QRP Remote Panel

INSTALLATION
OPERATION AND MAINTENANCE
MANUAL

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1. General Information

1.1 System Overview

QRP Remote Panel has been designed to connect to M-Controller Gas Monitoring System, which can host up to 12 QRP or M-Relay units to provide flexible and programmable controls. The QRP units display the relay status and gas concentration; perform actions programmed in the M-Controller.

Each QRP contains 4 removable relays for alarms, fans etc. and 3 24VDC transistor outputs for buzzer, strobe light and horn.

Although the QRP is designed to perform actions programmed in the M-Controller, it's possible to override the 4 relays and 3 transistor outputs through the keypad and LCD display screen and clear the override by password protection, which makes the M-Controller System compliant with safety regulations, such as CSA Standard B52 Mechanical refrigeration code.

The enclosure of the QRP 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.

QRP power supply is designed for 24VDC/AC.

1.2 Key Features

- 8 x 2 character LCD Display c/w backlight
- 4 tactile & audible keypad
- RS-485 digital sensor port with communication indicators
- 4 x 10A SPDT pluggable relay module
    - Relays activation programmed in M-Controller
    - Relay status indicators
- 24VDC Buzzer, strobe and horn outputs
- Enclosure meets IP66 & NEMA 4, 4X, 12 & 13 ratings
- Operation at 15–24VAC or 18-30VDC
- CSA/UL approval (pending)

2. Specifications

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

Input Power:	24VDC nominal, range 18 to 30VDC ~ 24VAC nominal, range 15 to 24VAC 50/60HZ F1: Not used F2: 1.0A DC Total max. **Note: AC Power must be non-grounded (floating).** **Note: No external over-current protection is required. Over-current protection is provided by means of fuses F2.**
Fuse:	F2: 1A Very Fast-Acting Fuse Littelfuse: Axial Lead and Cartridge Fuse Part Number: 0251001 Must be CSA/UL approved.
Power Switching:	Slide switch on Power Supply Board (SW1). This switch disconnects power to the main and I/O motherboard cards. SW1 provides a convenient method to locally remove power from the QRP and connected devices for wiring adjustments etc.
Enclosure:	IP66 & NEMA 4, 4X, 12 & 13 ratings UL listed 508 listed (File # E65324)

Environmental conditions:	Location:	Indoor or Outdoor
	Altitude:	Up to 2 000 m
	Temperature:	-20°C to 50 °C
	Relative Humidity:	95 % for temperatures up to 31 °C
		Decreasing linearly to 80 % at 40 °C
	Pollution Degree:	2, in accordance with IEC 664

Keypad:	4 Tactile & Audible keypad
Display:	8 x 2 character display c/w backlight
Panel Indicators:	4 Communication Status LED's (Green) • Master TX • Master RX • Sensor TX (not used in QRP) • Sensor RX (not used in QRP) 4 Relay Status LED's (Red) • Relay1 Status • Relay2 Status • Relay3 Status • Relay4 Status
Relay Module:	4 Pluggable Relays SPDT, Dry contacts 10.0 A maximum resistive 250VAC, 30 VDC 7.5 A maximum inductive 240VAC 5.0 A maximum inductive 30 VDC
Buzzer, Horn and Strobe:	24VDC transistor output terminals are supplied for connection to buzzer, strobe and horn set Maximum of 6 Watts each output Buzzer, Strobe and Horn can be programmed individually. They are addressed to Relay5, Relay6 and Relay7, combined with onboard Relay1 to Relay4 can be programmed in M-Controller system.
Storage Temperature:	-40°C to 70°C
Size:	180mm X 120mm X 90mm
Weight:	Less than 1.5lbs (0.680 kg)

3. QRP Addressing

QRP address can be set in [MENU] => [System Settings] => [Address]. Default is 2.

The QRP valid address in an M-Controller System is from 0 to 11. Each QRP module contains 4 relays and 3 transistor outputs. **The 4 relays are addressed Relay1 to Relay4 in the QRP module, the 3 transistor outputs (buzzer, strobe, horn) are addressed to Relay5, Relay6 and Relay7.**

Relay1 to Relay7 are only named in the local QRP. When the QRP is connected to a M-Controller, the QRP relay numbering is same as the M-Relay relay numbering or M-Annunciator numbering in the M-Controller system. Relay numbering from the standpoint of the M-Controller is numbered consecutively with numbers 1, 2 and 3 being the M-Controller internal relays and numbers 4 through 99 the relays in the remote modules, such as M-Relay or QRP.

The following table indicates the relationships. **QRP address can be set through [Menu].**

QRP Address	Relay Numbers Per M-Controller Menu Assignments	QRP Address	Relay Numbers Per M-Controller Menu Assignments
0	4 to 10	6	52 to 58
1	12 to 18	7	60 to 66
2	20 to 26	8	68 to 74
3	28 to 34	9	76 to 82
4	36 to 42	10	84 to 90
5	44 to 50	11	92 to 98

For example, if the QRP address is #1, the Relay1 to Relay4, Buzzer, Strobe and Horn in the QRP are addressed as below:

- Relay1 – Relay4: addressed to Relay12 – Relay15 in M-Controller
- Buzzer Output: addressed to Relay16 in M-Controller
- Strobe Output: addressed to Relay17 in M-Controller
- Horn Output: addressed to Relay18 in M-Controller

4. Installation

4.1 Type and Location

The QRP 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.

4.2 Positioning

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 the QRP be installed 5 feet (1.5m) above the floor.

4.3 Physical Dimensions

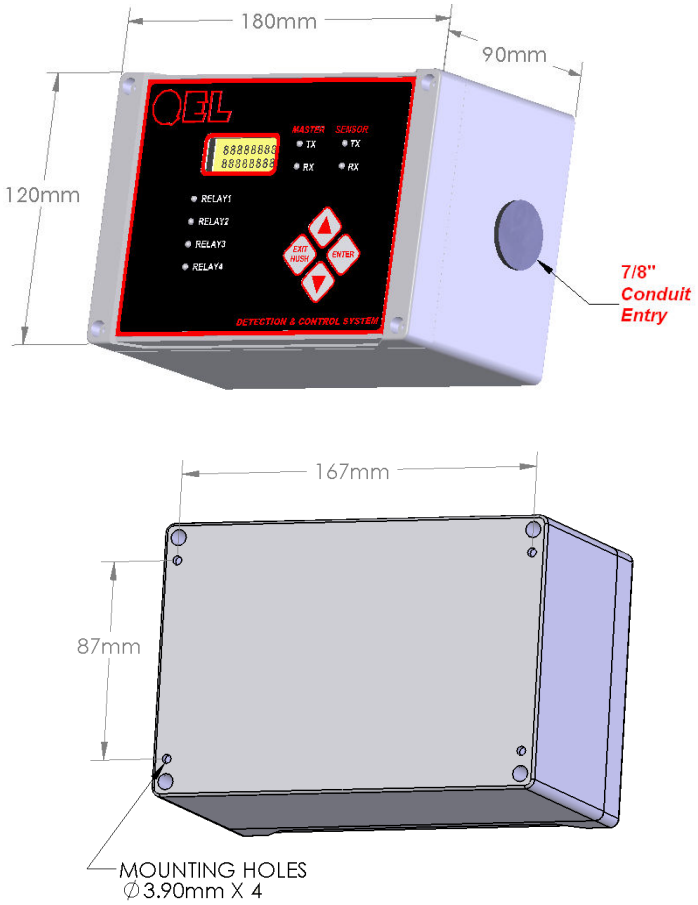


Figure 1: QRP Physical Dimensions

4.4 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.

You might drill an additional access hole to bring the wires into the NEMA 4X enclosure. The access hole should be drilled on the side of the enclosure.

Warning: Be sure to look inside the unit prior to drilling so that to make sure there is sufficient clearance for the hole and fitting that you are using. Seal conduit to prevent foreign material from entering the enclosure.

4.5 Connectors

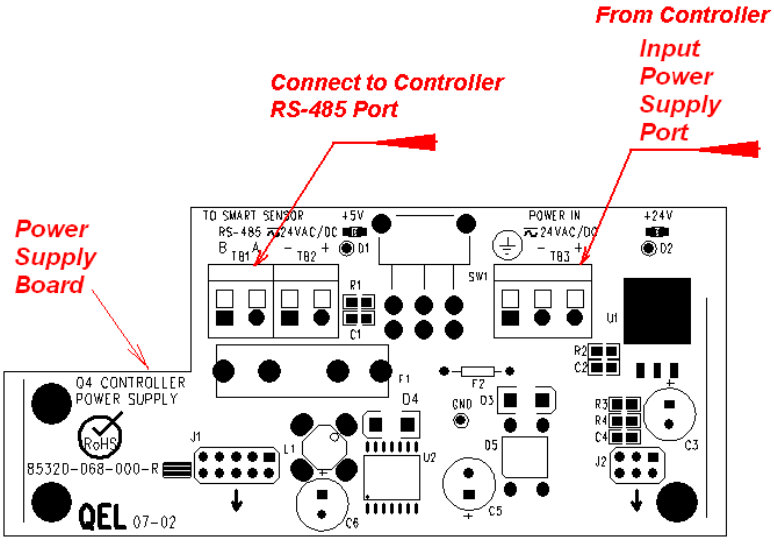
Make sure to observe wiring to the correct terminal blocks.

Warning: Disconnect the main supply and switch off the QRP 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.

4.6 Connection

4.6.1 Input Power Supply and Communication Connection

QRP operates on 24VAC 50/60HZ or 24VDC. There are no selections required by the user to select the input power. The input power is connected to the Power Supply Board using the Terminal Block TB3 located inside the unit.



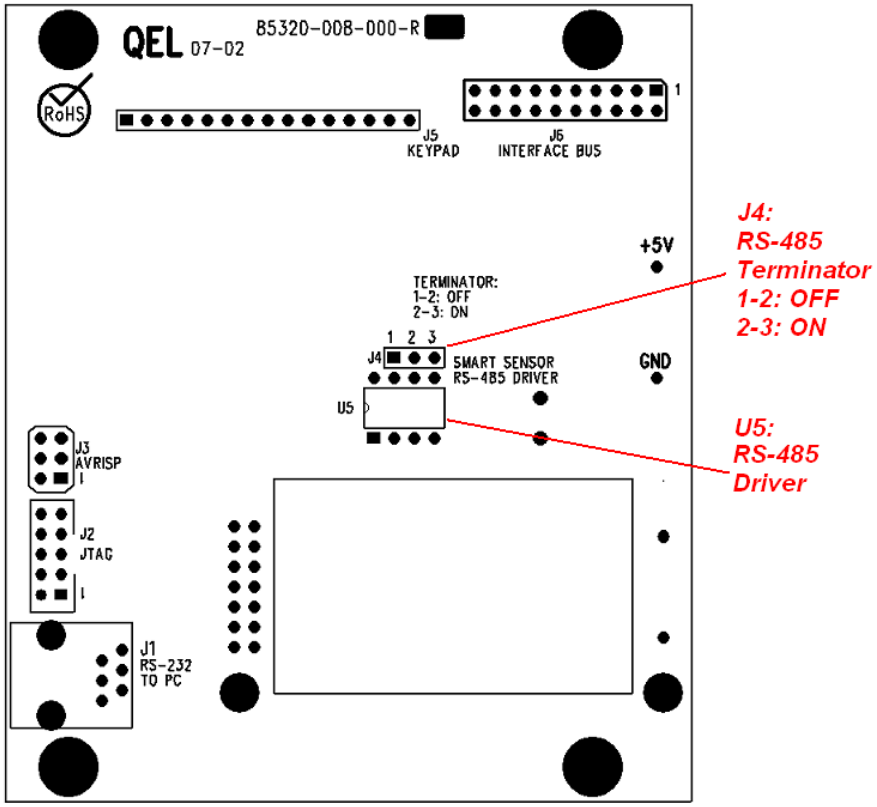
4.6.2 Wire and Cable

The terminal block TB1, TB2 and TB3 accept 12 AWG to 24 AWG wire, Use 16 AWG or 18 AWG wire for Power Supply in long wiring runs. We recommend using BELDEN 9841 for communications. This wire has 120 ohm input impendence, which will eliminate RS-485 communication problems.

4.6.3 RS-485 Terminator

The terminator on each end of the RS485 loop is designed to match the electrical impedance characteristic of the twisted pair loop, and will prevent signal echoes from corrupting the data on the line. The terminator should be enabled on BOTH ends of the RS485 loop. Short and medium length modbus/485 loops can operate without the terminating resistor. Longer runs may require the terminating resistors. But adding terminator dramatically increases power consumption.

The QRP supplies this resistor on its Main Board, and it is chosen using a jumper at J4.



Factory default setting is disabled terminator.

J4
1 2 3

Terminator Disabled / OFF
(Default)

J4
1 2 3

Terminator Enabled / ON

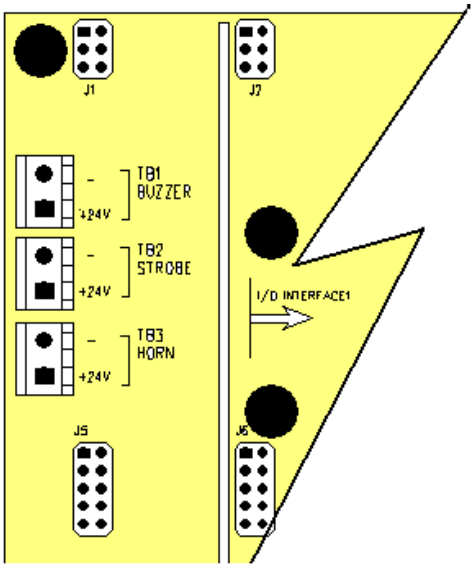
4.6.4 RS-485 Driver Replacement

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 U5 is socketed on the circuit card of Main Board for ease of replacement in the field.

U5: RS-485 TRANSCEIVER IND. TEMP PDIP8 [QEL SKU#: 3200-0029]

4.7 Buzzer, Strobe and Horn Outputs

The QRP supports buzzers, strobe and horn outputs. They can be programmed in M-Controller individually.



The outputs are 24 VDC transistor outputs; the maximum current is not more than 300mA. They are located on the I/O motherboard inside the QRP.

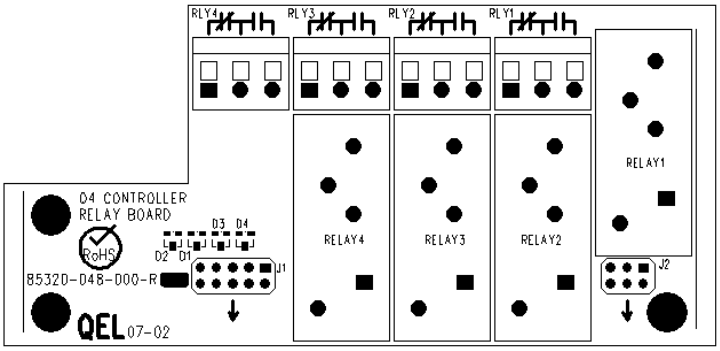
Note: Buzzers, Strobe and Horn are not included in the QRP packing.

4.8 Relay Module Board Installation

Relay Module Board is an option for QRP. The Relay module is equipped with four pluggable Single-Pole Double-Throw (SPDT) relays and four terminal blocks RLY1 to RLY4. Each relay can be programmed individually.

Switching capability of each relay is:

- 10.0 A maximum resistive 250VAC, 30 VDC
- 7.5 A maximum inductive 240VAC
- 5.0 A maximum inductive 30 VDC



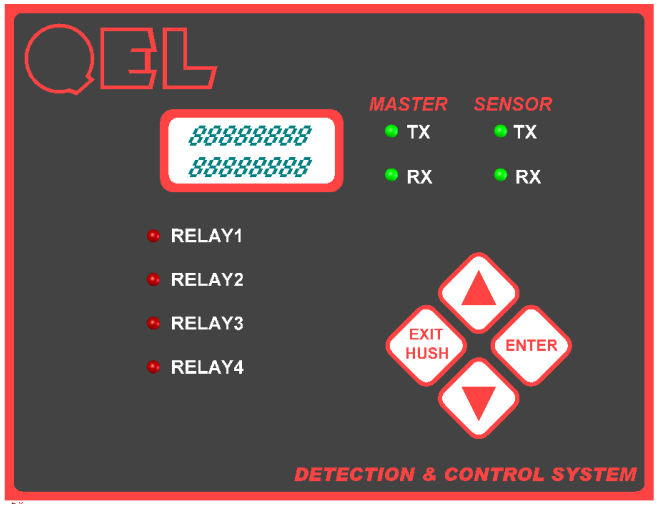
Relay outputs are usually used to control other equipment, such as fans, lights, horns, or visual alarm indicators.

Each relay supports two working modes, which can be set through [Menu] => [Relay Style]:

- Relay Style: Work as normal relay
- Buzzer Style: When the relay is used to control an external Buzzer or Horn. Working at buzzer style will make the relay have the same function of the onboard buzzer. It will be switched off when the key [Exit/Hush] is pressed to perform Hush Buzzer function.

5. Function and Configuration

5.1 Keypad and Indicators



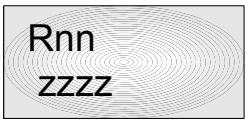
The buttons are structured into two sections:

Running Mode Buttons: Allows detailed views of status, and acknowledge and 'Hush' functions.

Menu Mode Buttons: Password controlled access to all the database setup and configuration menus.

5.1.1 Running Mode: Remote Display and Acknowledge Commands

In normal operation the display appears as follows.



Where

Snn = the Sensor number/address

Rnn = the Relay, Buzzer, Strobe or Analog Output

xxxx = the Gas concentration

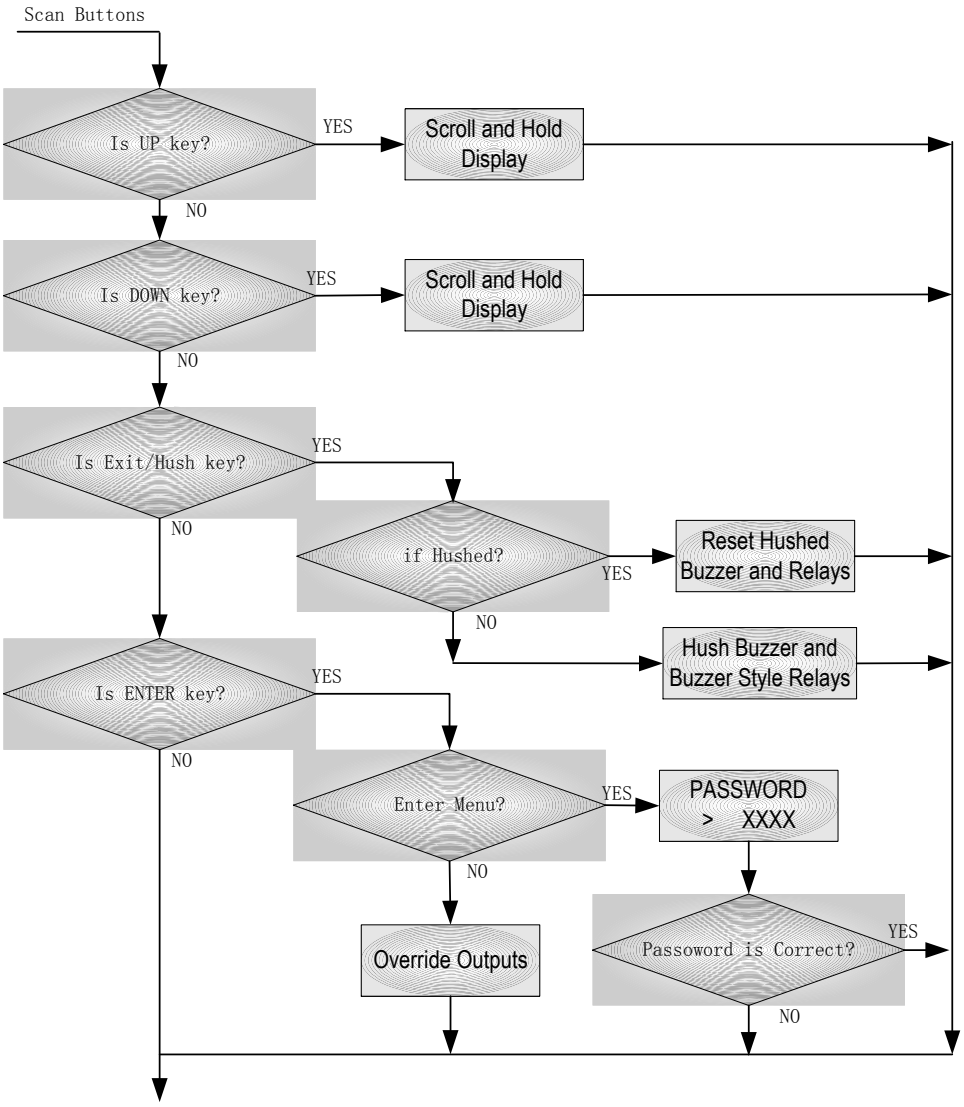
uuu = units of measure

yyyy = the gas type

zzzz = output status

The buttons have the following functions:

- Scroll Up / Down and Hold
- Latched Relay Reset
- Hush Buzzer, Horn and Buzzer-Style Relays



5.1.2 Override Outputs

If the override function is enabled in the QRP, the onboard Relay1 to Relay4, buzzer, strobe and horn can be overridden through the keypad in order to manually actuate relays to switch fans or strobe lights on.

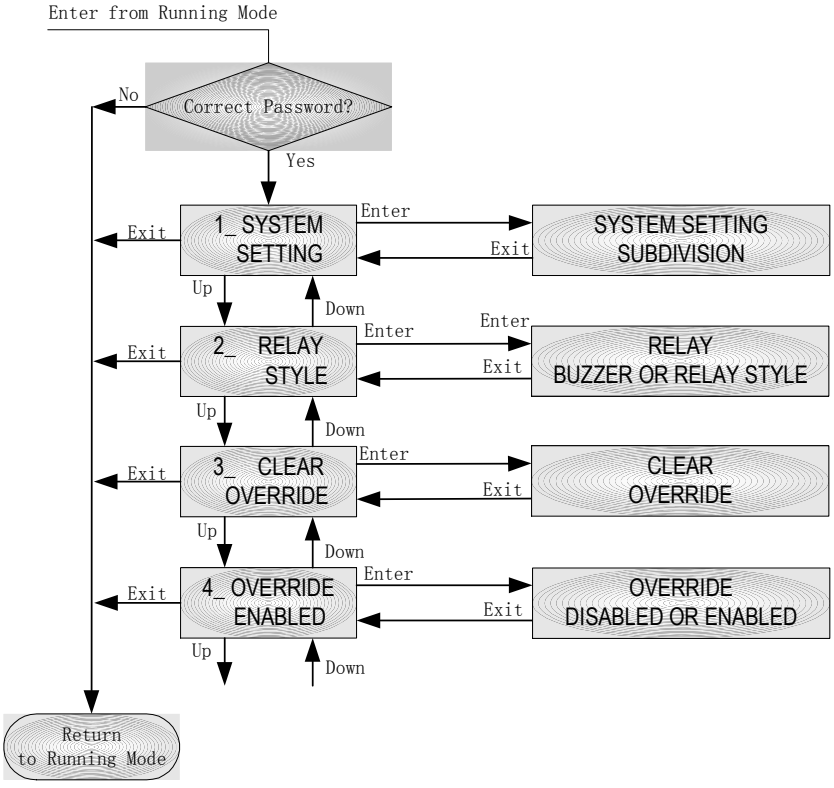
Once the output is overridden, the output will not be controlled anymore by the M-Controller. It has to be reset by performing [Clear Override] in the password protected main [Menu].

The overridden function can be disabled in Menu, so the outputs will not be overridden locally.

5.1.3 Menu Mode: Menu Tree

Main Menu is password protected. Press key [Enter] to enter Menu mode. You will then be prompted for a four-digit password. Once the password is accepted, you are allowed into the main menu tree. Press button [Up] or [Down] to scroll through the main branch headings, press button [Enter] to enter the function, press button [Exit/Hush] to exit to up level menu.

Factory default password is 4321.



Note: **While in the Menu Tree, all normal monitoring operations stop. The alarm status does not change.**

5.1.4 LED indicators

Master TX, RX: When the QRP is connected to an M-Controller System, 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 the M-Controller. The other is TX LED, which indicates the data stream out of the QRP.

Sensor TX, RX: Not used.

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.**

5.2 Scroll and Hold

Press key [UP] and [DOWN] to scroll through the display items. One frame is for sensor, the next frame is to display output status. Once the key [UP] or key [DOWN] is pressed, the current display will stop at that point for two minutes if no other button is pressed, displaying the ongoing status or reading.

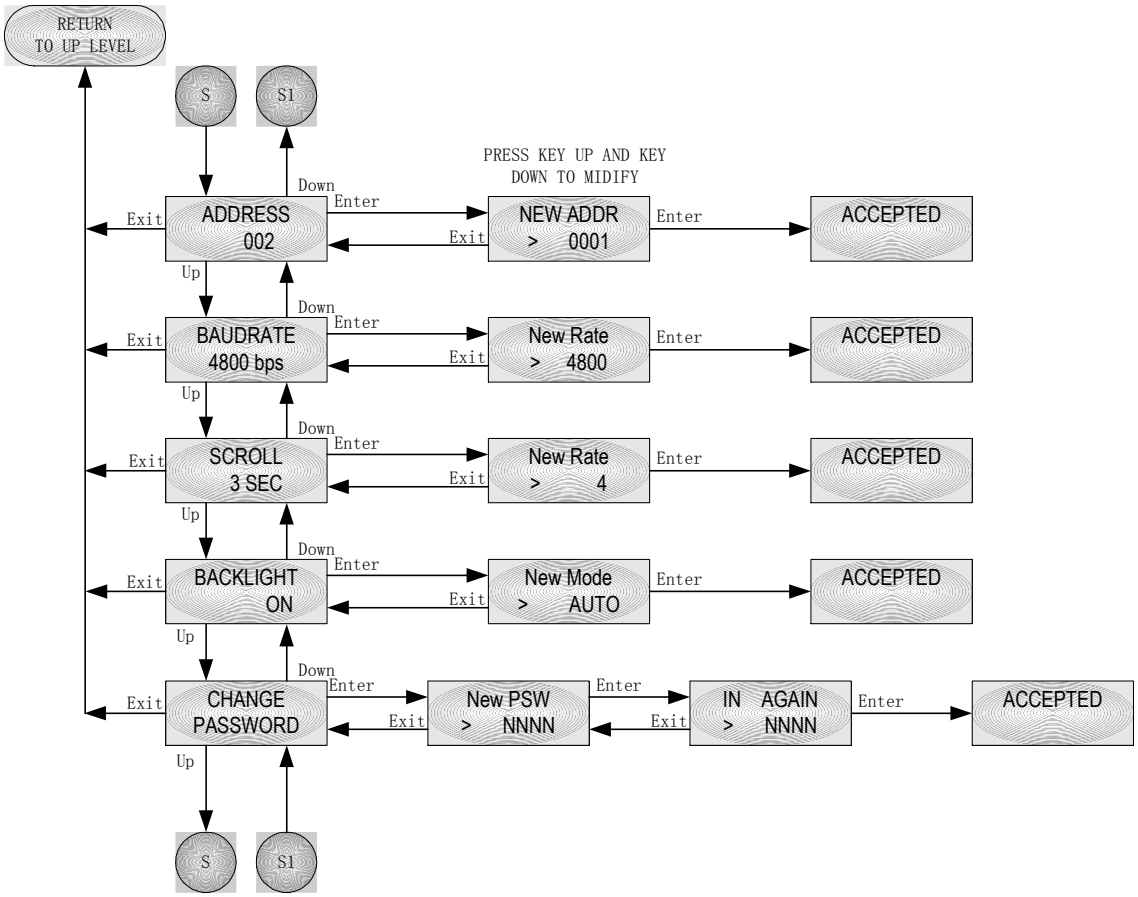
5.3 Hush Buzzer and Horn

Press the [**Exit/Hush]** button to silence the buzzer, horn and buzzer style relays. Press the Exit/Hush button again to remove the hush function.

5.4 Menu "1_System Setting"

System Settings contains general settings for monitor operations, communications.

5.4.1 Menu "1_System Setting" Flow Chart



5.4.2 Miscellaneous

Password: Default password is 4321.

Address: This is a base address used in lager monitoring network, such as in M-Controller system. Valid address is between 0 and 255. Available address for M-Controller system is between 0 and 11.

Baud rate: Remote Sensor network baud rate, 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. In Auto mode, the backlight will turn on for 10 seconds after any key has been pressed. Default setting is Auto mode.

5.4.3 Change Password

Change Password allows any combination of up to four digits.

Warning: **Be sure that you record the new password in a safe and secure location!**

5.5 Menu "2_Relay Style"

Relay1 to Relay4 can be set to Normal Style Relay or Buzzer Style Relay.

Procedures:

- Select a relay
- The LCD will display current relay style, you can press key [Up] and key [Down] to browse the relay that you want to modify, and then Press [Enter]
- The LCD will ask which mode you want to choose for the selected relay: Relay Mode or Buzzer Mode. Press [Up] and [Down] button to select the style/mode for the relay
- Press [Enter] to save the setting for the relay

5.6 Menu "3_Clear Override"

See 5.1.2 Override Outputs.

5.7 Menu "4_Override Enabled"

See 5.1.2 Override Outputs.

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
LCD Display does not come on	• No power supply • LCD has problem • Program has crashed	• Check power / ground connections • Change LCD • Reprogram
RS-485 RX LED or TX LED constantly ON	• RS-485 bus connection has problem • RS-485 Driver U5 is damaged • Controller side RS-485 Driver has problem	• Disconnect the Cable to isolate the problem • Replace U5 IC on main board • Replace RS-485 Driver in Controller

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 QEL 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 QEL 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. QEL assumes no responsibility for improper installation, maintenance, etc., and stresses the importance of reading all manuals. QEL shall not be responsible for any liability arising from auxiliary interfaced equipment nor any damage resulting from the installation or operation of this equipment.

QEL'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 QEL any liability in connection with the sales of our products other than that set forth herein.

NOTE: Due to on-going product development, QEL 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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