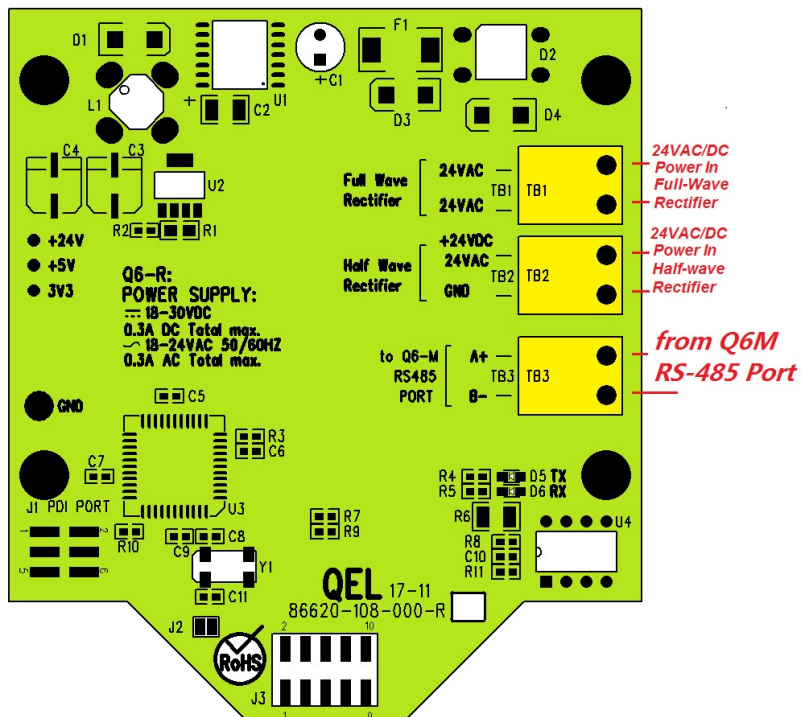
Q6R Terminals

2.3.1 Wire and Cable

Terminal blocks TB1 to TB7 accept 12 AWG to 24 AWG wire. Use 16 AWG or 18 AWG wire for the power supply in long wiring runs, which can be up to 1km (1,000 meters) long.

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

2.3.2 Power Requirements

The Q6M and Q6R power supply voltage requirements are nominally 24VAC or 24VDC.

The Q6M and Q6R both have full wave rectifier and half wave rectifier on board. If the Q6 works alone, the 24VAC/DC can connect to either full wave rectifier or half wave rectifier connectors. If the Q6 connects to controllers, 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 Q-Controller uses half-wave rectifier only, M-Controller uses full-wave rectifier only, so the Q6 can work with both controllers

- When the Q6 shares a common AC source with a Q-Controller, use the half wave rectifier connector Q6M TB5 and Q6R TB2

- When the Q6 shares a common AC source with an M-Controller or Q4 Controller, use the full wave rectifier connector Q6M TB4 and Q6R TB1

2.3.3 Q6 works alone
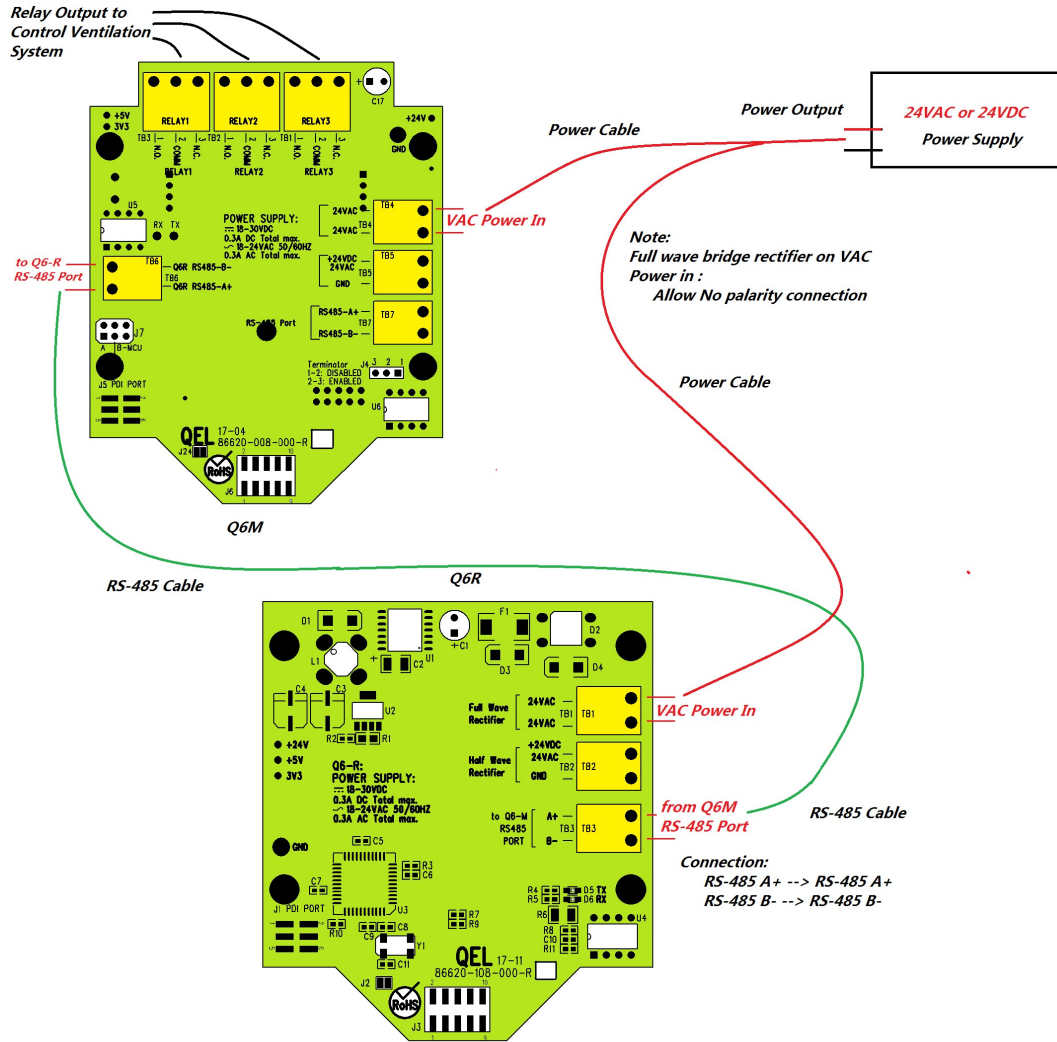
2.3.4 Q6 Connection with Q-Controller

Note:
Q6 takes two addresses in the Q-Controller system:
Address is for Q6M
Address +1 is for Q6R
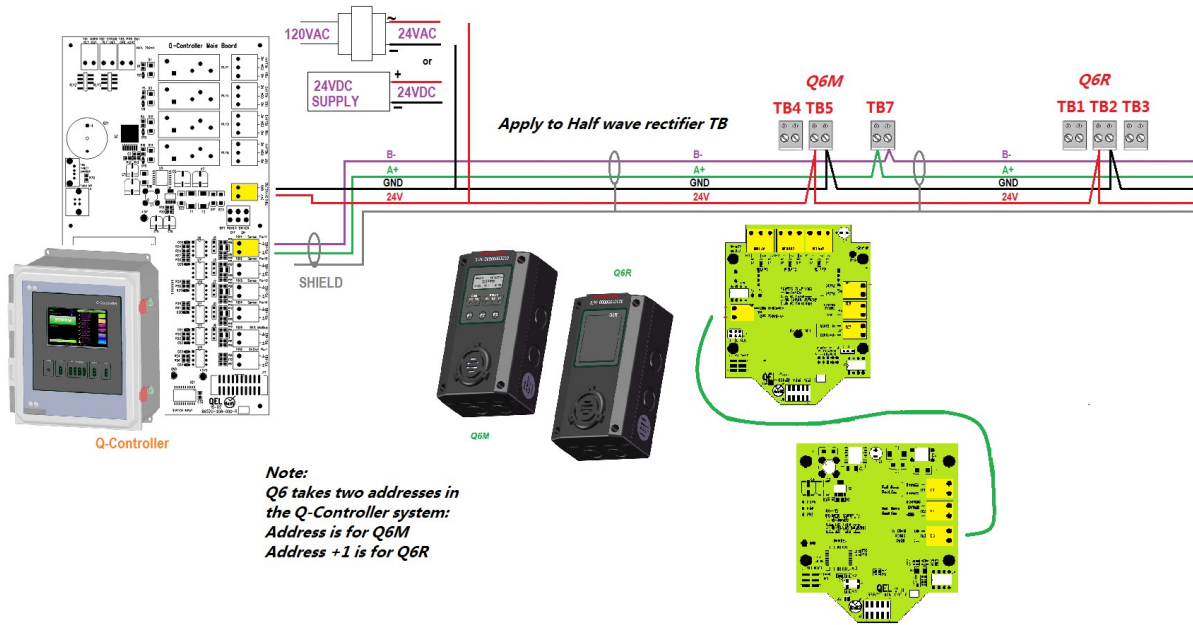
2.3.5 Q6 Connection with M-Controller

Note:
Q6 takes two addresses in the M-Controller system:
Address is for Q6M
Address +1 is for Q6R
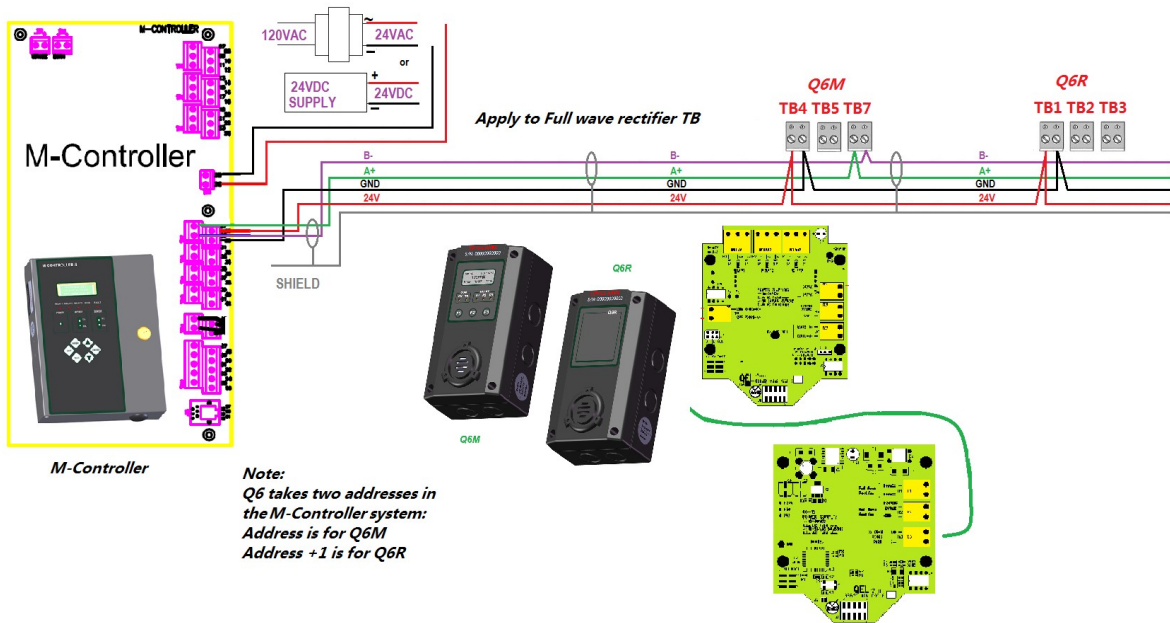
2.3.6 RS-485 Terminator

Factory default setting is disabled terminator.

The Q6M supplies this resistor on the main board, and it is chosen using a jumper at J4.
- J4 1-2: Terminator Disabled / OFF (default)
- J4 2-3: Terminator Enabled / ON

2.3.7 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). This IC (U6) has a socket on the circuit card for ease of replacement in the field.

2.3.8 Relays Output

The Q6M has three onboard programmable Single-Pole Double-Throw (SPDT) relays. These relays can be used to control other equipment, such as fans, lights, horns, etc. eliminating the need for a separate controller.

Three terminal blocks (TB1, TB2 and TB3) are located on the main board. Each relay can be programmed individually.

Switching capability of each relay is:
- 1.0 A maximum resistive load at 30 VDC
- 0.3A maximum resistive load at 125VAC

3. Function and Configuration

3.1 Indicators

The indicators consist of five LED's – two to indicate RS-485 digital communication, three to indicate the status of relays 1-3.

3.1.1 RS485-TX/RX

When the Q6M is connected to a controller system via RS-485, the traffic of the communication can be monitored visually through the two RS-485 indicators. One is RX LED, which indicates the data stream received in from the controller. The other is TX LED, which indicates the data stream out of the Q6M.

Note: If the TX LED or the RX LED is always ON, is indicative of a communication problem. See Troubleshooting for RS-485.

3.1.2 Relay 1-3 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 (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.

3.2 Tool Function

Press key [F3] to enter tool functions that might be used frequently in the field.
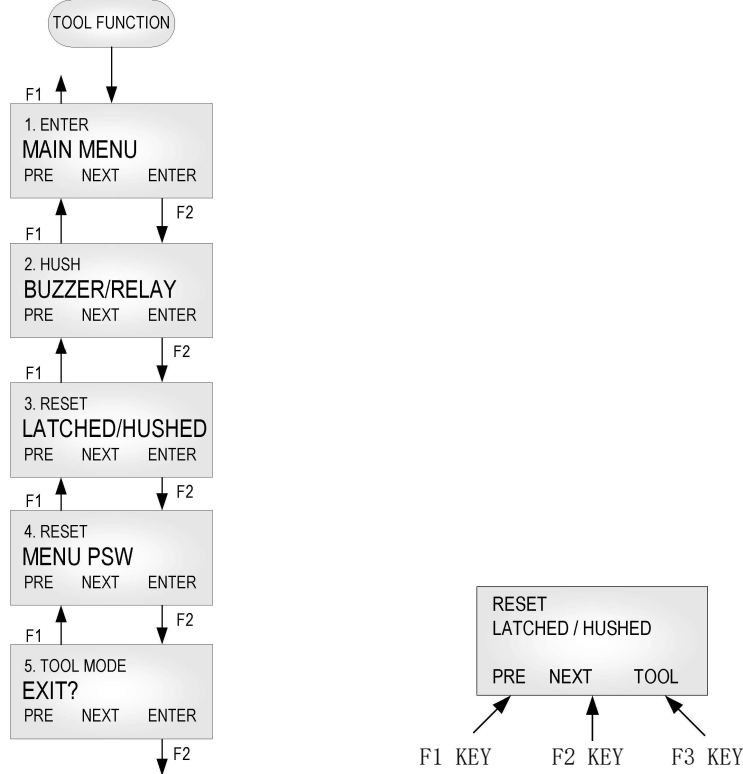
3.2.1 Enter Main Menu

Press key [F1] to browse previous item of the current menu.
Press key [F2] to browse next item of the current menu.
Press key [F3] to enter the main menu for more configuration and settings.

3.2.2 Hush Buzzer and Relay

Press key [F3] to silence the buzzer and buzzer-style relays.

3.2.3 Reset Latched/Hushed

To acknowledge a latched condition or a hushed condition, press key [F3] to reset latched relays and hushed buzzer for which the alarm condition has been removed. If the alarm condition (e.g. high gas concentration) is still present the relay(s) will not reset.

3.2.4 Reset MENU Password

If you forgot the main menu password, you can reset the menu password to default password "4321" by entering a correct active code. For the active code, contact GES.

3.2.5 Exit Tool Mode

Press key [F3] to return to monitoring mode.

3.3 Main Menu Tree

The main menu is password protected. Once the password is accepted, you are allowed into the main menu tree.
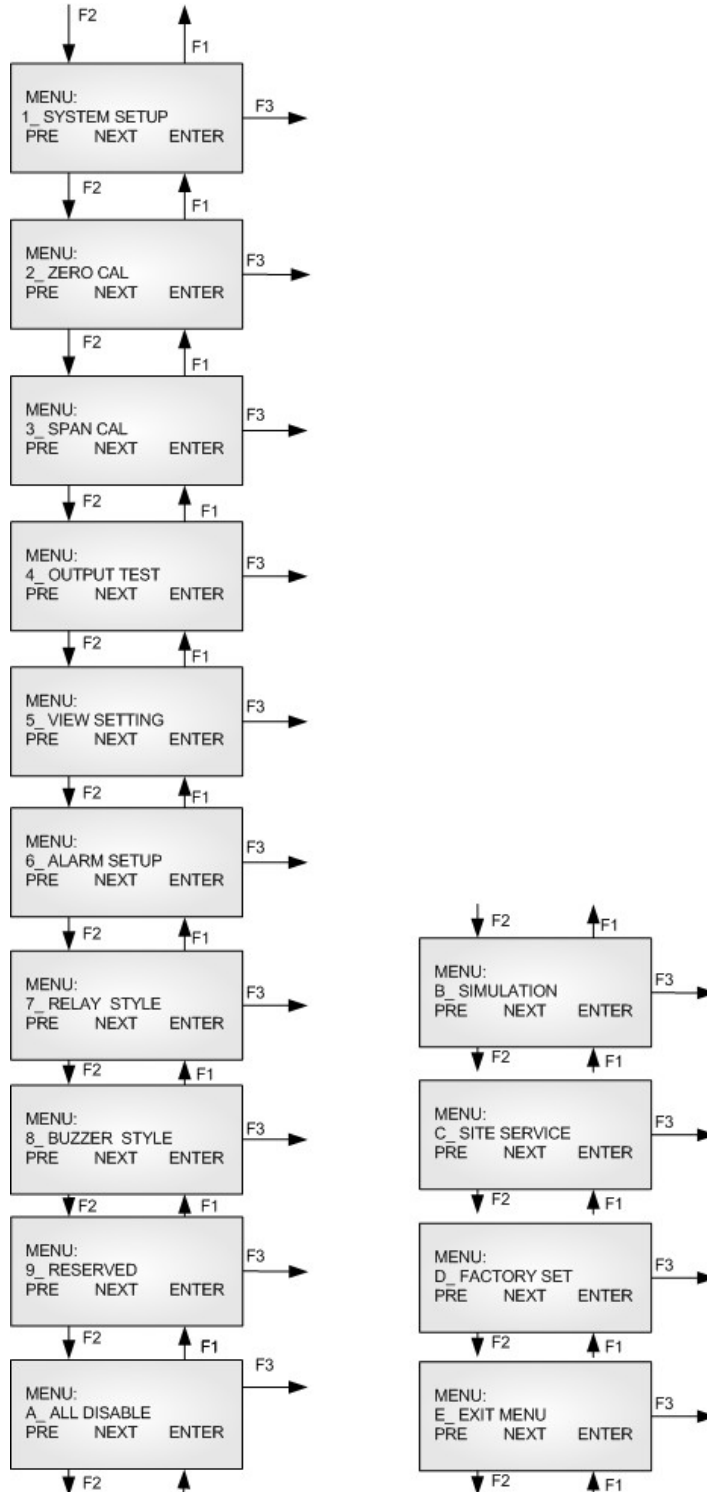
Factory default password is 4321.

Note: While in the menu tree, all normal monitoring operations stop. The alarm status does not change.

3.4 Menu "1_SYSTEM SETUP"

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

3.4.1 System Settings

Password:	Default password is 4321.
Q6M MAC Address:	Q6M monitor address can be defined from 0 to 255. Default is 3. Q6R address would be address + 1 Note: In Modbus protocol, the address 0 is for broadcast.
Baud rate:	Define baud rate for RS-485 communication with GES controllers OptoMux protocol or other SCDA system with Modbus protocol. Q6 default baud rate is 4800 bps
Scroll Rate:	In normal operation, the sensor and relay status information scrolls automatically. Set the number of seconds for each item to be displayed. Default value is 3 seconds.
Backlight:	The LCD backlight can be set to Always Off, Always On and Auto Power Saving mode. In Auto Power Saving mode, the backlight will turn on for 10 seconds after any key has been pressed. Default setting is Auto.
New Password:	The new password can be any combination of up to four digits. Default password is 4321. **Warning: Be sure that you record the new password in a safe and secure location!**
Protocol:	The Q6 Default protocol is OptoMux. The Q6 also supports Modbus protocol, responds as a Modbus Slave using RTU protocol. When it's set to Modbus, the parity bit can be defined as EVEN, ODD and No Parity.

Display Mode:	- Display Instant: displays instantaneous gas concentration - Display Average: - Displays STEL (15min average reading) - Displays TWA (8 hour average reading) - Displays daily peak - Display Alarm: displays alarm 1-8 status - Display Relay: displays relay 1-3 status - Display Buzzer: displays buzzer 1-3 status - Display A-Out mA: Not Available for Q6 - Display A-Out VDC: Not Available for Q6 - Display Clock: displays real time clock (Default is no clock display) If there is nothing to display, the unit will display "Running…"
Auto Zero:	Settings for both Q6M sensor and Q6R sensor When AutoZero is set to ON, the unit will gather the lowest reading in 7-day period and set the unit into Zeroing Calibration mode so that the lowest reading goes to zero. When AutoZero is set to OFF, the unit will not adjust its own zero and work off the last manual or factory calibration. Default value is OFF. **NOTE: AutoZero works best in situations where the building will purge at night (or over a weekend) to a zero concentration of target gas.**
Key Beeper:	ON: Beeping when keypad is touched OFF: No beeping when keypad is touched
Restore Default:	**Note: Don't do this if you don't have calibration gas and precision reference instrumentation to calibrate the unit** To load defaults to factory settings, to restore the unit to correct operation. The settings below will be restored to default values: -Password, -Scroll rate, -Backlight, -Display mode, -Key beeper, -LCD contrast, **-Gas type on the Sensor Board, -**Alarm settings, -Relay/Buzzer settings. Zero and span calibrations are needed.

ADJ Clock:	Adjust real time clock.
ADJ Contrast:	Adjust the LCD contrast. Valid values are between 10 (light) and 50 (dark). Default is 21.
Q6 Sensors:	If the smart sensor in Q6M unit is not installed, it can be disabled here, so the Q6M will not detect the smart sensor board and will not report any fault on the sensor offline If the smart sensor in Q6R is not installed, it can be disabled too. Both default values are ON, that means both Q6M and Q6R sensors are installed.

3.5 Menu "2_ZERO CAL"

First to select which sensor is going to be calibrated, Q6M or Q6R? The subsequent zero calibration will be performed on that sensor.

The calibration is using a two-point calibration process. First, use a "Zero Gas", then use a "CAL Gas" containing a known concentration of a standard reference gas, to set the second point of reference.

3.5.1 Equipment Required
- A cylinder of Zero Gas, (clean air or nitrogen).
- A cylinder of Cal Gas
- Flow Limiting Regulator(s) **0.2 to 1.0 lpm**
- Tubing

3.5.2 Zeroing Calibration Procedure
- "2_ ZERO CAL:"

```
2_ ZERO CAL
```

- Press key [F3] and the device will show the calibration notice and then ask if you want to continue. The middle line will display the current concentration.

```
CONTINUE?
          XXPPM
```

- Apply the Zero Gas.

- Wait for about 3 minutes or until the reading is stable.

- Press key [F3] to confirm Zeroing Cal.

- When the device is in Zeroing CAL, it will take 3 seconds to 20 seconds to complete.

- When the zeroing CAL operation is over, the device will display "Accepted" and return to "2_ZERO CAL".

- Make sure there is no Cal Error displayed. If Cal Error is reported, repeat the procedures above. If the Cal Error is still showed up, the sensor may be expired.

- Remove the gas.

- Exit the menu to Monitoring Mode.

3.6 Menu "3_SPAN CAL"

First to select which sensor is going to be calibrated, Q6M or Q6R? The subsequent span calibration will be performed on that sensor.

- "3_ SPAN CAL"

```
3_ SPAN CAL
```

- Press key [F3] and the device will ask for the CAL GAS, input the concentration of the calibration gas.

```
CAL GAS:
>              XXX
```

- Press key [F3] and the device will show the calibration notice and then show the flow rate for the span calibration. Press any key to continue, and then the device will ask you if you want to continue. The middle line will display the current concentration.

```
CONTINUE?
        XXPPM
```

- Apply the calibration gas.

- Wait for about 3 minutes or until the reading is stable.

- Press key [F3] to confirm SPAN CAL.

- When the device is in span cal, it will take 10 seconds to 1 minute to complete.

- When the span cal operation is over, the device will display "Accepted" and return to "3_SPAN CAL".

- Make sure there is no Cal Error displayed. If Cal Error is reported, repeat the procedures above. If the Cal Error is still showed up, the sensor maybe expired.

- Remove the gas.

- Exit menu to Monitoring Mode.

3.7 Menu "4_OUT TEST"

During system installation and testing, it may be necessary to force relays and buzzers on and off.

The Relay Testing feature allows the user to force the actuation of each relay. This function forces an Actuate vs. De-actuate action, not an energized vs. non-energized action. Therefore the user must be aware of these relays, which have been defined as normally energized or not normally energized.

According to UL2075 standard for safety, the Q6 Endurance Test will automatically perform 6000 cycles of Relay/Buzzer On and Off operation at a rate of not more than 15 cpm.

Note: The 4mA (1VDC/2VDC) and 20mA (5VDC/10VDC) outputs are not available for Q6.
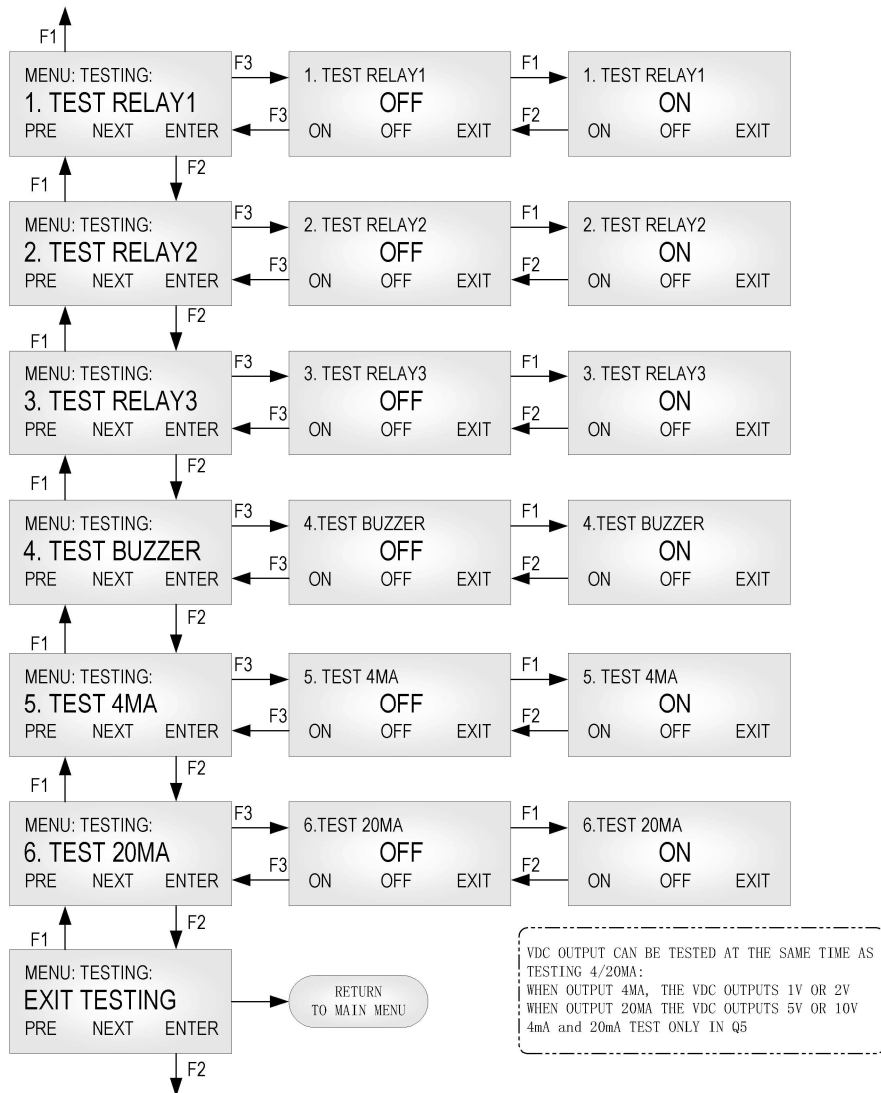
3.8 Menu "5_VIEW SETTING"

This function is to verify the settings for the alarms, relays, buzzers and analog outputs.

Note: The View of A-Out Setup is not available for Q6.

```
F1↑
┌─────────────────┐   F3   ┌─────────────────┐   F3   ┌─────────────────────────┐
│ 1. VIEW         │───────▶│ VIEW            │───────▶│ INPUT: INSTANT          │
│ ALARM SETUP     │   F1   │      ALARM 2    │        │ ON   : 25PPM            │
│ PRE   NEXT  ENTER│◀──────│ EXIT   NEXT  ENTER│       │ OFF  : 23PPM            │
└─────────────────┘        └─────────────────┘        │ TRIGGER: R1, 2, B1      │
 F1↑           ↓F2                                     └─────────────────────────┘
┌─────────────────┐   F3   ┌─────────────────┐   F3   ┌──────────────────────┐   F3  ┌──────────────────────┐
│ 2. VIEW         │───────▶│ VIEW            │───────▶│ 1. DE-ENERGIZE       │──────▶│ 4. ON-DELAY: 010 SEC │
│ RELAY STYLE     │   F1   │      RELAY 1    │        │ 2. NON-LATCHING      │       │ 5. OFF-DELAY: 010 SEC│
│ PRE   NEXT  ENTER│◀──────│ EXIT   NEXT  ENTER│       │ 3. NORMAL STYLE      │       │                      │
└─────────────────┘        └─────────────────┘        │ KEY TO CONTINUE ...  │       │ END OF DETAIL        │
 F1↑           ↓F2                                     └──────────────────────┘       └──────────────────────┘
┌─────────────────┐   F3   ┌─────────────────┐   F3   ┌──────────────────────┐
│ 3. VIEW         │───────▶│ VIEW            │───────▶│ 1. ON-DELAY: 010 SEC │
│ BUZZER STYLE    │   F1   │      BUZZER 3   │        │ 2. OFF-DELAY: 010 SEC│
│ PRE   NEXT  ENTER│◀──────│ EXIT   NEXT  ENTER│       │ 3. CHIRP TWICE       │
└─────────────────┘        └─────────────────┘        │ END OF DETAIL        │
 F1↑           ↓F2                                     └──────────────────────┘
┌─────────────────┐   F3   ┌──────────────────────┐
│ 4. VIEW         │───────▶│ INPUT: 15 MIN AVG    │
│ A-OUT SETUP     │        │ 4MA  : 0 PPM         │
│ PRE   NEXT  ENTER│       │ 20MA :  100 PPM      │
└─────────────────┘        │ VDC OUTPUT: 1-5V     │
 F1↑           ↓F2         └──────────────────────┘
┌─────────────────┐   F3   ┌──────────────────────┐   F2   ┌──────────────────────┐
│ 5. VIEW         │───────▶│ EVENT 1:             │───────▶│ EVENT 2:             │
│ EVENT RECORDS   │   F3   │ 2009-12-08  20:05:32 │   F1   │ 2009-12-08  20:06:30 │
│ PRE   NEXT  ENTER│◀──────│ RELAY 1 ON           │◀──────│ HUSHED BUZZER/RELAY  │
└─────────────────┘        │ PRE    NEXT    EXIT  │        │ PRE    NEXT    EXIT  │
 F1↑           ↓F2         └──────────────────────┘        └──────────────────────┘
┌─────────────────┐   F3   ┌──────────────┐
│ 6. VIEW SETTING │───────▶│  RETURN TO   │
│ EXIT?           │        │  MAIN MENU   │
│ PRE   NEXT  ENTER│       └──────────────┘
└─────────────────┘
         ↓F2
```
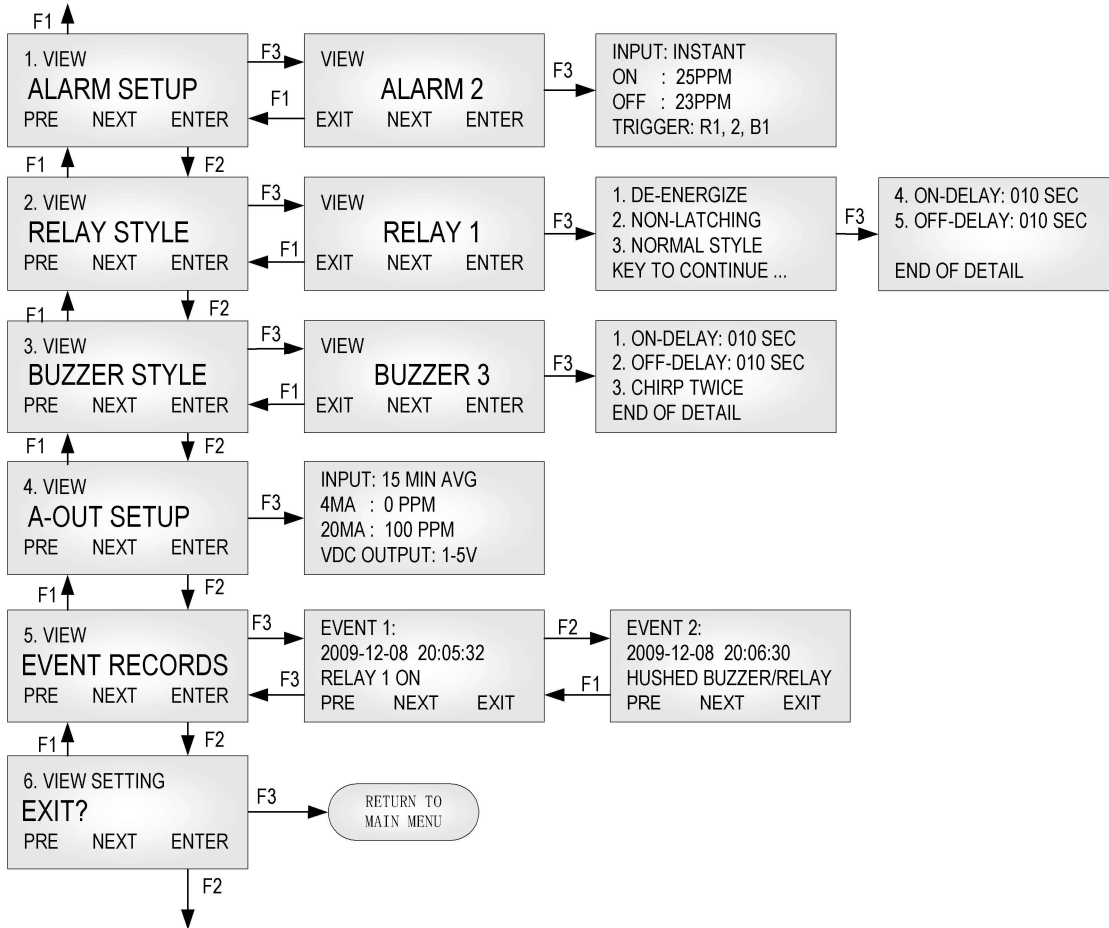
3.9 Menu "6_ALARM SETUP"

First to select which sensor's alarm is going to be set, Q6M or Q6R? The subsequent alarm settings will be performed on that sensor. The Q6M supports alarm 1 to alarm 8 on its sensor. The Q6R supports alarm 1 to alarm 8 on its sensor too.

Alarm is a programmable condition that can receive a selectable input and trigger relays and buzzers.

Disabled or **Enabled:**	Each alarm may be individually set to be enabled or disabled. If the alarm is disabled, the alarm will not be used to calculate or trigger anything. **Default: Alarm 1 to Alarm 4 is enabled. Alarm 5 to Alarm 8 is disabled.**
Input:	One of five inputs is selected to calculate the alarm condition status to trigger the selected outputs: • **INSTANT**: instantaneous gas reading. • **15 MIN AVG** (STEL): Short Term Exposure Limit, average reading over 15 minutes. • **8 HOURS AVG** (TWA): 8-hour Time Weighted Average, average reading over 8 hours. • **DAILY PEAK**: daily peak reading. • **FAULT**: If the unit reports any faults, no matter the gas concentration, it will trigger the selected outputs.
Alarm On **and** **Alarm Off** **Reading:**	*If Alarm On is greater than or equal to Alarm Off:* Alarm On: Sets the concentration at or above which the relay will actuate. Alarm Off: Sets the concentration at or below which the relay will de-actuate. *If Action On is less than Action Off:* Action On: Sets the concentration below that the relay will actuate. Action Off: Sets the concentration above that the relay will de-actuate.
Trigger:	Trigger Outputs: Relay 1, Relay 2, Relay 3, Buzzer 1, Buzzer 2, Buzzer 3

3.10 Menu "7_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 Enabled.**
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.**
ON Delay:	"Delay on Actuation" or "Delay on Make". For each relay a separate time delay may be set from 0 to 990 seconds before an alarm condition will cause the relay to actuate. **Default is 5 seconds.**
OFF Delay:	"Delay on De-Actuation" or "Delay on Break". For each relay a separate time delay may be set from 0 to 990 seconds before a return to a non-alarming signal condition will cause the relay to de-actuate. **Default is 5 seconds.**
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 Buzzer/Relay function in the Tool Menu. **Default is OFF.**

3.11 Menu "8_BUZZER STYLE"

The buzzer style is almost identical to that of the relays, except the style that represents the buzzer tone options:

- Tone 1: Chirp once.

- Tone 2: Chirp twice.

- Tone 3: Intermittent 50% duty cycle.

- Tone 4: Continuous.

The menus are identical to those for the Relay Style.

3.12 Menu "A_ALL DISABLE"

This function is for calibration, system testing etc. When All Disable is ON, the status of the relay, buzzer and analog output, etc., will freeze in their current state.

Default is OFF.

3.13 Menu "B_SIMULATION"

First to select Q6M or Q6R to be set into simulation mode

Simulation mode is used to assist in testing the installation before commissioning. When simulation is enabled, the unit will not detect gas concentrations; it will display the simulated value and use it to calculate the status of relays and buzzers. This feature is available for evaluating the user settings and testing the installation (e.g.: the activation of the valve, fan speed, relay set points, etc. can be verified.)

Any concentration between 0ppm and 9999ppm can be simulated.

3.14 Menu "C_SITE SERVICE" and "D_FACTROY SET"

Factory service staff access only. The customer has no need to operate it.
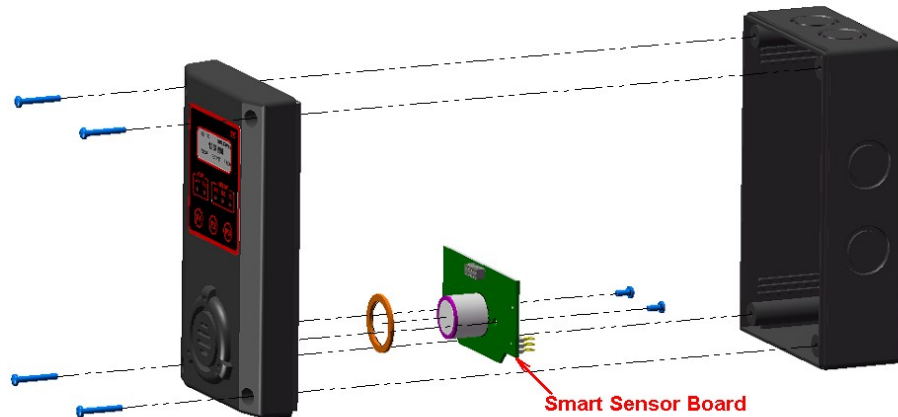
4. MODBUS Protocol Supported By Q6

For Modbus protocol, please contact GES.

5. Maintenance

5.1 Smart Sensor Assembly Replacement

5.1.1 Disassembling

Observe all safety and electrical codes and regulations before removing enclosure lid.


Smart Sensor Board

Important: Calibrate the monitor whenever a component is replaced. But if you replace a smart sensor assembly with a sensor onboard from GES, you don't need to recalibrate the monitor, as all the calibration information has been stored in the smart sensor board in the factory process.

5.1.2 Replacement Procedure

To replace the entire smart sensor assembly, complete the following steps:

1. Power down the monitor.

2. Remove the four screws securing the enclosure lid assembly to the base enclosure and remove the enclosure lid assembly.

3. Remove the two screws securing the smart sensor board and remove the smart sensor board from the lid assembly

4. Feed the O-ring over the sensor on the new smart sensor assembly

5. Plug the new smart sensor assembly and secure with two screws. Ensure that the connectors are correctly matched. Incorrect installation may damage the sensor assembly and/or the display board.
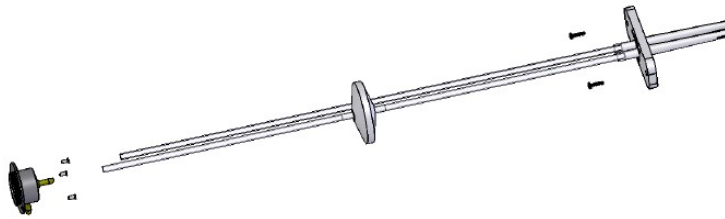
Accessories
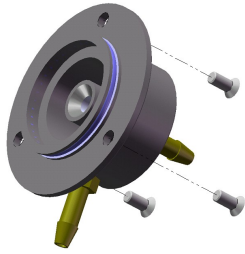
Pump-thru &
Calibration Cap Kit
SKU#: 85930-006-000
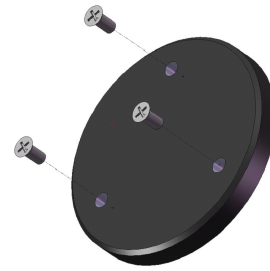
Splash Guard Kit

SKU#: 85930-007-000

Duct Mount Adapter Kit

SKU#: 85930-040-000

Note: For Duct Mount Installation, Q6 needs both the Pump-thru Kit and Duct Mount Kit.

Q-View & USB-RS485 Converter Kit SKU#: 85930-004-000

Q-View is Windows based software running on a PC to used configure Q6 sensors through an RS-485 network. It supports the GES controller protocol (OptoMux) and Modbus protocol.

6. Troubleshooting

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.

SYMPTOMS	PROBABLE CAUSE	SUGGESTED SOLUTION
RS-485 RX LED or TX LED constantly ON	• RS-485 bus connection has a problem • RS-485 driver U6 is damaged • Controller side RS-485 driver has problem	• Disconnect the cable to isolate the problem • Replace U6 IC on main board • Replace the RS-485 driver on the controller
No response to gas	• Sensor screen is dirty • Sensor has expired	• Clean sensor opening • Replace smart sensor assembly, see Replacement Parts
Apparent false alarm	• Puff of gas • Not properly calibrated • Solvent fumes or interference from high levels of interfering gas • Radio frequency interference	• Monitor is functioning • Recalibrate • Remove source of interfering gas • Check that grounding and shielding is correct
No signal at controller	• Maximum distance reached • Controller does not operate	• Verify loop resistance, change wire AWG • Troubleshoot controller

7. 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:

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