

Refrigerant Leak Detection System (RLDS) Installation and Operation Manual





Emerson | Digital Solutions
1065 Big Shanty Road NW, Suite 100
Kennesaw, GA 30144
770-425-2724 • www.climate.emerson.com
For technical support, email ColdChain.TechnicalServices.com

CE/FCC Compliance Notice Information

Class A compliance for RLDS under CE Requirements. Meets Part 15 Subpart B requirements of the FCC Rules. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. ETL, report no 3151009LAX-001 to:

ANSI/UL 61010-1

CAN/CSA 22.2 No 61010-1 & CE Mark

READ ALL INSTRUCTIONS CAREFULLY

If the equipment is not used in the manner specified by the manufacturer, the protection provided by the equipment may be impaired.

CONTENTS

1 INTRODUCTION.....	1
1.1. HOW TO USE THIS MANUAL	1
1.2. NOTES.....	1
1.3. SAFETY PRECAUTIONS.....	1
1.3.1. AC Power Supply	1
1.3.2. Protective Grounding.....	1
1.3.3. Explosive Atmosphere	1
1.3.4. Proper Exhaust Venting	1
1.3.5. Working Inside Instrument.....	1
1.3.6. Misuse and Modifications to the Instrument.....	2
1.3.7. In Case of Malfunction.....	2
1.3.8. RLDS Fusing	2
1.3.9. Installation Category	2
1.3.10. Altitude Limit.....	2
1.3.11. Cleaning.....	2
1.4. WARNING AND CAUTION CONVENTIONS	2
1.4.1. Warning.....	2
1.4.2. Caution.....	2
1.4.3. Important.....	2
2 FUNCTIONAL OVERVIEW	3
2.1. GENERAL DESCRIPTION.....	3
2.2. COMMUNICATION OPTIONS	3
2.3. UNDERSTANDING MONITORING LEVELS	4
2.4. RESPONSE TO THE PRESENCE OF MULTIPLE REFRIGERANTS	4
2.5. SUGGESTED LOCATION OF SAMPLING POINTS	4
2.6. RLDS HARDWARE SPECIFICATIONS.....	6
3 RLDS INSTALLATION	8
3.1. RLDS - INSTALLATION CONSIDERATIONS	8
3.1.1. Warnings and Cautions.....	8
3.1.2. Inspection.....	8
3.1.3. Monitor Location	8
3.1.4. Mounting Instructions.....	9
3.2. RLDS - CONNECTING GAS SAMPLE LINES	10
3.2.1. Overview	10
3.2.2. Tubing Considerations	10
3.2.3. Connecting Purge Line	11
3.2.4. Connecting Exhaust Line	11
3.2.5. Connecting Sample Intake Lines.....	11
3.2.6. Considerations	12
3.3. INSTALLING AN OPTIONAL SPLITTER KIT	13
3.3.1. Connecting the Water Trap.....	13
3.4. RLDS INTERIOR COMPONENTS.....	14
3.5. RLDS ELECTRICAL WIRING.....	14
3.5.1. Warnings and Cautions.....	15
4 CONNECTING COMMUNICATION DEVICES	16
4.1. E2 MODBUS DIRECT SUPPORT FOR RLDS	16
4.1.1. Network Connection to E2.....	16

4.1.1.1.	COM Port Associations - E2 Versions 3.xx and Below	16
4.1.1.2.	COM Port Associations - E2 Versions 4.0 and Above	16
4.1.1.3.	E2 Termination	17
4.1.2.	<i>E2 Setup of RLDS</i>	17
4.1.2.1.	Set Up Network Ports	17
4.1.2.2.	Add and Connect RLDS	17
4.2.	E2, EINSTEIN, AND REFLECS CONTROLLERS (THE RLDS GATEWAY BOARD)	19
4.2.1.	<i>Powering the Gateway Board</i>	19
4.2.2.	<i>Gateway Board Networking</i>	20
4.2.2.1.	Changing Terminator Switch Settings	20
4.2.2.2.	RLDS Node Address	20
4.2.3.	<i>Connecting to an E2, Einstein, or REFLECS Site Controller</i>	21
4.2.4.	<i>Connecting the Gateway Board to the E2, Einstein, or REFLECS Network</i>	21
4.2.4.1.	Wire Connection	21
4.2.4.2.	Setting the Board Numbering Dip Switch	22
4.2.4.3.	Setting the Baud Rate Dip Switches	23
4.2.4.4.	Setting the RS485 I/O Termination Jumpers	23
4.2.5.	<i>Gateway Board Status LEDs</i>	24
4.2.5.1.	The General Status LED	24
4.2.5.2.	The Alarm LED	24
4.2.5.3.	RS485 I/O Network Status LED	24
4.2.5.4.	Receiver Bus Network Status LED	24
4.3.	INTEGRATING WITH BUILDING MANAGEMENT SYSTEMS	24
4.4.	CONNECTING TO A BUILDING MANAGEMENT SYSTEM	25
4.5.	TERMINATING MULTIPLE MONITORS	26
4.6.	PC SOFTWARE	27
4.6.1.	<i>Operation</i>	27
4.6.2.	<i>Saving and Sending Programs</i>	27
4.6.3.	<i>Trend Data</i>	28
4.6.4.	<i>Converting the TREND Text File to a Microsoft Excel File</i>	28
4.6.5.	<i>Saving and Printing Screens and Logs</i>	28
4.6.6.	<i>USB Type Laptops</i>	28
4.7.	OPTIONAL CURRENT LOOP INTERFACES	28
4.7.1.	<i>Optional 4–20 mA DC Outputs</i>	28
4.7.2.	<i>4-20 mA DC Connections</i>	29
5	RLDS - CONNECTING EXTERNAL ALARMS	31
5.1.	OVERVIEW	31
5.2.	CONNECTION	31
6	PROGRAMMING SETUP AND UI NAVIGATION FOR RLDS - DISPLAY SCREENS	33
6.1.	INITIAL POWER UP	33
6.2.	DATA DISPLAY SCREEN	33
6.3.	NAVIGATE TO THE FIRST SETUP SCREEN	33
6.4.	NAVIGATE TO THE SECOND SETUP SCREEN	34
6.5.	LOCATION	34
6.6.	NUMBER OF ZONES INSTALLED	34
6.7.	ALARM ACKNOWLEDGE (ACK) - MODE	34
6.8.	AUDIBLE ALARM	35
6.9.	ZONE HOLD	35
6.10.	DETECTION LIMIT	35
6.11.	LOOP MODE	35
6.12.	LOOP2 FACTOR	35
6.13.	RE-ZERO MODE	36
6.14.	NAVIGATING TO THE THIRD SETUP SCREEN	36

6.15.	BAUD RATE	36
6.16.	NODE ADDRESS	36
6.17.	PASSWORD.....	37
6.18.	ADDITIONAL SERVICE FEATURES.....	37
6.19.	SERVICE TIMEOUT	37
6.20.	DEG DIGIPOT	37
6.21.	NODE ADDRESS	38
6.22.	SENSOR TEMPERATURE COEFFICIENT (FOR FACTORY USE ONLY)	38
6.23.	PASSWORD.....	38
6.24.	ACQUIRING TEMPERATURE COEFFICIENT (FACTORY USE ONLY)	38
6.25.	R DIGIPOT.....	38
6.26.	ESTABLISHING THE CO2 BASELINE	38
7	GENERAL OPERATION OF RLDS - UI.....	40
7.1.	FUNCTIONAL OVERVIEW	40
7.2.	THE ZONE SETUP SCREEN	40
7.2.1.	<i>Location</i>	40
7.2.2.	<i>Gas/Refrigerant Type</i>	40
7.2.3.	<i>Distance + EXH</i>	40
7.2.4.	<i>Temperature at Zone</i>	40
7.2.5.	<i>Current Detection Reading</i>	40
7.2.6.	<i>Log Interval</i>	41
7.3.	NAVIGATING TO THE SECOND ZONE SETUP SCREEN	41
7.3.1.	<i>Leak Level</i>	41
7.3.2.	<i>Spill Level</i>	41
7.3.3.	<i>Evacuation Level</i>	41
7.3.4.	<i>Resetting the Peak PPM Value</i>	41
7.4.	ALARM CONDITIONS	41
7.5.	FAULT CONDITIONS	42
7.6.	ALARMS.....	42
7.6.1.	<i>Functional Overview</i>	42
7.6.2.	<i>Responding to Alarms</i>	42
7.6.3.	<i>Alarm Detail Screen</i>	42
7.6.4.	<i>Acknowledging Alarms</i>	43
7.6.5.	<i>Silencing an Alarm</i>	43
7.6.6.	<i>Clearing the Alarm Even Log</i>	44
7.7.	SYSTEM FAULTS	44
7.7.1.	<i>Functional Overview</i>	44
7.7.2.	<i>Navigating to the Fault Screen</i>	45
7.7.2.1.	<i>Critical Faults</i>	45
7.7.2.2.	<i>Non-Critical Faults</i>	46
7.7.3.	<i>Reset to Factory Default Settings</i>	46
7.7.4.	<i>Clearing System Faults</i>	46
7.7.5.	<i>Viewing Fault Log</i>	47
7.7.6.	<i>Viewing Flow Log</i>	47
7.8.	THE TREND SCREEN	47
7.8.1.	<i>Navigating to the Trend Screen</i>	47
7.9.	THE CALIBRATION SCREEN	48
7.9.1.	<i>Overview</i>	48
7.9.2.	<i>Navigating to the Calibration Screen</i>	48
7.9.3.	<i>Calibration Procedure</i>	48
7.9.4.	<i>Adjusting Calibration Factor</i>	49
7.9.5.	<i>CO2 Atmospheric Concentration</i> <i>(RLDS-CO2 Units Only)</i>	49

7.9.6. Programming New Gases.....	50
7.10. ZONE HOLD MODE	50
7.11. THE DIAGNOSTIC SCREEN	51
7.11.1. Navigating to the Diagnostic Screen.....	51
7.11.2. Diagnostic Screen Overview	52
8 QUICK SETUPS FOR HAND-HELD TERMINAL (HHT).....	53
8.1. TIME/DATE SETUP	53
8.2. ZONE SETUP.....	53
8.2.1. General Configuration 1 Screen	53
8.2.2. General Configuration 2 Screen	54
8.2.3. Zone Config Screen 1	54
8.2.4. Zone Config Screen 2	55
8.3. STATUS OPTION SCREEN	55
8.3.1. Zone Status Screen	55
8.3.2. General Controller (CTRL STATUS) Screen.....	56
9 HAND-HELD TERMINAL (HHT) FOR USE WITH THE GATEWAY AND RLDS CONTROLLER.....	57
9.1. HHT KEY OPERATIONS	57
10 MAIN SCREENS	58
10.1. HOME SCREEN (F1 SCREEN).....	58
10.2. RLDS ENABLE SCREEN	58
10.3. SELECT RLDS SCREEN (F2 SCREEN).....	58
10.4. OPERATION SELECT (OPTION) SCREEN	59
10.4.1. RLDS STATUS (STATUS OPTION) Screen.....	59
10.4.2. RLDS FAULTS (SYSTEM FAULTS) screen.....	59
10.4.3. RLDS Configuration Option (CONFIG OPTION) Screen.....	60
10.4.4. General Configuration 1 Screen	60
10.4.5. General Configuration 2 Screen	60
10.4.6. Zone Config Screen 1	61
10.4.7. Zone Config Screen 2	61
10.4.8. Time/Date Screen	62
10.4.9. Calibrate Gas Screen 1	62
10.4.10. Calibrate Gas Screen 2	62
10.4.11. Calibrate Gas Screen 3	62
10.4.11.1. Calibrate Gas Screen 3 Continued	63
10.5. STATUS OPTION SCREEN	63
10.5.1. Zone Status Screen	63
10.5.2. General Controller (CTRL STATUS) Screen.....	63
10.5.3. DIAGNOSTICS Screen 1: Sensor Data Register	64
10.5.4. Screen 2: Sensor Data Register	64
10.5.5. Screen 3: Sensor Data Register	64
10.5.6. Screen 4: Sensor Data Register	65
10.5.7. Screen 5: Sensor Data Register	65
10.5.8. Screen 6: Sensor Data Register	65
10.5.9. Screen 7: Communication Statistics.....	65
11 RLDS SETUP ON REFLECS, E2, EINSTEIN, AND SUPERVISORY CONTROLLERS	66
11.1. REFLECS SETUP FOR RLDS	66
11.2. E2 VERSION 3.01 AND BELOW SETUP FOR RLDS (WITHOUT GATEWAY).....	66
11.3. EINSTEIN SETUP FOR RLDS	68
11.4. SUPERVISORY CONTROLLER SETUP FOR RLDS	68
11.4.1. Adding Application.....	68

11.4.2.	<i>Edit Application</i>	69
11.4.3.	<i>General</i>	69
11.4.4.	<i>Zone Setup</i>	69
11.4.5.	<i>Zone Alarms Leak/Spill/Evac</i>	69
12	RLDS MAINTENANCE	71
12.1.	WARNINGS AND CAUTIONS	71
12.2.	REPLACEMENT PARTS OVERVIEW	71
12.3.	REPLACEMENT PARTS AND OPTIONAL ACCESSORIES	73
12.4.	TROUBLESHOOTING	74
	APPENDIX A: RECOMMENDED REFRIGERANT GAS ALARM SETTINGS	77
	APPENDIX B: SYSTEM MENU MAP	79

1 Introduction

1.1. How to Use This Manual

Thank you for investing in an Emerson Multi-Zone Gas Monitor. To assure operator safety and the proper use of the monitor, please read this manual. It provides important information on the installation, operation, maintenance, and servicing of the monitor and display module. This manual provides important information on how to install, operate, and service the RLDS.

Please read this manual carefully before use.

If you have a working knowledge of refrigerant monitors, you will find this manual useful as a reference tool. If you are new to the use of refrigerant monitors, this document is educational in the principles of gas detection and the proper operation of this device.

1.2. Notes

Emerson reserves the right to change the operation or specifications of this instrument at any time without notice.

If any errors or ambiguities are discovered in this manual, promptly inform Emerson.

No part of this manual may be reproduced or recreated, in any form or by any means, without the express prior permission of Emerson.

1.3. Safety Precautions

1.3.1. AC Power Supply

Ensure the source voltage matches the voltage of the product before energizing the equipment.

The RLDS uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 20 Watts.

It is highly recommended that the RLDS be placed on a separate circuit (with UPS or surge protection) and be connected directly to the AC power source.

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be within easy reach of the operator. This switch should also be clearly marked as the monitor's type of equipment.

- A switch or circuit-breaker must be included in the building installation
- The switch must be in close proximity to the equipment and within easy reach of the operator
- The switch must be clearly marked as the disconnecting device for the equipment

1.3.2. Protective Grounding

Under no circumstances should the RLDS be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

1.3.3. Explosive Atmosphere

Do not operate this equipment in the presence of flammable liquids, vapors, or aerosols. Operation of any electrical instrument in such an environment constitutes a safety hazard.

1.3.4. Proper Exhaust Venting

It is imperative that the exhaust port on this instrument be properly vented as described in this manual. Failure to do so constitutes a safety hazard.

1.3.5. Working Inside Instrument

Extreme care should be exercised when accessing the interior of the monitor. Only qualified electrical maintenance personnel should perform connections and adjustments. Always de-energize the power supply before opening the monitor's enclosure.

1.3.6. Misuse and Modifications to the Instrument

The protection provided by the monitor may be impaired if the monitor is used in a manner not specified by Emerson. Modifications to this monitor, not expressly approved, will void the warranty.

1.3.7. In Case of Malfunction

Do not continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and contact a qualified repair technician or the nearest Service Center. ONLY the provided knockouts are to be used for electrical and communication wiring. Drilling into the box will void the warranty.

1.3.8. RLDS Fusing

F1, F2	1AMP, 250VAC FAST ACTING (Type "F")
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Table 1-1 - Fusing Requirements

1.3.9. Installation Category

Installation Category II, Pollution Degree II, as defined by UL.

1.3.10. Altitude Limit

RLDS 6,562 ft (2,000 m)

1.3.11. Cleaning

If, during period maintenance inspection it becomes necessary to clean the outside of the case, use a **DRY CLOTH**. To avoid shock hazard and/or equipment damage, **DO NOT USE SOAP AND WATER**.

1.4. Warning and Caution Conventions

When used in this manual or as labeled on the gas monitor, the following hazard symbols and/or associated words are defined as follows.

1.4.1. Warning

This symbol and/or the use of the word **WARNING** indicates a potential hazard from electrical shock associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in death or serious injury.



WARNING:

1.4.2. Caution

This symbol and/or use of the word **CAUTION** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in minor or moderate bodily injury, and damage to the equipment.



CAUTION:

1.4.3. Important

The use of the word **IMPORTANT** in this manual calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in incorrect performance of or damage to the equipment and may void the warranty.



IMPORTANT:

2 Functional Overview

2.1. General Description

Gas monitors are specified to support compliance to federal, state and local safety codes governing emissions. Avoiding significant refrigerant loss reduces equipment replacement costs, maintains equipment efficiency, promotes safety, and protects the environment.

The RLDS provides for the continuous monitoring of refrigerant gas levels in up to 16 separate test *zones* or *channels*. The instrument is easily programmed to monitor a variety of gases (dependent on the particular model) and independent leak (small), spill (medium), and evacuation (large) levels may be designated for each zone. The instrument also retains a log of previous readings that can be easily accessed for analysis.

An audible alarm and front panel indicators are provided to signal alarm and fault conditions, and relay contacts are provided that can be used to trigger external alarm devices in the event of a system fault, or if a leak (small), spill (medium), or evacuation (large) level of gas is detected. The system also may be fitted with an optional two-channel 4-20mA current loop board for connection to remote monitoring equipment.

The RLDS requires only minor periodic maintenance such as the occasional replacement of filters. The monitor incorporates active diagnostics that continuously check the system for proper operation. A front panel indicator is provided to alert an operator of system malfunctions, and fault codes are generated that enable the user to identify the cause of the fault.

All 800# models of the RLDS come with the number of line-end filters (plus one extra) to match the number of zones for each model.

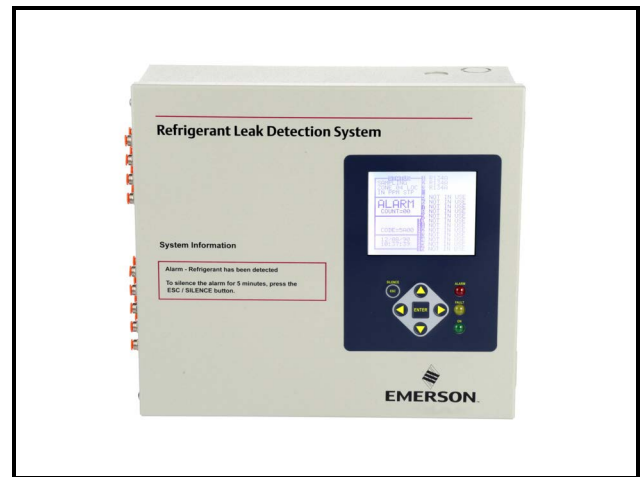


Figure 2-1 - RLDS Front View

2.2. Communication Options

The RLDS features full two-way communications via an RS485 interface. MODBUS RTU is the communication protocol standard and can be connected directly to an E2 or Supervisor controller.

The instrument can be connected directly to a Building Management System or it may be operated as a stand-alone system. An RS-232C port is also provided for connection to a PC. This enables the monitor to be set up from a personal computer.

Please refer to **Section 4, Connecting Communication Devices** for a more complete discussion of communication protocols.

2.3. Understanding Monitoring Levels

Effective use of this instrument requires an understanding of what constitutes reasonable alarm setpoints for the type of gases being monitored.

All AC&R systems leak some refrigerant. Refrigerant manufacturers define allowable exposure levels and threshold limit values in units of parts per million (PPM). In a good “tight” installation these background levels will be acceptably low and often do not require corrective action. You can reduce nuisance alarms and needless service calls if the alarm levels are set at practical limits.

Recommended monitoring levels based on compliance to ANSI/BSR ASHRAE 15-2007 and ASHRAE Safety Code 34-2007 have been developed and are listed in *Appendix A: Recommended Refrigerant Gas Alarm Settings Section*.

Setting the unit at these recommended alarm levels will satisfy the needs of most users. However, the PPM levels generated by system leaks into the environment are greatly influenced by the volume of air in the sampling area, air circulation, size of the leak, distance to the monitoring point, and a host of other variables. In some cases the set points may need to be adjusted either up or down to achieve effective monitoring. Please contact your representative (770-425-2724) for assistance in obtaining these levels.

2.4. Response to the Presence of Multiple Refrigerants

The RLDS is a refrigerant level monitor, not a gas analyzer. You must program the monitor to test for a specific refrigerant in each zone, and it will only return accurate concentration readings for that particular refrigerant. If a leak occurs of another refrigerant gas type, the monitor may return incorrect readings.

Most applications only require detection of a single refrigerant and the problems that are associated with monitoring multiple gases are rarely an issue. If there is a possibility of multiple refrigerants leaking in the

same sampling zone, you should carefully consider which refrigerant compound you program the unit to monitor.

2.5. Suggested Location of Sampling Points

At the point of origin of a refrigerant leak, the gas is nearly pure (highly concentrated). As the refrigerant is dispersed into the air, the gas molecules diffuse, causing a dilution of the original concentration. The RLDS measures the refrigerant concentration at the sample collection point, so if the termination of the collection line is not at the exact point of the refrigerant leak, the unit will read a diluted mixture of the refrigerant gas and air.

Gases of interest may be heavier or lighter than air and may collect above or below the point of the leak. Therefore sampling point placement is critical and must take into account properties of the target gas and air flow within the space.

Leak Detector Gas Type	Sampling Point Location
Multi-Zone Halogen	Mount sampling points 6-18 inches above floor
Multi-Zone CO2 (Carbon Dioxide)	Mount sampling points 4-6 feet above floor (breathing zone)

Table 2-1 - Sampling Point Locations

DO NOT block any of the zones. Unused zones may be disabled by setting the distance parameter to zero feet in the zone setup screen.

The RLDS should be centrally located in the mechanical room and be readily accessible for easy visual monitoring and servicing. The combined length of sample tubing, plus exhaust tubing, should not exceed 1200 feet (366 meters) for any zone. The fresh air purge line should draw from an area that does not contain any gas other than fresh air. The exhaust line should run to an outside location if possible.



NOTE: The combined length of the purge line and the exhaust line cannot exceed 500 feet (152.4 meters).

Ideally, two to three pick up points spaced around each chiller will provide sufficient coverage. It may

be necessary to perform a “smoke” test of the mechanical room to determine the best locations. The smoke test would provide the pattern of air currents present in the mechanical room.

The RLDS should be kept dry. When used in a wet or humid area, it is highly recommended to use the optional water stop accessory to avoid internal damage.



NOTE: For information about using the RLDS in wet locations, see Section 3.2.6., Considerations.

2.6. RLDS Hardware Specifications

Hardware Specifications	
Product Type	Multiple refrigerant gases and multiple area monitoring system for low level continuous monitoring of CFC, HCFC, and HFC refrigerant gases used in most commercial refrigeration systems. System design supports compliance to the refrigerant monitoring requirements of ANSI/BSR ASHRAE 15-2007 and ASHRAE Safety Code 34-2007.
Coverage	4-point standard, expandable to 16 points in 4-point increments
Detector Type	Infrared Non-Dispersive
Gas Library:	<p>CFC: R-11, R-12, R-113, R-114, R-502, HFP</p> <p>HFC: R125, R-134a, R236FA, R245Fa, R32, R-404a (HP62), R-407a, R-407c (AC9000), R-407F, R-410a (AZ20), R422a, R422d, R427a, R-507 (AZ50), R-508b (SUVA95)</p> <p>HCFC: R-123, R-124, R21, R-22, R227, R-23, R-401a (MP39), R-402a (HP80), R-402b (HP81), R-408a, R-409a, R-500, R-503</p> <p>Halon: H1211, H1301, H2402</p> <p>Other: FA188, FC72, H1234YF, H1234ZE, N1230, N7100, N7200, N7300, N7600, R424A, R426A, R438A, CUSTOM</p>
Sensitivity	All gases 1 PPM
Measuring Range	All gases 0 to 10,000 PPM
Accuracy*	<p>Most gases $\pm 1\text{PPM} \pm 10\%$ of reading from 0-1000 PPM (R11, R22, and R113 $\pm 10\text{ PPM} \pm 15\%$ of reading 0-1000 PPM)</p> <p>*At reference environmental conditions (77°F/25°C, 45% RH non-condensing, 1 ATM)</p>
Front Panel	<p>3 Indicator lights:</p> <ul style="list-style-type: none"> • Green = Monitor is powered on. LED glows during normal operation; flashes when unit is in warm-up mode • Red = Alarm. LED flashes when any point has exceeded the alarm setting • Yellow = Fault. LED flashes when there is a system fault
Size/Weight	12.23"H x 13.7"W x 4.96"D (31.06 cm x 34.80 cm x 12.60 cm) / 15 lbs.
Temperature Drift	$\pm 0.3\%$ of reading per degrees C
Sampling Mode	Automatic or manual (hold)
Re-Zero	Auto or on zone change
Response Time	5 to 315 seconds – depending on air line length and number of zones
System Noise	Less than 40dB(A) @ 10 feet (3 meters)
Monitoring Distance	1200 ft. (365 meters) maximum for combined length of sample + exhaust tubing (each zone)
Conditioned Signal	Dual optional 4-20mA dc isolated outputs. Channel 1 = zone area, Channel 2 = PPM

Table 2-2 - RLDS Specifications

Hardware Specifications	
Alarms	Four SPDT alarm contacts rated 2A at 250 VAC (inductive) 5 A at 250 VAC (resistive). Three are assigned to PPM level alarms, one assigned to system faults.
Communications	Full two-way communication with Building Management System via RS-485 serial interface. RS-232C communication port standard.
Power Safety Mode	Fully automatic system reset. All programmed parameters retained.
Operating Temp	32°F to 122°F (0°C to 50°C)
Ambient Humidity	5% to 90% RH (non-condensing)
AC Power	100 to 240 VAC, 50/60 Hz, 20 W
Certification	UL 61010-1, CAN/CSA 22.2 No. 61010 & CE Mark
Warranty	2 years from date of shipment
Altitude Limit	6,562 ft (2,000 m)

Table 2-2 - RLDS Specifications

RLDS-CO ₂ Hardware Specifications	
Product Type	The RLDS-CO ₂ provides multiple area monitoring for low level continuous monitoring of carbon dioxide gases used in most commercial systems. System design supports compliance to the gas monitoring requirements of ANSI/BSR ASHRE 15-1994.
Gas Library:	Carbon Dioxide (CO ₂)/R-744
Sensitivity	10 PPM
Measuring Range	300-8,000 PPM
Accuracy*	Most gases ±5 PPM ±5% of reading from 300-1000 PPM, ±10% of reading from 1001-3000 PPM *At reference environmental conditions (77°F/25°C, 45% RH non-condensing, 1 ATM)

Table 2-3 - RLDS-CO₂ Specifications

3 RLDS Installation

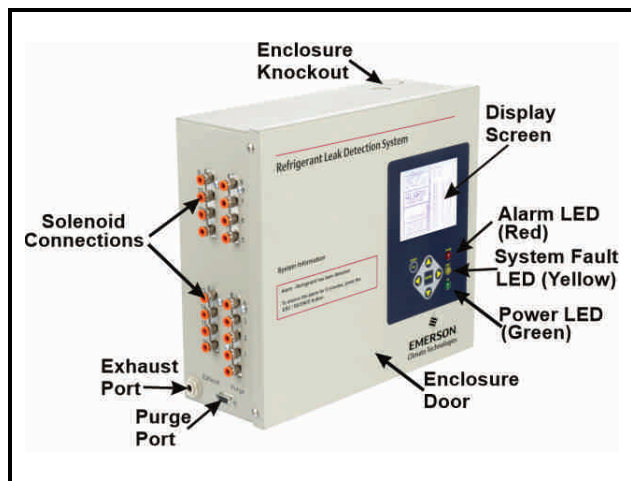


Figure 3-1 - RLDS Diagram

Standard accessories needed for a four (4)-point System:

Accessory	Part Number
Five (5) Line-End Filters (Assembly)	275-0300
Charcoal Filter	275-0275
RLDS Instruction Manual	026-1309

Table 3-1 - RLDS Accessories and Part Numbers

3.1. RLDS - Installation Considerations

3.1.1. Warnings and Cautions



WARNING: Explosion hazard! Do not mount or operate this equipment in an area that may contain or in the presence of flammable liquids, vapors, or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.



WARNING: Shock hazard! Always disconnect the AC power before working inside the equipment.



CAUTION: Drilling holes in the RLDS enclosure may damage the unit and will void the warranty. Please use the knockouts provided for electrical connections.



CAUTION: The RLDS contains sensitive electronic components that can be easily damaged. Do not touch nor disturb any of these components.

3.1.2. Inspection

The RLDS has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the monitor be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the enclosure and inspect the interior of the unit for loose components that may have become dislodged during shipment. If damage is discovered, please contact Technical Support for assistance (770-425-2724).

3.1.3. Monitor Location

The RLDS should be centrally located in the facility and should be easily accessible for visual monitoring and servicing. Combined length of the intake sample line and the exhaust line cannot exceed 1200 feet (366 m) in length, but it is important to remember that sampling cycle time is proportional to the total number and length of individual sample lines.

Dirt, grease, and oils can adversely affect the operation of the RLDS. The monitor should be installed out of direct sunlight in a clean, dry area that is not subject to temperature or humidity extremes. Installation of the monitor in a mechanical room is acceptable provided reasonable environmental conditions exist. If there is a question, consider installing the unit outside of the mechanical room in a cleaner area of the facility.



NOTE: The mounting location of the monitor should allow it to be easily accessible for visual monitoring and servicing.

3.1.4. Mounting Instructions



NOTE: The RLDS should be installed plumb and level and securely fastened to a rigid mounting surface.

The enclosure utilizes keyhole mounting brackets designed for 1/4" (6.35 mm) fasteners. Locate the four screws as shown in the diagram below and allow the screw heads to protrude approximately 1/4" (6.35 mm).

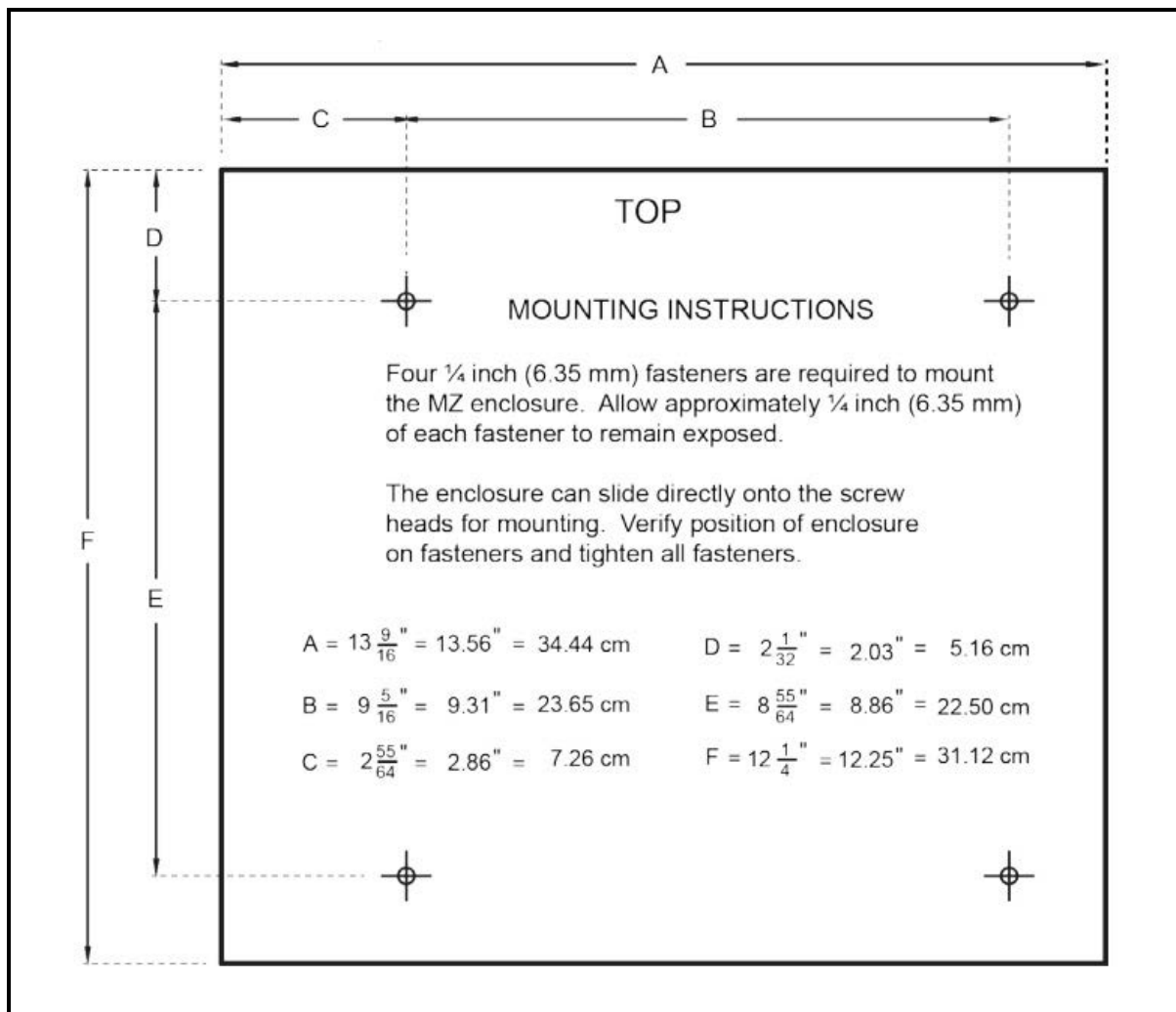


Figure 3-2 - RLDS Mounting Dimensions

Hold the monitor flat against the mounting surface and allow it to slide down, engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the monitor securely against the mounting surface.

3.2. RLDS - Connecting Gas Sample Lines

3.2.1. Overview

Individual sample lines are run from the RLDS to each area of the facility to be monitored. Additionally, a purge line is installed to provide clean air for resetting the infrared zero baseline. An exhaust line is installed to vent residual gas away from the monitor. All air line connections, located on the left side of the enclosure, are indicated in **Figure 3-3**.

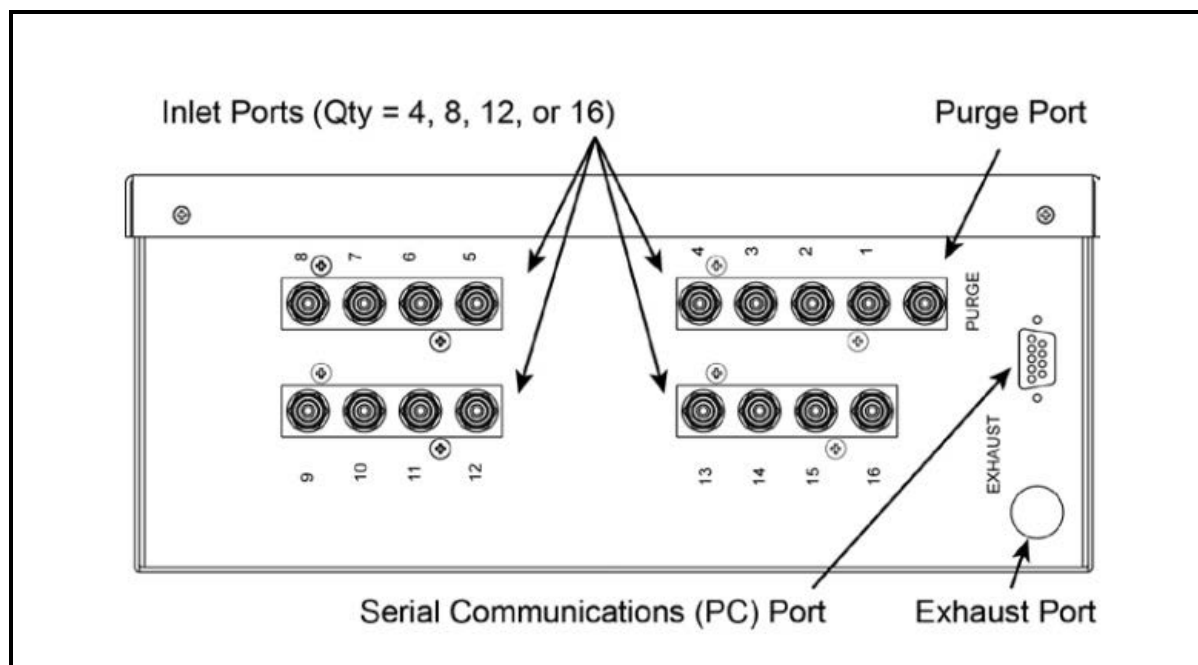


Figure 3-3 - RLDS Side View (Tubing Connections)

3.2.2. Tubing Considerations

Use 1/4" (6.35 mm) outside diameter (0.04" wall) (1.02 mm wall) flex tubing for all air lines or equivalent. The tubing should be clean and free of residual moisture or other contaminants. The tubing should be cut cleanly with a sharp knife and care should be taken not to distort the tubing end.

To connect the air lines to the monitor simply push the tubing firmly onto the connector. To remove a line, press the plastic ring on the connector with one hand while withdrawing the tube with your other hand.

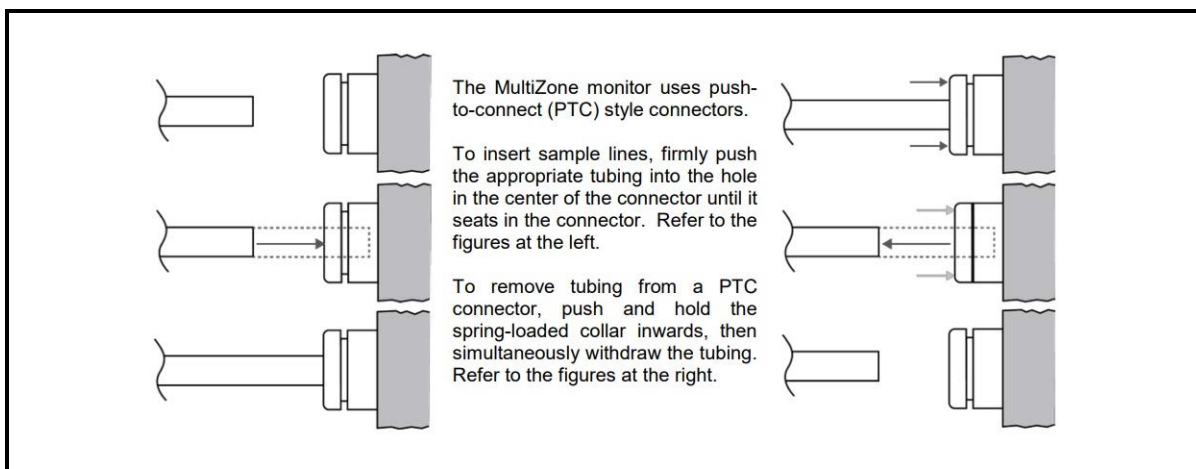


Figure 3-4 - Using PTC Connectors: Connecting (Left) and Disconnecting (Right)

All tubing bends should have a radius of no less than 5" (12.7 cm) to ensure proper airflow. If kinks or obstructions occur in any of the air lines, the instrument may not function properly.

3.2.3. Connecting Purge Line

A purge line is an intake line that is required to draw fresh air into the instrument and should not exceed 300 feet (91.44 m) in length. It is advisable to terminate the purge line outdoors, provided the input is not exposed to rain, snow, ice, exhaust fumes, or other airborne contaminants. If an outdoor installation is impractical, the line should be run to an area inside the facility that you are certain is not contaminated with ambient gas. If this is not possible, an optional charcoal filter assembly (P/N) can be used with the RLDS to filter refrigerant from the purge line. It may be mounted adjacent to the monitor. A line-end filter (P/N) should be attached to the end of the purge line when the charcoal filter is not used. Note that the charcoal filter option must NOT be used in ammonia or CO₂ applications.



IMPORTANT: (CO₂ Only): Because CO₂ is present in ambient air, the purge line **MUST BE** run outside, away from any known sources of CO₂ gas. An atmospheric CO₂ concentration value can be manually entered by the user in the CAL screen. CO₂ is supported by RLDS-CO₂ units. See Navigating to the Calibration Screen Section.

3.2.4. Connecting Exhaust Line

An exhaust line (¼" OD tubing) (6.35 mm) can be used when it is required to vent gas samples away from the instrument and should not exceed 300 feet (91.44 meters). The exhaust line should terminate in a location that is completely isolated from the purge line termination point and other areas of the facility that will be monitored. Ideally this line should terminate outdoors in a location that is not exposed to the elements. This line does not require a line-end filter. If the exhaust line terminates outside the building, position the tubing so that no water or moisture can enter it.

3.2.5. Connecting Sample Intake Lines

The RLDS is designed to accommodate up to 16 separate sample intake lines. The standard configuration of the unit includes one manifold of four intake connectors and one purge connector. Additional manifolds can be easily installed to increase monitoring capacity. Please contact Technical Assistance (770-425-2724) for more information. Additional

manifolds can be easily installed to increase monitoring capacity (field installation kit and four zone line end filter kit) zone line end filter kit.

Sample intake lines can be up to 1,200 feet (366 m) when no exhaust tubing is used. Otherwise, the combined length of the sample line and the exhaust line cannot exceed 1,200 ft (366 m). All line terminations should be positioned to reduce the

possibility of mists, aerosols, oil, water, dust, or other contaminants being drawn into the instrument. A line-end filter (P/N 275-0315) should be attached to the end of each sample intake line. General placement guidelines are shown below, but air-flow dynamics should also be considered (e.g., consider the effects of exhaust fans which tend to draw target gas from the space).

Leak Detector Gas Type	Sampling Point Location
Multi-Zone Halogen	Mount sampling points 6-18 inches above floor
Multi-Zone CO2 (Carbon Dioxide)	Mount sampling points 4-6 feet above floor (breathing zone)

IMPORTANT: DO NOT block any of the zones. Unused zones may be disabled by setting their length parameter to zero feet in the *Zone Setup screen* (**Section 7.2., The Zone Setup Screen**).

Depending on type of use and location of lines, the end-of-line water stop filter assembly can be used to prohibit moisture from entering the intake lines. Three (3) end-of-line water stop filters are supplied with a standard unit. Place the end of the intake line into the blue receiver of the end of line water stop and tighten sufficiently.

Note that only filter assembly, either the line-end filter or end-of-line water stop, should be used for each line.

Please refer to the earlier section (**Section 2.5., Suggested Location of Sampling Points**) to learn more about where to locate the monitoring points.



CAUTION: The introduction of contaminants through the air intake lines can result in serious and permanent damage to the monitor.

3.2.6. Considerations

For maximum protection, the RLDS may be shut down when a System Fault occurs. This might be desired, for example, when the RLDS is used in wet locations such as meat preparation rooms. When water is pulled into the system, a System Fault will occur, closing the fault relay located at the bottom of the main control board. To turn power off to the RLDS when this occurs, wire the fault relay into a spare 16AI input. Route the power supply to the RLDS through an 8RO output using the normally closed contacts. Program the E2/Einstein to alarm the fault input on a contact closure and turn on the 8RO output when this occurs. This can be done using a Digital Sensor Control application in the E2/Einstein. Refer to the E2 Installation and Operation manual (P/N 026-1614) for details on setting up a Digital Sensor Control application.

3.3. Installing an Optional Splitter Kit

Splitter kits are made available which allow the RLDS unit to take gas sample readings from several sample points while utilizing just a single zone. These kits are designed for use **ONLY** in confined/defined spaces with high potential for leaks, such as food cases, cold rooms, refrigeration rack rooms, etc. 2-way (P/N 275-0304) and 3-way (P/N 275-0305) splitter kits are available as optional accessories. Refer to instructions (supplied with the kit) for detailed installation instruction.

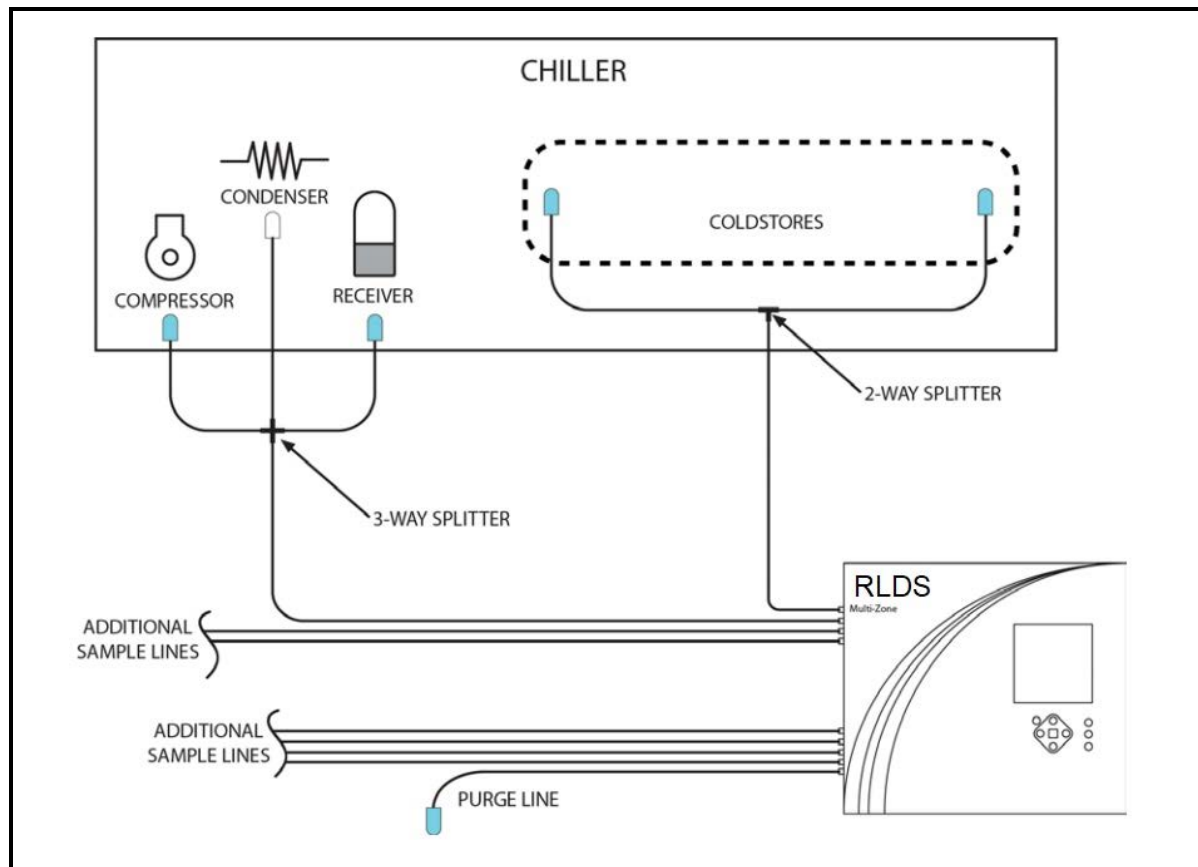


Figure 3-5 - Splitter Kit Installation

3.3.1. Connecting the Water Trap

The water trap is an optional accessory for applications that result in water or condensation frequently entering the intake lines. This is available in a manual style trap (P/N 275-0234) which is manually emptied once it has become filled. Install the water trap close to the unit for the most effective results. The intake line may be cut where the user finds appropriate (preferably close to monitor). Each side of the intake line should be inserted into the receivers on either side of the water trap. Secure tightly. A replacement filter (P/N 275-0235) for the water trap is available and is replaced by unscrewing the clear plastic cup of the water trap, pulling the filter directly out (do not unscrew), and inserting the new filter into place. Replace the cup of the water trap. If desired, an optional mounting bracket (275-0236) may be used to secure the water trap in place.



NOTE: The termination filter (P/N) or end-of-line water stop filter (P/N) should be used, regardless of the presence of a water trap.



NOTE: Extreme or humid temperatures may cause water to condense in the tubes. A water trap is highly recommended for use in these scenarios.

3.4. RLDS Interior Components

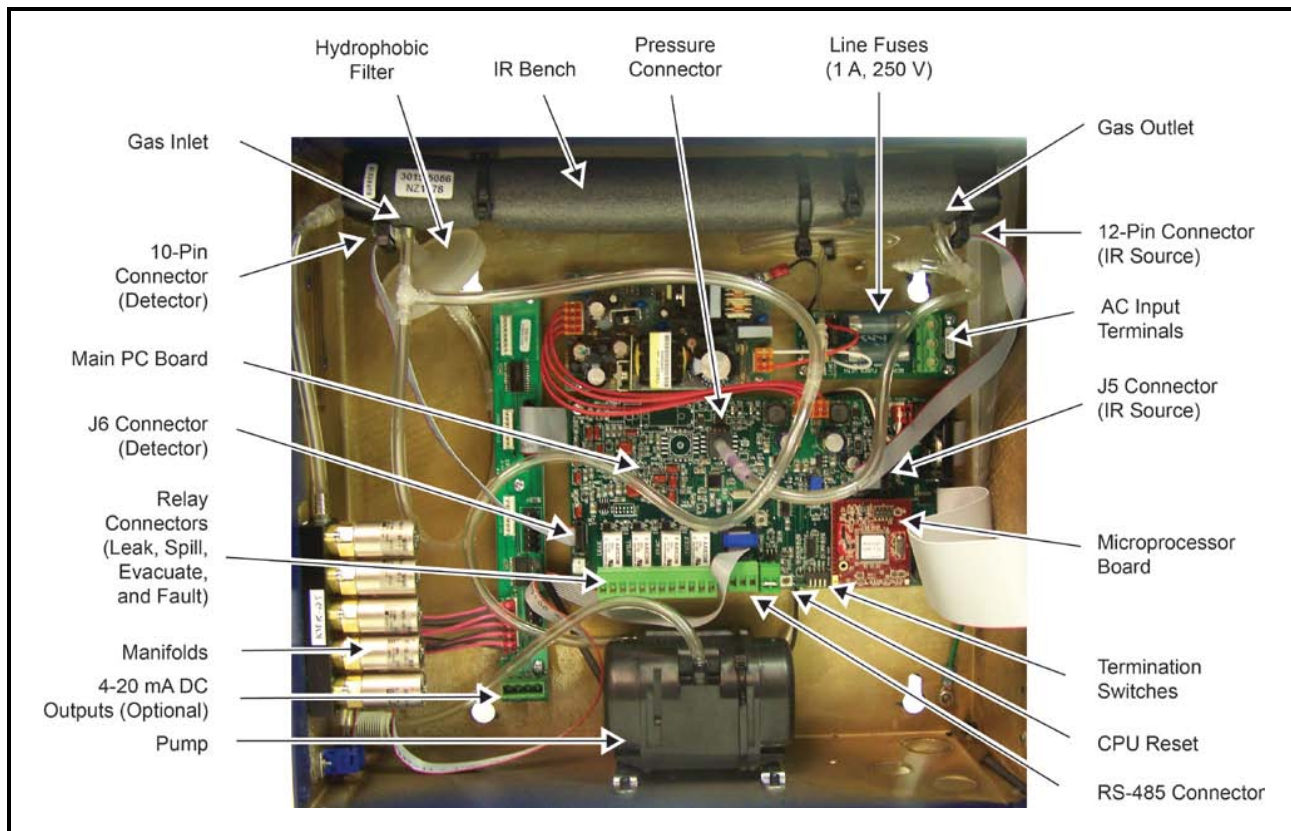


Figure 3-6 - Diagram of RLDS Interior



NOTE: The plastic cable ties surrounding the air pump are to ensure safe handling during shipment. Remove before operating the unit. Reinstall a plastic cable around the air pump if the unit is shipped back to Emerson for service or repair. This prevents damage during shipment.

3.5. RLDS Electrical Wiring

The RLDS uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 20 Watts. It is highly recommended that the monitor be connected directly to the AC power source, preferably on its own circuit. The AC power connection should be completed with UL approved 3-conductor wire (minimum 16 AWG), rated 300 VAC at 221°F (105°C).

Locate a convenient service knockout and install electrical conduit in the typical manner.

Locate the AC Input Terminals and Ground Stud on the inside of the monitor (**Figure 3-6**). Secure the incoming AC power neutral (white/blue) and live (black/brown) wires to the LINE 1 and LINE 2 terminals.

Using the supplied crimp-on ring terminals, washers, and nuts, connect the incoming AC power ground wire (green) to the monitor's AC input ground stud, and then install a separate wire between the ground stud and the GND terminal.



NOTE: For more information on power specifications, contact your Emerson representative for more information.

3.5.1. Warnings and Cautions



WARNING: Electrical installation should be performed by a certified electrician and must comply with all applicable local, state, and federal electrical safety codes.



WARNING: The AC power ground wire must first be connected to the monitor's ground stud. Under no circumstances should this monitor be operated without a protective ground. Doing so poses a potential shock hazard, and is also a violation of electrical safety standards applicable to this type of equipment.



WARNING: Drilling holes in the RLDS enclosure may damage the unit and will void the warranty. Only use the knockouts provided for electrical connections.

- A switch or circuit breaker rated 1.0 A, 250 VAC must be attached to the unit's AC power leads.
- This switch must also be located in close proximity to the monitor, and be within easy reach of the operator.
- This switch should also be clearly marked as the unit's main AC disconnect device. The circuit breaker or switch must disconnect all current-carrying conductors (i.e., Live and Neutral).

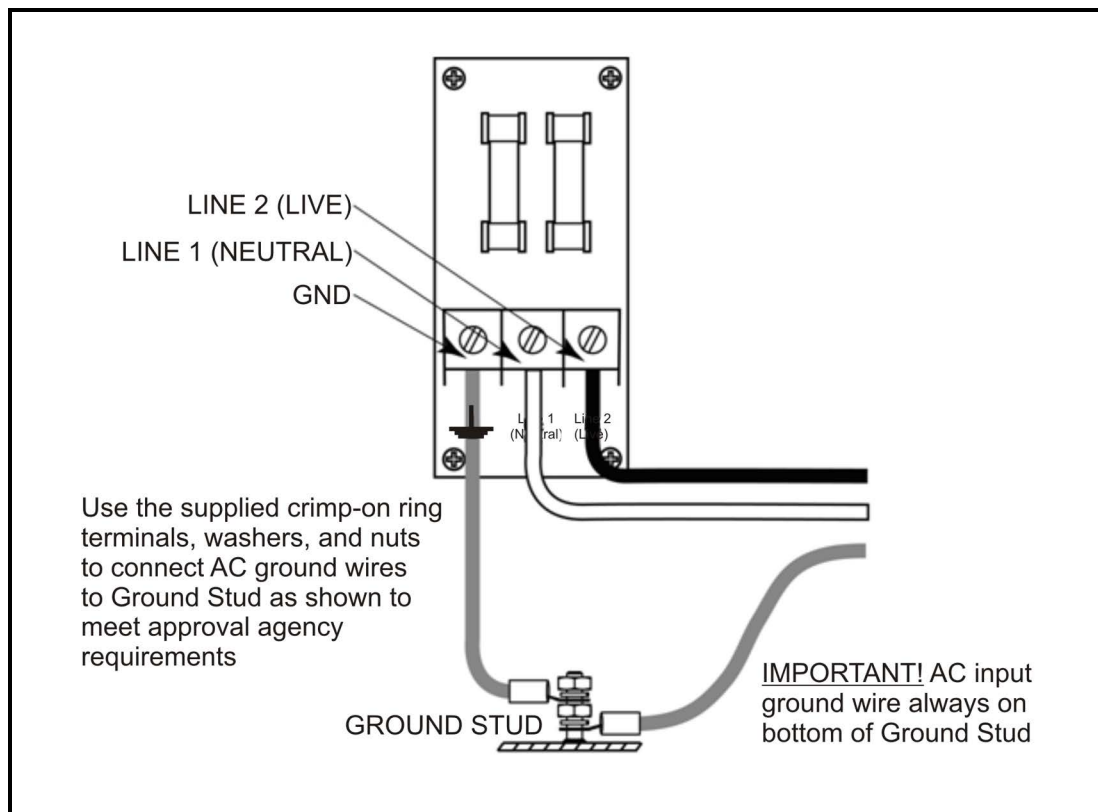


Figure 3-7 - RLDS AC Input Power and Ground Connections

4 Connecting Communication Devices

4.1. E2 MODBUS Direct Support for RLDS

4.1.1. Network Connection to E2

Connecting an RLDS to an E2 unit requires the E2 version 3.01 and above. Contact Emerson for upgrade information if the controller is a version prior to 3.01.

4.1.1.1. COM Port Associations - E2 Versions 3.xx and Below

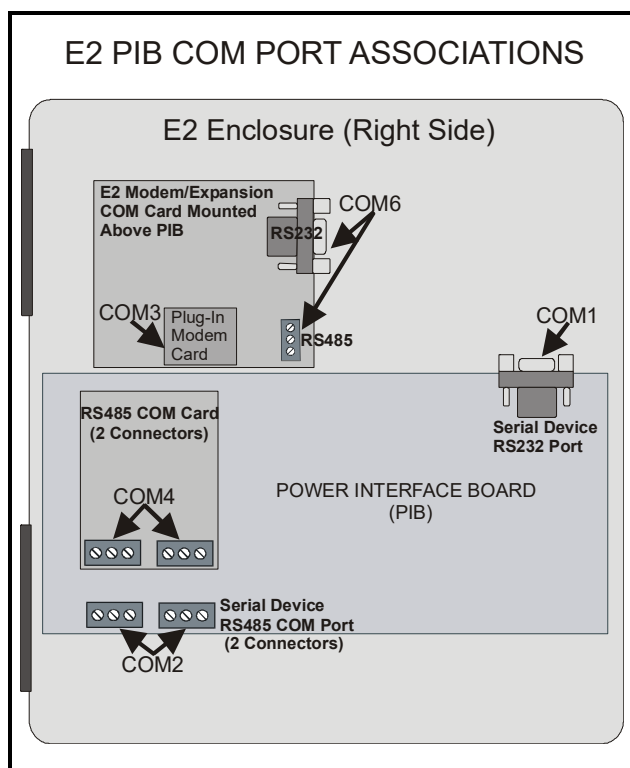


Figure 4-1 - Location of E2 COM Ports - E2 PIB Board (E2 version 3.xx and below)

An E2 has up to three COM ports that can be assigned for MODBUS communication (COM2, an RS485 port on the E2 power interface board, and

COM4 and COM6, which are optional ports requiring expansion cards). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect MODBUS devices to COM2. Ensure your E2 is equipped with an RS485 COM Card (P/N 637-4890) and configured in E2 General Services (Menu 7 3 1, Serial tab) to enable COM4 or an E2 Expansion COM Card (P/N 637- 4871) to enable COM6.

Connect the MODBUS network cable to the three-terminal connector on the COM port you wish to assign as MODBUS. Wire RS485+ to the RLDS+ RS485- to the RLDS- and the shield cable to the RLDS GND.

4.1.1.2. COM Port Associations - E2 Versions 4.0 and Above

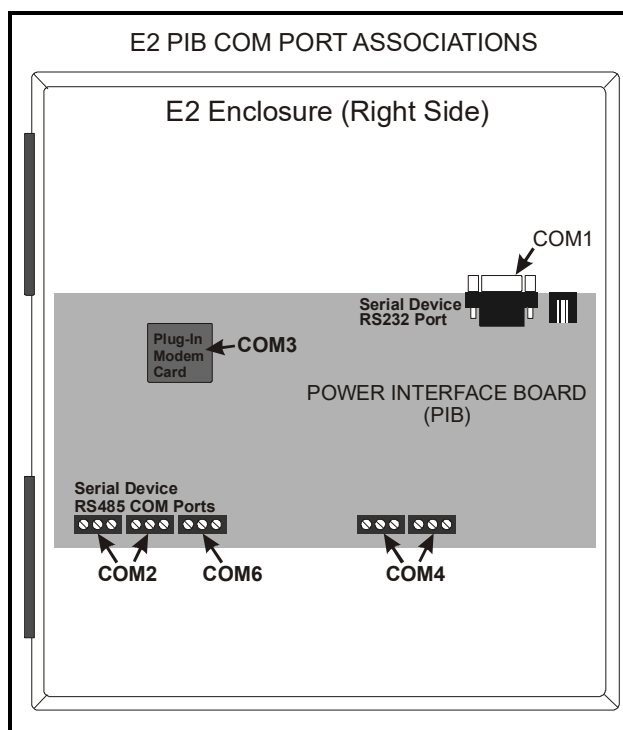


Figure 4-2 - Location of E2 COM Ports - E2 PIB Board (E2 version 4.0 and above)

An E2 has three COM ports that can be assigned for MODBUS communication (COM2). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect MODBUS devices to COM2. Ensure your E2 is configured in E2 General Services (Menu 7 3 1, Serial tab) to enable COM4 or COM6.

Connect the MODBUS network cable to the three-terminal connector on the COM port you wish to assign as MODBUS. Wire RS485+ to the RLDS+ RS485- to the RLDS- and the shield cable to the RLDS GND.

4.1.1.3. E2 Termination

For E2 versions 3.xx and below, if the E2 will be the first device in the daisy-chain, set the port's termination jumpers to the **TERMINATED & BIASED**


position (all three jumpers UP); otherwise, set all jumpers DOWN if not the first device.

For E2 versions 4.0 and above, if the E2 is the beginning of all RS485 I/O or MODBUS Networks, all three of these jumpers should be set to the UP position. For MODBUS, the jumpers should all be in the top-most position (**MOD**). For I/O Net, the jumpers should be in the middle position (**I/O**). For no termination, set the jumpers to the down position (**NO**).

4.1.2. E2 Setup of RLDS

4.1.2.1. Set Up Network Ports

Before setting up a RLDS, the port on the E2 that has the MODBUS cable connected must be set up as a MODBUS port.

1. Log in to the E2 with Level 4 access.
2. Press  followed by **&7#1** - **General Controller Info**.
3. Press **Ctrl** + **#3** to open the **Serial** tab of the General Controller Info setup screens:

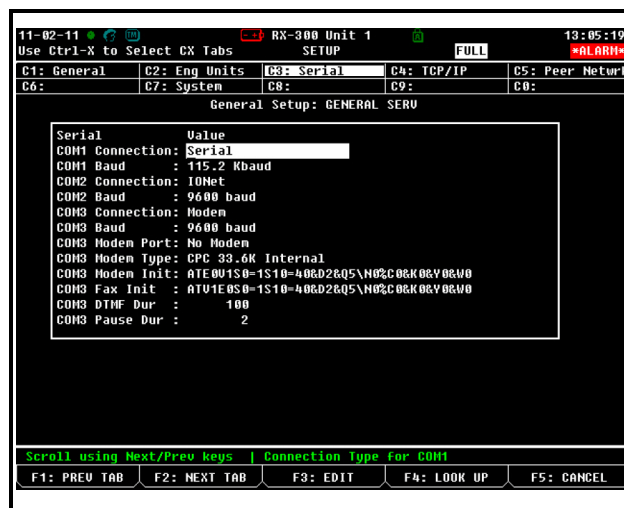




Figure 4-3 - Serial Communications Manager Screen

4. This screen will have a “Connection” field for all COM ports on the E2. Highlight the COM port connection field that will be used, and press **F4** - **LOOK UP**. From the list of network types, select **MODBUS**.
5. Four fields will become visible underneath the COM port connection field, which pertain to the way the device communicates:
 - **Baud** - Default setting is **19200**. Leave this field at the default value.
 - **Data Size** - Leave this field at the default value (**8**).
 - **Parity** - Leave this field at the default value (**None**).
 - **Stop Bits** - RLDS value is one (**1**).
6. Press  to save changes and exit.

4.1.2.2. Add and Connect RLDS

To enable communications between E2 and the RLDS, the devices must be added and addressed in E2.

1. Log in to the E2 with Level 4 access.
2. Press  **&7&7@2** - **Connected I/O Boards**

and Controllers.

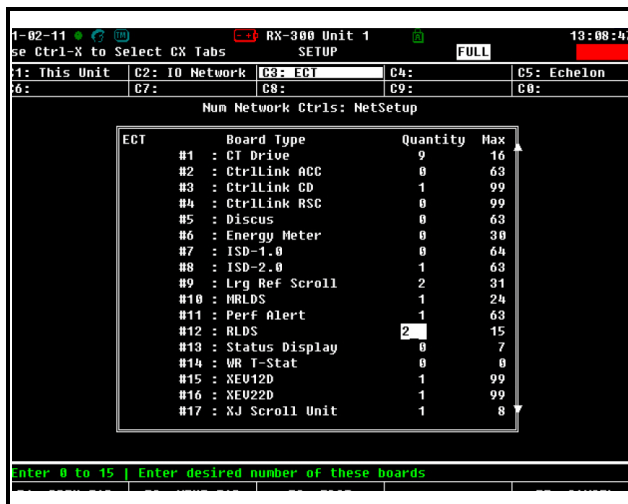





Figure 4-4 - Connected I/O Screen

3. On the **ECT** tab screen enter the number of RLDS Panels in the **RLDS** number field.
4. Press  to return to the Network Setup menu, then select **1** - **Network Summary** (Figure 4-5).
5. Locate the RLDS you added to the network list (press  and  to scroll through the list) and highlight with the cursor. Press **F5** for Setup.

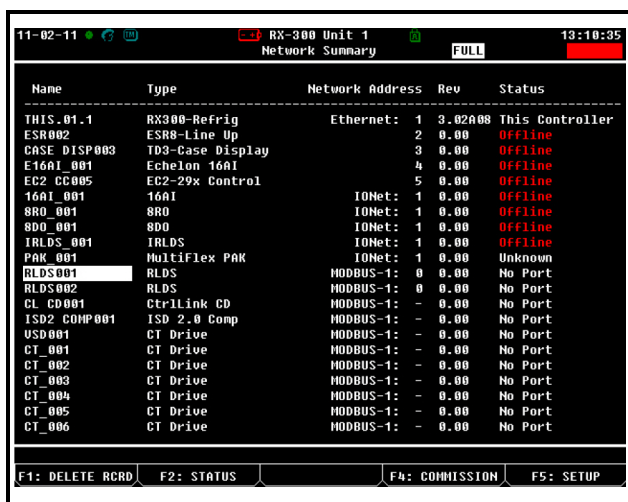


Figure 4-5 - Network Summary Screen

Each RLDS is assigned a MODBUS address automatically when it is created.

6. Locate the RLDS you set up, and look at each

device's status in the **Status** field. You will see one of the following messages:

- **Online** - The RLDS is communicating normally.
- **Offline** - The RLDS is not communicating, has not been commissioned, is not functional, or is not powered up. Verify the RLDS is powered up, wired correctly, and has the proper network address, baud rate, and parity.
- **No Port** - No port is set up in the E2 Serial Configuration Manager to be a MODBUS port.

7. To commission the device, select **F4** - **Commission** and choose the MODBUS network address.

4.2. E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)

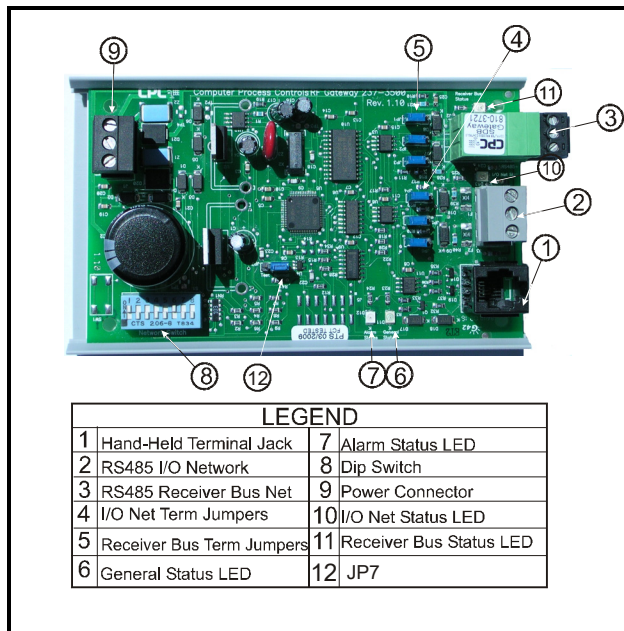


Figure 4-6 - RLDS Gateway Board Layout (P/N 810-3760)



NOTE: Before installing the Gateway board, verify that jumper JP7 (if present on the board) is set to the “NORMAL” position (not the “TEST” position). Operating the Gateway with the jumper in TEST position may cause board damage.

The RLDS may be connected to an Emerson controller using a Gateway Board. The Gateway Board is a special interface device that allows an E2, Einstein, or REFLECS site controller to communicate with up to three RLDS units as if each of them were a standard 16AI Analog Input board, and allows for programming with the Hand-Held Terminal (HHT).

The Gateway Board communicates with the RLDS units via the MODBUS network, which is connected to the Gateway’s “Receiver Bus” network terminal. The Gateway communicates with site controllers (E2, Einstein, or REFLECS) via the RS485 I/O Network (COM A & COM D for REFLECS).

In addition to being an interface with the site controller, the Gateway Board also allows you use a Hand-held Terminal (HHT) device to program the RLDS and view status.

4.2.1. Powering the Gateway Board

Input Voltage	24VAC, Class 2, 50/60Hz
Power	5VA

Table 4-1 - Gateway Power Requirements

The Gateway board requires 24VAC power from a Class 2 center-tapped transformer.

Emerson supplies several sizes of center-tapped transformers for powering multiple 16AIs, 8ROs, and other RS485 peripheral boards of the E2, Einstein, and REFLECS systems.

Refer to your controller’s user manual for information on how to use the center-tapped transformers listed in **Table 4-2** to power multiple RS485 I/O devices.

Figure 4-7 shows how to connect the 56VA and 80VA transformers to the Gateway power connector.

	Three-Board	Six-Board
P/N	640-0056	640-0080
Power Rating	56 VA	80 VA

Table 4-2 - Power Ratings for Emerson Transformers

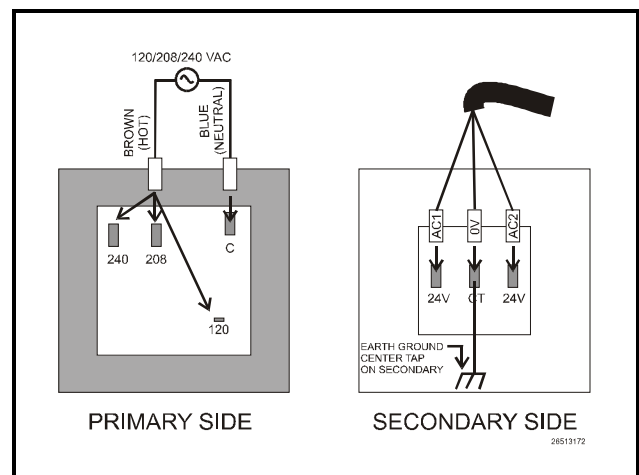


Figure 4-7 - Pinout for the 56VA (640-0056) and 80VA (640-0080) Transformers

4.2.2. Gateway Board Networking

To connect the Gateway to an RLDS, punch out one of the remaining service knockouts to gain access to the interior of the RLDS monitor. Locate the RS485 connector and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in **Figure 4-8**. When you are through securing the connections, carefully plug the connector back onto the circuit board.

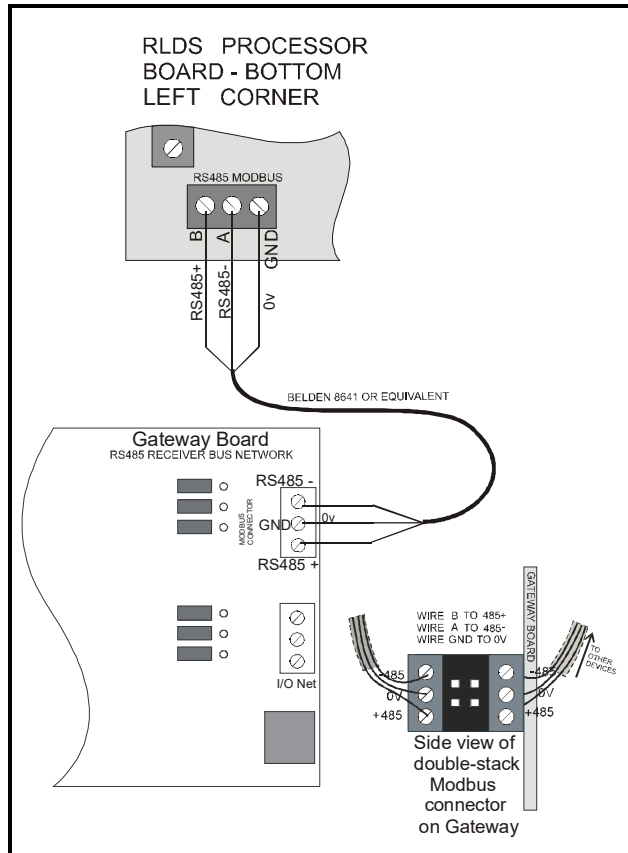


Figure 4-8 - RLDS and Gateway Board Wiring

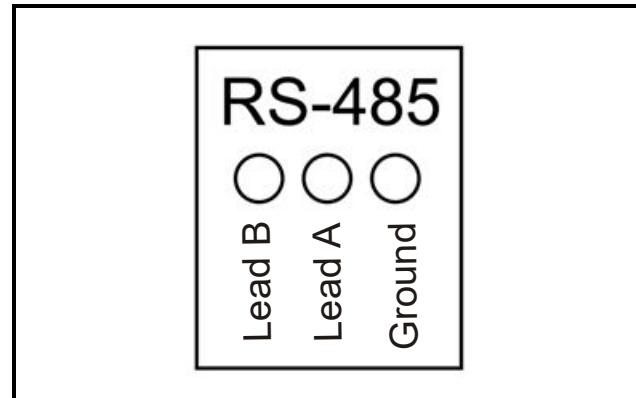


Figure 4-9 - RS485 Connector - RLDS

4.2.2.1. Changing Terminator Switch Settings

The terminator switch is shipped from the factory in the terminated or DOWN/OFF/OUT position (no termination). This is the correct setting if the RLDS is connected to the middle of the network. If the RLDS is connected as a single device, or it is the last device on the network chain, the terminator must be moved to the UP/ON/IN position. Locate switch 4 and determine its position. If it must be moved, slide the switch to the appropriate position.

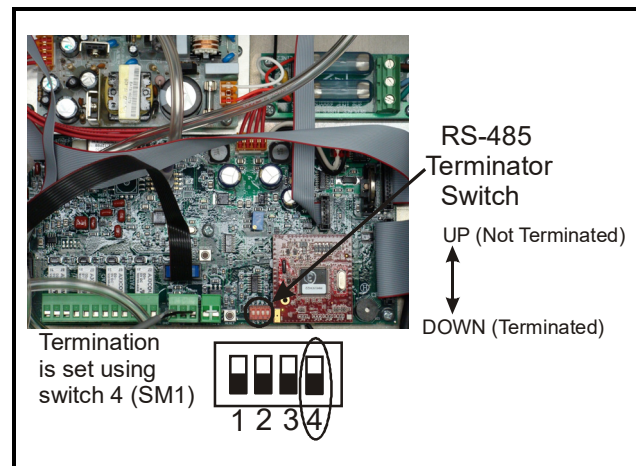


Figure 4-10 - Positioning the Termination Switch - RLDS

4.2.2.2. RLDS Node Address

The node address is set through the front display of the RLDS unit. Refer to **Section 6.16., Node Address** for more information.



NOTE: If connecting RLDS units to an Emerson site controller network, you **MUST** number the units from 1-3. The Gateway Board will not recognize any RLDS unit with a number that is not 1, 2, or 3.

4.2.3. Connecting to an E2, Einstein, or REFLECS Site Controller

Up to three RLDS units may be connected to a site controller via the Gateway Board. The node address switch on each RLDS must be set in succession from 1 to 3 in order for the Gateway Board to recognize the units on the network.

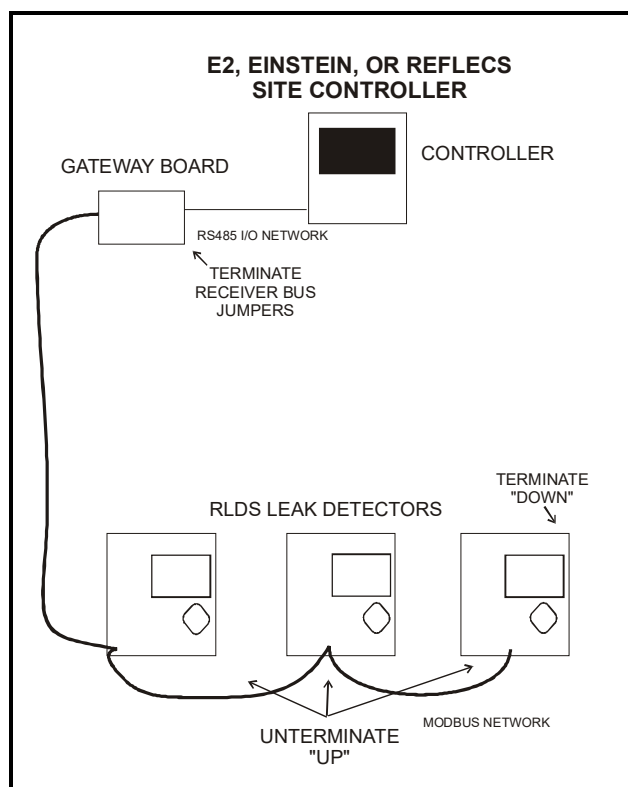


Figure 4-11 - RLDS Units Connected to Gateway, Site Controller

Termination

The three RLDS units and the Gateway Board are connected serially via MODBUS. If an RLDS is at the end of the network segment, terminate the unit by setting the termination switch to the DOWN position. Otherwise, set the termination switch to the UP position to leave the unit unterminated.

If the Gateway Board is at the end of a network, the Gateway Board's "Receiver Bus" termination jumpers must be set to the "termination" position (Figure 4-12). Otherwise, the jumpers should be set to the "no termination" position.

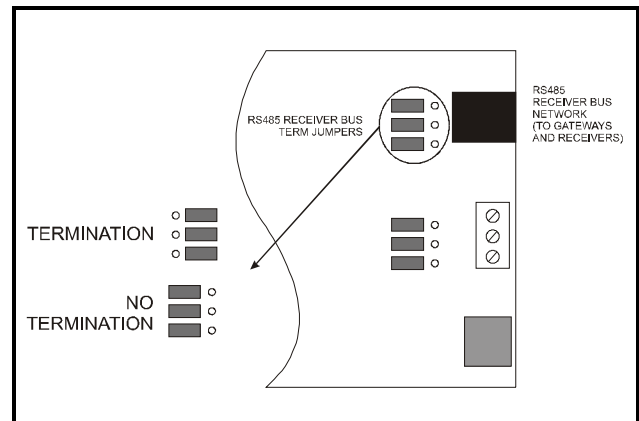


Figure 4-12 - Gateway Board Termination Jumpers

Network Wiring

For network wiring, use Belden #8762 or #8641 cable or equivalent. The total length of network cable in this configuration may not exceed 4921 feet (1499 meters).

4.2.4. Connecting the Gateway Board to the E2, Einstein, or REFLECS Network

Each E2, Einstein, or REFLECS site controller that will communicate with one or more RLDS must have a Gateway Board installed on its RS485 I/O Network. For E2 and Einstein controllers, this means the Gateway will be installed on the RS485 I/O Network; for RMCC, BEC, BCU, and other REFLECS products, the Gateway will be installed on the COM A or COM D network.

4.2.4.1. Wire Connection

Using shielded three-conductor network cable (Belden #8641 or equivalent), connect the RS485 I/O Network wire to the three-terminal connector on the Gateway board as shown in Figure 4-13. For further information about how RS485 networks are configured, refer to your site controller's user manual.

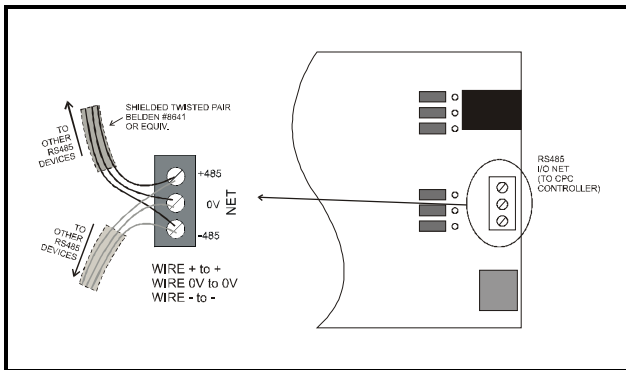


Figure 4-13 - Connecting the Gateway to the RS485 Network

4.2.4.2. Setting the Board Numbering Dip Switch

The first step is to determine whether the RLDS Gateway should emulate 16AI boards – known as the REFLECS mode, or if the RLDS Gateway should emulate IRLDS units in Einstein/E2 – known as the Einstein mode. When dip switch 8 is in the ON position it selects the REFLECS mode, and when dip switch 8 is in the OFF position it selects the Einstein mode.

REFLECS Mode

In the REFLECS mode the Gateway board responds as a series of three 16AI Analog Input boards numbered in succession. Addressing the “boards” represented by the Gateway is achieved by setting dip switches 1 through 4 to the first board number to be used. When this number is set, the Gateway will also use the next two board numbers above the first board number. For example, if a Gateway dip switch is set to board number 3, the Gateway will use board numbers 3, 4, and 5 on the I/O Network.

Once the RLDS Gateway has been added to the network, the *I/O Board Device Numbers* screen in REFLECS (from the REFLECS Home screen press 7,7,2) will also need to be adjusted to show the correct number of input boards. This number should be the total number of input boards plus the number of RLDS units.

Since the RLDS Gateway can support up to three (3) RLDS units, the first RLDS unit maps to the first RLDS Gateway address, and the second RLDS unit maps to the second RLDS Gateway address; therefore, if the RLDS Gateway address = 3, then RLDS unit #1 will appear on 16AI #3 and so forth.

If you are not using all three RLDS units, you can disable them on the Gateway (see **Section 11.2., RLDS Enable Screen**). If they are disabled on the RLDS Gateway, then the corresponding addresses are free to be used by other 16AI boards.

Note that because the Gateway reserves three 16AI Board numbers for its own use, an I/O Network with a Gateway is limited to thirteen (13) 16AI boards. Note also that since 16 is the highest board number possible, a Gateway’s dip switch may not be set to any number above 14.

Einstein Mode

In the Einstein mode the Gateway board responds as a series of three IRLDS units numbered in succession. Addressing the “boards” represented by the Gateway is achieved by setting dip switches 1 through 4 to the first unit number to be used. When this number is set, the Gateway will also use the next two board numbers above the first board number. For example, if a Gateway dip switch is set to board number 4, the Gateway will use IRLDS numbers 4, 5, and 6. Once the RLDS Gateway has been added to the network, the *Connected I/O Boards and Controllers* screen in E2 (from the E2 Main Menu press 7,7,2) will also need to be adjusted to show the correct number of IRLDS units. This number should be the total number of RLDS, IRLDS II, and MRLDS (up to 16 can be mapped to one IRLDS) units being used on that Einstein/E2.

Since the RLDS Gateway can support up to three (3) RLDS units, the first RLDS unit maps to the first RLDS Gateway address, and the second RLDS unit maps to the second RLDS Gateway address; therefore, if the RLDS Gateway address = 4, then RLDS unit #1 will appear on IRLDS #4 and so forth.

If you are not using all three RLDS units, you can disable them on the Gateway (see **Section 10.2., RLDS Enable Screen**). If they are disabled on the RLDS Gateway, then the corresponding addresses are free to be used by other Gateways mapping in other RLDS, IRLDS II, or MRLDS units.

For example, if you had an IRLDS II Gateway with two IRLDS II units, and an RLDS Gateway with one RLDS, then you could set the IRLDS II for address 1 and disable the third IRLDS II unit on the Gateway. Then set the RLDS Gateway for address 3 and disable the second and third RLDS units on this Gateway. In E2 you would select three IRLDS

controllers. IRLDS units 1 and 2 would map to the IRLDS II Gateway and the third IRLDS would map to the RLDS on the RLDS Gateway.

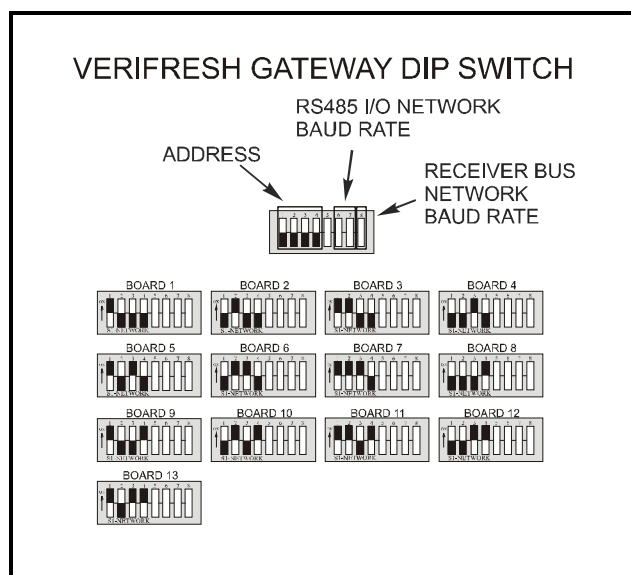


Figure 4-14 - Gateway Dip Switch Numbering

4.2.4.3. Setting the Baud Rate Dip Switches

Dip switches 6 and 7 control the baud rate at which the Gateway communicates with the site controller on the RS485 Network. These switches must be set to the same baud rate setting as the E2, Einstein, or REFLECS (usually 9600 baud). All Gateways and RLDS units on the network must have the same baud rate dip switch setting.

Dip switch 8 must be set to the ON position for REFLECS controller mode and OFF for E2, Einstein controller mode.

Baud rate for the RLDS is set by software, either through the RLDS, or on the Gateway Board via Hand-Held Terminal. It is recommended you use 19200 baud as the MODBUS Network baud rate, as it is the default baud rate used by the RLDS. Set dip switch 5 to OFF.

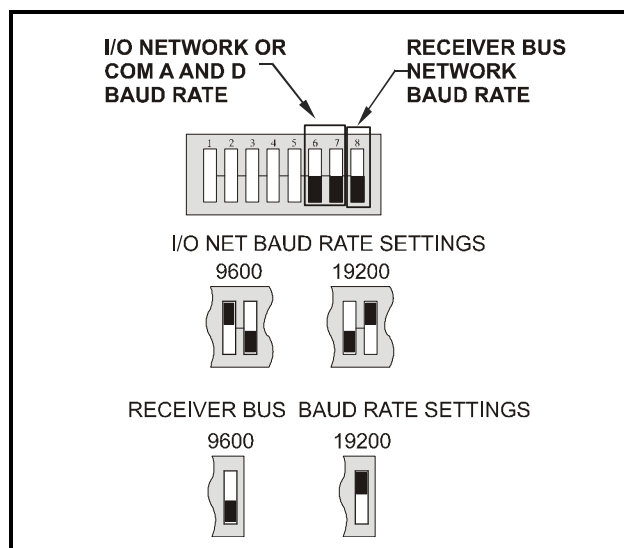


Figure 4-15 - Dip Switch Setting for Numbering Gateway

4.2.4.4. Setting the RS485 I/O Termination Jumpers

As part of an area controller's RS485 I/O (COM A or COM D) Network, a Gateway must be terminated if it is the end device of a daisy chain. Refer to the controller's user manual for information about daisy chain networks and how they are terminated.

To terminate the Gateway, set the I/O Network Jumpers to the right position as shown in **Figure 4-16**. To un-terminate the Gateway, set the jumpers to the left position.

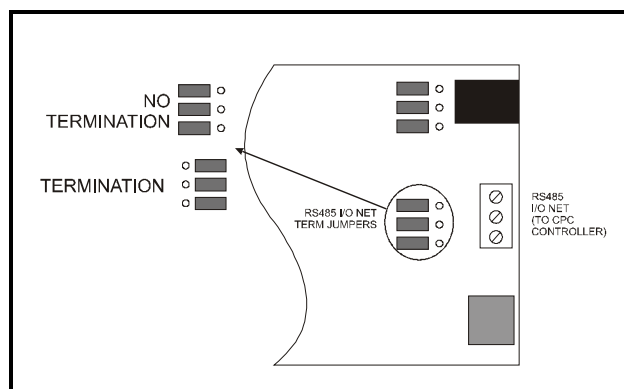


Figure 4-16 - Gateway RS485 I/O Network Termination

4.2.5. Gateway Board Status LEDs

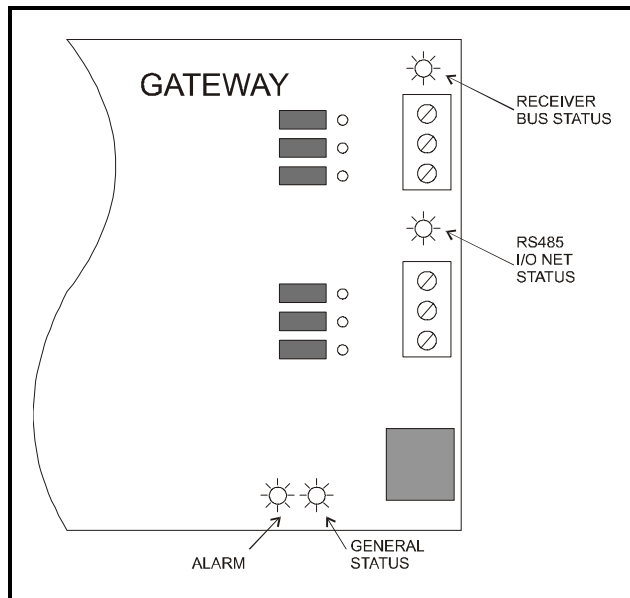


Figure 4-17 - Gateway LED Locations

The Gateway has four LEDs: a General Status LED, an Alarm LED, an RS485 I/O Net Status LED, and a Receiver Bus Status LED (Figure 4-17).

4.2.5.1. The General Status LED

The General Status LED light flashes green once every second to indicate it is powered up.

4.2.5.2. The Alarm LED

The Alarm LED (red) indicates when an alarm condition exists for the Gateway. There are five possible LED states, each of which indicates a different condition.

- **OFF** - No alarm conditions are active, and the Gateway is functioning normally.
- **Flashes 4 times/second** - There is a problem with the physical hardware (ROM) of the Gateway board. The board may need to be replaced.
- **Flashes 2 times/second** - There is no user configuration on this Gateway, no RLDS units are commissioned in its memory, and it is essentially in an empty state. This LED state will occur when the board is first powered up on-site.
- **Flashes 1 time/second** - The Gateway is not communicating with the area controller due to a possible RS485 I/O Network or controller failure.
- **ON with no flashing (steady)** - One or more of the RLDS units is offline. If all are offline, check the wiring. If just one is offline, check the RLDS

controller.

4.2.5.3. RS485 I/O Network Status LED

The RS485 I/O Network Status LED flashes orange to indicate traffic on the I/O Network (between the Gateway and the site controller). If this light does not come on at all and the Alarm LED is flashing once per second, there is a problem with the RS485 I/O Network or the area controller.

4.2.5.4. Receiver Bus Network Status LED

The Receiver Bus Network Status LED blinks orange each time the RLDS Gateway sends a message on MODBUS. However, when the Gateway receives a message from the RLDS units, the LED will flash brightly for 1/2 second.

If the Gateway has RLDS configurations in memory and is communicating properly, you should see this LED flash brightly several times within the course of a few minutes.

4.3. Integrating with Building Management Systems

The RLDS may be connected directly to a Building Management System using a shielded twisted pair cable. The cable from the Building Management



NOTE: For multiple RLDS, the last RLDS on either end of the network must have its terminator in the "IN" position, and all other units must have their terminators in the "OUT" position.



NOTE: For multiple RLDS, the total length of the RS-485 cable cannot exceed 4500 feet (1372 m). (Use instrument cable 20 gauge multi-strand shielded and twisted pair – similar or equal to Belden cable #8762.)

4.4. Connecting to a Building management System

NOTE: User must have two (2) dedicated ports to successfully complete the required setup.

The RLDS may be connected to a Building Management System via the RS-485 connector. The node address on each RLDS may be set from 1 to 15 in order to identify itself to the Building Management System.

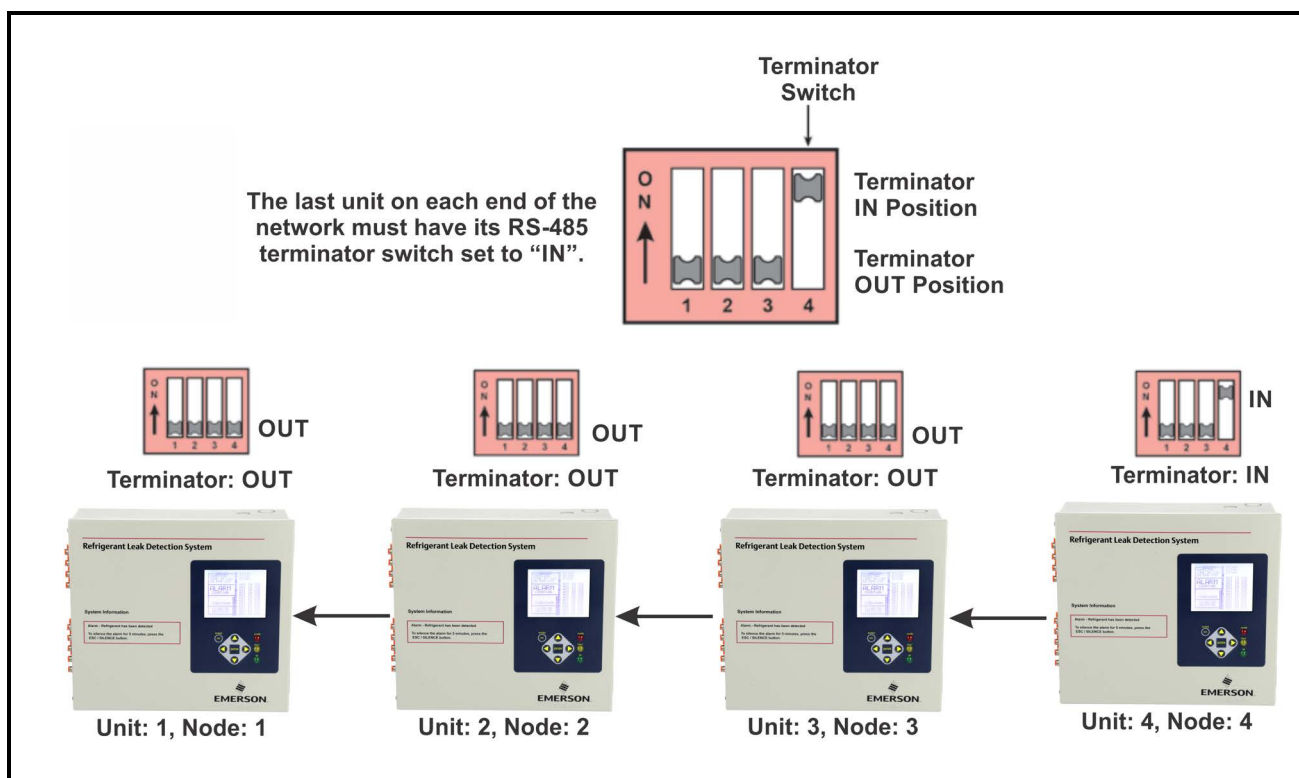


Figure 4-18 - Termination Settings for Multiple Monitors Connected to a BMS (Two Trunks)

4.5. Terminating Multiple Monitors

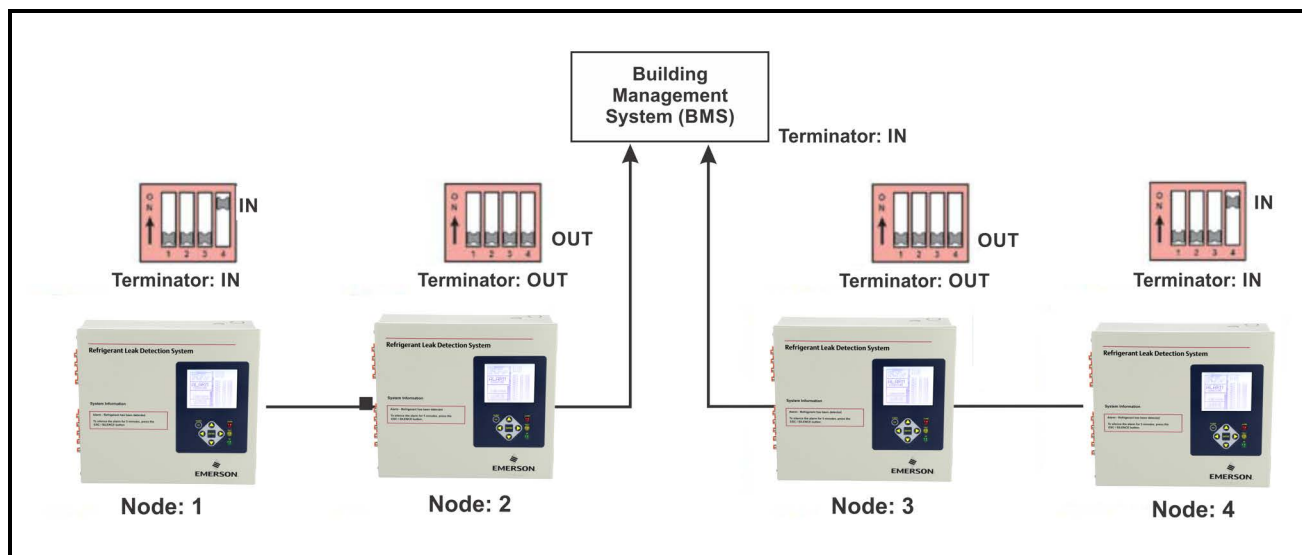


Figure 4-19 - Termination Settings for Multiple Monitors Connected to a BMS (Two Trunks)

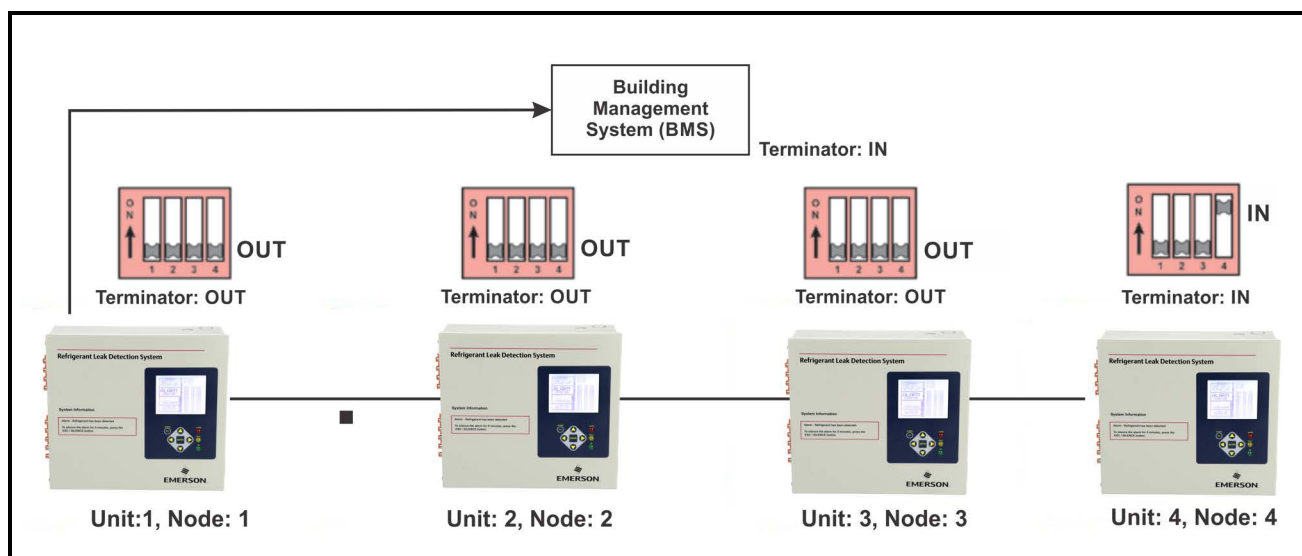


Figure 4-20 - Termination Settings for Multiple Monitors Connected to a BMS (Daisy Chain)

4.6. PC Software

4.6.1. Operation



NOTE: The RLDS is compatible with PC software version 1.52 or higher. However, calibration data can only be edited on the front panel of the RLDS, not through the PC Software.



NOTE: The PC software is not compatible with 64-bit (or newer) computers.



NOTE: The PC software uses COM1 by default. Therefore, the interface cable should be connected to the port configured as COM1 on the PC. Also, no other software drivers or devices in the computer may control COM1 when the RLDS software is in use. Alternatively, COM2 (for example) may be used by adding a space and the number 2 to the command line.

When using a USB to serial converter, be sure it has been mapped to COM1 or COM2.

The connection is made through a standard “straight through” serial port connection. A three-wire connection is used (RXD, TXD, and GND). No hardware flow control is used. The RLDS software automatically configures COM1 to match the RLDS RS-232 communications parameters.



NOTE: Occasionally, the laptop connection will not connect properly and only two beeps are heard and the program times out. To resolve this, disconnect the RS-232 cable and cycle power on the RLDS and the laptop. After both are operational, connect the RS-232 cable and start the software program.

1. Apply power to RLDS monitor and allow it to warm up. *Note that on CO2 models, a “Clearing Purge Line” message is displayed for approximately 2.5 minutes before warm up begins.*
2. Connect RS-232 interface cable to the PC and RS-232 port on the RLDS monitor.
3. Insert software disk into the PC.
4. Open the RLDS software using Windows

Explorer.

5. Upon start up, the program will immediately attempt to download data from the RLDS, as indicated by several beeps.

Navigate using your PC keyboard:

- Use the up, down, left, and right arrow keys to navigate through the screen options.
 - Use the **Enter** key to select options.
 - Use the **Esc** key to go back one step.
6. Go to **EDIT**. From the EDIT Menu, select **SYSTEM**. The monitors’ **LOCATION** becomes highlighted. Press **Enter** to move to the **TAG** area. Use the Backspace key to remove the existing tag. Enter a new tag. Press **Enter** to return to **LOCATION**. Select the next item to be addressed. *Note that you cannot change the “SN” or “FIRMWARE” items. Press the Esc key to return to the menu bar.*
 7. Go to **EDIT**. From the EDIT Menu, select **ZONES**. Select a specific zone to identify and set parameters. When **REFRIGERANT** is selected (Halogen Monitor), scroll through the gas library to locate and select the gas type for that zone.
 8. Setting the Alarms: Select **EVAC LEVEL**. Use the **Backspace** key to clear previous setting. Type in the new PPM level. Use the same method to set the spill level and leak level.
 9. To close or bypass a zone: Set the **DISTANCE** to **0** feet.



IMPORTANT: When a modified parameter (zone, system, or calibration) is sent to the RLDS monitor, please wait for the computer software to indicate that the download is complete before continuing with any further edits.

4.6.2. Saving and Sending Programs

- When saving to your computer, the program will automatically add “.cfg” to the filename you have entered.
- To send a saved program to the RLDS, open the program and connect the PC to the RLDS. From the monitor, select **SEND SETUP** and press **Enter**. The saved program will be sent to the RLDS.

4.6.3. Trend Data



NOTE: Creating a trend data file must be done while connected to the RLDS.

From the computer, select **GET TREND DATA**. Select the zone that you want to trend and press **Enter**. The trend data will appear in a list format. Press **Enter** again to access the file name screen. Type the file name in for that particular zone. Press **Enter**. The file will be saved as a text file that can be converted to an Excel file or printed as is.



NOTE: The **TREND** file must be saved zone by zone, with a filename per zone.

4.6.4. Converting the TREND Text File to a Microsoft Excel File

Open Excel and the desired file. Select “**Delimited**” format and “**Space**” as the delimiter. Select “**General**” as the column data format. The text file will display as an Excel file. When saving, change the file name extension to “**.xls**”. Comments or notes may be added to this file as needed and saved.

4.6.5. Saving and Printing Screens and Logs

Open the software while connected to the RLDS. After the software receives the program, open the desired screen (e.g., software screen, alarm log, fault log, diagnostic screen, etc.). Use the **Alt** and **Print Screen** key combination on the PC keyboard to capture the image and paste it into a Word document. Save and print. This is the last thing that needs to be done.

4.6.6. USB Type Laptops

Some laptops have USB ports and no RS-232 9-pin ports. A USB-to-serial converter or PCMCIA-to-serial converter will be required if a PCMCIA slot is available. You will be required to purchase a PCMCIA card that provides an RS-232 output. This is necessary for Windows Vista and higher versions.

4.7. Optional Current Loop Interfaces



NOTE: The two-output, current loop interface is an option that **MUST** be ordered separately.

4.7.1. Optional 4–20 mA DC Outputs

Upon installation of the optional 4–20 mA DC Interface Board (P/N 275-0030), the RLDS has the capability of providing dual 4-20 mA DC scrolling current loop outputs for connection to external monitoring devices (e.g., a local loop-powered display or a building management system [BMS]).



IMPORTANT: Loop outputs are powered internally. Do not use an external power supply as this can damage the loop card.



NOTE: Optional remote loop-powered displays are available to view the 4-20 mA outputs.

The interfaces are set up as follows:

- Loop 1 indicates zone area
- Loop 2 indicates PPM.

The 4-20 mA outputs are scaled to correspond to individual zone numbers and PPM concentrations. Scaling for the 16 (maximum) zone numbers is fixed. The default scaling for the PPM concentrations provides a 0-1000 PPM range for the 4-20 mA output, although it can be adjusted through the **LOOP2 FACTOR** option in the *System Setup* screen. Refer to **Table 4-3** and **Table 4-4**.

Loop 1 = Zone

Output	Zone
4 mA DC	n/a
5 mA DC	1
6 mA DC	2
7 mA DC	3
8 mA DC	4
9 mA DC	5

Table 4-3 - Loop 1 (Zone Area)

Output	Zone
10 mA DC	6
11 mA DC	7
12 mA DC	8
13 mA DC	9
14 mA DC	10
15 mA DC	11
16 mA DC	12
17 mA DC	13
18 mA DC	14
19 mA DC	15
20 mA DC	16

Table 4-3 - Loop 1 (Zone Area)

Loop 2 = PPM (Default: 0.016 mA DC = 1 PPM)

Output	PPM Default
4 mA DC	0 PPM
5 mA DC	63 PPM
6 mA DC	125 PPM
7 mA DC	188 PPM
8 mA DC	250 PPM
9 mA DC	313 PPM
10 mA DC	375 PPM
11 mA DC	438 PPM
12 mA DC	500 PPM
13 mA DC	563 PPM
14 mA DC	625 PPM
15 mA DC	688 PPM
16 mA DC	750 PPM
17 mA DC	813 PPM
18 mA DC	875 PPM
19 mA DC	938 PPM
20 mA DC	1000 PPM

Table 4-4 - Loop 2 (PPM)

4.7.2. 4-20 mA DC Connections

External devices are connected to the RLDS using a shielded dual twisted pair cable. Use any of the remaining service knockouts to gain access to the interior of the monitor. Locate the dual 4–20 mA DC output connector (see below) and remove it from the circuit board. Secure the wire leads to the connector

orienting them as shown in the diagram below. Check to make sure the polarity matches the wiring at the external device. When you are through securing the connections, carefully plug the connector back onto the circuit board.



NOTE: The ground connections of the 4-20 mA DC output connector are common.



NOTE: The 4-20 mA DC output connector are **SIGNAL OUT ONLY. DO NOT APPLY POWER.**



NOTE: It is highly recommended that a current loop isolator is used when connecting to the 4-20 outputs.



NOTE: When one or both current loop outputs are not used, install a jumper wire between the ground and the unused loop terminal(s) to prevent the system from generating a current loop fault.

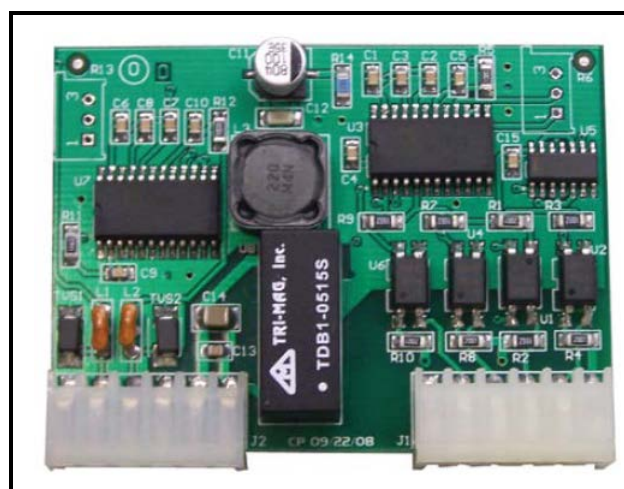


Figure 4-21 - Optional Dual 4-20 DC Output Board for Multi-Zone



CAUTION: The loop outputs have isolated grounds. Therefore the cable shield should be terminated at the receiver and not the RLDS monitor. The signal for both current loops must be returned to the RLDS monitor.

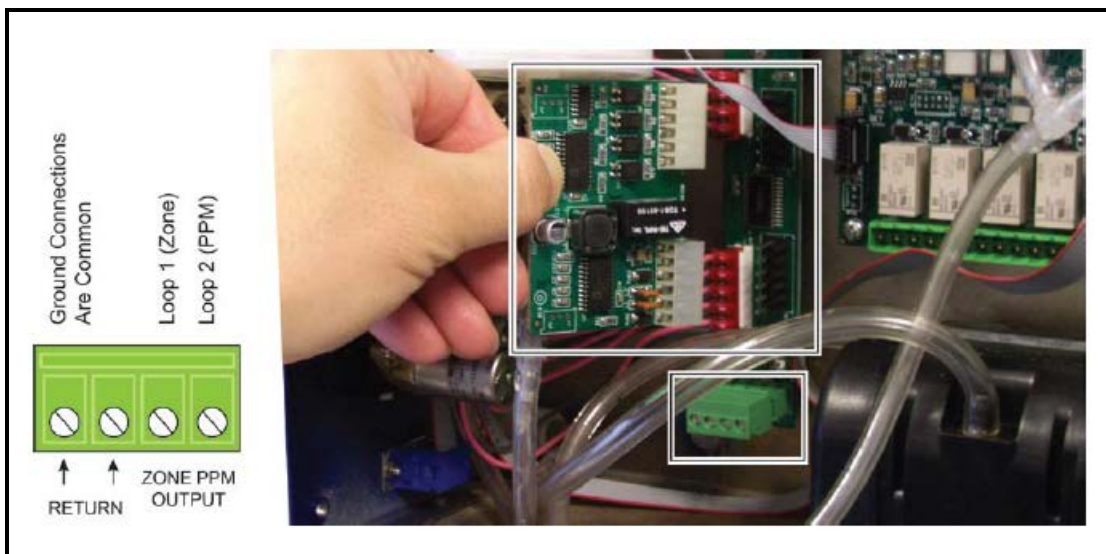


Figure 4-22 - Connecting the Gateway to the RS485 Network

5 RLDS - Connecting External Alarms

5.1. Overview

The RLDS includes four SPDT relays whose contacts are rated 2 A at 250 VAC (inductive) and 5 A at 250 VAC (resistive). These relays are used for the connection of external alarm devices that are activated when the relay is energized. The relays are factory assigned to energize under the following conditions:

Relay #1	Leak	Alarm Point 100 ppm
Relay #2	Spill	Alarm Point 300 ppm
Relay #3	Evacuate	Alarm Point 500 ppm
Relay #4	Fault	System Fault Event

5.2. Connection

Use the conduit or any of the remaining service knockouts to gain cable access to the interior of the monitor. Locate the relay connector (see **Figure 3-4**) and remove it from the circuit board. Secure the leads to the connector orienting them as shown in **Figure 5-1**. When you are through securing the connections, carefully plug the connector back onto the circuit board.

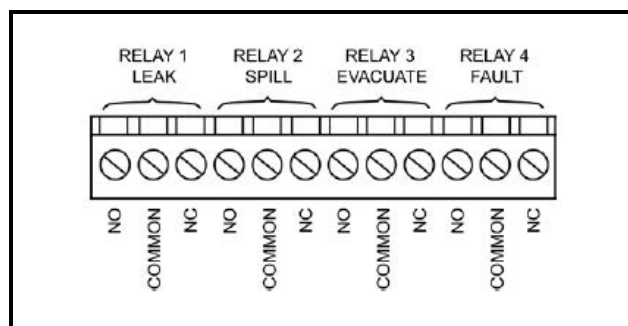


Figure 5-1 - RLDS Relay Connector



NOTE: Each relay may be connected as normally open (NO), or normally closed (NC).

1. The relay contacts are rated 2 A at 250 VAC (inductive) and 5 A at 250 VAC (resistive).
2. Power for the alarm devices connected to the relay contacts may be supplied by an external 24 VDC power source or the monitor's AC input terminals. Wiring diagram in **Figure 5-2** shows the power to this device is being tapped off the monitor's AC input. Wiring diagram in **Figure 5-3** power is supplied from an external power source.
3. Jumper the "Live/Positive" line of an external power source (DC devices) or the monitor's AC input (AC devices) to the "Common" terminal on the relay connector.
4. Connect the "Live/Positive" end of the strobe or horn to the "NO" terminal of whichever level of alarm is appropriate for the application.
5. For protection, install an in-line fuse of the appropriate size and design for the external alarm device being used.
6. The other end of the strobe or horn is connected to the "Neutral/Negative" leg of the external power source (DC devices) or monitor's AC input (AC devices).

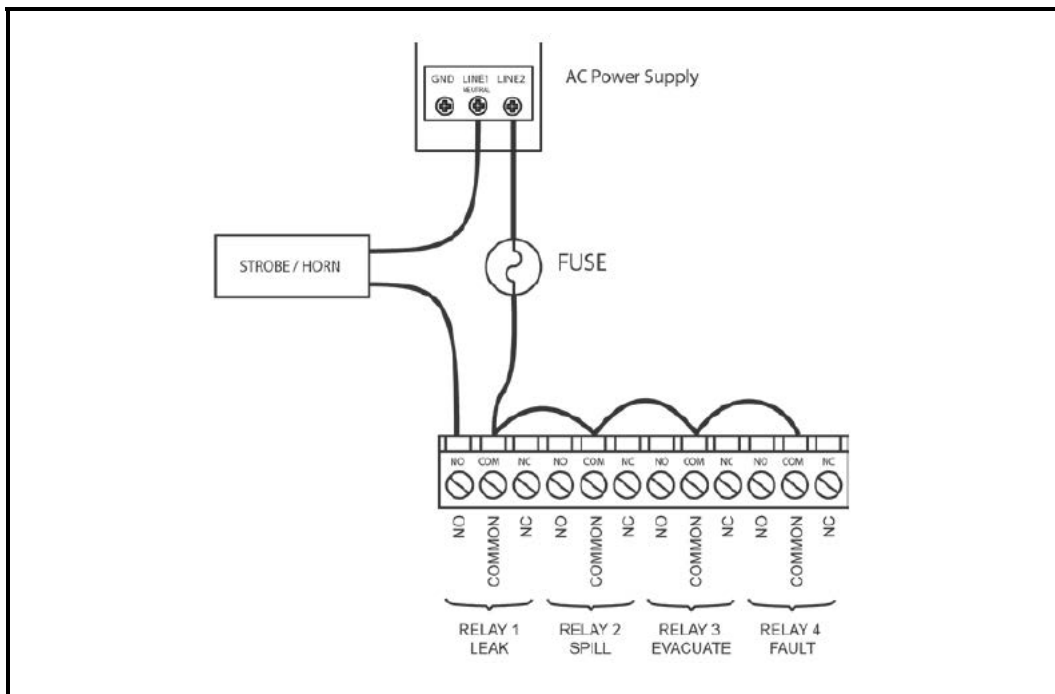


Figure 5-2 - Typical AC External Alarm Relay 1 Wiring

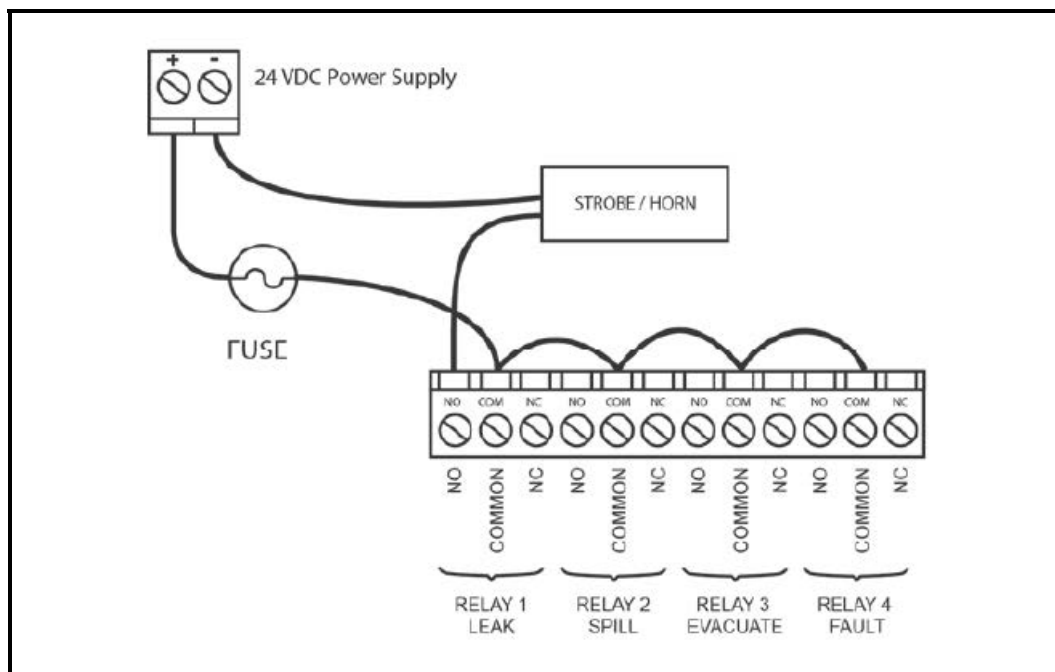


Figure 5-3 - Typical DC External Alarm Relay 1 Wiring

6 Programming Setup and UI Navigation for RLDS - Display Screens

6.1. Initial Power Up

When the RLDS is first powered up, all front level panel LEDs will illuminate, and a splash screen will appear and display the monitor's firmware version level. Note that on CO₂ models, a "Clearing Purge Line" message is displayed for approximately 2.5 minutes before warm up begins. After a moment, the **Warm Up** screen will be displayed and the green **MONITOR ON** light will blink.

After a 15-minute warm up cycle, the **MONITOR ON** light will glow steadily and the *Data Display* screen will be displayed.

6.2. Data Display Screen

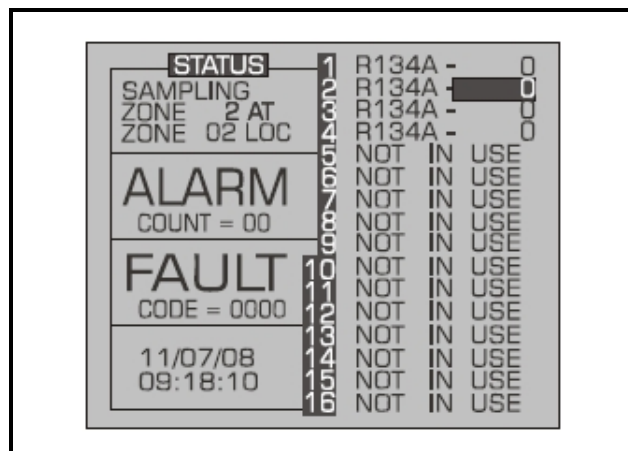


Figure 6-1 - Data Display Screen

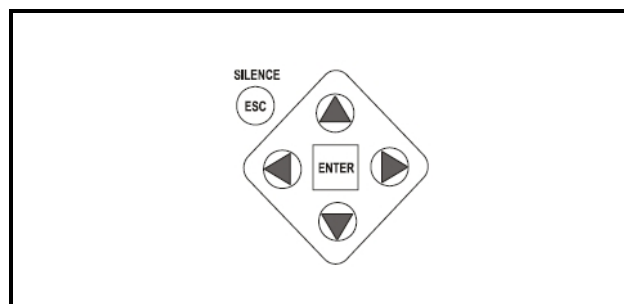


Figure 6-2 - RLDS Front Panel Navigation Keys

- Use the arrow/cursor keys for multi-directional movement in making selections and moving the cursor.
- Use the **ENTER** key to initiate and complete a selection.
- Use the **ESC** key to go back during programming or silence an alarm in alarm mode



NOTE: Refer to "RLDS Setup Screens - System Map" on page 45.

6.3. Navigate to the First Setup Screen

1. From the *Data Display* screen, press the UP or DOWN arrow key. **SETUP** will be highlighted in the first box.
2. Press **ENTER** to select this option and display the *Setup* screen.

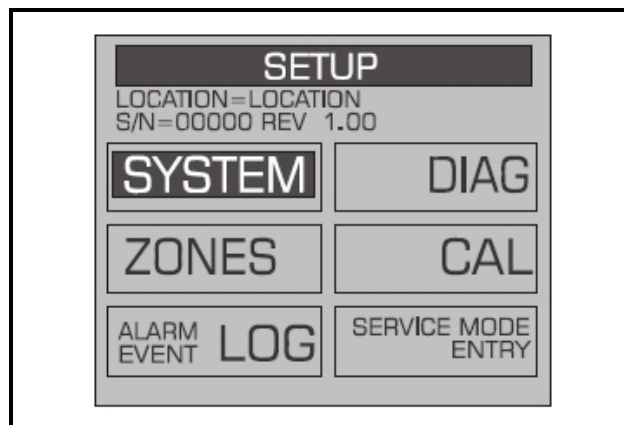


Figure 6-3 - Setup Screen 1

6.4. Navigate to the Second Setup Screen

1. From RLDS *System Setup screen 1* select the **SYSTEM** option to go to *System Setup screen 2*.
2. Press the **ESC** key to return to the *System Setup screen 1*.

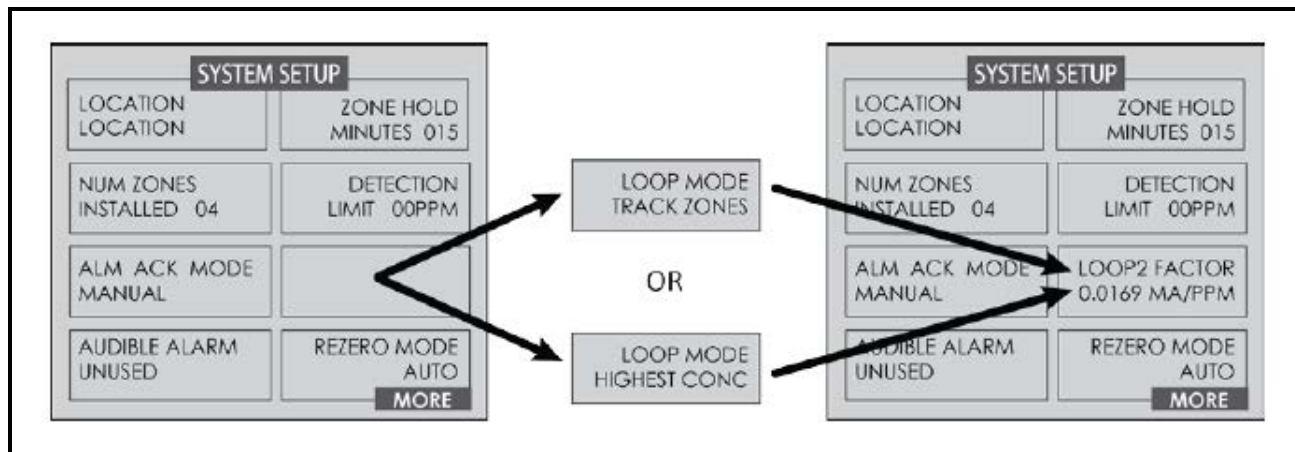


Figure 6-4 - Setup Screen 2

6.5. Location

This is the name you assign to the RLDS monitor to identify its location. It may have up to 12 alphanumeric characters.

1. Press the **ENTER** key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.6. Number of Zones Installed

IMPORTANT: DO NOT change the number of zones to deactivate unused zones. Changing the number of installed zones is only necessary when manifold blocks are added or removed. Go to the individual zone that you wish to disable and set its distance to zero.

1. Press the **ENTER** key to adjust the number.

2. Use the UP/DOWN cursor keys to modify the number (must be 4, 8, 12, or 16).
3. Press **ENTER** to accept the new number or **ESC** to revert to the previous setting.



IMPORTANT: Do not change the number of zones to deactivate unused zones. Changing the number of installed zones is only necessary when manifold blocks are added or removed. Go to the individual zone that you wish to disable and set its distance to zero.

6.7. Alarm Acknowledge (Ack) - Mode

This function programs the relays in the RLDS unit for latching or non-latching operation.

1. Press the **ENTER** key to adjust the setting.
2. Use the UP/DOWN cursor keys to toggle between settings.

AUTO - Non-latching (Alarm relay will automatically de-energize when the gas level drops below its alarm point).

MANUAL - Latching (Alarm relay remains energized, and will not release until the alarm condition has been manually acknowledged). Refer to *Section 7.6.4., Acknowledging Alarms.*

3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.8. Audible Alarm

This parameter selects the function of the RLDS monitor's internal audible alarm device.

1. Press the **ENTER** key to adjust the setting.
2. Use the UP/DOWN cursor keys to select **unused, monitor on, evacuate, spill, leak, fault, or alarm.**
3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.



NOTE: In "Monitor On" mode, the unit will only give audible alarms on a critical fault that stops the unit from monitoring.

6.9. Zone Hold

Zone hold sets the length of time a zone will be monitored when the zone hold feature is activated. The default is 15 minutes. The range is 1 to 999 minutes.

1. Press the **ENTER** key to adjust this setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual members.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.10. Detection Limit

The Detention Limit is essentially a squelch setting that instructs the instrument to interpret PPM readings below the designated level as 0. The range is 1 to 99 PPM.

1. Press the **ENTER** key to adjust the setting.
2. Use the UP/DOWN cursor keys to modify the setting.

3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.

6.11. Loop Mode

Loop Mode sets the loop mode of the two optional 4-20 mA outputs. Options are:

- track zones mode (default)
- highest PPM concentration mode



NOTE: Both **LOOP MODE** (for selecting track zones or highest PPM mode) as well as the **LOOP2 FACTOR** (for scaling the PPM output) are configured from the **SETUP** menu. Configure one, then press **ENTER** to access the other.

In track zones mode the RLDS adjusts the ZONE and PPM outputs to correspond to the latest sampled zone number and its corresponding PPM concentration, respectively. For example, if the RLDS samples zone #9 at 63 PPM, the ZONE and PPM outputs would read 13 mA (corresponds to zone #9) and 5 mA (corresponds to 63 PPM), respectively, until the next zone is sampled. This continues in a cyclic fashion through each zone. Note that this example assumes LOOP2 Factor was left at its default value (0.016). This can be adjusted through the **LOOP2 FACTOR** option in the *System Setup screen*.

In *highest concentration (PPM)* mode the RLDS adjusts the two current outputs to correspond to the zone number that has the highest PPM concentration and the corresponding value of that concentration, respectively. Unlike *track zones mode*, this mode will adjust the two outputs to correspond to whichever zone has the highest PPM concentration. For example, if zone #9 is sampled at 125 PPM, the two 4-20 mA outputs will read 13 mA and 6 mA, respectively, as long as it continues to sample at 125 PPM or until a different zone samples a concentration greater than 125 PPM.

6.12. Loop2 Factor

Loop2 Factor sets the PPM scale factor for current loop number 2. To calculate the current output, multiply the scale factor by the PPM and add four (4). For example, at the default scale factor of 0.016, a measurement of 100 PPM would generate a current output of 5.6 mAdc. The current output cannot exceed the 20 mAdc capacity of the interface.

1. Press the **ENTER** key to adjust the setting.
2. Use the **LEFT/RIGHT** cursor keys to move across the entry field and the **UP/DOWN** cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.



NOTE: Both **LOOP MODE** (for selecting track zones or highest PPM mode) as well as the **LOOP2 FACTOR** (for scaling the PPM output) are configured from the **SETUP** menu. Configure one, then press **ENTER** to access the other.

6.13. Re-Zero Mode

This parameter defines the frequency at which the instrument re-zeros the optical sensor.

1. Press the **ENTER** key to adjust the setting.
2. Use the **UP/DOWN** cursor keys to toggle between settings.

AUTO - sets the instrument to re-zero every 10 minutes.

ZONE CHANGE - sets the instrument to re-zero at each zone change. This is the most accurate setting, but increases the time interval between measurement cycles.

3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.14. Navigating to the Third Setup Screen

From the second *System Setup* screen 2, select the **MORE** option to go to the *System Setup* screen 3. Select the **BACK** option to return to the *System Setup* screen 2.

HGM SETUP	
RS485 BAUD 19200	
NODE ADDRESS 01	
PASSWORD 000	
	BACK

Figure 6-5 - Setup Screen 3



NOTE: The **RS485 BAUD** rate text will be replaced by "Service Timeout" when in **Service Mode**.

6.15. Baud Rate

This parameter defines the baud rate for the RS-485 communications port.

1. Press the **ENTER** key to adjust the setting.
2. Use the cursor keys to scroll through a list of available baud rates to select the desired baud rate.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.16. Node Address

Each RLDS on the network must have a distinct node address. The node address may be set from 1 to 64.

1. Press the **ENTER** key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.17. Password

This field is used to define a system password. The default setting is **000**, which provides no password protection.

1. Press the **ENTER** key to adjust the password.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual alphanumeric characters.
3. Press **ENTER** to accept the new password or **ESC** to revert to the previous setting.

6.18. Additional Service Features

The Service Mode option is located on the System Setup Screen in the bottom right corner. When activated, the Service Mode will disable the RLDS unit for a specified length of time. The default is 5 minutes. This time interval can be changed as described in *Section 6.16., Node Address*



IMPORTANT: Note that while in the Service Mode no measurements are made, nor are any alarms activated.

Access the service mode options from the initial *Data Display Screen*. Press the **SERVICE MODE ENTRY** option twice within 3 seconds. To exit the **Service Mode**, again press the **SERVICE MODE ENTRY** option twice within 3 seconds.

Several features can be viewed on the *System Setup Screen 3* when the monitor is placed in service mode. While in service mode, the user can identify the model number, set digipot values and sensor temperature, and acquire the temperature coefficient.

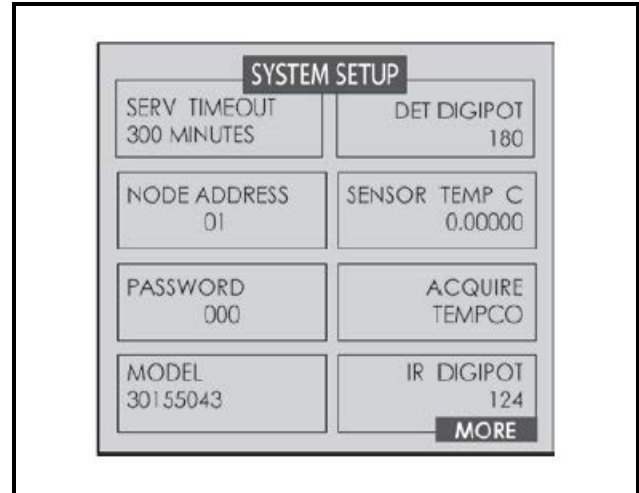


Figure 6-6 - System Setup Screen 3 - Service Mode

6.19. Service Timeout

Displayed in Service Mode. Sets the length of time the Service Mode is in effect. Stops the monitor for up to 300 minutes (5 hrs) to allow for servicing the unit.

1. Press the **ENTER** key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.20. DEG Digipot

The DIGIPOT function allows a manual and more precise adjustment of the digital potentiometer, which controls the voltage of the IR Detector. The DIGIPOT is auto-tuned at every power up.

1. Press the **ENTER** key to adjust the setting. Once the option is selected the screen will also display the voltage.
2. Use the UP/DOWN cursor key to modify the Digipot value.

6.21. Node Address

Each RLDS on the network must have a distinct node address. The node address may be set from 1 to 64.

1. Press the **ENTER** key to adjust the setting.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

6.22. Sensor Temperature Coefficient (For Factory Use Only)

This field is typically for factory use only. A customer may need to enter a temperature coefficient if the IR bench is replaced and a new temperature coefficient is supplied with the replacement bench.

Note that changing this setting will void the calibration.

6.23. Password

This field is used to define a system password. The default setting is 000 (no password protection).

1. Press the **ENTER** key to adjust the password.
2. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual alphanumeric characters.
3. Press **ENTER** to accept the new password or **ESC** to revert to the previous setting.

6.24. Acquiring Temperature Coefficient (Factory Use Only)

This field is for factory use only. Changing this setting will void the calibration.

6.25. R Digipot

This option indicates the electrical parameters of the infrared emitter.

6.26. Establishing the CO₂ Baseline

At power up, an automatic zeroing sequence establishes the CO₂ sensor baseline. At that time, the RLDS assumes the default ambient CO₂ level of 386 ppm. However, if:

- the purge line wasn't connected to the instrument, or
- the purge line was not terminated in fresh air,

then the sensor baseline may be compromised. If you suspect that the baseline was compromised, then you can re-establish the proper CO₂ sensor baseline by ensuring the purge line is properly installed and following the procedure below.

-
1. Restart the RLDS by either (a) cycling the power, or (b) pressing the CPU reset switch on the main printed circuit board (see **Figure 6-7**).

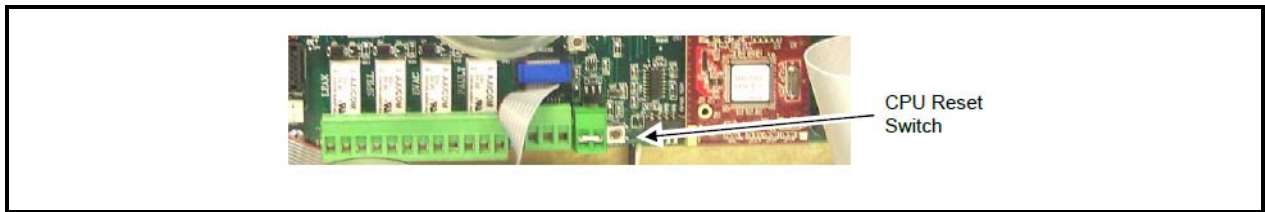


Figure 6-7 - Location of CPU Reset Button



WARNING: If using the CPU reset switch to restart the instrument, extreme care should be exercised when accessing the interior of the monitor. This includes touching a non-painted area of the RLDS chassis to provide proper grounding prior to touching the CPU reset switch or any other internal components. Failure to touch a grounding area can allow static electricity on your clothing or body to damage the RLDS. Such damage is not covered under warranty.

2. After the restart and the warm-up have completed, the instrument is ready for use.

7 General Operation of RLDS - UI

7.1. Functional Overview

Normally each RLDS will perform measurements on its active zones sequentially and without user input. The total time it takes an RLDS to complete a measurement cycle is directly proportional to the number of active zones and the physical length of the air lines. Monitors linked together on a network operate independently of each other and consequently complete their respective measurement cycles at different rates.

7.2. The Zone Setup Screen

From the *System Setup screen 2 (Figure 6-4)*, scroll down and select the **ZONES** option.

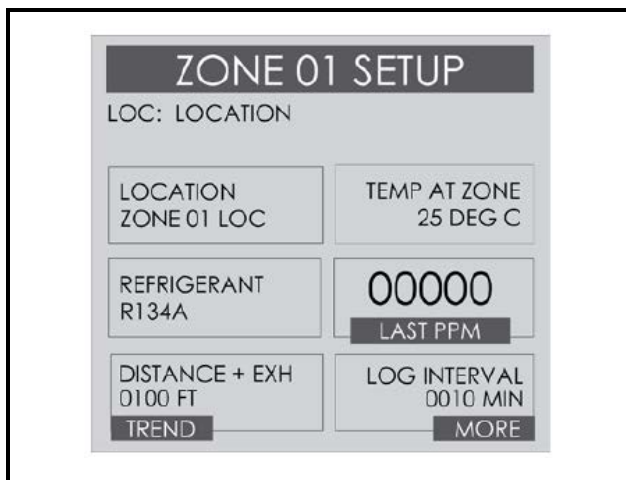


Figure 7-1 - Zone Setup Screen 1

7.2.1. Location

This is the name you assign to the RLDS to identify the zone location. It may have up to 12 alphanumeric characters.

1. Press the **ENTER** key to adjust the setting.

2. Use the **LEFT/RIGHT** cursor keys to move across the entry field and the **UP/DOWN** cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.2.2. Gas/Refrigerant Type

This displays the kind of gas the RLDS is detecting.

1. Press the **ENTER** key to adjust the setting.
2. Use the **LEFT/RIGHT** cursor keys to select the type of refrigerant you want the device to detect.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.2.3. Distance + EXH

This displays the combined length of the sample tubing plus any tubing on the exhaust port. Total length should not exceed 1200 feet (365 meters).

1. Press the **ENTER** key to adjust the setting.
2. Use the **LEFT/RIGHT** cursor keys to move across the entry field and the **UP/DOWN** cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.2.4. Temperature at Zone

This is used to set the expected temperature of the air at the zone being sampled. The value is used to calculate the STP PPM value shown in the diagnostic screen only.

1. Press the **ENTER** key to adjust the setting.
2. Use the **LEFT/RIGHT** cursor keys to move across the entry field and the **UP/DOWN** cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.2.5. Current Detection Reading

This reading displays the current PPM level of the selected gas.

7.2.6. Log Interval

The RLDS retains a data log of 100 measurements for each zone. The log interval is the number of minutes from 1 to 1440 between each log point. This parameter can be changed from *Zone Setup screen 1* (*Figure 7-1*).

The default setting for this parameter is **10 minutes**. If the log interval time is set to **0**, then a measurement is recorded in the trend log after every measurement cycle. Therefore, after the trend log is filled, it will contain the last 100 measurement points for a zone. If you want the data logged less frequently, increase this value.

It is important to remember that cycle time is dependent on many factors, including the number of zones being monitored, input line length, and the run zeroing mode selected. Before changing this value it may be useful to review the log data first using the *Trend screen* to determine the nominal cycle time.

7.3. Navigating to the Second Zone Setup Screen

Select the **MORE** option at the bottom right side of the screen (*Figure 7-1*) to continue to the next screen containing more options. This screen displays the peak PPM value in the upper left side of the screen.

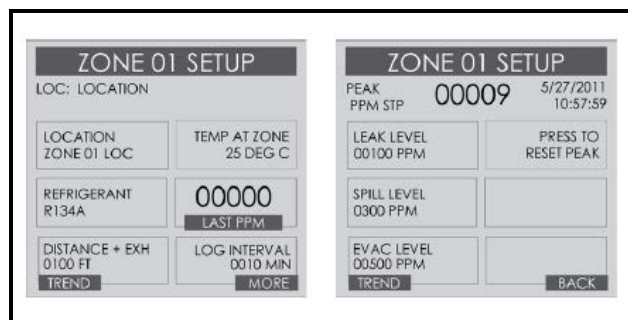


Figure 7-2 - Navigating from the First to the Second Zone Screen

7.3.1. Leak Level

This is the concentration level in PPM that will activate a leak alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the

setting.

3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.



NOTE: This value must be less than the spill level.

7.3.2. Spill Level

This is the concentration level in PPM that will activate a spill alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.



NOTE: This value must be less than the evacuate level and greater than the leak level.

7.3.3. Evacuation Level

This is the concentration level in PPM that will activate an evacuate alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the UP/DOWN cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.



NOTE: This value must be greater than the spill level.

7.3.4. Resetting the Peak PPM Value

Pressing this key resets the current peak PPM level stored in memory and displays it at the top of the screen.

7.4. Alarm Conditions

When an alarm condition is detected anywhere on the network, the red **ALARM** LED will glow on the front of the unit. Additionally, an external alarm device

may activate and an audible alarm may sound if those features have been enabled (*Section 4.2., E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)*).

An inverse flashing box indicates an alarm condition in the affected zone.

You can investigate the status of the affected zone further by selecting the **ALARM** option on the *Status screen* (*Figure 6-1*).

7.5. Fault Conditions

If a system malfunction occurs, the yellow **FAULT** LED will glow. Additionally, an external alarm (*Section 4.2., E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)*) device may activate and an audible alarm may sound if those features have been enabled (*Section 6.8., Audible Alarm*).

7.6. Alarms

7.6.1. Functional Overview

If the PPM level for any zone exceeds its designated spill, leak, or evacuate thresholds, an alarm condition will be created. Once the RLDS completes a measurement cycle in the affected zone the alarm condition will be indicated. At that time the red **ALARM** LED on the RLDS will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (*Section 6.8., Audible Alarm*).

7.6.2. Responding to Alarms

An operator can respond to alarms by accessing the *Alarm Summary screen*. Navigate to this screen by selecting **ALARM** on the *Data Display screen* (*Figure 6-1*).

Alarm Summary Screen

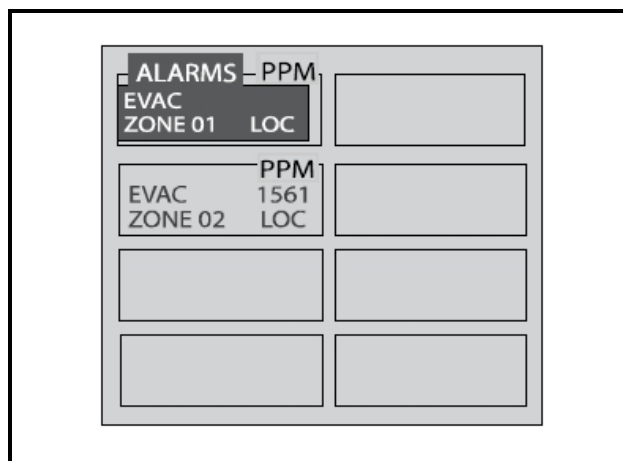


Figure 7-3 - Alarm Summary Screen

The *Alarm Summary screen* displays a list of all alarm conditions pending across the network. The screen is divided into eight (8) boxes, and each box represents a single alarm. If more than eight (8) alarms are pending, the **MORE** option will be displayed at the bottom of the screen to permit access to that additional information.

Each box displays the zone number, zone name, and the current PPM reading. A flashing box indicates an alarm that has not been acknowledged. A static box represents an alarm that has been acknowledged but has not yet been cleared from the system.

7.6.3. Alarm Detail Screen

To further investigate an alarm, press the **s** key to go to the *Alarm Detail screen*.

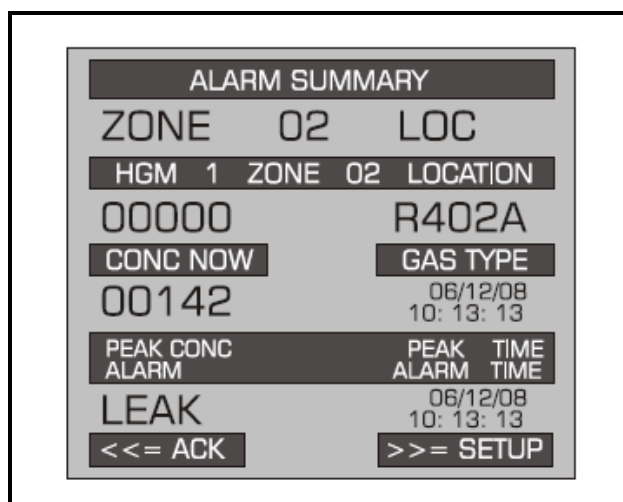


Figure 7-4 - Alarm Detail Screen

The *Alarm Detail screen* displays more comprehensive information about the nature of the alarm including:

- Complete location information
- Gas type and current concentration (CONC NOW)
- Peak concentration and peak time
- Type of alarm, alarm time, and date

This screen provides the following navigation options at the bottom of the display:

- **ACK** - using the left arrow key, ACK will acknowledge the alarm as described in the next section.
- **SETUP** - using the right arrow key, navigate to the *Zone Setup screen 1* (**Figure 7-1**). This enables review of the zone setup parameters and accesses the *Trend screen*.

Use the **ESC** button on the RLDS unit to go back to the previous menu.

7.6.4. Acknowledging Alarms

Each pending alarm may require, depending upon selected alarm mode, acknowledgment before the system returns to normal operation **Section 6.7., Alarm Acknowledge (Ack) - Mode**. To acknowledge an alarm, navigate to the *Alarm Detail screen* and select the **ACK** option as previously described. You will then be returned to the *Alarm Summary screen* and the box associated with that alarm will no longer be blinking, indicating that the alarm has been acknowledged. Repeat this procedure to acknowledge any remaining alarms.

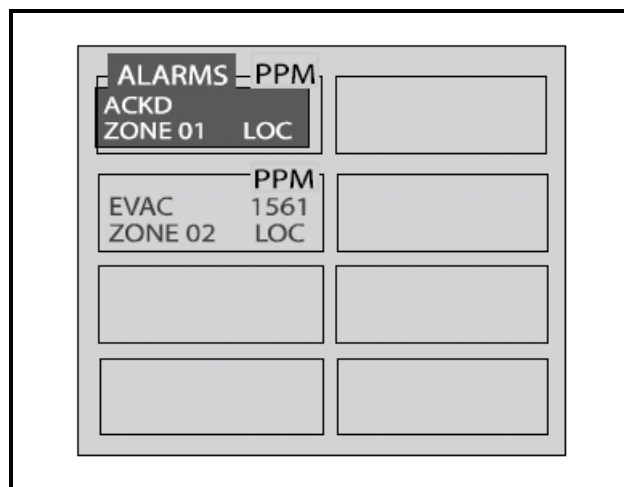


Figure 7-5 - Alarm Summary Screen - Acknowledge Mode

Once all the alarms associated with a given RLDS are acknowledged, its red LED will turn off, and any external alarms connected to the RLDS relays will deactivate.

Keep in mind that the system will continue to generate new alarms if PPM values above the alarm thresholds are detected.

7.6.5. Silencing an Alarm

When alarms are active, the **ESC** key functions as a silence key. During an active alarm and with the main screen displayed, press the **ESC** key. This will generate a prompt to “PRESS ENTER TO CONFIRM SILENCE”. When **ENTER** is pressed, the LEAK relay will open and the internal audible alarm (if enabled) will turn off. In this way, when the LEAK relay is used to operate strobes and horns, they can be quickly silenced without effecting the SPILL or EVAC, which may be controlling fans or ventilation equipment. This “silence” mode will be indicated by a reverse flashing “S” in the alarm window. “Silence mode” will be automatically canceled if the alarm condition of any zone changes by clearing or elevating to a higher level.

7.6.6. Clearing the Alarm Even Log

A data log of the last 20 alarm events is retained in memory.

- From the *Data Display* screen, press the UP or DOWN arrow key. SETUP will be highlighted in the first box.
- Press the DOWN arrow key until Alarm Event Log is highlighted, then press **ENTER** to select this option and display the Alarm Event Log (see *Figure 7-6*)

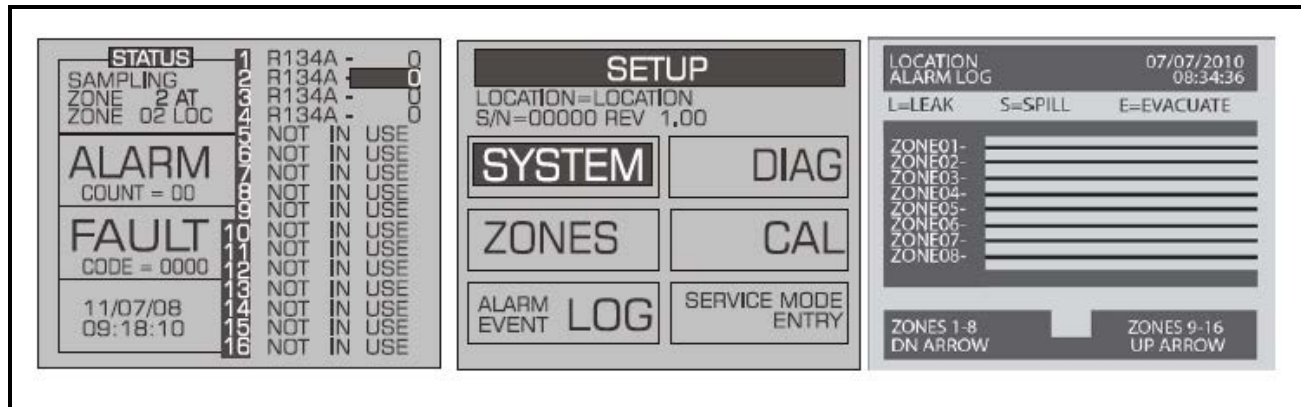


Figure 7-6 - Accessing the Alarm Log

This screen lists zones in the left column and displays which alarms were associated with each zone as represented by the vertical cursor bar. As you move the bar horizontally using the LEFT/RIGHT cursor keys, the date and time the alarm condition was detected is displayed in the upper right hand corner of the display window.

Various fault conditions are listed and explain what action should be taken to correct the problem in *Section 7.7.2.1., Critical Faults*. Note that the fault codes are cumulative. For example, a code <4200> is both a <4000> “REZERO VOLT TOL” and <0200> “GAIN SET FAULT” combined, indicating two simultaneous faults.

NOTE: The Alarm Event Log can be reset by pressing a combination of the ENTER and RIGHT arrow buttons while viewing the log.

7.7. System Faults

7.7.1. Functional Overview

If a system malfunction occurs, the yellow **FAULT** LED to glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (*Section 6.8., Audible Alarm*).

Depending on the nature of the fault, the RLDS may or may not continue to operate normally. Under a non-critical fault condition, the RLDS will continue to measure and log data, but some peripheral functions may be compromised. Under a critical fault condition, action is required for the RLDS to operate normally.

7.7.2. Navigating to the Fault Screen

Displayed on the initial *Data Display* screen (**Figure 6-1**) is a **Fault** option. Scroll down with the cursor key and select this option, and the *Fault* screen will display:

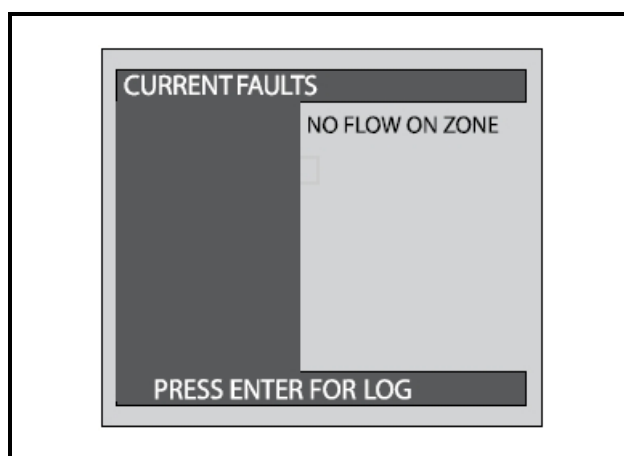



Figure 7-7 - Fault Screen

7.7.2.1. Critical Faults

Fault	Code	Description/Possible Cause
NO FLOW ON ZONE	<0800>	<p>Go to the <i>Data Display</i> screen (Figure 6-1) and select FAULT. This will display a <i>NO FLOW</i> message in each individual zone affected. Check for a blockage in the air sample line or at the line-end filter. Once the blockage has been cleared, the RLDS will return to normal operation after the zone has been sampled.</p> <div> NOTE: This can take several minutes since it is dependent upon how many zones there are and their lengths. The RLDS will clear the fault the next time it polls the affected zone.</div>
NO FLOW ON PURGE	<1000>	Check the purge line for a blockage. Verify that the length of the purge line and exhaust line do not exceed 500 feet (152 meters) in length.
CLIPPING FAULT	<8000>	The detector voltage may be out of tolerance.
REZERO VOLT TOL	<4000>	The detector output voltage is out of tolerance.
OVER RANGE DETECTED	<2000>	This indicates that the measured concentration on one or more zones have exceeded the measurement range.
ZERO FILTER FAULT	<0100>	Indicates contamination in the purge air, or if a charcoal filter is in use, the filter may need to be changed.
GAIN SET FAULT	<0200>	Indicates sensor gain (digipot) is outside acceptable range.
A2D FAULT	<0400>	Analog to digital converter not working.

7.7.2.2. Non-Critical Faults

Fault	Code	Description/Possible Cause
BOX TEMP FAULT	<0001>	Enclosure's internal temperature is outside normal range (or IR sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Verify that the ventilation holes are not obstructed. Check the <i>Diagnostic screen (Figure 7-14)</i> for the ZERO temperature, BNCH temperature and BOX temperature. Contact Technical Support with this information for further instructions.
BENCH TEMP FAULT	<0002>	Optical bench is outside of normal operating range (or sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Check the <i>Diagnostic screen (Figure 7-14)</i> for the ZERO temperature, BNCH temperature and BOX temperature. Contact Technical Support with this information for further instructions.
RESSURE SENSOR	<0004>	Manifold pressure is outside normal operating range (or sensor has failed). Check the <i>Diagnostic screen</i> record ALL data (<i>Figure 7-14</i>). Contact Technical Support with this information for further instructions.
RS485 FAULT	<0008>	RS-485 Communications Error.
LOOP FAULT	<0010>	This would only be displayed if the dual 4-20 mAdc option was installed and one or both current loops are open. Check the wiring to load/monitoring circuit on both 4-20 mA loops.
CONFIG FAULT	<0080>	There is an error in the RLDS <i>Setup screen 2 - NUMBER ZONES INSTALLED</i> field (<i>Figure 6-4</i>). Check that the number of zones installed for each RLDS unit and the number of RLDS units on the network are properly programmed. Check to ensure that the manifold solenoid cable connector in each RLDS unit is securely fastened to its terminal connector. Check for an illegal parameter. If necessary, reset to the factory default settings.

7.7.3. Reset to Factory Default Settings

IMPORTANT: Performing this function ERASES all program parameters, alarms, faults, trends, and log files.

1. Press and hold down the up and down arrow keys on the RLDS (*Figure 3-6*).
2. Cycle AC power OFF then ON.
3. Hold the keys until the second beep is heard.
4. The screen will indicated "This unit has been reset to the factory default conditions".
5. Release the keys.
6. Reprogram the RLDS as described in *Section 6, Programming Setup and UI Navigation for RLDS - Display Screens*.

7.7.4. Clearing System Faults

If the fault condition is associated with an RLDS, the monitor will return to normal operation soon after the problem is corrected. At that time the yellow LED will turn off and any external alarms connected to the monitor's alarm relays will also turn off.

Once the system malfunction has been corrected, it may take some time for the fault condition to clear completely. If the fault is associated with a specific zone, the RLDS must first cycle back to the affected zone before it returns to normal operation. At that time the yellow LED will turn off and any external alarms connected to the monitor's alarm relays will also turn off.

7.7.5. Viewing Fault Log

A data log of the last 20 fault conditions is retained in memory. On the *Fault screen* (**Figure 7-7**) select the **LOG** option to view a display of the Fault Log:

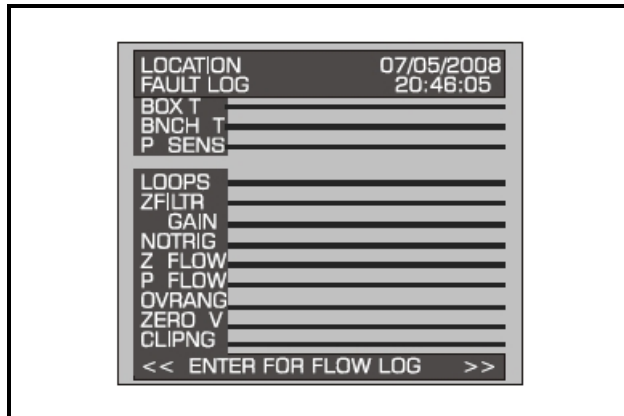


Figure 7-8 - Fault Log Screen

This screen lists potential fault conditions in the left column and displays a check mark indicating which problems were associated with each fault condition as represented by the vertical cursor bar. As you move the bar horizontally using the left/right cursor keys, the date and time the fault condition was detected are displayed in the upper right hand corner of the display window.

Anytime the fault status changes, there is an entry in the fault log, both when the fault occurs and when it is cleared.

The Fault Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

7.7.6. Viewing Flow Log

On the Fault Log screen, press **ENTER** (as shown in **Figure 7-8**) to access the *Flow Log screen*. The Flow Log displays the last 20 flow events for all zones and the purge port.

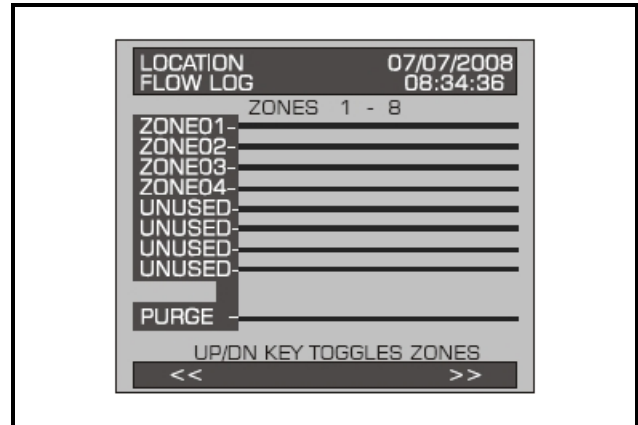


Figure 7-9 - Flow Log Screen

This screen lists the zones in the left column and displays flow data. Use the up/down buttons to scroll through the zones and the left/right to scroll through the log data. As you move the bar horizontally, the date and time of the condition are displayed in the upper right hand corner.

The Flow Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

7.8. The Trend Screen

7.8.1. Navigating to the Trend Screen

From the *Zone screen* (**Figure 7-1**), select the *Trend* option on the bottom left side. This will open the *Trend screen*:

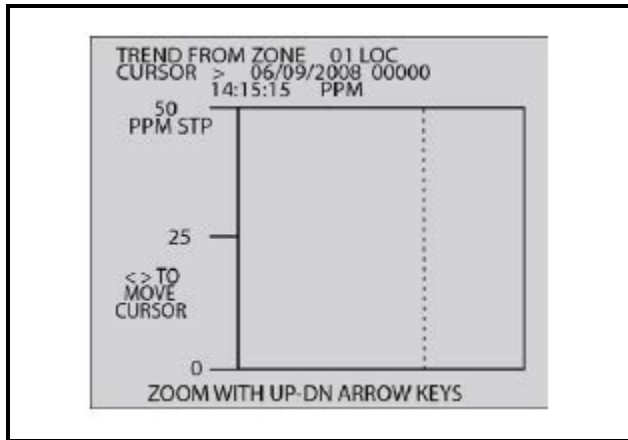


Figure 7-10 - Trend Screen

The trend graph opens with the cursor located over the most recent data point. Use the LEFT/RIGHT cursor keys to move the cursor to different data points. Holding a key down will cause the cursor to move rapidly across the screen. As you move the cursor position, the date and time of that reading, along with the PPM value, are displayed at the top of the screen above the graph. The trend graph is automatically scaled to accommodate the largest PPM value displayed. The ZOOM OUT and ZOOM IN options allow you to adjust the vertical scale of the graph.

The trend data is stored on a first-in, first-out basis. After 100 trend values have been stored, the 101st value will replace the first value stored; therefore, in normal operation, when entering trend mode the cursor will be located at the most recent data point. The data points to the left of the initial cursor location will be the next most recent. The data point to the right will be the oldest data point in the buffer and will be overwritten by the next data point.

The Trend Data Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

When finished, press the **ESC** key to revert to the previous screen.

7.9. The Calibration Screen

7.9.1. Overview

The Calibration Screen is used to adjust the calibration factor for each refrigerant gas. It is also used to program the instrument for new gases.

IMPORTANT: Changing information on **CAL FACTOR** will VOID the factory calibration. Typically, the unit will remain within the factory-calibrated accuracy indefinitely and no calibration is required. Complex software algorithms adjust for temperature drift, IR source aging, and pressure changes in order to keep the unit within factory accuracy specifications.

7.9.2. Navigating to the Calibration Screen

On the *System Setup* screen (**Figure 6-3**), select the Calibration option abbreviated **CAL**.

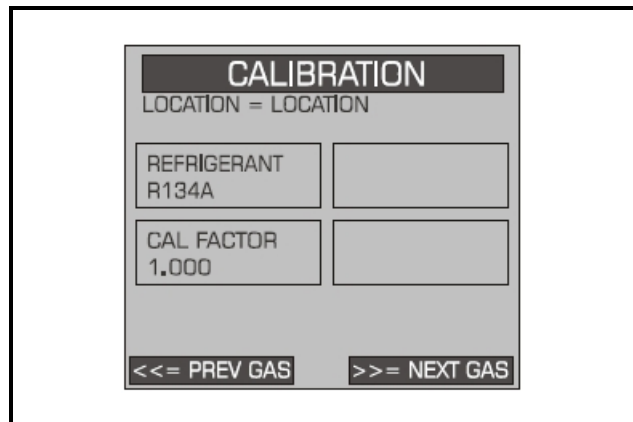


Figure 7-11 - Calibration Screen

7.9.3. Calibration Procedure

The **CAL FACTOR** is determined by sampling a known dilution of the type of gas to be sampled. Calibration is best performed at or near full scale. It can, however, be done at any concentration, and ideally in the range where maximum accuracy is desired down to, but not below, 100 PPM.

A cylinder of the desired gas at a certified PPM level must be used to assure sampling occurs at ambient conditions. A minimum sample size of 5 liters is required.

The RLDS monitor should be operating for at least one hour prior to performing a calibration.

Prepare the RLDS for sampling by initially setting its **CAL FACTOR** to **1.000**. Next, set up the RLDS for a logging interval of zero minutes (**Section 7.2.6., Log Interval**), and place the RLDS in its zone hold mode for the zone you wish to use for calibration purposes (**Section 6.13., Re-Zero Mode**).

Connect the sample bag directly to the intake port for the zone you have set up and allow the RLDS to sample the entire bag. When sampling is complete, view the trend data for the zone used to sample (**Section 7.8., The Trend Screen**). Read the measured PPM by placing the cursor on the spikes cause by the sample. If the bag was large enough for multiple samples, average the most stable ones.

The new CAL factor is computed by dividing the known gas value by the measured value. Typically this value will be between 0.95 and 1.05. This value is stored in non-volatile memory.

7.9.4. Adjusting Calibration Factor

The factory default CAL factor for standard units is **1.000**. This value may be different if the high accuracy option is ordered. Proceed as follows to adjust the current calibration factor:

1. Use the **PREV GAS** or **NEXT GAS** options to scroll through the list of refrigerants until the gas you wish to work with is displayed.
2. Select the **CAL FACTOR** option to edit the value.
3. Use the LEFT/RIGHT cursor keys to move across the entry field and the UP/DOWN cursor keys to modify the individual numbers.
4. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.



NOTE: The CO₂ calibration is a more complex, 2-point calibration. CO₂ units are factory calibrated and not intended to be calibrated in the field. Refer to screens in **Section 7.9.5., CO₂ Atmospheric Concentration (RLDS-CO₂ Units Only)**

7.9.5. CO₂ Atmospheric Concentration (RLDS-CO₂ Units Only)

CO₂ is supported by RLDS-CO₂ units. Because CO₂ is present in ambient air, a relative reading is used to determine the amount of CO₂ coming from a leak.

The CAL screen offers the ability to enter the atmospheric CO₂ concentration manually. This value is typically in a range of 380-400 PPM, however concentrations may vary slightly based on geographic locations or other factors (the factory default setting is 386 ppm).



IMPORTANT: The ambient CO₂ level is set at the factory to 386 ppm and will likely not need to be changed. If, however, the ambient CO₂ concentration at your location is known to be a value other than this default value, then the instrument's ambient CO₂ setting may need to be changed.

Adjust the ambient CO₂ concentration as follows:

1. From the **SYSTEM SETUP** menu, navigate to the **CAL** screen.
2. Ensure the **GAS TYPE** setting is selected (see **Figure 7-13**) and press **ENTER**.
3. CO₂ calibration curve options are displayed. Simply press **ENTER** to access the ambient CO₂ concentration setting (PPM IN PURGE). See **Figure 7-12**.
4. Use the UP/DOWN cursor keys to modify the numbers to set to the appropriate value.
5. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.
6. After selecting CO₂ as the desired gas and setting the **CAL FACTOR**, you will be prompted to enter the CO₂ concentration value.
7. Use the UP/DOWN cursor keys to modify the numbers to set to the appropriate value.
8. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

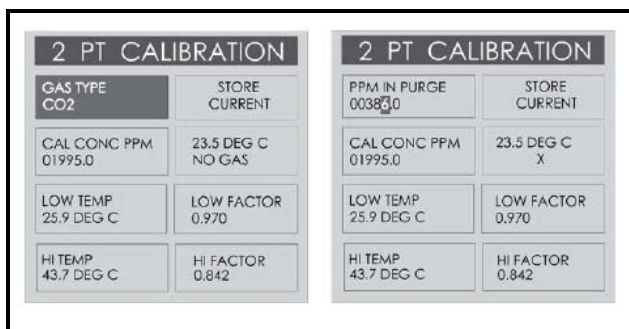
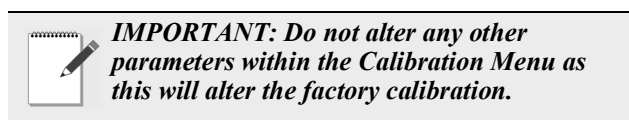


Figure 7-12 - Accessing the CO₂ Atmospheric Concentration Setting (PPM IN PURGE)



7.9.6. Programming New Gases

As new gases come into use, the RLDS allows the addition of these new gases to its on-board gas library. At the end of the gas library list is an option labeled **CUSTOM** for adding new gases. From the *Calibration screen* use the left/right arrows to select **CUSTOM** from the list of refrigerants. Next, press **ENTER**, and use the up/down arrow keys to enter the calibration factor.

The selection of the matching gas and **CAL** factor is performed by analyzing the new refrigerant. Once the matching gas is determined, field calibration is possible by using the same procedure as for other refrigerants. When the new gas entry is complete, simply set up the appropriate zone for **CUSTOM**.

Program the instrument for a new gas as follows:

1. From the *Calibration screen*, use the **PREV GAS** or **NEXT GAS** options to scroll through the list of available choices until the **CUSTOM**

option is displayed.

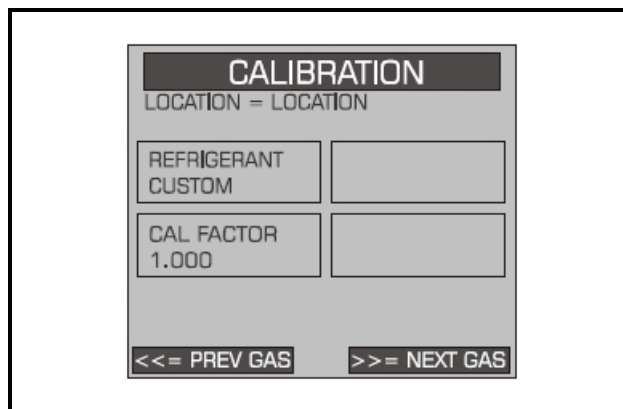


Figure 7-13 - Custom Gas Screen

2. Select the **CUSTOM** option. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.
3. Enter the new **CAL** Factor as received from Emerson.

7.10. Zone Hold Mode

A zone can be placed on hold and continuously monitored for a length of time determined by the **Zone Hold Time** value. To place a zone on hold, select the zone at the main run screen, then press and hold down the **ENTER** key until the unit beeps. The word “**HOLDING**” will appear in the status box.

While in the hold mode, further investigation of the zone’s status can be made by navigating to that *Zone’s Setup Screen #1*. To release the zone from the hold mode, press and hold down the **ENTER** key until the unit beeps and the screen display returns to normal.

7.11. The Diagnostic Screen

7.11.1. Navigating to the Diagnostic Screen

On the *System Setup* screen (*Figure 6-3*), select the **Diagnostic** option (DIAG).

Diagnostic Screen

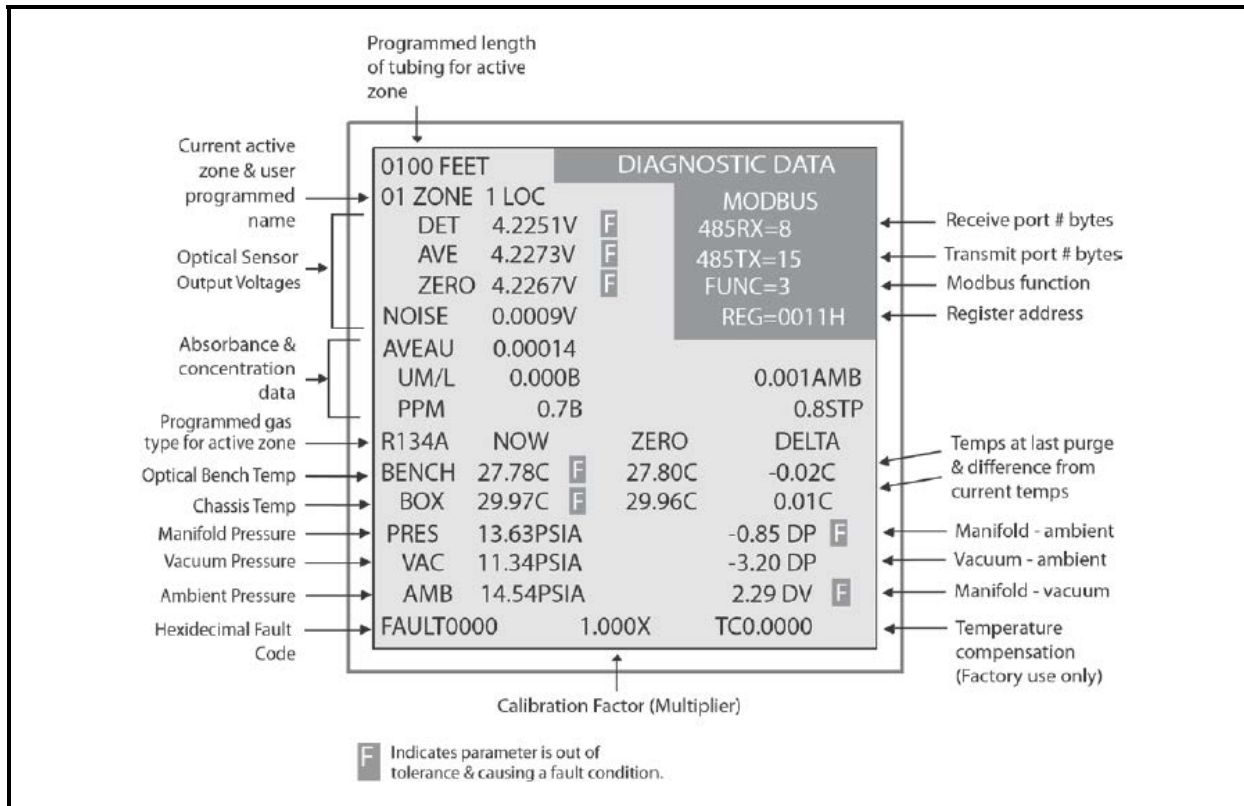


Figure 7-14 - Diagnostic Screen Layout

Diagnostic Options and Controls

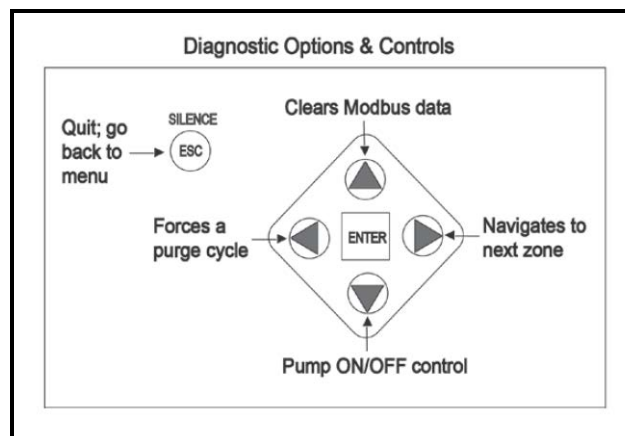


Figure 7-15 - Diagnostic Screen

7.11.2. Diagnostic Screen Overview

The *Diagnostic Screen* contains sensor data and status information useful for trouble shooting various fault conditions. An explanation of each line is given below along with normal operating ranges.

Field Name	Description
xxxx FEET	Programmed length of tubing for an active zone.
xx ZONE name	Current active zone and user-programmed name. This field may also show “WARM UP” during warm up mode.
DET	Detector Voltage - Peak-to-peak output of the IR sensor, in the absence of gas this value can range from 4.100V to 4.300V .
AVE	Average Detector Voltage - Running average of the values displayed in line 1 (DET).
ZERO	Zero Voltage - IR sensor output that was stored during the last purge cycle and has the same range as line 1 (DET).
NOISE	A 16-point running average of the noise portion of IR bench output. This reading is valuable mainly when refrigerant is <i>not</i> present.
AVEAU	Average Absorbency - Optical absorbency computed from the Average Detector Voltage and Zero Voltage. In the absence of selected gas, the absorbency is 0.000AU . When sampling desired gas, its value varies proportionally with the refrigerant concentration.
UM/L	uMoles/L - Absolute concentration in micro-moles per liter of gas based on NOISE and the internal calibration. There are two figures displayed: the first (annotated by a B) is the actual measurement at the IR bench. The second is the calculated value corrected to ambient conditions (temperature + pressure).
PPM	Parts Per Million is the volume concentration referenced to standard temperature and pressure and is computed from the Average Absorbency, Zero Temperature, and Ambient Pressure. There are two figures displayed. The first (annotated by a B) is the actual PPM at the IR bench. The second is a PPM reading normalized to standard temperature and pressure.
ZERO	Zero Temperature - Displays the sensor and enclosure temperature measured and stored during the last purge cycle in degrees C.
BENCH	Bench Temperature - Current IR sensor temperature in degrees C as well as the raw voltage coming from the temperature sensor. This value can range from ambient to ambient +15 degrees C.
BOX	Box Temperature - Current internal enclosure temperature along with the raw voltage from the temperature sensor, and has the same range as Bench Temperature.
PRESS	Pressure - Current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below Ambient Pressure (AMB).
VAC	Vacuum - The vacuum pressure is measured every purge cycle by closing all sample valves. Its value is typically 2.5 to 4.0 PSIA below Ambient Pressure (AMB).
AMB	Ambient - Ambient pressure is measured every purge cycle with the sample pump off and the manifold open. Its value is weather and altitude dependent and can range from 10.0 to 15.5 PSIA .
FAULT CODE	For fault code information, see the fault code list (<i>Table 7-4 on page 51</i>).
y.yyyX	Calibration multiplier used when measuring concentration.
TCx.xxxx	Temperature Compensation – magnitude of voltage applied to sensor output (in volts). Factory use only.
MODBUS data	485 RX=x - Receive port number of bytes FUNC - Function 485 TX=x - Transmit port number of bytes REG=xxxxx - Register address

Table 7-1 - Diagnostic Screen Sensor Data and Status

8 Quick Setups for Hand-Held Terminal (HHT)

Summaries of Zone Setup and Date/Time Setup have been included here for your convenience. For more detailed information about these setup procedures, please refer to their respective sections in this manual.

8.1. Time/Date Setup

Time and date is set from the CONFIG OPTION screen.

1. From the Home screen (F1), press the down arrow key three (3) times to display the OPTION screen:



NOTE: There is a short interval after the message WAITING ON READ FROM RLDS.

```
OPTION: 1
  1 = RLDS STATUS
  2 = RLDS FAULTS
  3 = RLDS CONFIG
```

2. Press the right arrow key and select 3.
3. Press the down arrow key twice to display the CONFIG OPTION screen:

```
CONFIG OPTION: 1
  1 = RLDS CTRL
  2 = TIME/DATE
  3 = CALIB GASES
```

4. Press the right arrow key and select 2.
5. Press the down arrow key twice to open the TIME/DATE screen:

```
1-DATE:  xx-xx-xx
1-TIME:  xx:xx:xx
```



NOTE: For TIME, enter military time only.

A change in the Time/Date on any one of the RLDS controllers changes ALL of the RLDS controllers on the network.

6. Press the right arrow key to edit the fields. The right and down arrow keys scroll downward through the list, while the left or up arrow keys will backspace the arrow so you may go back to change a field.
7. Press the up arrow key to scroll back up to the CONFIG OPTION screen to calibrate gases. Your changes are saved and the data is written when you scroll back up to the CONFIG OPTION screen.

8.2. Zone Setup

8.2.1. General Configuration 1 Screen

1. From the CONFIG OPTION screen, press the right arrow key and then press the 1 key for RLDS CTRL.
2. Press the down arrow key twice to display the General Configuration 1 screen:

```
Ux: ENABLED:DISABLED
Ux- ZONES: 8
Ux- MODEL: 300
Ux- REV  : 1.12
```



NOTE: x is the RLDS currently being accessed.

3. Press the down arrow key to display the General Configuration 2 screen:

8.2.2. General Configuration 2 Screen

U1: NAME OF CONTROLLER

1 - BUZZER: NONE
1 - AL ACK: MANUAL



NOTE: The “blank” line is used to provide a cursor so the user knows which character they are editing. The “.” and “—” keys are used to scroll an individual character selection or numeric numbers can be entered directly.

4. Press the right arrow key to activate the **U1** field so you can change the name of the controller. Use the right and left arrow keys to move across the field to select each letter, and remember to use the “.” and “—” keys to toggle letters.
5. Press the down arrow key to move from the **U1** field to the **BUZZER** field. The default for this field is set to **NONE**. Use the “.” and “—” keys to scroll through the choices: **NONE**, **ALARM**, **FAULT**, **LEAK**, **SPILL**, **EVAC**, or **MN OFF** (monitor is offline and is no longer monitoring the refrigerant lines).
6. Press the down arrow key to move from the **BUZZER** field to the **AL ACK** field. The default for this field is set to **MANUAL**, but it is recommended the setting be changed to **AUTO** so the zone can automatically reset itself after the condition clears.



NOTE: In **MANUAL** mode an alarm will not clear until it is acknowledged and the alarm condition is no longer active. Even if the alarm is no longer active and it has been acknowledged, it is not cleared until the next time that zone is read. On a 16-zone device this will take at least four (4) minutes.

7. Press the down arrow key to scroll you to the next screen:

8.2.3. Zone Config Screen 1

The Zone Configuration Screen 1 is used to configure an individual zone:

01: ZONE 01 LOC

01 - REFRIG:
01 - LENGTH:

- **ZONE** (name) can be 1-12 characters and is an alphanumeric representation of the location of the zone.
- **REFRIG** (refrigerant) is the gas being detected in that zone. The default is set to R134a and must be changed using the “.” and “—” keys to select the appropriate refrigerant.
- **LENGTH** (tubing length) is the total tubing length for that zone. Length is 500 feet for an active zone and 0 (zero) for a deactivated zone. The tubing range is 0-500 feet.



NOTE: The “blank” line is used to provide a cursor so the user knows which character they are editing. The “.” and “—” keys are used to scroll an individual character selection or numeric numbers can be entered directly.

8. Press the right arrow key to activate the **ZONE** (name of zone) field so you can change the name of the zone. Use the right and left arrow keys to move across the field to select each letter, and remember to use the “.” and “—” keys to toggle letters.
9. Press the down arrow key to move from the **ZONE** field to the **REFRIG** field. The default for this field is set to R134a, but use the “.” and “—” keys to scroll through the refrigerant choices.
10. Press the down arrow key to move from the **REFRIG** field to the **LENGTH** field. Enter the length of tubing for the zone.



NOTE: Set **LENGTH** to 0 (zero) for any zones not being used.

11. Press the down arrow key to display the Zone Config Screen 2:

8.2.4. Zone Config Screen 2

```
01-ZONE TMP: xxx
01-ALM LEAK: xxx
01-ALM SPIL: xxx
01-ALM EVAC: xxx
```

This zone screen is where alarm levels for each zone are set. Each zone can be set to a different level for each of the values, and the values activate the relays inside the RLDS.

01 is the variable indicating which zone number you are working with. Use the up and down arrow keys to cycle through the active zones for each RLDS. Continue for the remaining zones until all zones are configured.

- ZONE TMP is in degrees C
- ALM LEAK= LEAK Level: Level to trigger a leak alarm in PPM. (Default is 100 with a range of 1-1000 PPM)
- ALM SPIL= SPILL Level: Level to trigger a spill alarm in PPM. (Default is 300 with a range of 1-1000 PPM)
- ALM EVAC= EVACUATE Level: Level to trigger an evacuate alarm in PPM. (Default is 500 with a range of 1-1000 PPM)

Press the down arrow from the Zone Config Screen 2 to display the RLDS Configuration Option (CONFIG OPTION) screen. (*Section 11.4.3., RLDS Configuration Option (CONFIG OPTION) Screen*)

The **WAITING ON WRITE TO RLDS** message displays, and after a short interval prompts you to the CONFIG OPTION screen.

8.3. STATUS OPTION Screen

From the STATUS OPTION screen, you are able to check zone status (individual zones), ctrl status (overall controller status), and diagnostics (diagnostic zone data).

```
STATUS OPTION:
  1 = ZONE STATUS
  2 = CTRL STATUS
  3 = DIAGNOSTICS
```

To display ZONE STATUS: (individual zones), press the right arrow key and press **1**. Press the down arrow key twice. The ZONE STATUS screen displays:

8.3.1. Zone Status Screen

```
01: ZONE 01 LOC
1-01: 0 LEAK A
02: ZONE 02 LOC
1-02: A
```

ACKNOWLEDGING ALARMS:

Each status will be listed for each individual zone, and any alarms can be noted from here.

Press the down arrow key from the Zone Status screen to scroll through the status concentration for each of the zones in use. The PPM concentration will be shown, alarm/failure indication, and if the alarm is acknowledged. If the zone is normal (no alarm detected), the alarm/failure fields and alarm acknowledge field (where **LEAK A** appears) should be blank. In order to acknowledge the alarm, press the CANCEL key so the **A** appears next to the alarm.

LEAK, SPIL(L), or EVAC(UATE) will display if there is an alarm. If there is a flow problem (failure) for the zone, FLOW displays. A failure cannot be acknowledged--only LEAK, SPIL, or EVAC alarms can be acknowledged.

Press the down arrow key to scroll through and view all of the zones.



NOTE: If the user selects a specific channel that is an alarm and presses the CANCEL key, the alarm will be acknowledged.

To display CTRL STATUS: (overall controller status), press the right arrow key and press **2**. Press the down arrow key twice. The General Controller (CTRL STATUS) screen displays:

8.3.2. General Controller (CTRL STATUS) Screen

Ux-MODE: NORMAL
Ux-STAT: <ZEROING: SAMPLE>
Ux-ALARM CNT:
Ux-ACT ZONE:



NOTE: *x is the RLDS.*

If the user selects the **MODE** field they will be able to change the mode the zone is in. If the user selects the **ACT ZONE** field, the current zone being sampled can be changed.

The user can toggle the zone mode (in the **MODE** field) by pressing the right arrow key to activate the field and using the “.” and “—” keys to select between **NORMAL**, **HOLD**, and **SERVICE**. If the zone is set to **HOLD** mode, the zone is continuously sampled.

Press the down or up arrow key to go back to the STATUS OPTION screen. Your changes are saved and data written upon scrolling back to the STATUS OPTION screen.



NOTE: *When setting up multiple zones in one area (such as a motor room), stagger these zones as they enter the RLDS. For example, if there are two motor rooms served by one RLDS, each motor room has three sensing zones. Make the first motor room zones 1, 3, and 5, and make the second motor room zones 2, 4, and 6. This will allow the leak detection system to return to that area being sensed more regularly.*

If the zone exists in a location where air flow will affect the dispersion of refrigerant, reduce the alarm limits to a lower level than usual. This will allow for dispersion of the refrigerant in the air.

9 Hand-Held Terminal (HHT) for use with the Gateway and RLDS Controller

The Hand-Held Terminal (HHT) connects directly to the Gateway and is used for the initial setup and to run the system. The HHT allows the user to make setpoint and setup adjustments during system start-up, and changes for routine or emergency maintenance. The HHT displays several screens for viewing leak system status, making control setpoint adjustments, and adjusting at what PPM an alarm should sound. Setpoint changes made through the HHT are transferred to the RLDS controller and overwrite any existing set points.

The HHT shares the communication port with the I/O Net, and while the HHT is plugged in you can get a momentary loss of communication on the I/O Net. This may result in concentrations, showing **NONE** momentarily.

- Down arrow key - moves to the next edit field if one is selected or advances to the next screen if no edit field is selected.
- Up arrow key - moves to the previous edit field if one is selected or moves back to the previous screen if no field is selected.
- “.” - Toggle option select fields or scroll alpha characters for names, and acts as a decimal point for floating point numbers.

The period key is the lower-most button on the bottom left of the HHT.

- “—” - Toggle option select fields or scroll alpha characters for names, and acts as a minus sign for numeric entry.

The dash key is the lower-most button on the bottom right of the HHT.



NOTE: Editable fields are activated when the right arrow appears next to them.

9.1. HHT Key Operations

The arrow keys will be used to move between fields and screens.

Special Keys:

- **F1** - Save current changes and go back to Screen 1 (Home screen).
- **F2** - Save current changes and go back to Screen 3 (SELECT RLDS screen).
- **CANCEL** - Clear an edit field or acknowledge an alarm on the status screen.
- **ENTER** - Checks if the entry is valid.
- Right arrow key - moves to the next editable field or moves right one character in alpha name fields.
- Left arrow key - moves to the previous edit field or moves left one character in alpha name fields.

10 Main Screens

10.1. Home Screen (F1 Screen)

Press **F1** at any point to save changes and display the Home screen:

```
RLDS GW-810-3760
VER: 1.10B04
FAIL: I/O NET
(PRESS DOWN ARROW)
```

The HHT is used to display the following on the Home screen:

- **RLDS GW-810-3760:** Model information
- **1.10B04:** Version number
- **FAIL: I/O NET:** Displays the operation mode on the third line of the HHT screen. This indicates which type of area controller the RLDS Gateway is attached to. The dip switch 8 is set to ON or OFF.
ON = REFLECS, OFF = E2, Einstein. If a failure condition exists with the RLDS Gateway, this line shows one of the following failure messages:

FAIL: I/O NET indicates that no communication with the I/O Net exists, and that communication between the controllers is down.

FAIL: FLASH/CLK indicates the hardware is bad and the Gateway should be replaced.

FAIL: USER CFG indicates that no RLDS units have been found on the network, and have not been configured by the user.

FAIL: RLDS CTRL indicates that one or more RLDS controllers are down.

- **PRESS DOWN ARROW** indicates what to do next.



NOTE: Pressing the down arrow scrolls you to the next screen.

10.2. RLDS Enable Screen

The second screen will show whether a particular unit is enabled, disabled, or unknown. When the RLDS Gateway first powers up it will show **UNKNOWN** for all units. It will then start scanning for each unit. If it finds a unit, it marks it as **ENABLED**.

If an RLDS is not present on the network, the user can mark that RLDS as **DISABLED** to prevent the Gateway from scanning for that unit. When the unit is disabled, the Gateway stops trying to access the RLDS controller and does not respond to the association request on the I/O Network.

```
RLDS LIST:
RLDS1: ENABLED
RLDS2: DISABLED
RLDS3: DISABLED
```

Press the down arrow to go to the next screen:

10.3. SELECT RLDS Screen (F2 Screen)

Press **F2** at any point to save changes and display the SELECT RLDS screen:

```
SELECT RLDS: 1
LDS1: ONLINE
RLDS2: DISABLED
RLDS3: DISABLED
```



NOTE: SELECT RLDS: 1 defaults to 1.

The F2 screen allows you to select the desired RLDS. The F2 screen shows the general **ONLINE** or **OFFLINE** status for the enabled RLDS controllers. **ONLINE** means the Gateway is successfully communicating with an enabled RLDS controller. If it is unknown whether an RLDS is present on the network, the screen will display **UNKNOWN**.

Select the desired RLDS by pressing the right arrow key and selecting the desired RLDS number. Press the down arrow key to prompt you to the Operation Select (OPTION) screen.

The WAITING ON READ FROM RLDS message displays, and after a short delay prompts you to the Operation Select (OPTION) screen.

10.4. Operation Select (OPTION) Screen

The Operation Select (OPTION) screen enables the user to select the following entry points:

```
OPTION: 1
        1 = RLDS STATUS
        2 = RLDS FAULTS
        3 = RLDS CONFIG
```



NOTE: *OPTION: 1 defaults to 1.*

Press the right arrow key to enable you to change the number selection next to **OPTION**. When a right arrow appears after **OPTION**, press the number key of the desired screen (1, 2, or 3). Press the down arrow key twice to display the selected screen.

- Select 1 to access the RLDS STATUS screen

See *Section 10.5., STATUS OPTION Screen*.

- Select 2 to access the RLDS FAULTS screen

See *Section 10.4.2., RLDS FAULTS (SYSTEM FAULTS) screen*.

- Select 3 to access the RLDS CONFIG screen

See *Section 10.4.3., RLDS Configuration Option (CONFIG OPTION) Screen*.

10.4.1. RLDS STATUS (STATUS OPTION) Screen

The STATUS OPTION screen allows you to check individual zones, overall controller status, and diagnostic data. Refer to *Section 10.5., STATUS OPTION Screen* to find out more information about accessing these screens.

STATUS OPTION:

```
1 = ZONE STATUS
2 = CTRL STATUS
3 = DIAGNOSTICS
```

- ZONE STATUS gives status on individual zones

See *Section 10.5.1., Zone Status Screen*.

- CTRL STATUS is overall controller status

See *Section 10.5.2., General Controller (CTRL STATUS) Screen*.

- DIAGNOSTICS is diagnostic zone data

See *Section 10.5.3., DIAGNOSTICS Screen 1: Sensor Data Register*.

10.4.2. RLDS FAULTS (SYSTEM FAULTS) screen

From the Operation Select (OPTION) screen, (*Section 10.4., Operation Select (OPTION) Screen*) select **RLDS FAULTS** by pressing the right arrow key, selecting **2**, and pressing the down arrow key twice.

The RLDS FAULTS screen will display a list of the system failures associated with the selected RLDS. One failure will be displayed on each line.



NOTE: *Once a fault is detected and repaired, the unit will go through an entire cycle and the fault will clear itself and return to normal.*

SYSTEM FAULTS

The following are failure messages that are used:

CLIPPING FAULT - A/D out of range
ZERO FAULT - Zero voltage outside factory limits
NO FLOW - No flow on any zone
PURGE FLOW - No flow on purge
ZONE FLOW - No flow on one or more zones
TRIGGER FAULT - IR Source clock trigger missing

CONFIG FAULT - No zones enabled
LOOP FAULT - Open current loop
PRESSURE RANGE - Pressure out of range
BENCH TEMP - Bench temperature out of range
BOX TEMP - Box temperature fault

10.4.3. RLDS Configuration Option (CONFIG OPTION) Screen

From the Operation Select (OPTION) screen, (*Section 10.4.*) select **RLDS CONFIG** by pressing the right arrow key, selecting **3**, and pressing the down arrow key twice. The CONFIG OPTION screen displays and allows the user to configure the selected RLDS:

```
CONFIG OPTION: 1
  1 = RLDS CTRL
  2 = TIME/DATE
  3 = CALIB GASES
```

Press the right arrow key to enable you to change the number selection that appears next to **CONFIG OPTION**. When a right arrow appears after **CONFIG OPTION**, press the number key of the desired screen (1, 2, or 3). Press the down arrow key twice to display the selected screen.

- Select 1 to access the General Configuration 1 Screen

See *Section 10.4.4., General Configuration 1 Screen.*

- Select 2 to access the Time/Date screen

See *Section 10.4.8., Time/Date Screen.*

- Select 3 to access the Calibrate/Refrigerant screens

See *Section 10.4.9., Calibrate Gas Screen 1.*

10.4.4. General Configuration 1 Screen

From the CONFIG OPTION screen, press the right arrow key and then press the **1** key for **RLDS CTRL**. Press the down arrow key twice to display the General Configuration 1 (a non-editable) screen:

```
Ux: ENABLED:DISABLED
Ux- ZONES: 8
Ux- MODEL: 300
Ux- REV : 1.12
```



NOTE: *x is the RLDS currently being accessed.*

Press the down arrow key to display the General Configuration 2 screen:

10.4.5. General Configuration 2 Screen

```
U1: NAME OF CONTROLLER

1 - BUZZER: NONE
1 - AL ACK: MANUAL
```



NOTE: *The “blank” line is used to provide a cursor so the user knows which character they are editing. The “.” and “—” keys are used to scroll an individual character selection or numeric numbers can be entered directly.*

Press the right arrow key to activate the **U1** field so you can change the name of the controller. Use the right and left arrow keys to move across the field to select each letter, and remember to use the “.” and “—” keys to toggle letters.

Press the down arrow key to move from the **U1** field to the **BUZZER** field. The default for this field is set to **NONE**. Use the “.” and “—” keys to scroll through the choices: **NONE**, **ALARM**, **FAULT**, **LEAK**, **SPILL**, **EVAC**, or **MN OFF** (monitor is offline and is no longer monitoring the refrigerant lines).

Press the down arrow key to move from the **BUZZER** field to the **AL ACK** field. The default for this field is set to **MANUAL**, but it is recommended the setting be changed to **AUTO** so the zone can automatically reset itself after the condition clears.



NOTE: In **MANUAL** mode, an alarm will not clear until it is acknowledged and the alarm condition is no longer active. Even if the alarm is no longer active and it has been acknowledged, it is not cleared until the next time that zone is read. On a 16-zone device this will take at least four (4) minutes.

The down arrow key will scroll you to the next screen:

10.4.6. Zone Config Screen 1

The Zone Configuration Screen 1 is used to configure an individual zone:

01: ZONE 01 LOC

01 - REFRIG:

01 - LENGTH:

- ZONE (name) can be 1-12 characters and is an alphanumeric representation of the location of the zone.
- REFRIG (refrigerant) is the gas being detected in that zone. The default is set to R134a and must be changed using the “.” and “—” keys to select the appropriate refrigerant.
- LENGTH (tubing length) is the total tubing length for that zone. Length is 500 feet for an active zone and 0 (zero) for a deactivated zone. The tubing length range is 0-500 feet.



NOTE: The “blank” line is used to provide a cursor so the user knows which character they are editing. The “.” and “—” keys are used to scroll an individual character selection or numeric numbers can be entered directly.

Press the right arrow key to activate the **ZONE** (name of zone) field so you can change the name of the zone. Use the right and left arrow keys to move across the field to select each letter, and remember to use the “.” and “—” keys to toggle letters.

Press the down arrow key to move from the **ZONE** field to the **REFRIG** field. The default for this field is set to R134a, but use the “.” and “—” keys to scroll through the refrigerant choices.

Press the down arrow key to move from the **REFRIG** field to the **LENGTH** field. Enter the length (1’ to 500’) of tubing for the zone.



NOTE: Set **LENGTH** to 0 (zero) for any zones not being used.

10.4.7. Zone Config Screen 2

01-ZONE TMP: xxx

01-ALM LEAK: xxx

01-ALM SPIL: xxx

01-ALM EVAC: xxx

This zone screen is where alarm levels for each zone are set. Each zone can be set to a different level for each of the values, and the values activate the relays inside the RLDS.

01 is the variable indicating which zone number you are working with. Use the up and down arrow keys to cycle through the active zones for each RLDS. Continue for the remaining zones until all zones are configured.

- ZONE TMP is in degrees C
- ALM LEAK= LEAK Level: Level to trigger a leak alarm in PPM. (Default is 100 with a range of 1-1000 PPM)
- ALM SPIL= SPILL Level: Level to trigger a spill alarm in PPM. (Default is 300 with a range of 1-1000 PPM)
- ALM EVAC= EVACUATE Level: Level to trigger an evacuate alarm in PPM. (Default is 500 with a range of 1-1000 PPM)

Press the down arrow from the Zone Config Screen 2 to display the RLDS Configuration Option (CONFIG OPTION) screen. (**Section 10.4.3.**)



NOTE: When setting up multiple zones in one area (such as a motor room), stagger these zones as they enter the RLDS. For example, if there are two motor rooms served by one

RLDS, each motor room has three sensing zones. Make the first motor room zones 1, 3, and 5, and make the second motor room zones 2, 4, and 6. This will allow the leak detection system to return to that area being sensed more regularly.

If the zone exists in a location where air flow will affect the dispersion of refrigerant, reduce the alarm limits to a lower level than usual. This will allow for dispersion of the refrigerant in the air.

10.4.8. Time/Date Screen

From the CONFIG OPTION screen, set the time and date. Press the right arrow key and select **2**. Press the down arrow key twice to open the TIME/DATE screen:

```
1-DATE:  xx-xx-xx
1-TIME:  xx:xx:xx
```



NOTE: For TIME, enter military time only.

A change in the Time/Date on any one of the RLDS controllers changes ALL of the RLDS controllers on the network.

Press the right arrow key to edit the fields. The right and down arrow keys scroll downward through the list, while the left or up arrow keys will backspace the arrow so you may go back to change a field.

Press the up arrow key to scroll back up to the CONFIG OPTION screen to calibrate gases. Your changes are saved and the data is written when you scroll back up to the CONFIG OPTION screen.

10.4.9. Calibrate Gas Screen 1



CAUTION: The Calibrate Gas screens are rarely used. Before modifying values in the Calibration screens, contact your Emerson representative for Correction Values.

The Calibrate Data message is used to calibrate the gases used. It is read only if the user enters the configuration screen for HHT screens.

From the CONFIG OPTION screen, press the right arrow key and then press the **3** key for **CALIB GASES**. Press the down arrow key twice and wait for the **WAITING ON READ FROM RLDS** message to clear to display the Calibration Gas screens.

```
x - R11:  xxx.x
x - R12:  xxx.x
x - R22:  xxx.x
x - R23:  xxx.x
```



NOTE: User enter a floating point number for x.

Press the down arrow key so the Calibrate Gas Screen 1 will cycle through all gases and view the available gases in the gas library. Press the down arrow key to cycle Calibrate Gas screens 2 and 3 to complete the calibration process:

10.4.10. Calibrate Gas Screen 2

```
1 - CURVE 1:  xxx
1 - CURVE 2:  xxx
1 - CURVE 3:  xxx
<blank>
```



NOTE: User enter a curve number for New Gas Type 1 for x.

Use the “.” and “—” keys to scroll through the supported gas/refrigerants.

Press the down arrow key:

10.4.11. Calibrate Gas Screen 3

User can select names for each new gas/refrigerants by pressing the right arrow key to activate the field and using the “.” and “—” keys to toggle the letters.

```

1:  NEW GAS1

2:  NEW GAS2

3:  NEW GAS3

```

Press the down arrow key:

10.4.11.1. Calibrate Gas Screen 3 Continued

```

3:  NEW GAS3

```

The default gas name is **NEW GAS1**.



NOTE: The “blank” line is used to provide a cursor so the user knows which character they are editing. The user can use “.” and “—” keys to scroll an individual character selection or numeric numbers can be entered directly.

Pressing the down arrow key brings you back to the CONFIG OPTION screen. To move back to the STATUS OPTION screen, first press the up arrow key to go back to the OPTION screen and select **1** for RLDS STATUS. You should now be back at the STATUS OPTION screen.

10.5. STATUS OPTION Screen

From the STATUS OPTION screen, you are able to check zone status (individual zones), ctrl status (overall controller status), and diagnostics (diagnostic zone data).

```

STATUS OPTION:

1 = ZONE STATUS
2 = CTRL STATUS
3 = DIAGNOSTICS

```

To display ZONE STATUS: (individual zones), press the right arrow key and press **1**. Press the down arrow key twice. The ZONE STATUS screen displays.

10.5.1. Zone Status Screen

```

01: ZONE 01 LOC
1-01: 0   LEAK  A
02: ZONE 02 LOC
1-02:                A

```

The PPM count, alarm status, and alarm acknowledge information is displayed for each individual zone.

Press the down arrow key from the Zone Status screen to scroll through the status concentration for each of the zones in use. The PPM concentration will be shown, alarm/failure indication, and if the alarm is acknowledged. If the zone is normal (no alarm detected), the alarm/failure fields and alarm acknowledge field (where **LEAK A** appears) should be blank.

ACKNOWLEDGING ALARMS

In order to acknowledge an alarm, press the left or right arrow keys to select the zone and then press the **CANCEL** key so the **A** appears next to the alarm. When the **A** appears, the alarm has been acknowledged.

LEAK, SPIL(L), or EVAC(UATE) will display if there is an alarm. If there is a flow problem (failure) for the zone, FLOW displays. A failure cannot be acknowledged--only LEAK, SPIL, or EVAC alarms can be acknowledged.

Use the down arrow key to scroll through and view all of the zones.

After you have scrolled through the zones you are back at the STATUS OPTION screen where you can make another selection.

To display CTRL STATUS: (overall controller status), press the right arrow key and press **2**. Press the down arrow key twice. The General Controller (CTRL STATUS) screen displays:

10.5.2. General Controller (CTRL STATUS) Screen

```

Ux-MODE:  NORMAL
Ux-STAT:  <ZEROING: SAMPLE>
Ux-ALARM CNT:
Ux-ACT ZONE:

```



NOTE: *x is the RLDS.*

If the user selects the **MODE** field they will be able to change the mode the zone is in. If the user selects the **ACT ZONE** field, the current zone being sampled can be changed.

The user can toggle the zone mode (in the **MODE** field) by pressing the right arrow key to activate the field and using the “.” and “—” keys to select between **NORMAL**, **HOLD**, and **SERVICE**. If the zone is set to **HOLD** mode, the zone is continuously sampled.

Press the down or up arrow key to go back to the STATUS OPTION screen. Your changes are saved and data written upon scrolling back to the STATUS OPTION screen.

To display **DIAGNOSTICS**: (diagnostic zone data), press the right arrow key and press **3**. Press the down arrow key twice. The first screen in a series of seven displays:

10.5.3. DIAGNOSTICS Screen 1: Sensor Data Register



NOTE: *Please refer to Section 8.10.2., Diagnostic Screen Overview for a complete list of values and definitions.*

DIAGNOSTIC INFO

x-PRESS :
x-P VOLT :
x-VAC P :

- PRESS is the current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below ambient.
- P VOLT is pressure sensor output voltage.
- VAC P is the current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below ambient.

Press the down arrow key to display the second screen:

10.5.4. Screen 2: Sensor Data Register

x-BOX T :
x-BOX V :
x-BNCH T :
x-BNCH V :

- BOX T is enclosure temperature in degrees C along with the raw voltage from the temperature sensor.
- BOX V is box temperature sensor output voltage.
- BNCH T is optical bench temperature in degrees C. The current IR sensor temperature in degrees C as well as the raw voltage coming from the temperature sensor itself. This value can range from ambient to ambient +15 degrees C.
- BNCH V is bench temperature sensor output voltage.

Press the down arrow key to display the third screen:

10.5.5. Screen 3: Sensor Data Register

x-AMB P :
x-BNCH Z :
x-BOX Z :

- AMB P is measured every purge cycle with the sample pump off and the manifold open. Its value is weather and altitude dependent and can range from 10.0 to 15.5 PSIA.
- BNCH Z is optical bench temperature in degrees C at last zero interval.
- BOX Z is box temperature in degrees C at last zeroing.

Press the down arrow key to display the fourth screen:

10.5.6. Screen 4: Sensor Data Register

```
x-PEAK C :  
x-PEAK V :  
x-AVG V :  
x-ZERO V :
```

- PEAK C is the current peak to peak A/D counts from detector.
- PEAK V is the current peak to peak voltage from detector.
- AVG V is the running average voltage from detector.
- ZERO V is the voltage measured at last zeroing and the IR sensor output that was stored during the last purge cycle.

Press the down arrow key to display the fifth screen:

10.5.7. Screen 5: Sensor Data Register

```
x-NOISE :  
x-AU :  
x-AVG AU :  
x-BNCH P :
```

- NOISE is the largest change in running average: 16-point running average of the noise portion of IR bench output. This reading is valuable mainly when refrigerant is NOT present.
- AU is the current absorbance value.
- AVG AU is the running average of absorbance level (Average Absorbency). In the absence of refrigerant, the absorbency is 0.000AU. When sampling refrigerants, its value varies proportionally with the refrigerant concentration.
- BNCH P is PPM in bench, based on zone gas selection (uncorrected).

Press the down arrow key to display the sixth screen:

10.5.8. Screen 6: Sensor Data Register

```
x-STPPPM :  
x-BNCH L :  
x-AMB L :
```

- STPPPM is PPM corrected to STP (1 atm, 25 degrees C).
- BNCH L is micromoles/liter in bench (uncorrected).
- AMB L is micromoles/liter corrected to ambient pressure.

Press the down arrow key to display the seventh screen:

10.5.9. Screen 7: Communication Statistics

```
SENT TRY NO  
1: <ct> <ct> <ct>  
2: <ct> <ct> <ct>  
3: <ct> <ct> <ct>
```

- SENT is total messages sent.
- TRY is number of retries needed for a message.
- NO is no response after all four tries.
- 1: <ct> <ct> <ct> is RLDS 1 count for each statistic.
- 2: <ct> <ct> <ct> is RLDS 2 count for each statistic.
- 3: <ct> <ct> <ct> is RLDS 3 count for each statistic.

Press the down arrow key to go back to the STATUS OPTION screen. Your changes are saved and the data is written. Statistics are cleared on reset.

11 RLDS Setup on REFLECS, E2, Einstein, and Supervisory Controllers

Dip switch 8 on the Gateway should be set to the OFF position for E2, Einstein, Supervisory controllers, and set to the ON position for REFLECS controllers.

11.1. REFLECS Setup for RLDS

Set dip switch 8 to ON and follow the steps for setting up RLDS units through the REFLECS controller interface:

1. Log on.
2. Press 7 for **Configuration** to reach the **CONFIGURATION** screen.

Input Definitions should be set here to show how the sensor control is linked to the zone. The number of devices and RLDS units are connected to the Gateway and enabled is the number of address slots the Gateway will use.

3. Press 1 for **Input Definitions** to reach the **INPUT DEFINITIONS** screen.
4. Pressing the down arrow several times will get you to the input list of **SENS01-48**. **Bd** (board) is the address of the Gateway, **Pt** (point) is the zone and allows you to define where the sensor input comes from.

The board number for the RLDS setup is the address of the Gateway. If there are three or less RLDS controllers connected to a Gateway, the Gateway address = the RLDS address. However, if there are more than three RLDS controllers, the second Gateway address will be the one entered for the board number, but the RLDS controllers are set 1 to 3 on the second Gateway.


5. Press 0 (zero) to go back to the **CONFIGURATION** screen.
6. Press 7 for **I/O Brd Setup** to reach the **I/O BOARD MENU** screen.
7. Press 2 to **Set Device #'s**.

The Gateway will react as three 16AI boards. The number of RLDS controllers plus the real number of 16AIs = the total number of 16AIs to enter in the next step:

8. At the **I/O BOARD DEVICE NUMBERS** screen, press the down arrow key to reach **Number 16AI Boards** and enter the number of how many 16AI boards and RLDS controllers there are. Press Enter.
9. Arrow down to the **I/O BOARD MENU** and press 0 (zero) twice to go back to the **MAIN MENU** screen.
10. Press 4 for **Sensor Control**.
11. Press 2 for **Setup**--up to 48 sensor control programs are allowed. Select one of the 48 units and press Enter to reach the **SENSOR SETUP** screen.
12. Press the right arrow to move to the **Name** field to change the name, and press the down or right arrow to move to the (sensor) **Type** field. Use the “.” and “—” keys to scroll through the options and select **IRLDS**.
13. Use the arrow keys to move off the active fields and press 0 (zero) twice to go back to the main screen.

11.2. E2 Version 3.01 and below Setup for RLDS (without Gateway)

Set dip switch 8 to OFF and follow the steps for setting up RLDS units through the E2 controller interface

1. Log in to the E2 with Level 4 access.
2. Press  **& 7 & 7 @ 2** - **Connected I/O Boards**

and Controllers.

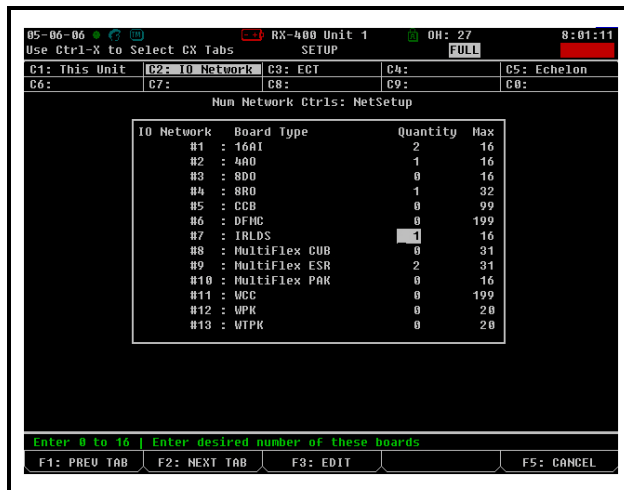


Figure 11-1 - Connected I/O Setup Screen

- Under the **I/O Network** tab, set the number of desired RLDS controllers under **IRLDS**.
- Press the key to return to the E2 home screen and save changes.
- Set the Gateway to 1. Each Gateway can handle three RLDS controllers, so if four RLDS controllers are on the network, two Gateways are needed. The first Gateway will be address 1 and the RLDS units are numbered as 1,2,3. The second Gateway will be addressed as 4, but the RLDS is set to 1 because all units on the Gateway are numbered sequentially 1 to 3. The RLDS controllers are always numbered 1 to 3 when connected to the Gateway.

To see a summary of RLDS controllers on the network:

- Press **5** - Configured Applications.

- Select **185**. for IR Leak Detection.

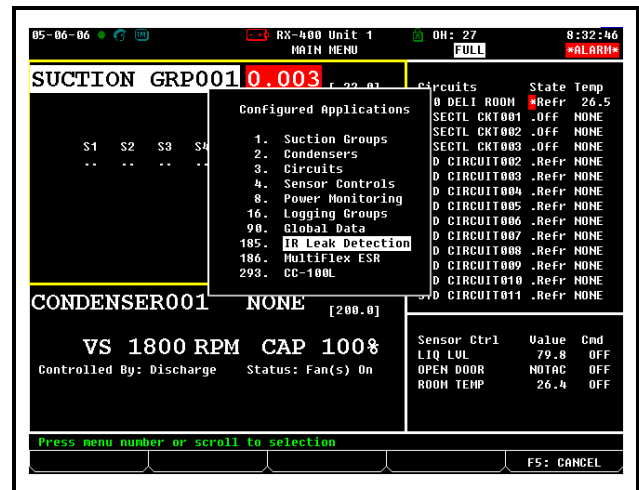


Figure 11-2 - Configured Applications

- The leak detectors are listed on the status screen. Press the down arrow to highlight a unit and **F5** to go the setup screen to enter channel, zone information, and more.

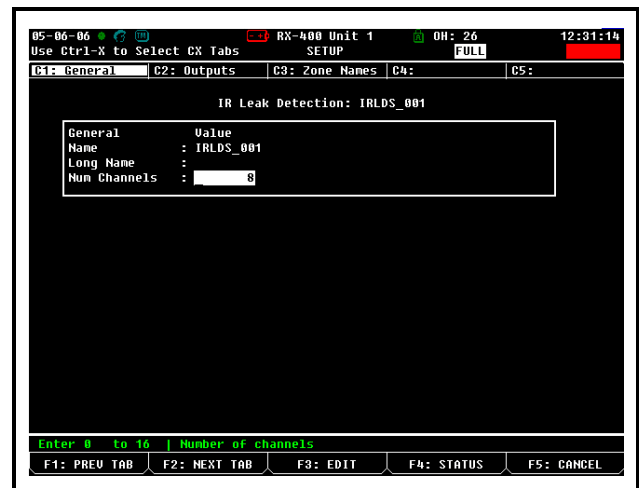


Figure 11-3 - RLDS Application Setup Screen

11.3. Einstein Setup for RLDS

Set dip switch 8 to OFF and follow the steps for setting up RLDS units through the Einstein controller interface:

1. Log on.
2. Press F8 for **ACTIONS**.
3. Press Y for **System Setup**.
4. Press 4 for **Network Status/Setup**.
5. Press 2 for **Connected I/O Boards & Controllers** to open the **Network Setup** screen.
6. Under **Boards on I/O Network**, set the RLDS number under **IRLDS Controllers**.
7. Press F9 **HOME** to go back to the Home screen.
8. Set the Gateway to 1. Each Gateway can handle three RLDS controllers, so if four RLDS controllers are on the network, two Gateways are needed. The first Gateway will be address 1 and the RLDS units are numbered as 1, 2, 3. The second Gateway will be addressed as 4, but the RLDS is set to 1 because all units on the Gateway are numbered sequentially 1 to 3. The RLDS controllers are always numbered 1 to 3 when connected to the Gateway.

To see a summary of RLDS controllers on the network:

1. Press F5 for **MORE**.
2. Press L for **Leak Detection**.
3. The leak detectors are listed under **See Summary**. Press the down arrow to highlight a unit and press Enter to show the summary of units listed.

The status screen for the selected RLDS controller is shown.

4. F8 for **ACTIONS**.
5. Press B for **Setup**--name the RLDS in the **Name** field.
6. Press the down arrow to the **Num Channels** field to add the number of zones.
7. Press F10 to go back and see the current status of the zones.

8. Press F9 **HOME** to go back to the Home screen.

11.4. Supervisory Controller Setup for RLDS

1. Click the **Control Inventory** icon.
2. Scroll down to the **Refrigeration** category and click **Add Control**.
3. Select **RLDS** to add an instance to the program.

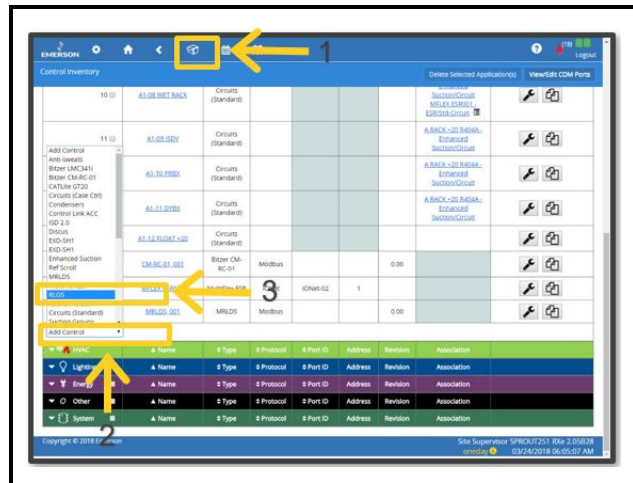


Figure 11-4 - Set up RLDS in the Supervisory Controller

11.4.1. Adding Application

1. Indicate the Name and association, Modbus port number and the address. Click **Update** or **Save Changes** to save.

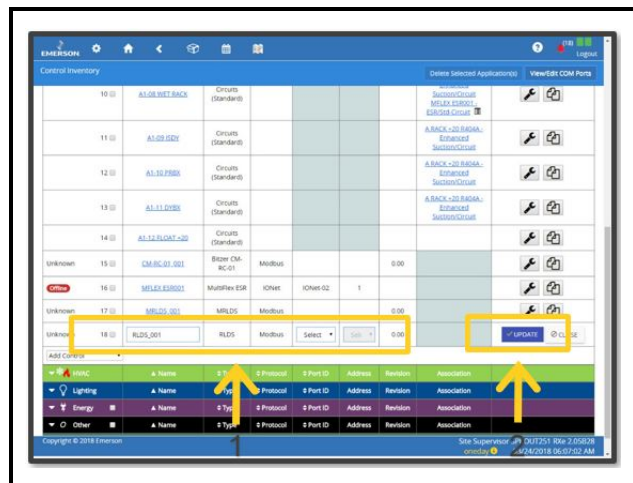


Figure 11-5 - Add the RLDS Application to the Supervisory Controller

11.4.2. Edit Application

1. Once the RLDS has been added, click the application name to view parameters.

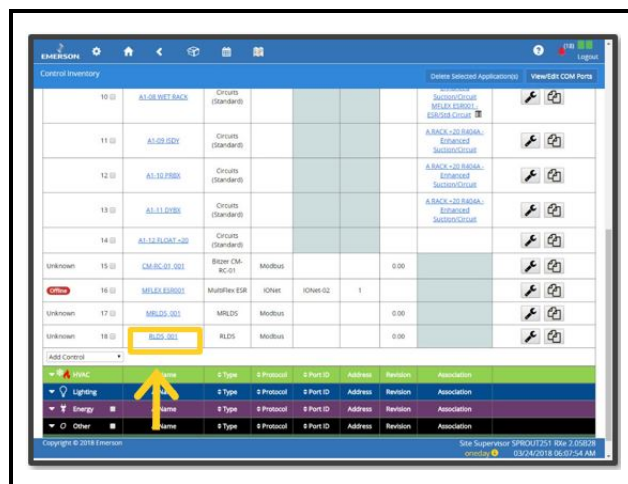


Figure 11-6 - Edit RLDS Application in the Supervisory Controller

11.4.3. General

1. Set up the RLDS Application by going to the **General** tab.
2. Click **Edit** button to configure the parameters.
3. Set the **Number of Zones**.

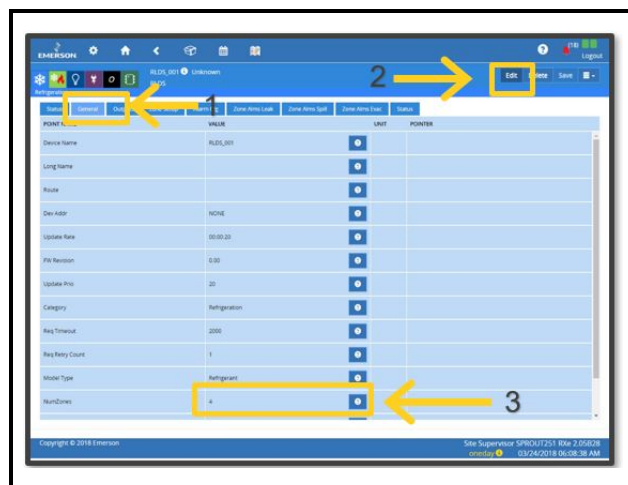


Figure 11-7 - RLDS Application General Tab

11.4.4. Zone Setup

1. Click **Zone Setup** tab.
2. Set the **Refrigerant Type**.

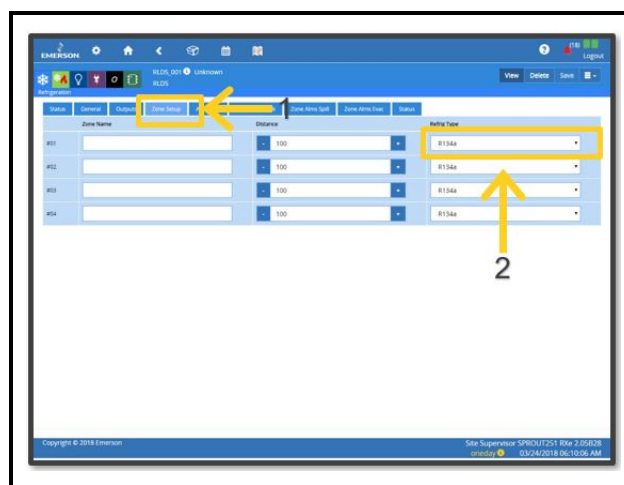


Figure 11-8 - RLDS Zone Setup Tab

11.4.5. Zone Alarms Leak/Spill/Evac

1. Click **Zone Alms Leak**, **Zone Alms Spill**, and **Zone Alms Evac** tab to configure the setpoints.
2. Set the Leak/Spill/Evac setpoint for each zone:
Default values are Leak = 100, Spill = 300, and Evac = 500.

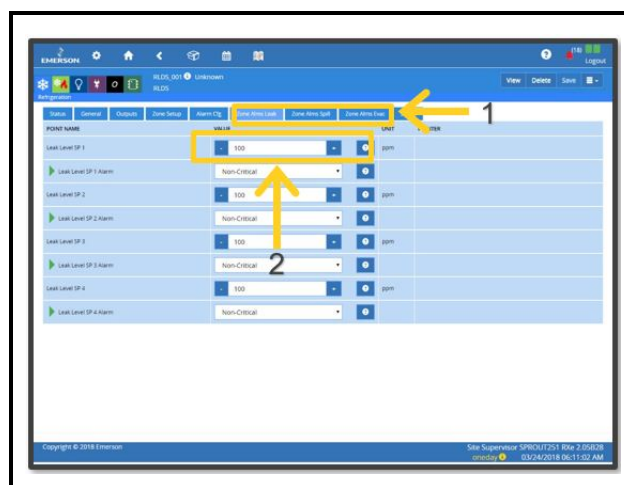


Figure 11-9 - RLDS Zone Alarms

12 RLDS Maintenance

12.1. Warnings and Cautions



WARNING: Shock hazard! Always disconnect the power supply before opening these enclosure of the monitor.



WARNING: The AC Power ground wire must first be connected to the monitor's ground stud. Under no circumstances should this monitor be operated without a protective ground. Doing so poses a potential hazard, and is a violation of electrical safety standards applicable to this type of equipment.



WARNING: Electrical installation should be performed by a certified electrician, and must comply with all applicable NEC/CEC and local safety codes.



IMPORTANT: The RLDS contains sensitive electronic components that can be easily damaged. Do not touch or disturb any components. Do not dislodge electrical wiring or pneumatic tubing.

12.2. Replacement Parts Overview



Part Name	P/N	Description
Charcoal Filter	275-0275	The charcoal filter removes refrigerant gas from the purge-air stream during the purging process. Replace the charcoal filter (P/N 275-0275) approximately every 6 months, when a zero filter fault occurs (fault code <0100>), or after the monitor has been exposed to unusually high levels of refrigerant gas, such as after an evacuation alarm. 
Hydrophobic Filter	572-0980	The hydrophobic filter prevents water from entering the IR detector. A zone flow fault will occur (fault code <0800>) if this filter becomes blocked. Replace the hydrophobic filter as required (P/N 572-0980). 
Air Line Tubing	270-4401 250ft 270-4402 500ft 270-4403 1000ft	The gas sample line and optional exhaust line should be periodically checked for obvious signs of kinks, damage and contamination. Replace the tubing as required.

Table 12-1 - Replacement Parts




Line End Filter Assembly	275-0242	<p>The gas-sample line filter and purge-line termination filters prevent dust and dirt from entering the monitor. Both of the filters should be periodically checked and replaced when there are obvious signs of contamination.</p> <ul style="list-style-type: none"> • A zone flow fault will occur (fault code <0800>) if the gas-sample line filter becomes blocked • A purge flow auto will occur (fault code <1000>) if the purge-line filter becomes blocked. <p>Remove the filter from the line and replace it with a new one.</p>	
Line End Filter	275-0315		
End-of-Line Water Stop	275-0315	<p>The end-of-line water stops prevent contaminants and moisture from entering the monitor. This filter should be periodically checked and replaced when there are obvious signs of contamination.</p>	
Water Trap	275-0234	<p>The water trap removes moisture that enters tubing before allowing it to enter the internal components of the RLDS unit. The water trap should be emptied often as condensate accumulates. The water trap filter should be periodically checked and replaced when there are obvious signs of contamination.</p>	
Fuses	275-0250	<p>The RLDS is protected from electrical damage by two, 1A, 250 V, type “F” fuses. Locate the fuse holders and carefully remove the fuses from their holders. Inspect and test the fuses with an ohm meter for continuity. Replace the fuses as required.</p>	
Clock Battery	204-0020	<p>The clock battery maintains the correct date and time when AC power is not applied to the monitor. Replace this battery approximately every 5 years. Battery shelf life is 10 years.</p>	
Sample Pump	275-0263	<p>The sample pump draws the gas sample into the monitor through the IR detector and discharges the sample via the exhaust port. To replace the pump, remove the inlet and outlet tubing, disconnect the AC power wires from the pump and remove the pump from the monitor. Install a new sample pump.</p>	
Intake Manifold Kit	275-1000	<p>Up to three additional intake manifolds (4 zones each) can be installed in the RLDS to increase the total capacity to 16 zones. Each manifold requires a 4-zone line end filter kit (275-0242). (Follow the instructions provided to install the manifolds. Then follow the instructions earlier in this manual to install the air lines and complete the zone programming steps. The RLDS setup must also be updated to recognize the new zones.)</p>	
4–20 mA DC Interface Board	275-0030	<p>The optional 4–20 mA DC Interface Board allows the operator to take advantage of the current loop interfaces provided for connection of external devices to the RLDS. The interface board plugs into the sockets provided on the valve/pump drive PCB, and the external devices are then cabled to the RLDS as described earlier in this manual.</p>	

Table 12-1 - Replacement Parts

12.3. Replacement Parts and Optional Accessories

Replacement Parts

Item Description	Part Number
RLDS 4 Zone, 5 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz	808-2004
RLDS 4 Zone, 5 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway	808-2005
RLDS 8 Zone, 9 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz	808-2008
RLDS 8 Zone, 9 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway	808-2009
RLDS 12 Zone, 13 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz	808-2012
RLDS 12 Zone, 13 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway	808-2013
RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz	808-2016
RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway	808-2017
RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz	808-2018
RLDS Gateway	810-3760
RLDS 4 Zone Expansion Kit	573-0000
Filter: Hydrophobic (Internal)	572-0980
Filter: Charcoal, Zero Air	275-0275
Filter: End of Line – Assembly (Termination/gas sample line)	275-0300
Filter: End-of-Line (Filter Only)	275-0315
Filter: End-of-line water stop	275-0233
Charcoal Filter Mounting Bracket	275-0236
Fuse: 1.0 A, 250 V, Type “F”	275-0250
Replacement Pump	275-0263
Tubing: ¼ in OD (For HGM and CO2; by the foot)	270-0810
IR Bench Replacement Kit (HGM)	275-0254
IR Bench Replacement Kit (CO2)	275-0291
Universal Power Supply	275-0259
Main PC Board Replacement	275-0261
Key Pad PC Board	275-0251
Display PC Board	275-0258
Power Entry PC Board	275-0259
Solenoid Valve Manifold Drive PC Board	275-0256
5 Port Solenoid Block (for HGM and CO2: Zones 1-4 and purge port)	275-0252
4 Port Solenoid Block (for HGM and CO2: Zones 1-4)	275-0253

Optional Accessories

Item Description	Part Number
Interface Board, 4-20 mA	275-0030
Variable Flow Regulator	275-0283
Four Zone Expansion Kit (must order filters 275-0300 in conjunction with kit)	573-0000
Four Zone End-of-Line Filter Kit	275-0300
Splitter Kit (2-way)	275-0304
Splitter Kit (3-way)	275-0305
Annual Maintenance Kits	
4 Zone (5 line end filters, 1 charcoal filter, 1 hydrophobic, 3 end-of-line water stop filters)	275-0237
8 Zone (9 line end filters, 1 charcoal filter, 1 hydrophobic, 3 end-of-line water stop filters)	275-0238
12 Zone (13 line end filters, 1 charcoal filter, 1 hydrophobic, 3 end-of-line water stop filters)	275-0239
16 Zone (17 line end filters, 1 charcoal filter 1 hydrophobic 3 end-of-line water stop filters)	275-0240
Gases	
R-22 Gas Cylinder, 100 PPM	275-0284
R-134a Gas Cylinder, 100 PPM	275-0285
R-123 Gas Cylinder, 100 PPM	275-0286
R-22 Gas Verification Kit	275-0280
R-134a Gas Verification Kit	275-0281
R-123 Gas Verification Kit	275-0282
Water Traps	
Manual Drain Water Trap	275-0234
Manual Drain Water Trap Replacement Filter	275-0235
Manual Drain Water Trap Mounting Bracket	275-0236

12.4. Troubleshooting

Certain critical faults may be corrected by checking and adjusting the detector voltage and/or emitter power. These faults include:

- CLIPPING FAULT <8000>
- REZERO VOLT TOL <4000>
- OVER RANGE DETECTED <2000>
- GAIN SET FAULT <0200>

To troubleshoot any of the above faults, use the procedure listed below.

1. With the monitor in either Warm Up Mode (flashing green LED) or Sampling Mode (solid green LED), access the Setup Menu by pressing the **ENTER** key twice.
2. Scroll to the bottom right of the screen to select the “Service Mode Entry” option.
3. With the “Service Mode Entry” option highlighted, press **ENTER** twice to enter Service Mode.
4. Scroll to the “SYSTEM” option and press **ENTER**.

5. Scroll to the “MORE” option and press **ENTER**. Note that “MORE” will flash when it is selected.
6. Scroll to and select the “IR DIGIPOT” option (see below) and press **ENTER**.
7. Use the UP and DOWN arrows to adjust the MW reading to 450 (or as close as possible). When at the proper value, press ESC once.

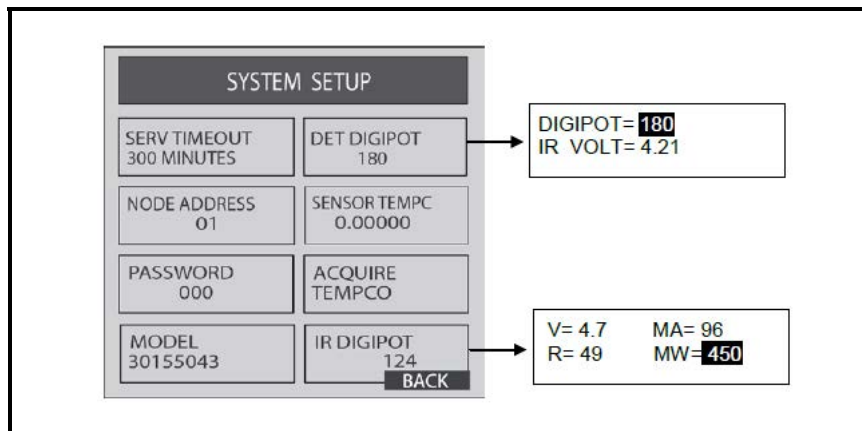


Figure 12-1 - Sample DIGIPOT Readings

8. Scroll to “DET DIGIPOT” option (see above) and press ENTER.
9. Use the UP and DOWN arrows to adjust the IR VOLT reading to 4.20 (or as close as possible). When at the proper value, press ESC once.



IMPORTANT: If IR VOLT does not reach 4.200 ± 0.100 volts when adjusting the DIGIPOT, return to step 6 to lower the IR emitter setting. If the IR emitter setting is 450 ± 20 mW, adjust the new IR emitter setting to 375 ± 20 mW. Repeat step 8 with the new IR emitter setting.

10. Press **ESC** to save.
11. Press **ESC** to get to the System Menu. Scroll to Service Mode and press ENTER twice to leave Service Mode. Press ESC once and allow the instrument to complete a pressure check and purge cycle (approximately 2 minutes).

If the faults cannot be cleared using the above procedure, call the factory for further assistance.

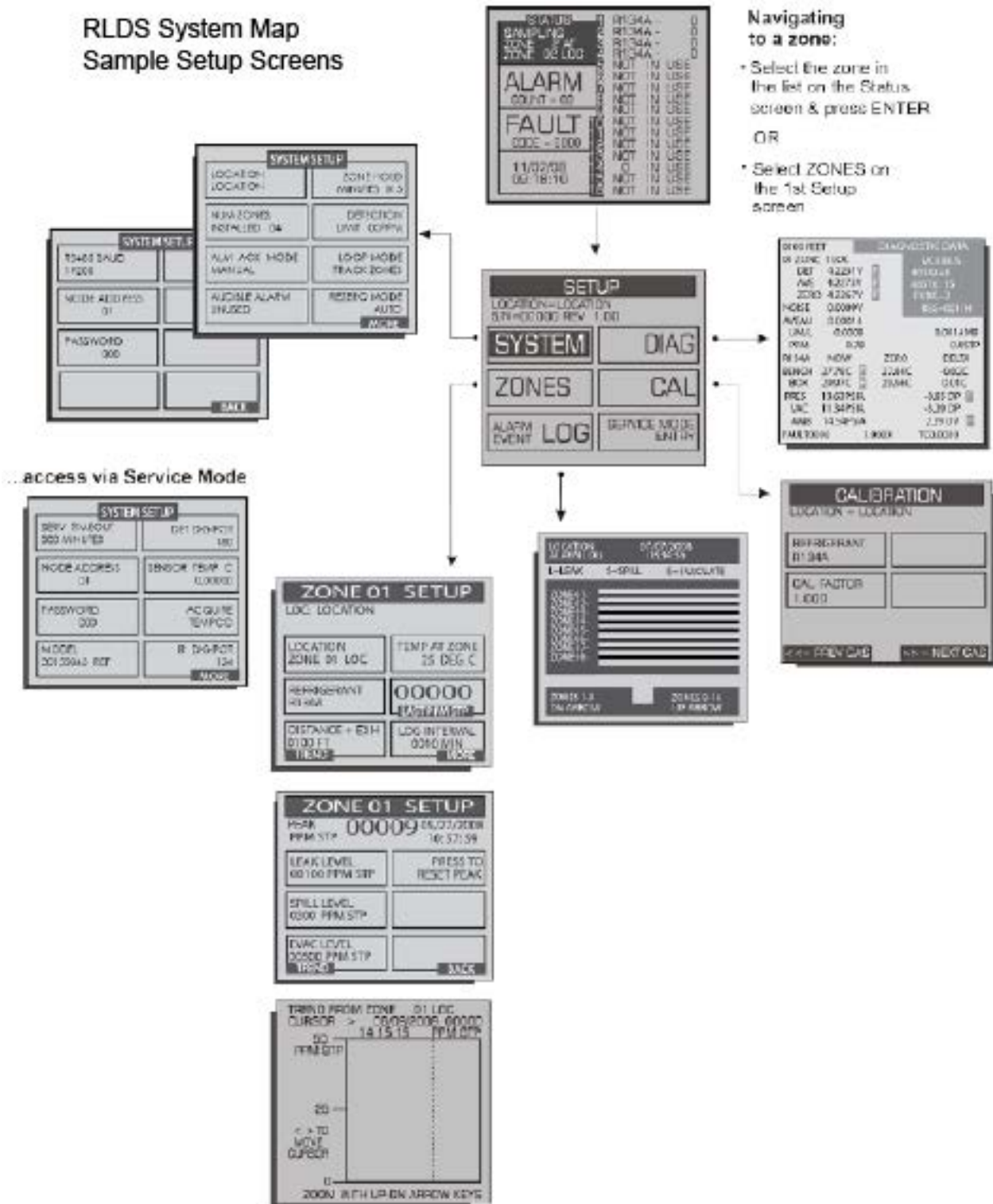
Appendix A: Recommended Refrigerant Gas Alarm Settings

Gas	Alarm Settings (PPM)		
	Leak	Spill	Evacuate
CO ₂ /R-744	1500	2000	3000
FA188	100	300	500
FC72	100	300	500
H1301	100	300	500
H1211	100	300	500
H2402	100	300	500
H1234YF	100	300	500
HFP	100	300	500
N1230	100	300	500
NH ₃ /R-717	50	150	300
R-11	100	300	500
R-12	100	300	500
R-21	100	300	500
R-22	100	300	500
R-23	100	300	500
R-32	100	300	500
R-113	100	300	500
R-114	100	300	500
R-123	25	35	50
R-124	100	300	500
R-125	100	300	500
R-134A	100	300	500
R-227	100	300	500
R-236FA	100	300	500
R-245FA	100	300	500
R-401A	100	300	500
R-402A	100	300	500
R-402B	100	300	500
R-404A	100	300	500
R-407A	100	300	500
R-408A	100	300	500
R-407C	100	300	500

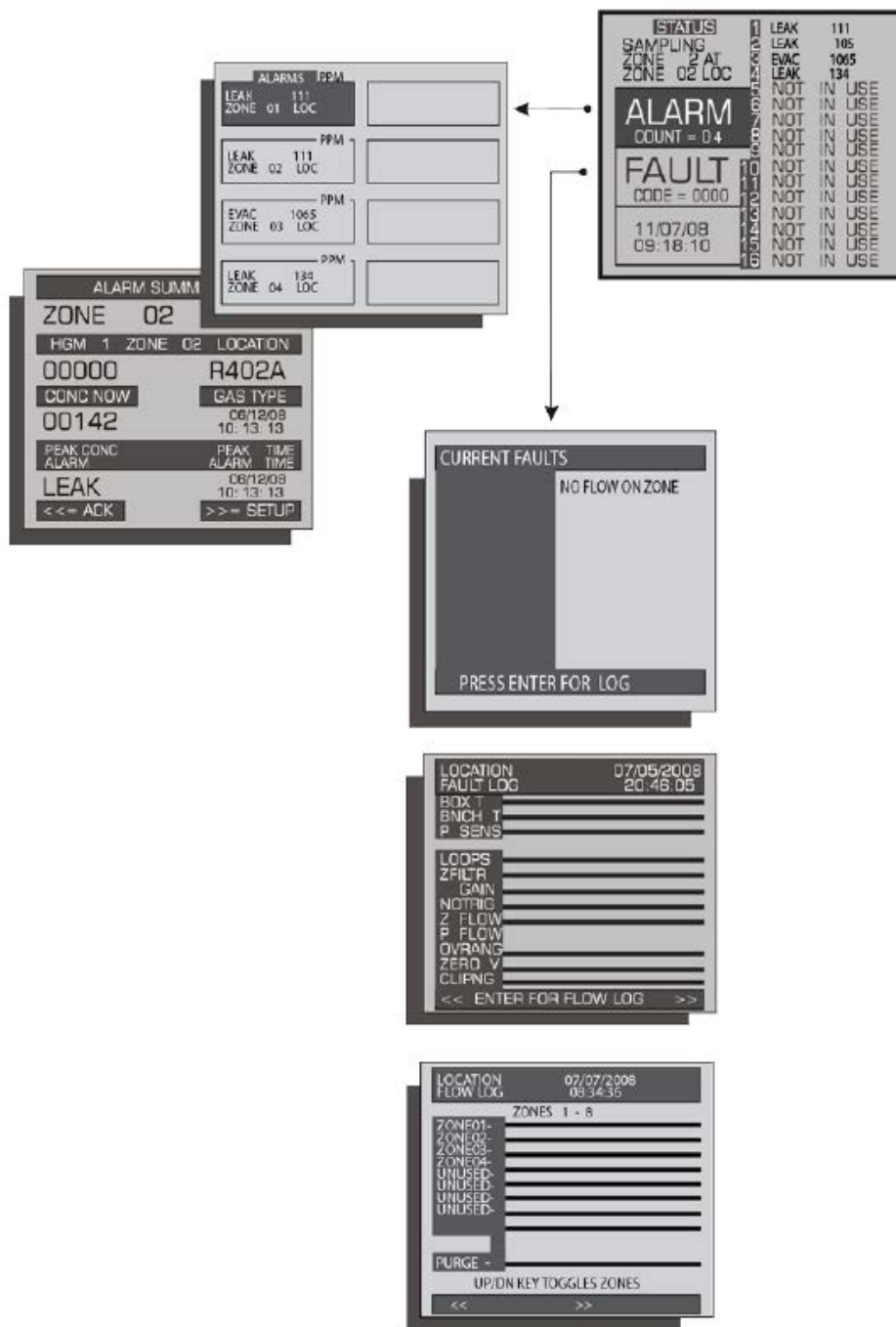
Table 10-2 - Recommended Alarm Settings and Gas Enumeration

R-409A	100	300	500
R-410A	100	300	500
R-422A	100	300	500
R-422D	100	300	500
R-424A	100	300	500
R-426A	100	300	500
R-427A	100	300	500
R-438A	100	300	500
R-500	100	300	500
R-502	100	300	500
R-503	100	300	500
R-507	100	300	500
R-508B	100	300	500
R-717/NH ₃	50	150	300
R-744/CO ₂	1500	2000	3000
H1234ZE	100	300	500
R407F	100	300	500
N7100	75	200	300
N7200	25	50	100
N7300	10	20	50
N7600	3	5	8

Table 10-2 - Recommended Alarm Settings and Gas Enumeration

RLDS System Map
Sample Setup Screens

RLDS System Map Sample Alarm and Fault Screens



Navigating to a zone:

- Select the zone in the list on the Status screen & press ENTER
- OR
- Select ZONES on the 1st Setup screen

Index

-A-

- Accessories 8
- Additional Features 39
- Air Lines 10
- Alarm Conditions 44
- Alarm Detail Screen 45
- Alarms 44

-B-

- Baud rate 23
- Baud Rate Dip Switch Setting 23
- Board Number Dip Switch Setting 22

-C-

- Calibration Factor 51
- Calibration screen 50
- Clearing System Faults 48
- CO2 51
 - Atmospheric Concentration 51
 - Hardware Specifications 7
- Connecting Gateway Board to E2, Einstein, or REFLECS Network 21
- Connecting to a Site Controller 21
- Controller Interface Setups for RLDS 68
 - E2 68
 - Einstein 70
 - REFLECS 68

-D-

- Default Settings 48
- Diagnostic screen 53
- Digipot (IR) 40
- Dip switch settings 22

-E-

- E2 Connection 21
- Einstein Connections 21
- Electrical Wiring 14
- Exhaust Line 11

-F-

- Fault Conditions 44
- Fault Definitions (Critical) 47
- Fault Definitions (Non-Critical) 48

- Faults (System) 46
- Fusing 2

-G-

- Gas Alarm Settings 77
- Gateway Addressing 22
- Gateway board 19
- Gateway Board Communications 19
- Gateway Board LEDs 24
- General Operation 42
 - Home Screen 2 43
- General Operation of UI
 - Alarms 44
 - Current Detection Reading 43
 - Distance 42
 - Evacuation Level 43
 - Fault Conditions 44
 - Functional Overview 46
 - Home Screen 2 43
 - Leak Level 43
 - Location 42
 - Log Interval 43
 - Overview 42
 - Refrigerant Type 42
 - Spill Level 43
 - Zone Screen 42

-H-

- Hand-Held Terminal 59
 - special keys 59
- Hand-Held Terminal Quick Setups 55
 - control status screen 58
 - status option screen 57
 - time/date 55
 - zone status screen 57
 - zones 55
- Hand-Held Terminal Screens 60
 - control status 66
 - sensor data register screens 66
 - status option 65
 - time/date 64
 - zone status 65
- Home Screen 2 43

-I-

- Installation 4, 8

Installation Considerations

inspection 8

Interior diagrams 14

-L-

Location of Monitor 8

-M-

Monitoring Levels 4

Multiple Refrigerants 4

-N-

Node Address Setting, see Node Address 20

-P-

Password 39

Placement in Mechanical Room 5

Programming the RLDS 35

Alarm Acknowledge (ACK) Mode 36

Audible Alarm 37

DET Digipot 39

Location 36

Loop2 Factor 37

Node Address 38, 40

Number of Zones 36

Password 39

Power-up 35

Re-Zero Mode 38

Setup Screen 1 35

Setup Screen 2 36

Setup Screen 3 38

Zone Hold Mode 37

Purge Line 11

-R-

REFLECS Connection 21

RS485 I/O Termination Jumpers 23

-S-

Safety Precautions 1

Sample Intake Lines 11

Sampling Points 4

Screw Locations 9

Setup Screen 1 35

Setup Screen 2 36

Setup Screen 3 38

Specifications 6

-T-

Termination switch settings 20

Terminator Settings 20

Tubing Considerations 10

-W-

Warning and Caution Statements 2

Warnings and Cautions 8, 15

Wire Connection 21

-Z-

Zone Hold Mode 37

Zone Screen 42

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