

M-Logger

Data logging and Event Recording



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.

1. Glossary

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.

Download: Send data files 'down' to a slave device as from a computer to the M-Logger.

Protocol: The actual language of communication between devices, as distinguished from the electrical standard.

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.

Upload: Sending data files 'up' to a master device, as to a computer.

M-Controller System: M-Controller System is developed by QEL, which supports 32 digital sensor inputs, 8 channel 4-20mA inputs, up to 99 Relay outputs, 3 Buzzers output, Strobe/Horn outputs as well as 8 channel isolated 4-20mA outputs. Working with M-NET and M-View, it offers Ethernet/ Internet capabilities as well as real time monitoring and data logging; Working with M-Logger, M-Logger can keep monitoring and data/event logging all statuses and readings of M-Controller.

M-View: It is a Windows based software, which supports M-Controller and M-Logger databases management and configuration as well as firmware updates.

2. General Information

2.1 System Overview

M-Logger is a stand-alone data logger data acquisition for the inputs and outputs information of M-Controller with time stamp. M-Logger allows in-the-field measurements of M-Controller to be saved to its embedded and removable USB Flash Drive for later download to a computer. The data logging information contains:

- 32 digital sensor reading and status
- 8 analog inputs reading
- 8 analog outputs mA reading
- 99 relay status
- 3 buzzer status
- 3 trigger status
- 1 strobe status
- Event recorder

Built-in Real Time Clock allows automatic time and date stamping of data acquired to USB Flash Drive when used in the stand-alone mode. With equipped 1GB USB Flash Drive from factory, it is able to keep data and events records for more than one year.

M-Logger contains a LCD Display to display information collected through M-Controller RS-422 port, so it also can be used as a remote display panel for M-Controller.

Connect its RS-232 port or isolated RS-485 port to a computer, the M-Logger can be operated and controlled using M-View Software to do real time data logging and recording. With the isolated RS-485 port or RS-232 port, it is easy and reliable to embed it to a large monitoring network by using ModBus protocol.

After data is recorded on local USB Flash Drive or in a PC computer, using M-View function [Historical Data Review] to review your data.

The enclosure for the M-Logger 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. A 24VDC Output AC/DC Adaptor is provided in the package.

2.2 Key Features

- 8 x 2 character LCD Display c/w backlight
- 4 tactile & audible keypad
- USB host port for USB Flash Drive as mass data storage
- Sample rate from 30 seconds to 250 seconds. With equipped 1GB USB Flash Drive, it can keep more than one year data and events records
- RS-422 port for M-Controller RS-422 port
- RX/TX communication indicators
- Isolated RS-485 module to high level system (option)
- RS-232 port to high level system
- Power Supply Board and Isolated RS-485 Boards are pluggable and available to plug into any spare slots for easy expandability and deploy ability
- Enclosure meets IP66 & NEMA 4, 4X, 12 & 13 ratings
- Operation at 15-24VAC or 18-30VDC
- CSA/UL approval (pending)

2.3 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
1.0A DC Total max.

~ 24VAC nominal, range 15 to 24VAC 50/60HZ
1.0A AC Total max.

Note: Don't share the same power supply with M-Controller. Use the provided 24VDC AC/DC Adaptor.

Note: AC Power must be non-grounded (floating) if using other 24VAC power supply.

Note: No external over-current protection is required. Over-current protection is provided by means of fuses F2. See fuse specification below.

Fuse: F1: Not used in M-Logger

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 M-Logger.

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)	
	<ul style="list-style-type: none"> • Master TX • Master RX • Sensor TX • Sensor RX 	
Optional RS-485 Module:	4 Relay Status LED's (Red)	
	<ul style="list-style-type: none"> • Combined Relay1, 5, 9, 13 ... Status • Combined Relay2, 6, 10, 14 ... Status • Combined Relay3, 7, 11, 15 ... Status • Combined Relay4, 8, 12, 16 ... Status 	
	Isolated RS-485 port with ModBus protocol	
	Responds as a Slave using Modbus RTU protocol	
	<ul style="list-style-type: none"> • Modbus RTU Slave Mode • Adjustable baud rate 19.2kbps to 57.6kbps [HOST BAUD] • 1 start bit / 8 data bits / 1 stop bit • Even parity • M-Logger Slave Address 1 to 254 [MY ADDR] • 	
RS-232 Interface:	RJ-11 Telephone jack Primarily used for uploading and downloading configuration databases and updating M-Logger firmware It also supports ModBus protocol just like above RS-485 module	

Storage Temperature: -40°C to 70°C

Size: 180mm X 120mm X 90mm

Weight: Less than 1.5lbs (0.680 kg)

3. Installation

3.1 *Unpacking the equipment*

The M-Logger is shipped with the following:

- The M-Logger in a NEMA 4X enclosure
- USB Flash Drive with M-View Setup.exe
- User Operation Manual
- Installation Drawing
- RJ11 to DB9 RS-232 Cable and Adapter
- Isolated RS-485 Board is option
- +24VDC Output AC/DC Adaptor

3.2 *Type and Location*

The M-Logger 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.

If the M-Logger is going to be operating at temperatures below the operating temperature, a controlled heater or strip is recommended to keep the temperature adequately warm. Contact your local distributor or the factory for additional information.

3.3 *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 controllers be installed 5 feet (1.5m) above the floor.

3.4 Physical Dimensions

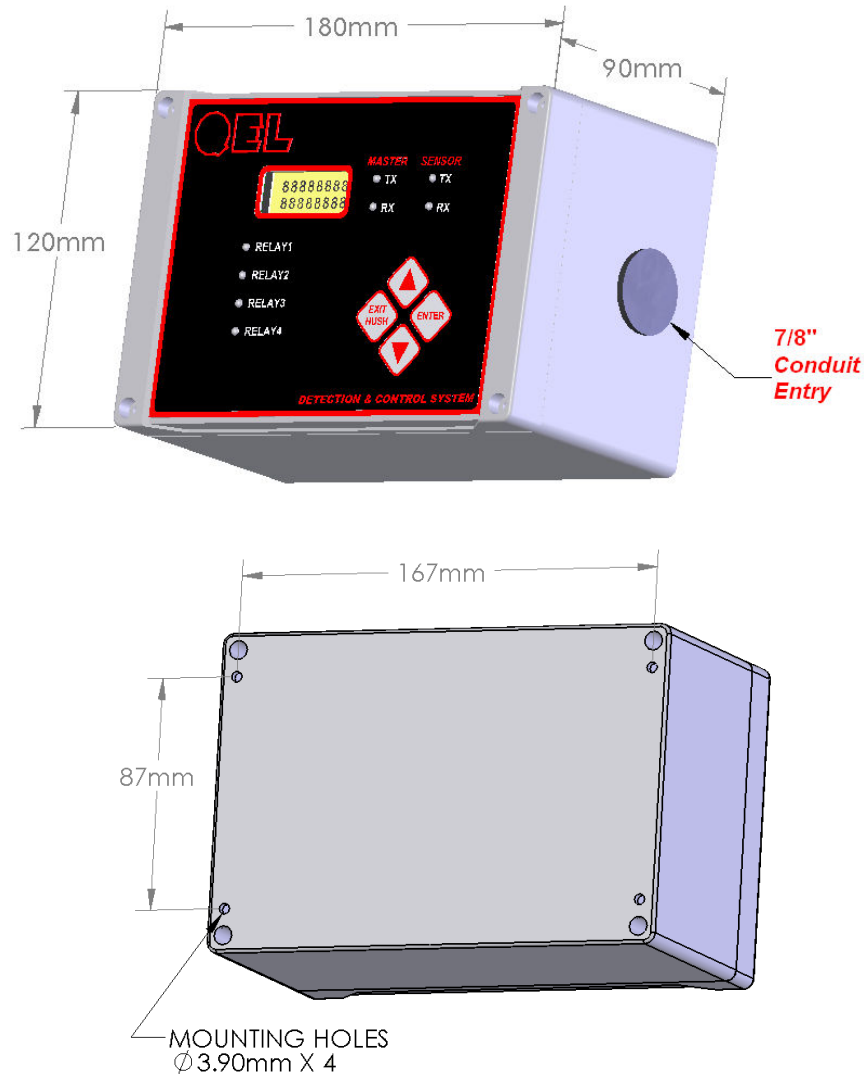


Figure 1: M-Logger Physical Dimensions

3.5 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.

3.6 Connectors

Make sure to observe wiring to the correct terminal blocks.

Note: Incorrect wiring to any of the terminals of the M-Logger 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 and switch off the M-Logger when changing any of the wiring to the unit. Do not touch sensitive components on the circuit card to prevent static discharge damage to the unit.

3.7 Power Supply Connection

The M-Logger power supply voltage requirements are nominally 24VAC/DC. A +24VDC Output AC/DC Adaptor is provided in the package. Use the provided 24VDC AC/DC Adaptor only. **Don't use the power supply of M-Controller.**

Note: Due to RS-422 withstands a low common mode voltage (± 7 volts), we recommend a separated power supply for M-Logger, that means the power supply should be isolated from the power supply of M-Controller.

3.7.1 Input Power Supply

M-Logger operates on 24VAC 50/60HZ or 24VDC. There are no selections required by the user to select the input power. Connect the two wires of 24VDC AC/DC Adaptor to the Power Supply Board using the Terminal Block TB3 located inside the unit. TB1 and TB2 are not used in M-Logger.



- Black wire is GND => connects to TB3 -
- Black/White wire is 24VDC => connects to TB3 +

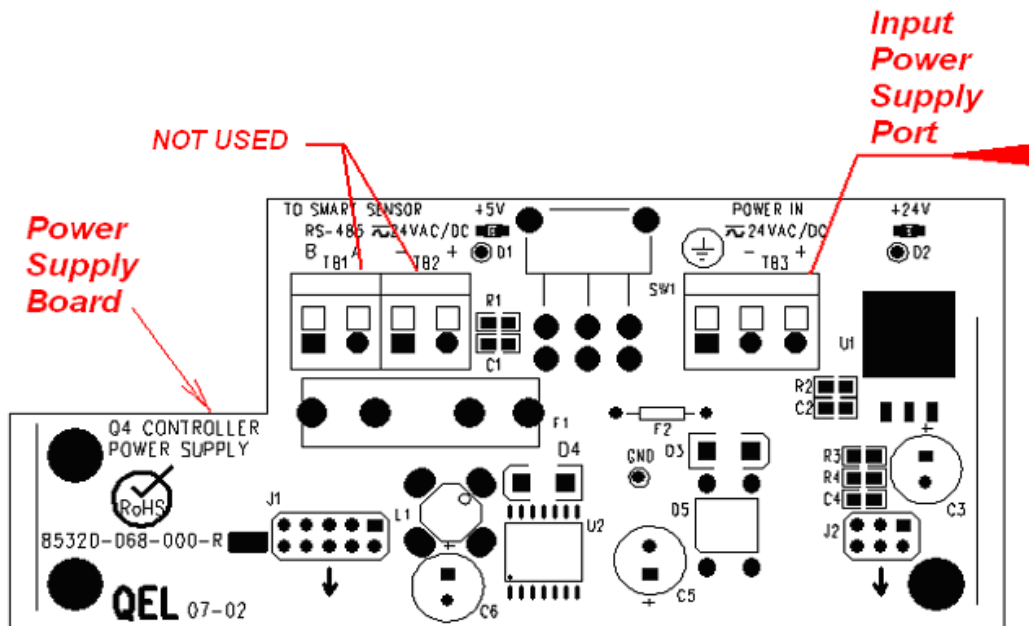


Figure 2: M-Logger Power Supply Board Installation

3.7.2 Proper Ground

The M-Logger must be grounded by connecting a **true earth-ground** to the ground terminal designated by the \oplus symbol.

The M-Logger can be damaged by power surges and lightening through the RS-422 line and power supply. Although the M-Logger has built-in surge protection, we strongly recommend that additional protection be obtained for the unit and for any electronic equipment that is attached to the power supply and RS-422 lines. Power supply protection is especially important if you live in a lightening-prone area.

Note: **Lightening damage is not covered under warranty.**

Note: **M-Logger Common/Power Supply Negative is not connected to Chassis Safety Ground.**

3.8 RS-422 Port to M-Controller RS-422 Installation

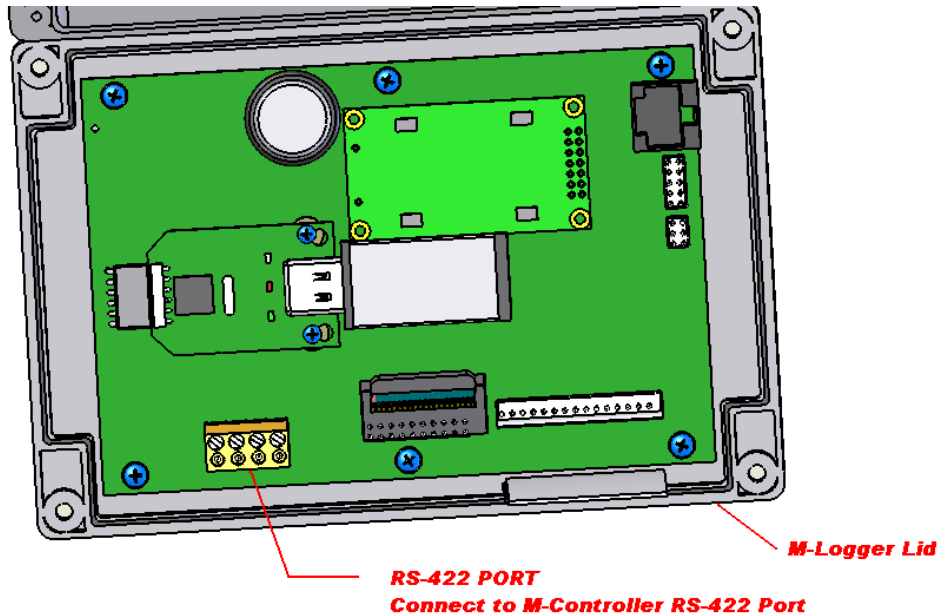


Figure 3: M-Logger Connection with M-Controller

3.8.1 Cable

We recommend using BELDEN 9829 for communications. This wire has 120 ohm input impedance, which will eliminate RS-422 communication problems.

3.8.2 Shield Ground

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.

3.8.3 RS-422 Terminator

The terminator on each end of the RS422 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 RS422 loop at long length situation. Short and medium length modbus/422 loops can operate without the terminating resistor. Longer runs may require the terminating resistors. But adding terminator dramatically increases power consumption.

The M-Logger supplies this resistor on its Main Board, and it is chosen using a jumper at J6.

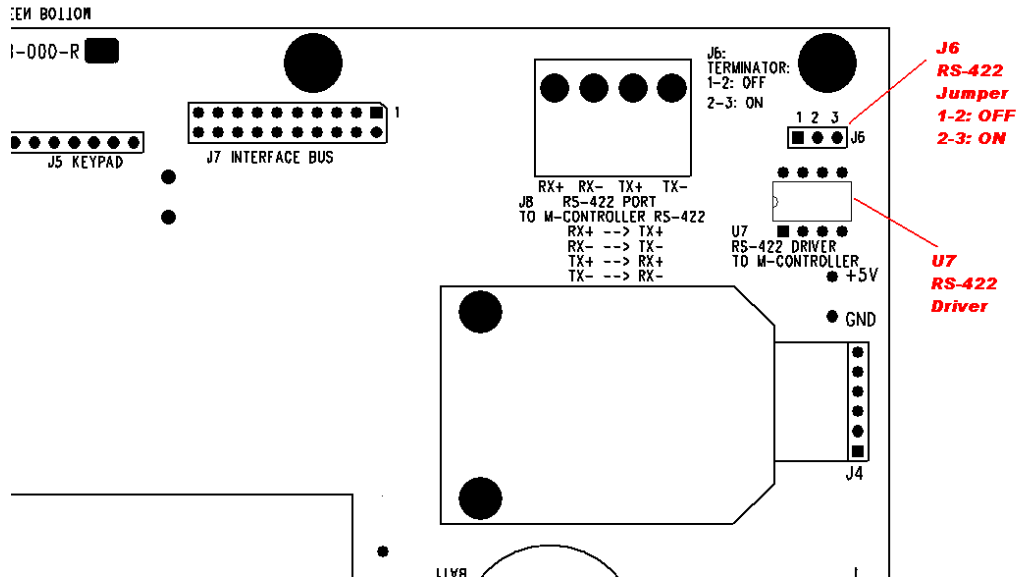
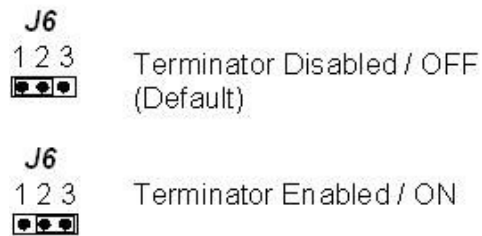


Figure 4: M-Logger Main Board Bottom View (Up side Down)

Factory default setting is disabled terminator.



3.8.4 RS-422 Driver Replacement

RS-422 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 U7 is socketed on the circuit card of Main Board for ease of replacement in the field.

U7: DS8921AN IC LINE DRIVER RS422 DIP8 [QEL SKU#: 3200-0012]

3.8.5 RS-422 Connection

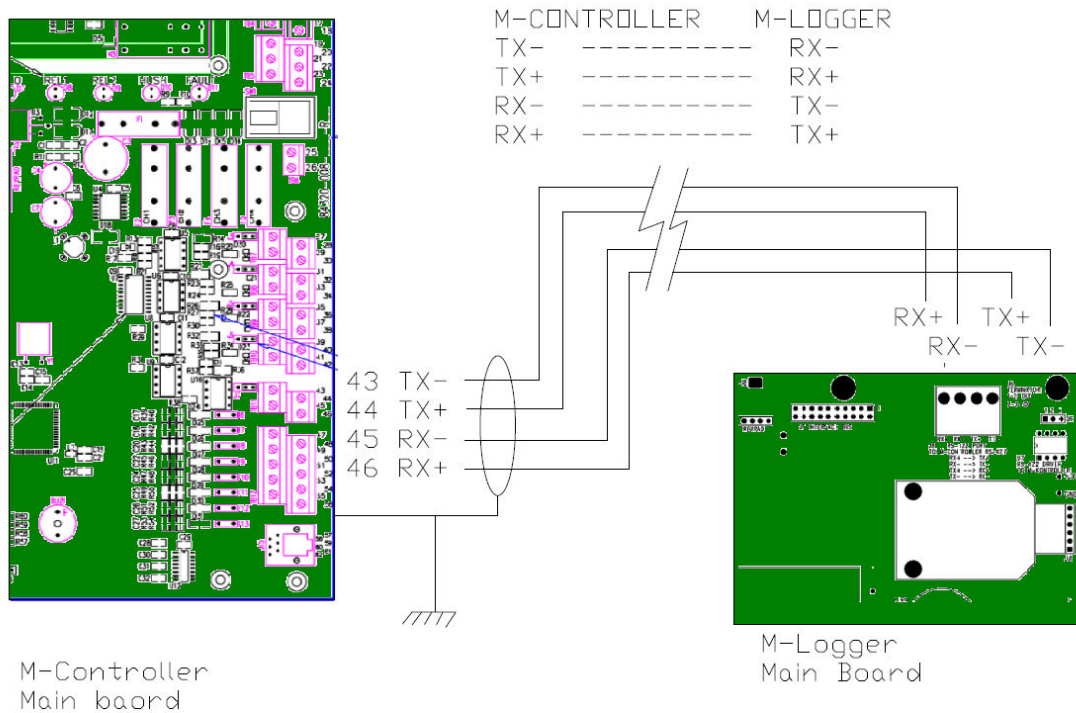


Figure 5: M-Logger RS-422 Connection with M-Controller

3.9 Beeper

Even though there are three terminal blocks TB1, TB2 and TB3 on the motherboard for buzzers, strobe and horn outputs, **M-Logger does not support these outputs.**

M-Logger has a beeper on board, when a valid key is pressed, the beeper will activate.

The Beeper can also be associated with the buzzer statuses of M-Controller. If the beeper were associated (or linked) with the M-Controller buzzer, the beeper would activate if M-Controller buzzers activated.

The association or link can be enabled or disabled through M-Logger [MENU] =>[3_Logger Setting] =>[LINK BUZ ENABLED]

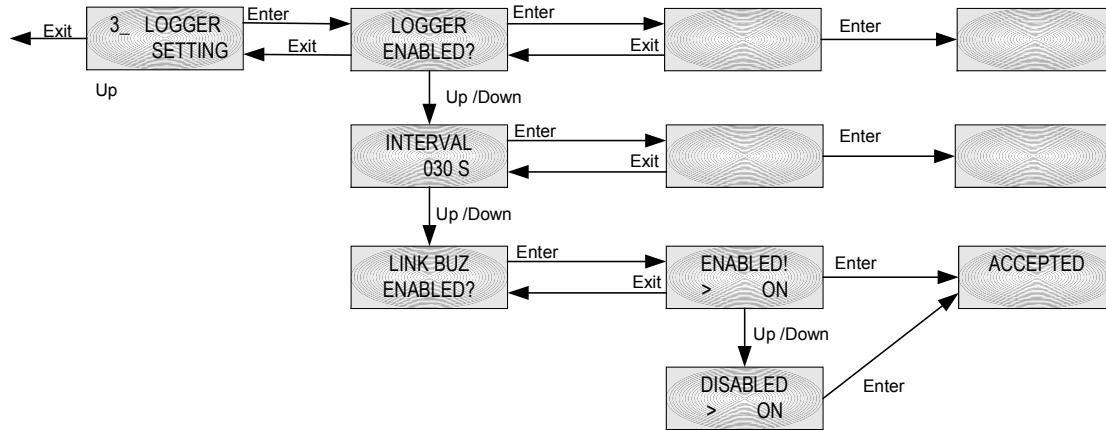


Figure 5: Link Buzzer Enabled/Disabled Flow Chart

3.10 Upstream RS-485 Module Board Installation (Option)

The M-Logger has an optional card that can provide one channel isolated RS-485 outputs **with no need for separate power supply**. The minimum isolation voltage is 1000 Vrms.

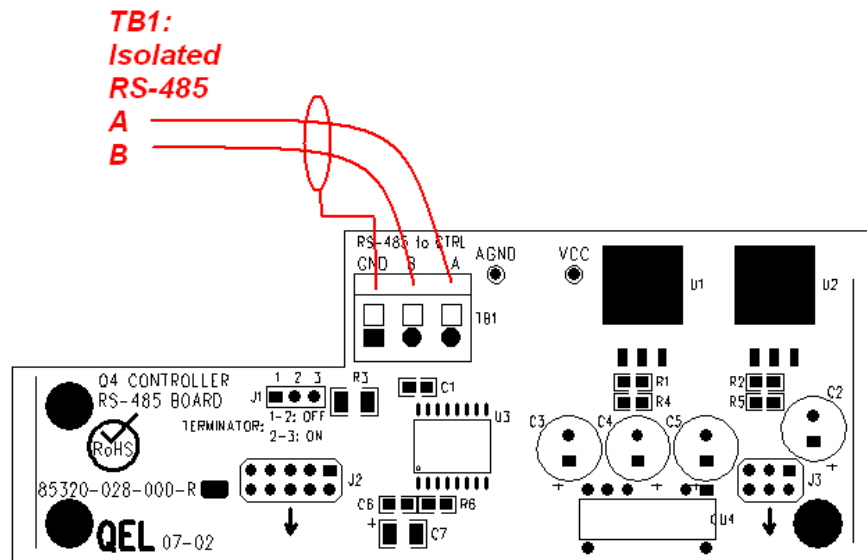


Figure 6: M-Logger Upstream RS-485 Board Installation

The upstream RS-485 port can be used to connect the M-Logger to other Control System, in which the M-Logger works as a Modbus RTU Slave, so M-Controller and M-Logger can be integrated into a larger monitoring network.

In order to work with a Modbus RTU Master, the following settings have to be set up in the M-Logger [Menu]=[System Setting]:

- [MY ADDR] My Address: Default is 214
- [HOST BAUD] Host Baud Rate: Default is 57.6kbps

The parameter My Address is used to define the M-Logger address in the Modbus network. The parameter HOST BAUD rate should be the same as the Modbus Baud Rate defined in the Modbus RTU Master.

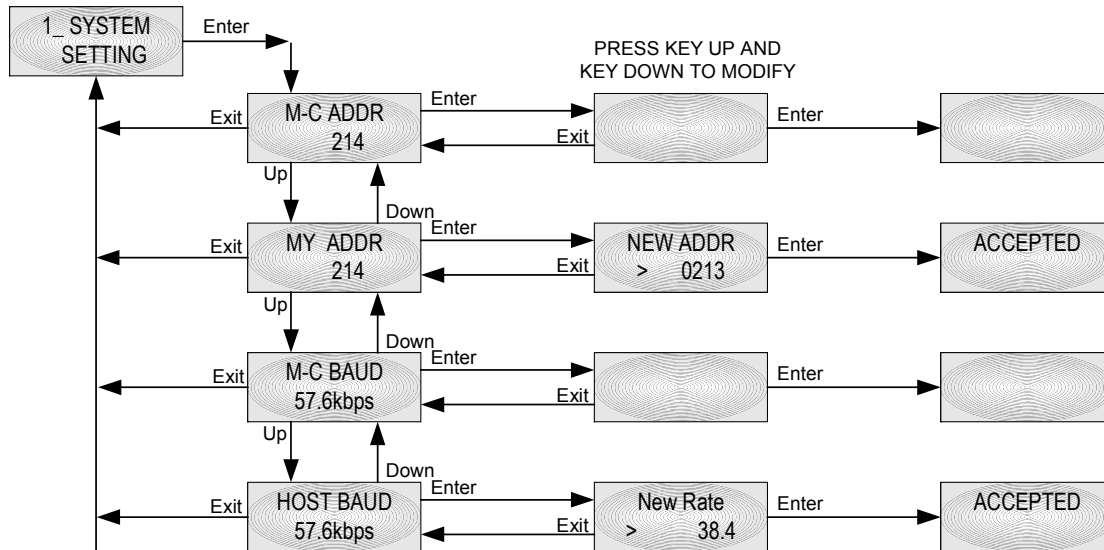


Figure 7: M-Logger Upstream RS-485 Settings Flow Chart

Through USB to RS-485 converter or RS-232 to RS485 converter, you can connect the RS-485 port to a remote computer instead of using RS-232 port of M-Logger, this would allow a long distance connection from a computer to the M-Logger for data logging and firmware updates by running M-View on your computer. Working in this way, the RS-485 port has the same function as the RS-232 port of M-Logger. The Host Baud Rate should be between 19.2kbps and 57.7kbps. See M-Logger RS-232 port.

3.10.1 Activate the RS-485 port

M-Logger has only one serial port for upstream communication, the RS-485 and RS-232 actually share the same port and only one port is active at a time. As factory default, the RS-232 port is enabled. If you want to use the RS-485 port to communicate with other system, the RS-485 port should be enabled; as a result RS-232 is disabled.

To switch RS-485 and RS-232, go to M-Logger [Menu]=>[2_OUTPUT RSxxx]

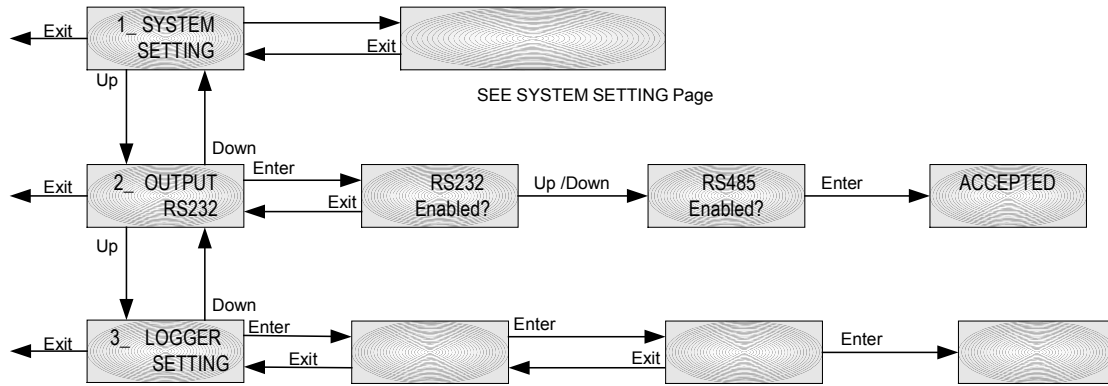



Figure 8: Enable RS-485 or RS-232 Flow Chart

3.10.2 RS-485 Terminator

The M-Logger RS-485 Board supplies the terminator resistor on the board, and it is chosen using a jumper at J1.

Factory default setting is disabled terminator.

J1
1 2 3 Terminator Disabled / OFF
(Default)



J1
1 2 3 Terminator Enabled / ON




Figure 9: RS-485 Terminator

4. Function and Configuration

4.1 Inputs and Outputs Addressing

M-Controller can support up to 32 remote digital sensor inputs, 8 channel 4-20mA analog inputs, 99 relay outputs, 3 buzzers outputs, 3 triggers outputs, 1 strobe and 8 channel analog 4-20mA outputs.

Acceptable addresses:

- Sensors are addressed Sensor0 to Sensor31 or S0 to S31
- 4-20mA Analog inputs are addressed S32 to S39 or Ain1 to Ain8
- Relays are addressed Relay1 to Relay99 or R1 to R99
- Buzzers are addressed Buzzer1 to Buzzer 3 or BZ1 to BZ3
- Triggers are addressed Trigger1 to Trigger 3 or TR1 to TR3
- Strobe is addressed STROBE or STR
- 4-20mA Analog Outputs are addressed AOut1 to Aout8

4.2 Keypad and Indicators

All system settings 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.

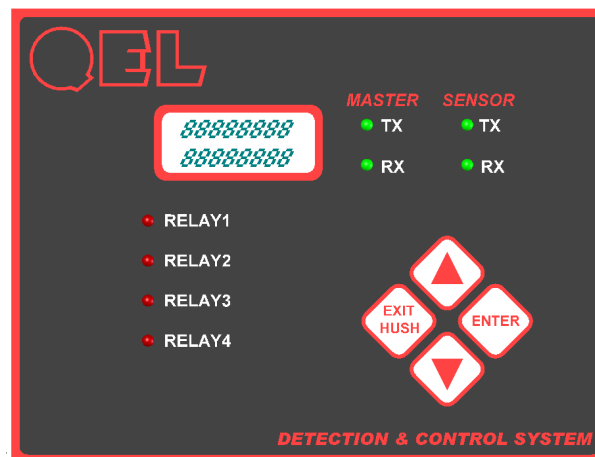


Figure 10: M-Logger Keypad and Indicators

The buttons are structured into two sections:

Running Mode Buttons: Allows to browse readings and statuses, perform acknowledge and 'Hush' functions.

Menu Mode Buttons: Password controlled access to all the system settings and configuration menus.

4.2.1 Running Mode: Status View and Acknowledge Commands

In normal operation the display appears as follows.



Where

Snn	= the Sensor number/address
Relay nn	= the Relay, Buzzer, Strobe or Analog Output
xxxx	= the Gas concentration
uu	= units of measure
yyyy	= the gas type
zzzz	= output status

The buttons have the following functions:

- Scroll and Hold with button [UP] and [Down]
- Hush alarmed beeper with button [Exit/Hush]
- Enter Menu Mode with press and hold button [Enter] for 3 seconds

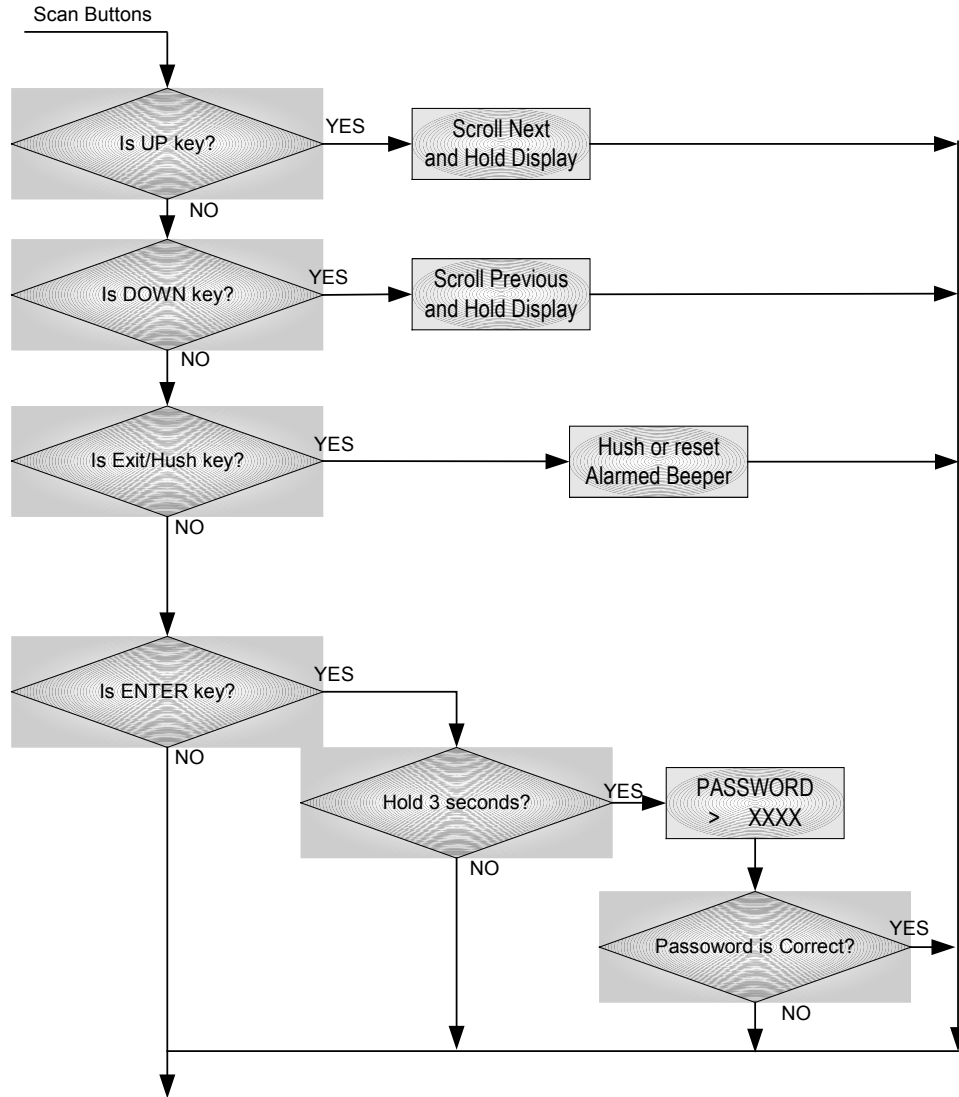


Figure 11: M-Logger Running Mode Key Functions Flow Chart

4.2.2 Menu Mode: System Setting and Configuration Menu Tree

Changing system settings and configuration items is password controlled. Press button [Enter] for 3 seconds. 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.

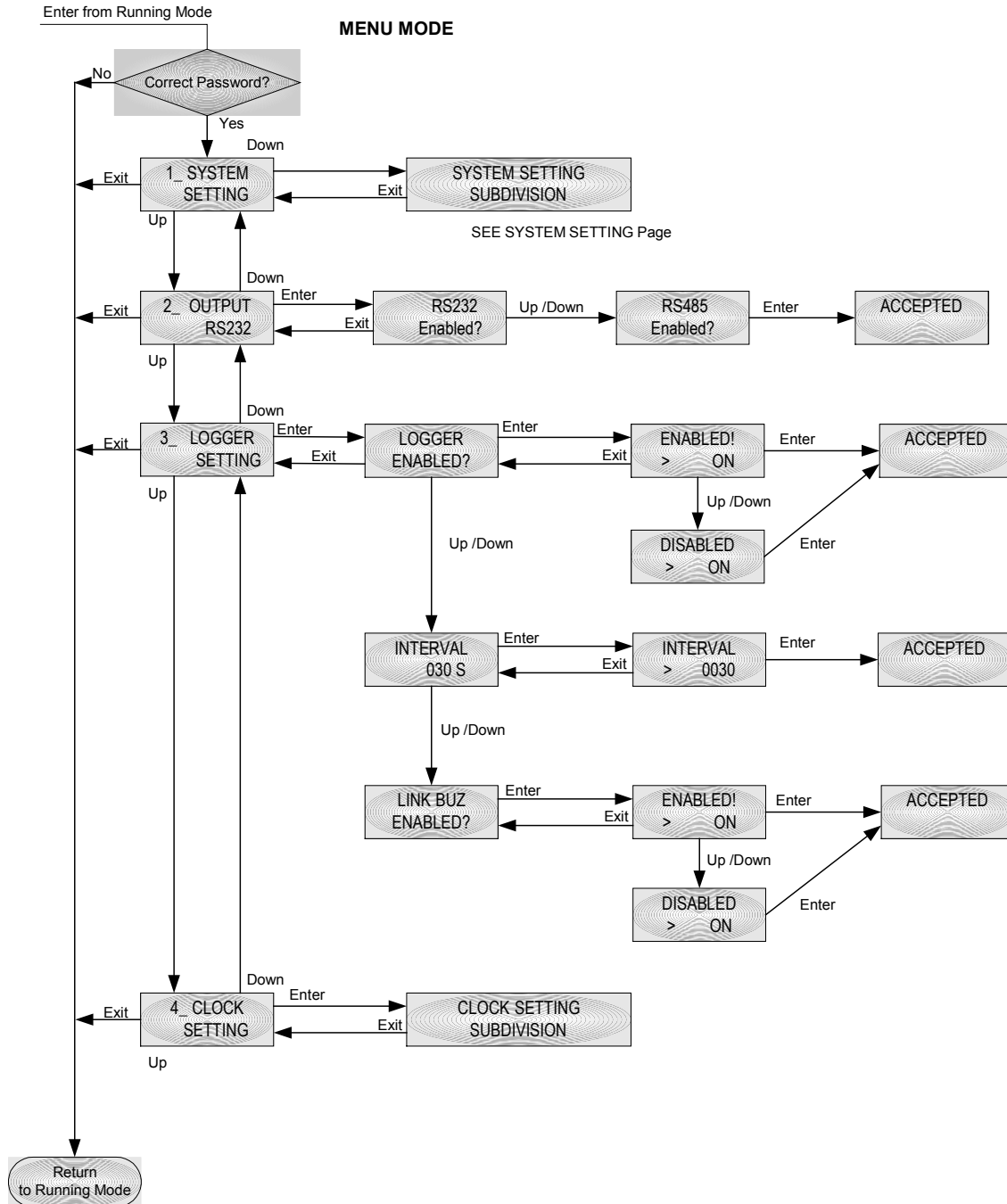


Figure 12: M-Logger Menu Tree Flow Chart

Note: While in the Menu Tree, all normal monitoring operations stop. The alarm status will be frozen.

4.2.3 LED indicators

Master TX, RX: When the M-Logger is connected to a computer or other control system; the traffic of the communication can be monitored visually through the two LED

indicators. One is RX LED, which indicates the data stream received in the M-Logger. The other is TX LED, which indicates the data stream out of the M-Logger.

Sensor TX, RX: When an USB drive and M-Controller are connected to the M-Logger; the traffic of the communication can be monitored visually through the two LED indicators. One is RX LED, which indicates the data stream replied from USB drive and M-Controller and received in the M-Logger. The other is TX LED, which indicates the data stream sent out of the M-Logger to the USB drive and M-Controller.

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

Relay1-4 LED: Indicate the status of four group relays in M-Controller system. When any one or more relays in the group are activated, the group Relay LED is ON. When no the relay in the group is activated, the group Relay LED is OFF.

- Relay 1 LED: Combined Relay1, 5, 9, 13 ... Status
- Relay 2 LED: Combined Relay2, 6, 10, 14 ... Status
- Relay 3 LED: Combined Relay3, 7, 11, 15 ... Status
- Relay 4 LED: Combined Relay4, 8, 12, 16 ... Status

4.3 Scroll and Hold

Press button [UP] and [Down] to scroll through the display items. One frame is for sensor, the next frame is to display output status and then the next frame is to display date and time. Once the button [UP] or [Down] is pressed, the current display will be held at that point for two minutes if no other button is pressed, displaying the ongoing status or reading or date/time.

4.4 Hush Beeper

Press the [Exit/Hush] button to silence the beeper if the beeper is in alarm status. Press the Exit/Hush button again to remove the hush function.

Note: Only the Beeper can be hushed by pressing the [Exit/Hush] button. The buzzer of M-Controller may still be alarmed. To hush the buzzer of M-Controller, you have to press the button [Hush] on the M-Controller's panel.

4.5 Menu “1_System Setting”

System Settings contains general settings for monitor operations and communications.

4.5.1 Menu “1_System Setting” Flow Chart

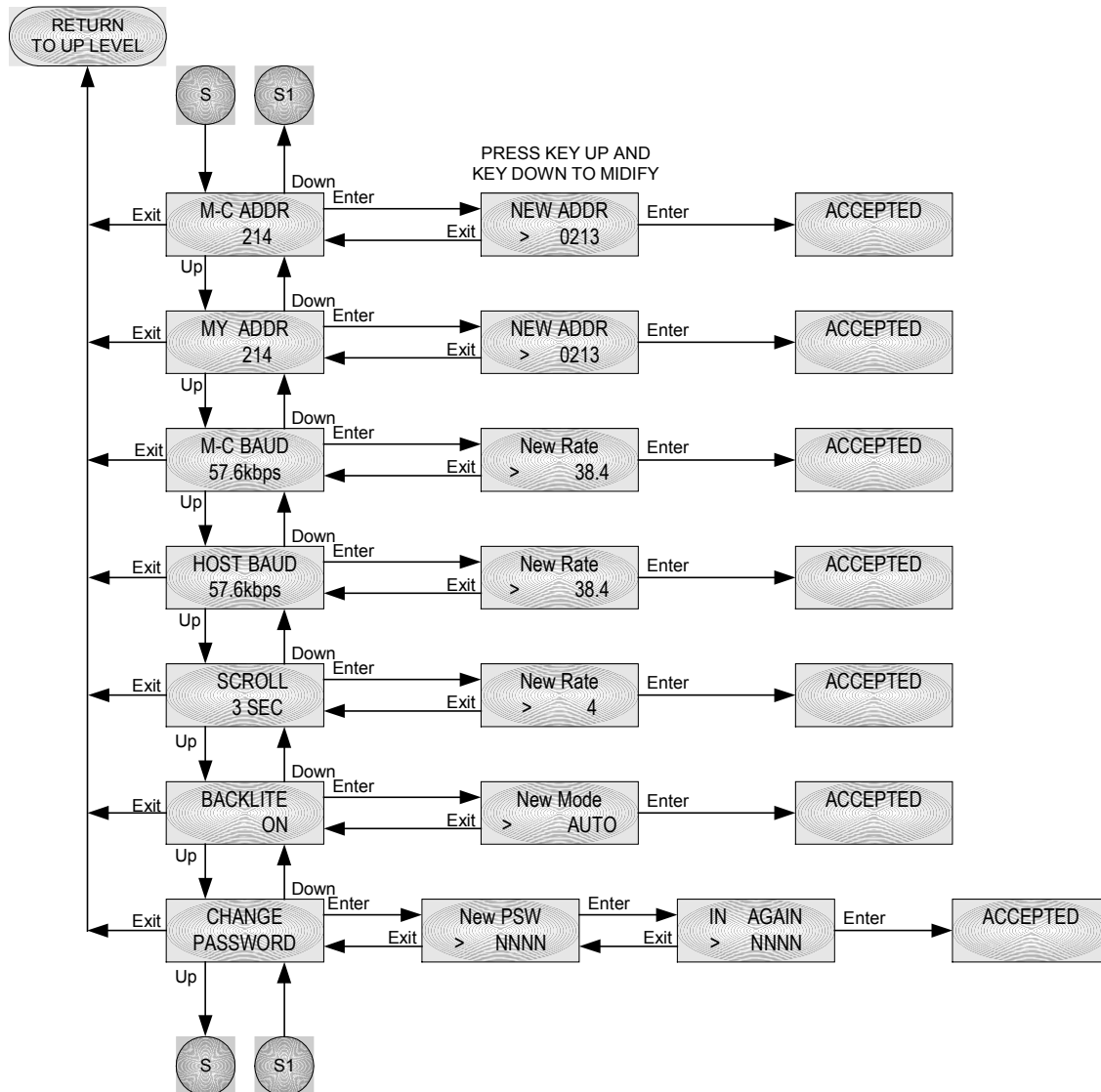


Figure 13: M-Logger Menu System Settings Flow Chart

4.5.2 Miscellaneous

PASSWORD: Default password is 4321.

M-C ADDR: M-C is abbreviation of M-Controller. This is the slave address assigned in the connected M-Controller. It will be used in Modbus protocol through RS-422 link connection. Valid address is between 1 and 254.

MY ADDR: This is the slave address assigned in the M-Logger when it is connected to other control system. It will be used in Modbus protocol through RS-485 or RS-232 link connection. Valid address is between 1 and 254.

M-C BAUD: M-C is abbreviation of M-Controller. M-Controller Host Baud Rate, default baud rate is 57.6kbps. It will be used in Modbus protocol through RS-422 link connection. It should be assigned to the same value as Host Baud Rate in M-Controller.

HOSTBAUD: Upstream Baud Rate, default baud rate is 57.6kbps. It will be used in Modbus protocol through RS-485 or RS-232 link connection.

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 Power Saver/Auto. In Auto mode, the backlight will turn on for 10 seconds after any button has been pressed. Default setting is Always ON mode.

4.5.3 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!

4.6 Menu “2_OUTPUT RS-232” or “2_OUTPUT RS-485”

M-Logger has only one serial port for upstream communication, so the RS-485 and RS-232 actually share the same port and only one port is active at a time. As factory default, the RS-232 port is enabled. If you want to use the RS-485 port to communicate with other system, the RS-485 port should be enabled; as a result the RS-232 is disabled.

If the Menu displays “OUTPUT RS-232”, that means the RS-232 is enabled and RS-485 is disabled currently. If the Menu displays “OUTPUT RS-485”, that means the RS-485 is enabled and RS-232 is disabled currently.

Flow chart see “Figure 8: Enable RS-485 or RS-232 Flow Chart”

4.7 Menu “3_LOGGER SETTING”

4.7.1 Data Logger Enabled and Disabled

M-Logger is a stand-alone data logger and is able to save the collected data and events to its embedded and removable USB Flash Drive. M-Logger is also a remote display panel for M-Controller. When the M-Logger is used to be a display panel without data logging function, the Data Logger has to be disabled, so the M-Logger will not report any fault caused by USB Drive, such as No USB Drive, USB Drive Full etc.

Flow chart see “Figure 12: M-Logger Menu Tree Flow Chart”

4.7.2 Data Logger Interval

Data Logger Interval represents the amount of time the M-Logger waits before saving the real time collecting data from M-Controller to M-Logger USB Flash Drive. The interval is the frequency of data logging. It is not the sampling rate that M-Logger collects data from M-Controller through RS-422 port.

The Data Logger Interval can be assigned from 30 seconds to 250 seconds. Factory Default value is 30 seconds. The longer interval is, the longer time that the USB Flash Drive can keep data. With Interval 30 seconds, the equipped 1GB USB Flash Drive can data log for more than 1 year without dumping the data to a computer.

M-Logger sampling rate through RS-422 port is about 2 to 3 seconds so that M-Logger can remotely display M-Controller information with short delays.

Flow chart see “Figure 12: M-Logger Menu Tree Flow Chart”

4.7.3 Link M-Controller Buzzer to M-Logger Beeper

The Beeper can also be associated with the buzzer statuses of M-Controller. If the beeper were associated (or linked) with the M-Controller buzzer, the beeper would activate if M-Controller buzzers activated. So the M-Logger can be used as a remote Annunciator of M-Controller.

Flow chart see “Figure 12: M-Logger Menu Tree Flow Chart”

4.8 Menu “4_CLOCK SETTING”

M-Logger has a real time clock on board powered by battery. In order to get accurate data logging from M-Controller, the date and time have to be accurate. The date and time can be set and adjusted in [Menu]=[4_CLOCK SETTING].

Note: Verify the date and time every time when you power up the M-Logger.

Offset is used to set the precision of the clock generated from the 32768Hz internal oscillator up to $\pm 189 \times 10^{-6}$ in the forward (ahead) or reverse (behind) direction, in units of $\pm 3.05 \times 10^{-6}$. When not using this function, be sure to set 0 for the register. Default value is 0.

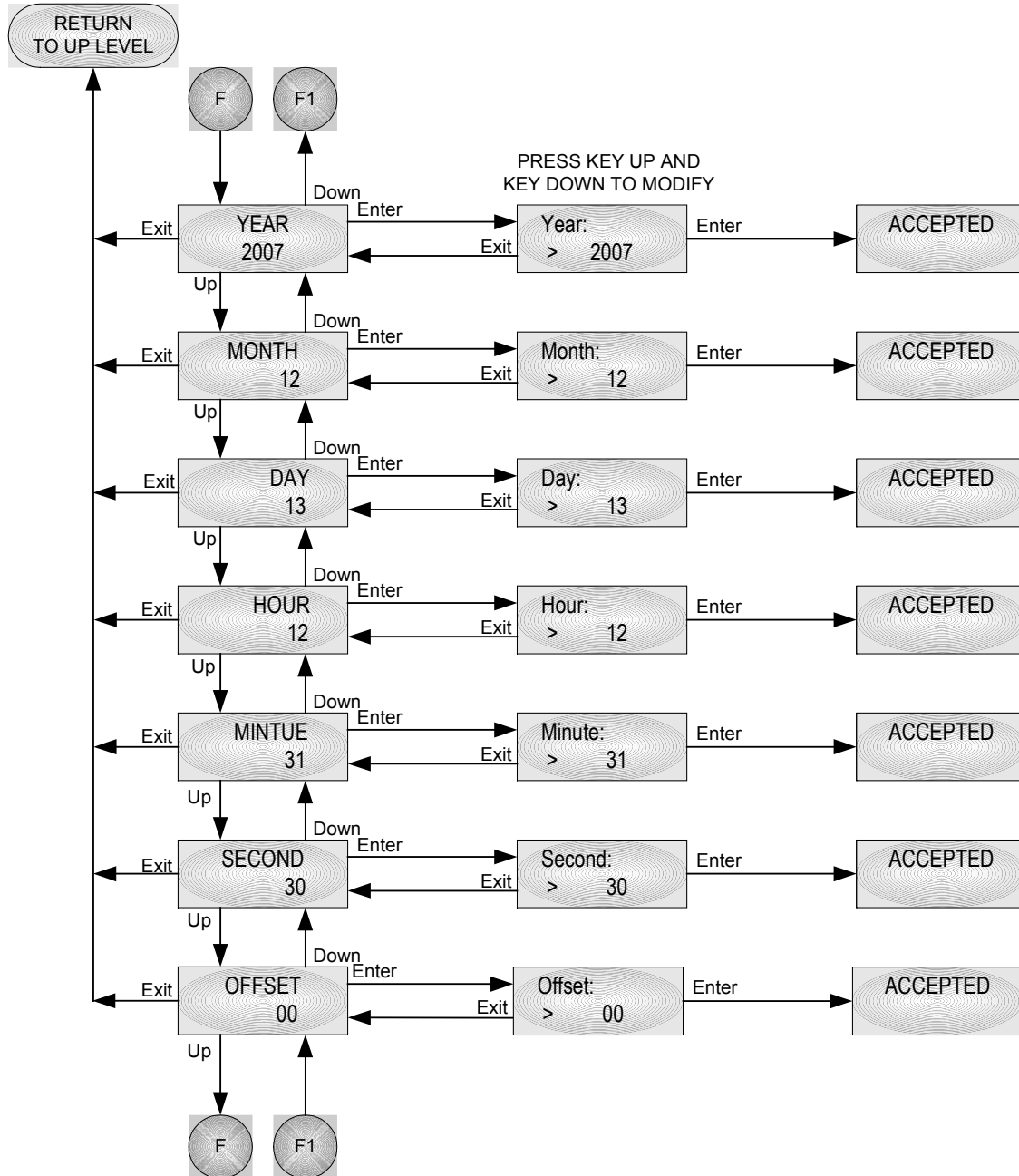


Figure 14: M-Logger Clock Settings Flow Chart

5. Link M-View

QEL supplies interface adapters and M-View Software in the USB Flash Drive.

The adapter is 9-pin female (COMM) to RJ-11 adapter.

The M-View is Windows-based software that 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. M-View currently supports M-Controller, Q4 Controller and M-Logger. Working with M-Logger, the M-View also can do Real Time Monitoring and Historical Data Review.

Minimum system requirements:

Operating System: Windows 98 or later

Ram: 256 Megabyte of RAM

Hard drive: 500 Megabytes free

Speed: Any

Mouse: Preferred (can navigate by 'tab')

Spare Serial Port: Anyone between COM1 to COM6

Note: If your computer has no serial port, call QEL for USB to Serial Adapter.

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

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

In order to communicate with a computer (see QEL's M-View software package), the M-Logger must be in "Running Mode", not "Menu Mode". You can connect a computer to the M-Logger through RS-232 port or RS-485 port. Make sure the port is enabled.

Note: You can find the M-Logger firmware version in M-View Polling Status window, it is the current firmware version in the connected M-

Logger, this version number can also be seen on M-Logger LCD when you power up the M-Logger. Check the M-Logger Firmware Version in M-View [Help]=>[About], if you found the M-View has a later version of M-Logger Firmware, you can click [Programming] in the M-View Screen to update the firmware in the M-Logger. M-View also checks the firmware version with M-Logger automatically, if M-View found the M-Logger work in an old version firmware, M-View would update the firmware to M-Logger too.

How to Connect M-Logger to PC M-View

- Connect the adapter and cable to a PC serial port and port J1 on the M-Logger Main Board. If you want to use RS-485 port of M-Logger to connect to a PC, you need a RS-232 to RS-485 converter.
- Make sure M-Logger is in Running Mode, the port is enabled and My Baud Rate is one of 19.2kbps to 57.6kbps
- Run M-View on your computer or laptop
- Click [Search and Download] to search M-Logger
- When M-Logger is online, system setup and real time data logging are functional

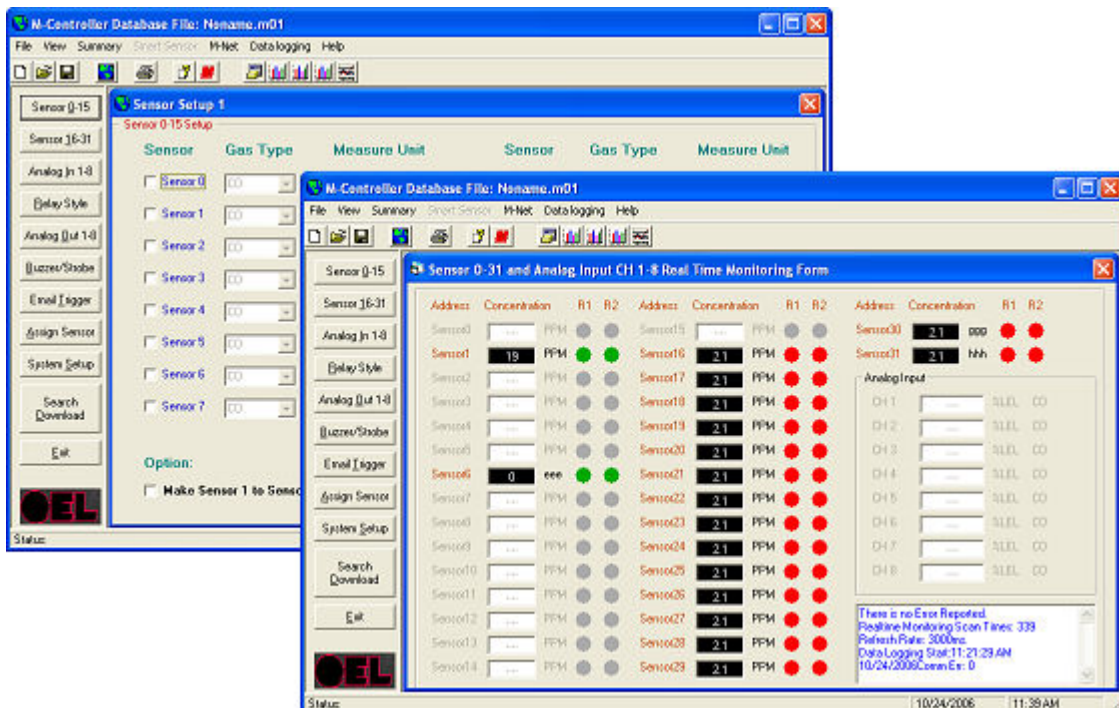


Figure 15: M-View screens

6. MODBUS Protocol Supported By M-Logger

6.1 Serial Transmission Mode

- Modbus RTU Slave Mode
- Baud rate: 19.2K, 28.8K, 38.4K, and 57.6K, selectable from Host Baud Rate Setting in System Setting Menu.
- Byte parity: Even parity.
- Data format: One start bit, 8 data bit, even parity bit, one stop bit, LSB first.
- Frame Check: CRC check.

6.2 Function Code Supported by M-Logger

• #03 Read Holding Registers

Function in M-Logger: Read inputs and outputs statuses and readings, such as

- Relay Statuses
- Analog output current (mA x 10)
- Analog inputs readings
- Digital Sensor readings and statuses
- Buzzers, Strobe and Triggers statuses

Attribute: Read Only.

Broadcast is not supported.

Query:

Slave Address:	xx (Default 214, check MY ADDR in M-Logger)
Function code:	03
Starting addr. Hi:	000
Starting addr. Lo:	xxx (00 to 122)
No. of points Hi:	000
No. of points Lo:	xxx (01 to 123)
CRC check:	xxxxH

Example: to read all holding registers in M-Controller/M-Logger (Slave Address: 214)

Query: [214] [003] [000] [000] [000] [123] [023] [206] in unsigned decimal.

Holding Register Address Table

Modbus	Name	Description
40001	Relay1 and Relay 2 Statuses	Relay1 status in High 8 bits, Relay 2 status in Low 8 bits Status Byte Definition: 0: Normal 1: Sensor Alarm 2: Communication Error 3: Offline 4: Sensor Gas type Error 5: Relay/Buzzer/Strobe/Trigger in On Delay process 6: Relay/Buzzer/Strobe in Off Delay process 7: Relay in Latched Status 8: Relay/Buzzer/Strobe/Trigger On 9: Relay/Buzzer/Strobe/Trigger Off 10: Relay/Buzzer/Strobe/Trigger in On Delay process (same as 5) 11: Relay/Buzzer/Strobe in Off Delay process (same as 6) 12: No Sensor is assigned to Relay/Buzzer/Strobe/Trigger 13: Buzzer is hushed 128: Disabled
40002	Relay3 and Relay4 Statuses	Relay3 status in High 8 bits, Relay 4 status in Low 8 bits Status Byte Definition see 40001
40003 to 40049	Relay5 to Relay98 Statuses	Relay5, 7, 9 ... status in High 8 bits, Relay6, 8, 10 ... status in Low 8 bits Status Byte Definition see 40001
40050	Relay99 Status	Relay99 status in High 8 bits, Low 8 bits is no use Status Byte Definition see 40001
40051	Analog Output CH1 and CH2 Statuses & mA reading	A-Out CH1 in High 8 bits, A-Out CH2 in Low 8 bits Byte Definition: 0: Disabled Channel 1 – 255: Analog Output Current Value (mA) X 10 Example: If (Byte) = 200, the Analog Output value is 20.0 mA. If (Byte) = 41, the Analog Output value is 4.1 mA. If (Byte) = 0, the Analog Output is disabled.
40052 to 40054	Analog Output CH3 to CH8 Statuses & mA reading	A-Out CH3, 5, 7 in High 8 bits, A-Out CH4, 6, 8 in Low 8 bits Byte Definition see 40051
40055	Buzzer1 and Buzzer2 Statuses	Buzzer1 status in High 8 bits, Buzzer2 status in Low 8 bits Status Byte Definition see 40001
40056	Buzzer3 and Strobe Statuses	Buzzer3 status in High 8 bits, Strobe status in Low 8 bits Status Byte Definition see 40001

40057	Trigger1 and Trigger2 Statuses	Trigger1 status in High 8 bits, Trigger2 status in Low 8 bits Status Byte Definition see 40001
40058	Trigger3 Status	Trigger3 status in High 8 bits, Low 8 bits is no use Status Byte Definition see 40001
40059	Digital Sensor 0-7 Relay Statuses	Usually, Each Digital Sensor has two Relays onboard: <ul style="list-style-type: none"> Relay High (H) and Relay Low (L) bit(1): ON, bit(0): OFF b15...b8= Sensor 3H,3L,2H,2L,1H,1L,0H,0L b7...b0= Sensor 7H,7L,6H,6L,5H,5L,4H,4L
40060	Digital Sensor 8-15 Relay Statuses	B15...b8= Sensor 11H,11L,10H,10L,9H,9L,8H,8L b7...b0= Sensor 15H,15L,14H,14L,13H,13L,12H,12L
40061	Digital Sensor 16-23 Relay Statuses	B15...b8= Sensor 19H,19L,18H,18L,17H,17L,16H,16L) b7...b0= Sensor 23H,23L,22H,22L,21H,21L,20H,20L
40062	Digital Sensor 24-31 Relay Statuses	B15...b8= Sensor 27H,27L,26H,26L,25H,25L,24H,24L b7...b0= Sensor 31H,31L,30H,30L,29H,29L,28H,28L
40063	Digital Sensor 0 and Sensor 1 Statuses	Sensor 0 in High 8 bits, Sensor 1 in Low 8 bits Byte Status Definition: b7, b3 ... b0 is Sensor Status, Status Definition see 40001, b6, b5, b4 is Decimal Position for its Reading in 40083 example: b6, b5, b4 = 000, The actual reading is Reading in 40083 b6, b5, b4 = 001, The actual reading is Reading / 10 b6, b5, b4 = 010, The actual reading is Reading / 100 b6, b5, b4 = 011, The actual reading is Reading / 1000
40064 to 40078	Digital Sensor 2 – 31 Statuses	Sensor 2, 4, 6 ... in High 8 bits, Sensor 3, 5, 7 ... in Low 8 bits Byte Status Definition see 40063
40079	Analog Input CH1 and CH2 Statuses	A-In CH1 in High 8 bits, A-In CH2 in Low 8 bits Byte Status Definition see 40063
40080 to 40082	Analog Input CH3 - 8 Statuses	A-In CH3, 5, 7 in High 8 bits, A-In CH4, 6, 8 in Low 8 bits Byte Status Definition see 40063
40083	Digital Sensor 0 Gas Reading without Decimal	The Gas Reading is 16 bits signed integer. The Actual Reading of the sensor should be divided by its Decimal Position, see 40063
40084 to 40114	Digital Sensor1-31 Gas Reading without Decimal	Same as Definition in 40083
40115	Analog Input CH1 Reading without Decimal	The Reading is 16 bits signed integer. The Actual Reading of the Analog Input should be divided by its Decimal Position in 40079
40116 to 40122	Analog Input CH2-8 Reading without Decimal	Same as Definition in 40115

40123	M-Controller Self Diagnostics Report	<p>Fault Flag Reg.</p> <p>b0 = 1, no analog output daughter board plug in b0 = 0, normal</p> <p>b1 = 1, polling remote relay fault b1 = 0, normal</p> <p>b2 = 1, polling remote sensors fault b2 = 0, normal</p> <p>b3 = 1, remote sensor has fault b3 = 0, normal</p> <p>b4 = 1, no sensor assigned to an analog output b4 = 0, normal</p> <p>b5 = 1, no sensor assigned to a buzzer or a trigger b5 = 0, normal</p> <p>b6 = 1, no sensor assigned to the strobe b6 = 0, normal</p> <p>b7 = 1, no sensor assigned to relays b7 = 0, normal</p> <p>b8 ... b15 reserved</p>
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- #17(11H) Report Slave ID

Function in M-Logger:

Return a description of the connected M-Controller.

Broadcast is not supported.

Query:

Slave Addr.: xxH
Function code: 11H
CRC check: xxxxH

Response:

Slave addr.: xxH
Function code: 11H
Byte count: 86H

Slave ID:	80H	
Run Indicator status:	FFH	(always ON)
Software Version:	(2 Bytes)	major version first
Controller Serial Number	(2 Bytes)	high byte first
Special Gas Type [8][3]	(24 Bytes)	8 Special Gas Type
Special Unit [8][3]	(24 Bytes)	8 Special Unit
Gas Type	(40 Bytes)	Sensor 0 first, plus 8CH A_In
Unit of Measure	(40 bytes)	Sensor 0 first, plus 8CH A_In
CRC check:	xxxxH	

Note:

- 1). Slave ID = 80H for M-Controller in QEL
- 2). Each Special Gas Type or Special Unit is composed of 3 characters.
- 3). Gas type and Units Definition:

Value	Gas Type	Units
00H	O2	%Vol
01H	CO	PPM
02H	CO2	%LEL
03H	H2S	UNITS
04H	SO2	Special Unit 1
05H	NO	Special Unit 2
06H	NO2	Special Unit 3
07H	Hydrogen	Special Unit 4
08H	HCN	Special Unit 5
09H	HCL	Special Unit 6
0AH	NH3	Special Unit 7
0BH	MMH	Special Unit 8
0CH	O3	
0DH	C2H4O	
0EH	Cl2	
0FH	ClO2	
10H	CH4	
11H	C3H8	
12H	H2	
13H	Others	
14H	Special Gas Type 1	
15H	Special Gas Type 2	
16H	Special Gas Type 3	
17H	Special Gas Type 4	
18H	Special Gas Type 5	
19H	Special Gas Type 6	
20H	Special Gas Type 7	
21H	Special Gas Type 8	

7. Troubleshooting

M-Logger 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 M-Logger 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	<ul style="list-style-type: none"> • No power supply • LCD has problem • Program has crashed 	<ul style="list-style-type: none"> • Check power / ground connections • Change LCD • Reprogram
M-View reports “M-Logger is offline” or “No Device Found”	<ul style="list-style-type: none"> • M-Logger is not turned on • M-Logger is working in Menu Mode. • Comm setting is wrong 	<ul style="list-style-type: none"> • Turn on M-Logger • Exit Menu mode to Monitoring mode • Check M-Logger is connected properly. Be sure that the port on the computer is not occupied by other program; Check MY BAUD in M-Logger is set between 19.2k and 57.6kbps
M-Logger reports “Disk Full!”	<ul style="list-style-type: none"> • No storage space for data and event 	<ul style="list-style-type: none"> • Dump the data and event files to a PC as backup; Remove these files from the USB Flash Drive • Replace with a blank USB Flash Drive
M-Logger reports “Low USB Memory!”	<ul style="list-style-type: none"> • Storage is almost run out of space for data and event 	<ul style="list-style-type: none"> • Dump the data and event files to a PC as backup; Remove these files from the USB Flash Drive • Replace with a blank USB Flash Drive
M-Logger reports “Found No Udrive!”	<ul style="list-style-type: none"> • USB interface board is broken • USB interface board is not properly reset 	<ul style="list-style-type: none"> • Replace USB interface • Restart M-Logger
M-Logger reports “Error No Disk!”	<ul style="list-style-type: none"> • No USB Flash Drive plug in • USB Flash Drive loose connection 	<ul style="list-style-type: none"> • Plug in USB Flash Drive • Secure USB Flash Drive

Figure 16: M-Logger Troubleshooting Table

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.

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