



FMS USER GUIDE

RLE TECHNOLOGIES



FALCON FMS

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The following information is located on the bottom of each Falcon FMS unit.
Please have this information available whenever a technical support call is placed:

Product Model Number _____

Product Serial Number _____

Product Manufacture Date _____

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CHAPTER 1: SYSTEM OVERVIEW

1-1 PRODUCT DESCRIPTION

The Falcon Monitoring System (FMS) is a comprehensive system which provides additional equipment protection by monitoring critical operating parameters in enterprises, remote network facilities, communication rooms, remote and unmanned facilities, and critical support systems. The FMS is a stand alone system. It operates via embedded “firmware” that handles all data collection, alarm reporting, and multiple concurrent communication mediums.

The FMS typically monitors analog and dry contact outputs from devices such as temperature sensors, humidity sensors, gas detectors, smoke detectors, fire suppression systems, surveillance products (e.g., IP cameras), leak detection systems, power monitoring systems, uninterruptible power supplies (UPSs), power distribution units (PDUs), generators, DC power plants, commercial power, HVAC units, ATS, TVSSs, and access keypads.

The FMS performs internal diagnostics that check the Flash Program code, serial ports, RAM, non-volatile RAM, real-time clock, internal power supplies, relay drivers, analog to digital converter (ADC), and modem. During operation, the FMS monitors its status and uses several LED indicators to report its condition.

The FMS embedded firmware enables system configuration, I/O setup, status inquiries, alarm reports, data logs, and troubleshooting. The FMS is menu driven and operates with any Web browser, ASCII terminal, or terminal emulation application (e.g., HyperTerminal).

1-2 FRONT PANEL INDICATORS AND CONTROLS



Expansion Card Relay Status LEDs

- Green (On) if the relay is active—for Expansion Card A only.

Network LEDs – Two Network Status LEDs

- Link - Green if network link is established. Red if there is no connection.
- Active – Green (On) if transmitting or receiving data.

Communications LEDs – Four Modem Status LEDs

- TX – Green (On) if information is being transmitted.
- RX – Green (On) if information is being received.
- OH – Green (On) if the Modem detects a dial tone (off hook).
- CD - Yellow (On) if a carrier is detected.

System Status LED

- Flashes Red ten times per second during the initial boot up of the FMS, which is approximately 45 seconds. If the initial boot up fails, the LED continues to flash. This indicates a condition that requires service; users must contact RLE for more information. After the boot up, this LED turns off if no alarms are present, or turns solid if the unit is in an alarm condition.

Power LED – Green (On) if power is on.

System Power Switch – Used to turn power to the unit on and off.

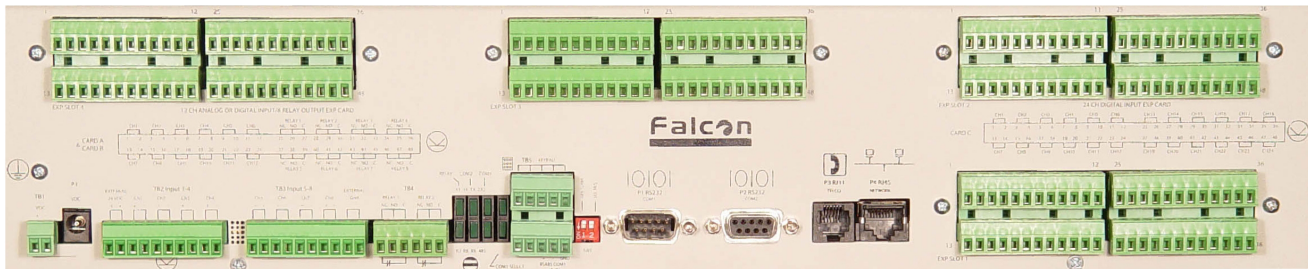
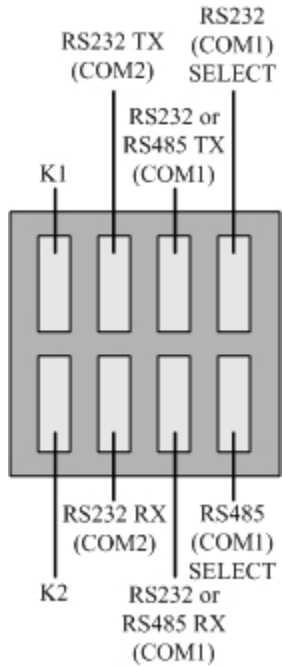
1-3 TERMINAL BLOCK DESIGNATIONS

Figure 1-1: Terminal Block Designations

TB1-1	(+) Input for 24 or 48VDC (optional) power	TB4-1	Relay 1 normally closed (NC)
TB1-2	(-) Input for 24 or 48VDC (optional) power	TB4-2	Relay 1 normally open (NO)
P1	24VDC wall adapter input (center +) (not available with 48VDC version)	TB4-3	Relay 1 common (C)
TB2-1	24VDC positive (+) external output (power for sensors)	TB4-4	Relay 2 normally closed (NC)
TB2-2	24VDC positive (+) external output (power for sensors)	TB4-5	Relay 2 normally open (NO)
TB2-3	Channel 1 positive (+)	TB4-6	Relay 2 common (C)
TB2-4	Channel 1 negative (-)	TB5-1	Keypad column 1
TB2-5	Channel 2 positive (+)	TB5-2	Keypad column 2
TB2-6	Channel 2 negative (-)	TB5-3	Keypad column 3
TB2-7	Channel 3 positive (+)	TB5-4	Keypad row 1
TB2-8	Channel 3 negative (-)	TB5-5	Keypad row 2
TB2-9	Channel 4 positive (+)	TB5-6	Keypad row 3
TB2-10	Channel 4 negative (-)	TB5-7	Keypad row 4
TB3-1	Channel 5 positive (+)	TB5-8	COM1 EIA485 positive (+) (configurable)
TB3-2	Channel 5 negative (-)	TB5-9	COM1 EIA485 negative (-) (configurable)
TB3-3	Channel 6 positive (+)	TB5-10	EIA485 ground
TB3-4	Channel 6 negative (-)	SW1-1	Unit EIA485 termination switch
TB3-5	Channel 7 positive (+)	SW1-2	Reserved for future use.
TB3-6	Channel 7 negative (-)	P2	COM1 EIA232 male DB9 pin connector (configurable)
TB3-7	Channel 8 positive (+)	P3	COM2 EIA232 female DB9 pin connector - craft port
TB3-8	Channel 8 negative (-)	P4	RJ-11 telephone line connector
TB3-9	24VDC ground external output (power for sensors)	P5	RJ45 Ethernet 10BaseT connector
TB3-10	24VDC ground external output (power for sensors)		

1-4 REAR PANEL INDICATORS

The rear panel of the FMS houses a series of green LEDs. The chart below tracks indicator status when the corresponding green LED is illuminated:



Status	Indicator
K1 (Output Relay)	Relay is energized.
EIA232 TX (COM2) Interface	Data is being transmitted.
EIA232 or EIA485 TX (COM1) Interface	Data is being transmitted.
EIA232 (COM1) Select Interface	EIA232 selected (P2)
K2 (Output Relay)	Relay is energized.
EIA232 RX (COM2) Interface	Data is being received.
EIA232 or EIA485 RX (COM1) Interface	Data is being received.
EIA485 (COM1) Select Interface	EIA485 selected (TB5)

Figure 1-2: Rear Panel Indicators

1-5 SW1 SWITCH SETTINGS

- SW1-1: EIA485 Termination switch should be in the down position (ON) if the FMS is an end device on an EIA485 network.
- SW1-2: Reserved for future use.

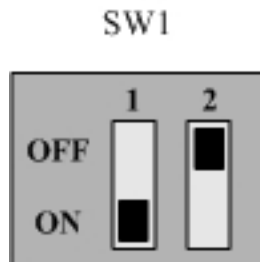


Figure 1-3: SW1 Switch is in the down position (ON) and SW2 switch is in the up position (OFF)

CHAPTER 2: GETTING STARTED

In order to get the FMS working, users must install the unit, wire and connect the power, and set the IP address. Any accessories for the FMS should also be connected at this time (e.g., keypad connection, Modbus connections, Expansion Cards, etc.)

2-1 INSTALLATION

The Falcon FMS comes in a 19 inch (.48m) rack mount enclosure. Install the FMS in the rack. Use the proper anchoring method to mount the unit securely. Supply either 24VDC (standard) or 48VDC (optional) to the unit.



WARNING!!

Units have different model numbers. Before applying power to the unit, verify the model number and power rating located on the back of the unit. The voltage indicator is the last number on the unit model number. The FMS will either be a 24VDC or a 48VDC.

2-2 FALCON FMS WIRING

RLE Technologies recommends an 18AWG stranded copper wire for connection from each monitored point to a terminal block (TB) connection on the FMS. RLE recommends no more than 500 feet (152.4m) of wire at this specification. If longer runs are needed, please contact RLE Technologies for application guidance. Shielded twisted pair wiring is recommended for analog signal transmitters being wired outside of conduit runs and dropped ceiling applications.

2-2.1 Power Supply and Ground Connections

Connect an 18AWG ground wire from the ground terminal to a suitable earth ground. For 24VDC model FMS, plug the wall adapter into P1 and a UPS outlet as shown below. The wall adapter has a 5 foot (1.524m) power cord. RLE Technologies recommends powering the FMS from a UPS supply to allow the FMS to send alarm notification during a power outage.

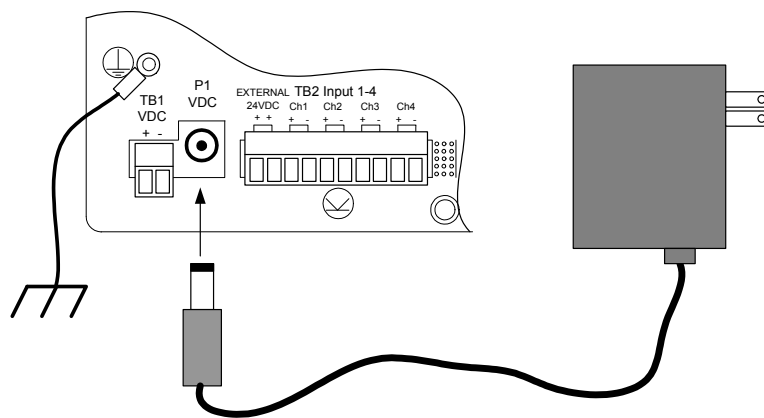


Figure 2-1: 24VDC Power Supply Connection

For a 48VDC model FMS, connect a 48VDC supply through a circuit breaker to TB1 as shown below. In telecommunications applications, the 48VDC supply is typically connected to the 48VDC battery system through a DC distribution panel.

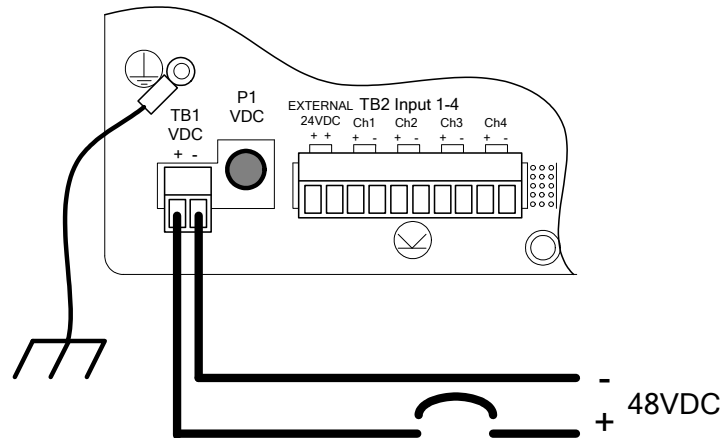


Figure 2-2: 48VDC Power Supply Connection

2-2.2 Universal Input Connections

The eight non-isolated universal inputs are connected to TB2 and TB3. Universal input channels can be individually configured through the FMS to monitor a 4-20mA signal, a Normally Open (NO) dry contact, or a Normally Closed (NC) dry contact; see

Figure 2-3 for examples of typical sensor wiring. Refer to APPENDIX D: FMS Accessories Wiring on page 109 for further details on wiring other RLE accessory sensors.

Some temperature and humidity sensors have internal jumper settings that may be used to select sensor range and output voltage or current. Jumper settings should be set before power is applied to the equipment. **The sensor range (50-95°F, 22-122°F, etc.) should be documented at this time.** The sensor range is required to determine the gain and offset settings when configuring the input through software.

**NOTE:**

The Falcon has 24VDC available (TB2-1, TB2-2 +24VDC, TB3-9, TB3-10 24VDC comm.) to power external sensors. The 24VDC external supply is internally fused at 300mA.

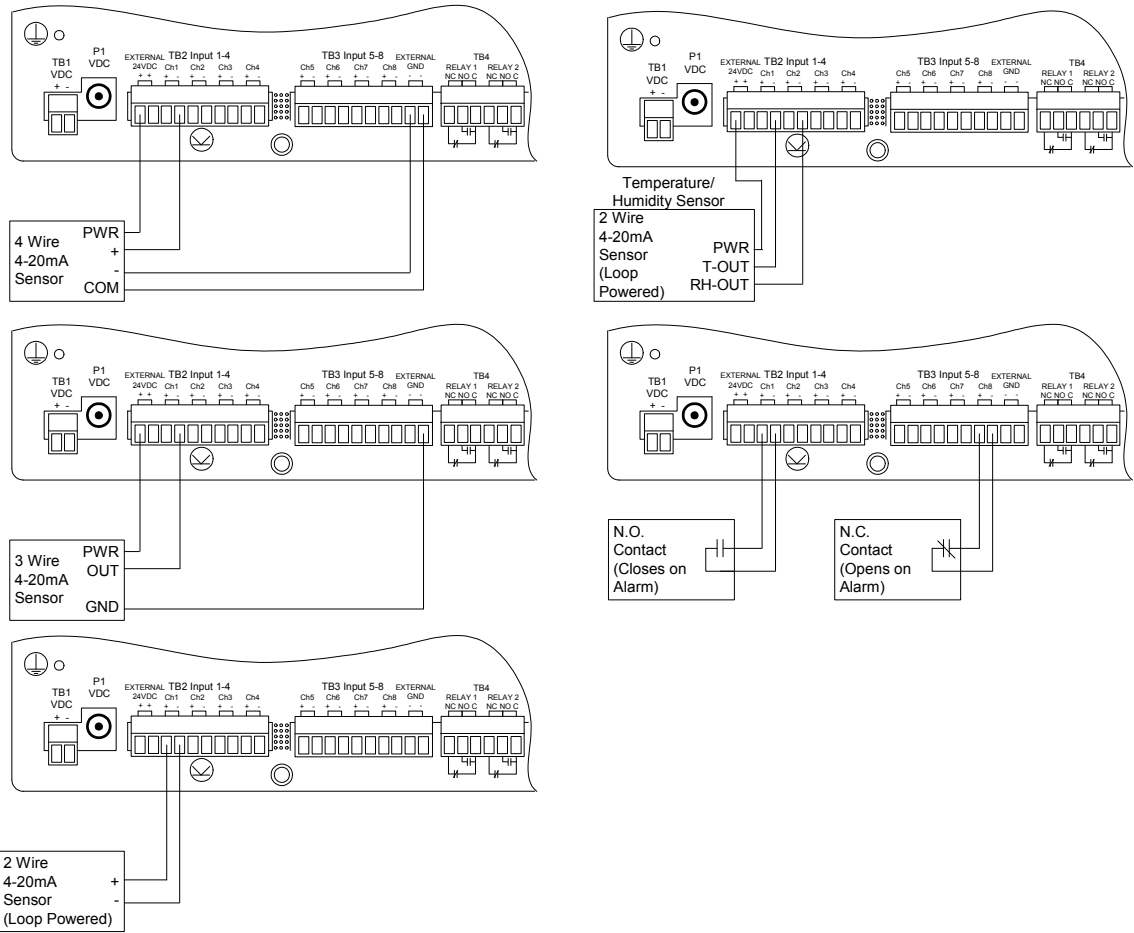


Figure 2-3: Universal Input Wiring Examples

Some equipment may have several dry contact outputs with a Common Ground. Connect this equipment as shown in Figure 2-4 below.

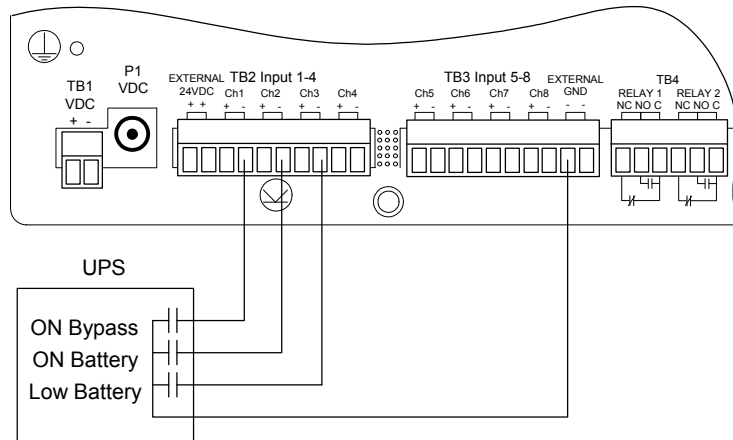


Figure 2-4: Dry Contact Inputs with Common Ground

2-2.3 Relay 1 and 2 Connections

Relay outputs may be used to unlatch doors, signal annunciators, signal IP cameras, and to turn on auxiliary equipment such as exhaust fans. Relay outputs are Form C (SPDT). Refer to specifications in APPENDIX D: FMS Accessories Wiring on page 109, for relay contact ratings. Relays may be configured, through the

FMS for Normally Open (NO—unsupervised or normally de-energized), or Normally Closed (NC—supervised or normally energized) operation; see Figure 2-5: Relay Output Wiring Examples for examples.

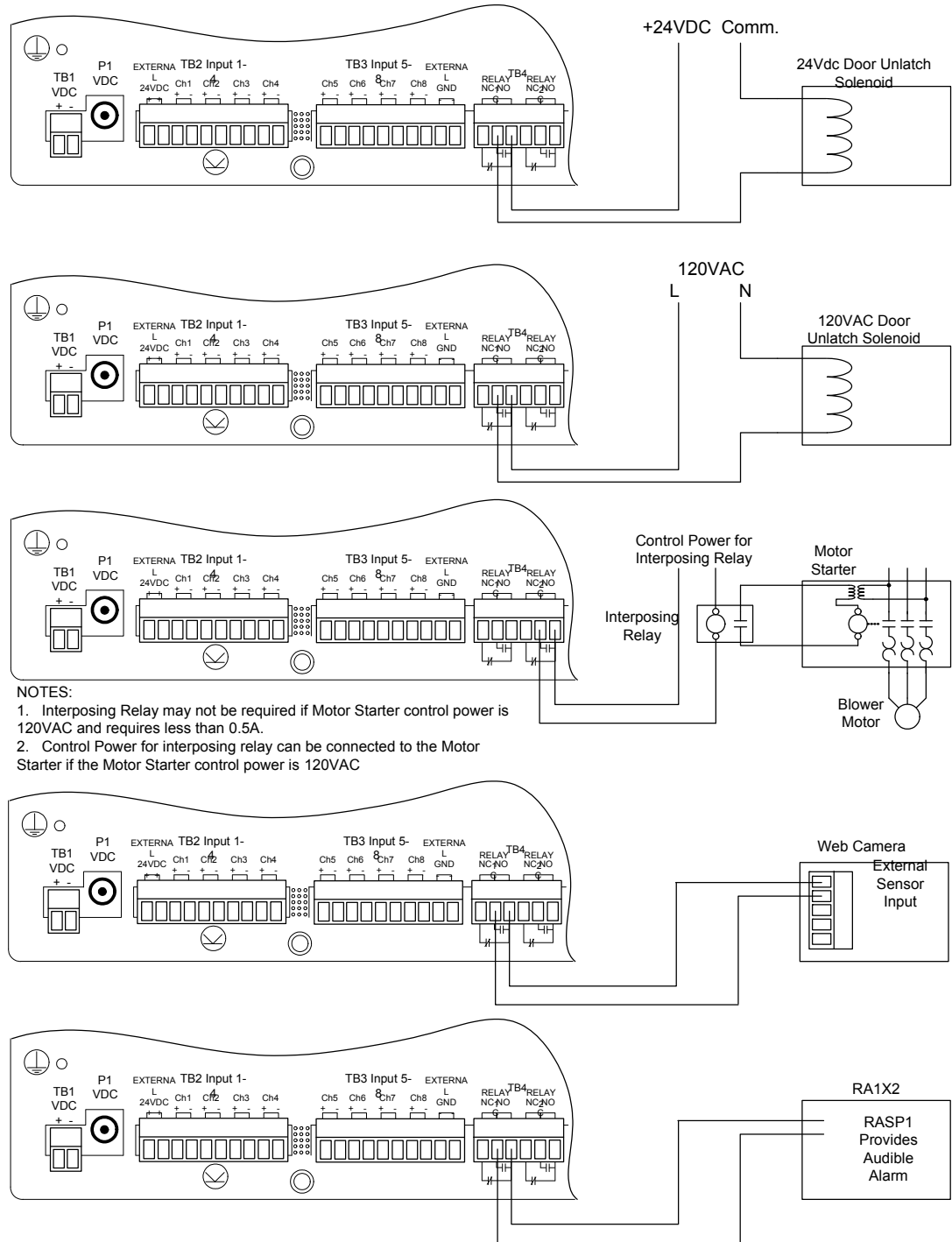


Figure 2-5: Relay Output Wiring Examples

2-2.4 Keypad Connection

The FMS has a 3 x 4 keypad interface. Entering a user code, configured through software, can activate a relay output which unlatches a door and allows an individual to enter the secure area. Entering the correct user code can also trigger a relay output to signal an IP camera to snap a picture and email it to a predefined recipient. Connect the keypad as shown in Figure 2-6. For more information on configuring the keypad function, see section 3-17 Keypad/DTMF Access Users on page 45.

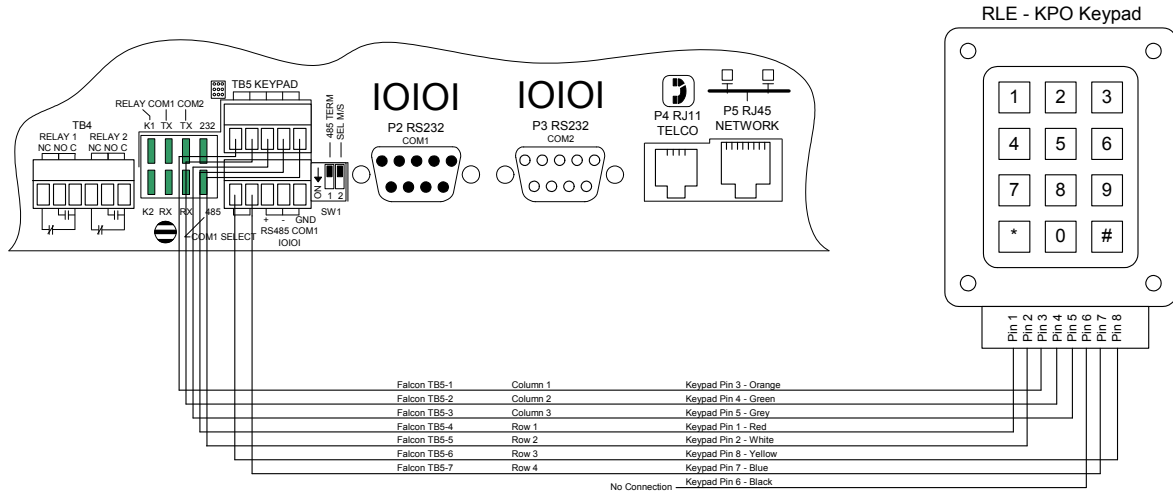


Figure 2-6: Keypad Wiring

2-2.5 EIA232 COM2 Connection

The EIA232 port can be connected to a PC for IP configuration, firmware downloads, and troubleshooting. It is typically a temporary connection. Connect the straight through, 9-pin, cable as shown in Figure 2-7.

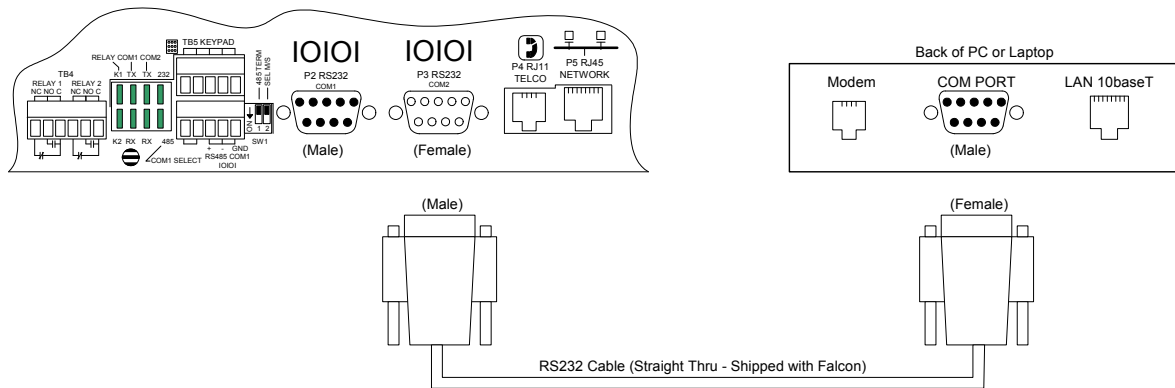


Figure 2-7: EIA232 COM2 Connection

2-2.6 RJ11 Phone Line Connection

The FMS contains an internal modem for dial in and dial out capabilities. The modem can be used for:

- Email notification through an Internet Service Provider (ISP).
- Remote connection to accomplish a variety of tasks, including: viewing alarms, changing IP configurations, and acknowledging alarms.
- Remote alarm acknowledgment and access through DTMF. This allows a user to dial the FMS from a touch tone telephone—standard phone or cell phone—and enter an acknowledgment code or access code.

- Pager notification to text, numeric pager or alpha-numeric pager (TAP changer). Text and numeric pagers do not use a TAP changer.

2-2.7 RJ45 Ethernet Connection

The FMS has an internal 10BASE-T Ethernet port used to configure and monitor the FMS. The Ethernet port supports Web browser access, email (SMTP), BACnet slave, Modbus slave, SNMP and when the EXP-MBCS option is installed, BACnet master and Modbus master. Figures 2-8 and 2-9 show the physical connections. Figure 2-8 shows a direct connection between the FMS and a PC using the crossover cable supplied with the FMS. Figure 2-9 shows a typical FMS connection on a subnet using a hub or switch and straight through CAT5 cables.

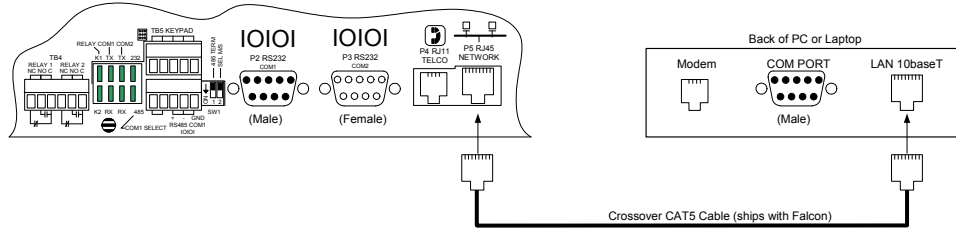


Figure 2-8: FMS Ethernet Connection to a PC using a Crossover Cable

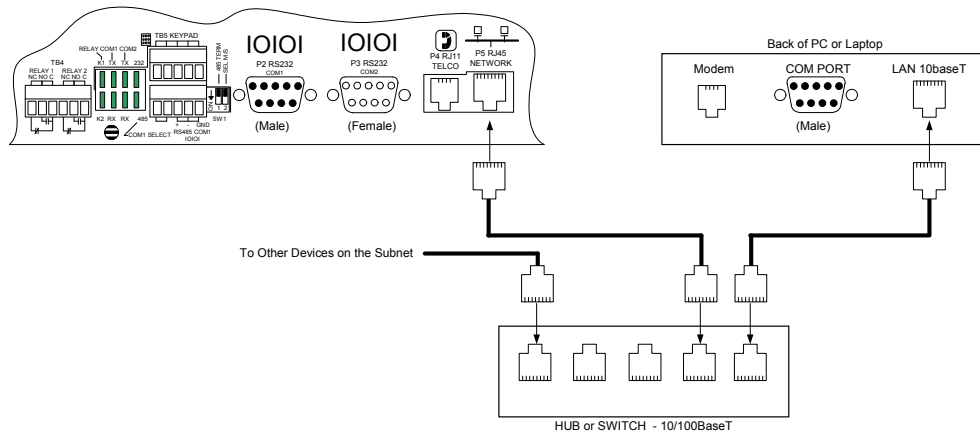


Figure 2-9: FMS Ethernet Connection to a PC on a Sub-Net

2-2.8 Modbus EIA485 Connections

The FMS can function as a Modbus Master or Slave over an EIA485, 2-wire hardware connection. The EXP-MBCS option is required to allow the FMS to function as a Modbus Master. This option must be set at the factory for an FMS to have Modbus capabilities.

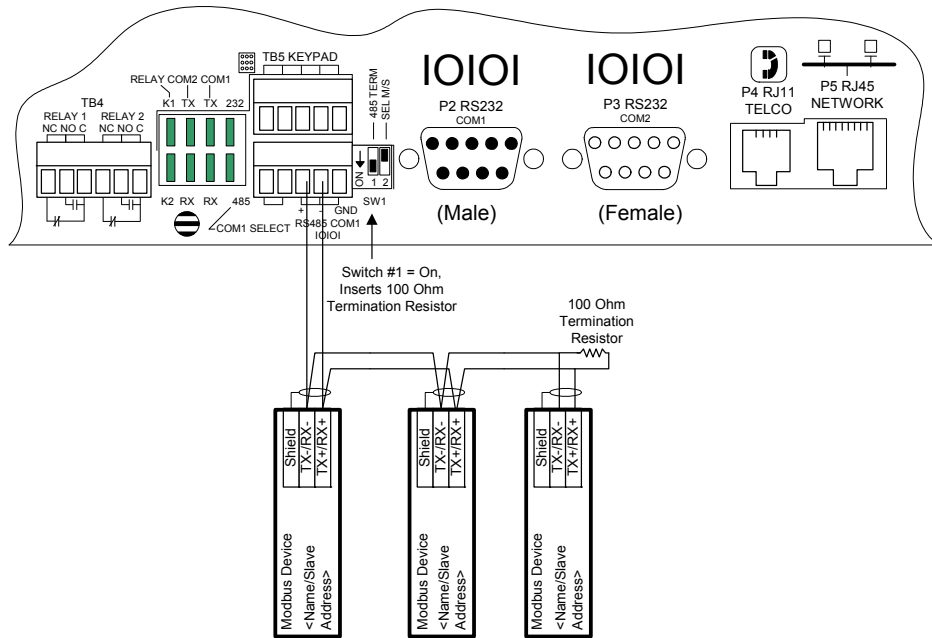


Figure 2-10: FMS EIA485 Connection

2-2.9 Modbus EIA232 Connections

The FMS can function as a Modbus Master or Slave over an EIA232 hardware connection. The EXP-MBCS option is required to allow the FMS to function as a Modbus Master. The EIA232 port is configured as a DTE device.

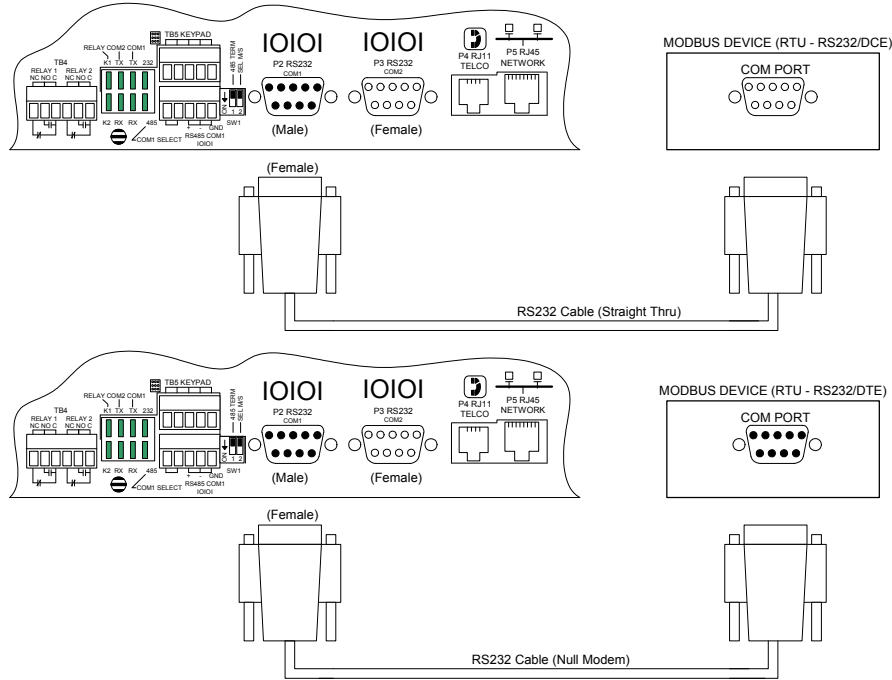


Figure 2-11: FMS EIA232 Connection to a DCE or DTE Device

2-2.10 Expansion Card A Connections

A sticker identifying the Expansion Cards as A or C is located on each Expansion Card. The following wiring diagrams show the Expansion Card in Slot 1. However, the Expansion Card may be in Slot 2, 3 or 4 based on the FMS configuration. The I/O for each card type appears on the back of the FMS for reference during field wiring; see Figure 2-13 pg. 14 and Figure 2-16, pg. 16 for typical wiring. For information on Expansion Card B, see APPENDIX H: Expansion Card B, pg. 127.

Expansion Card A has 12 non-isolated analog input channels and 8 relay output channels. The analog input channels can be wired for 4-20mA, 0-5VDC, 0-10VDC, NO (normally open) dry contact or NC (normally closed) dry contact. The circuit board has internal jumpers to select an mA input or a voltage input. The factory default is set as a 4-20mA input. See APPENDIX A: FMS Expansion Cards, pg. 100, for jumper location and settings.

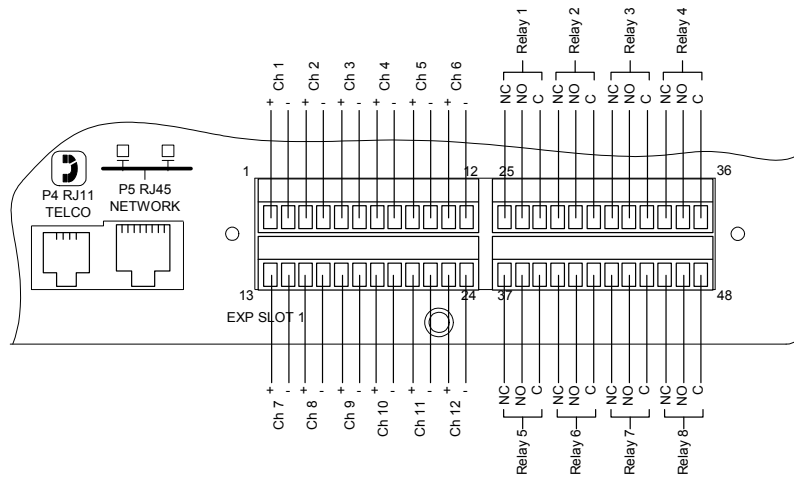


Figure 2-12: Expansion Card A I/O Terminals

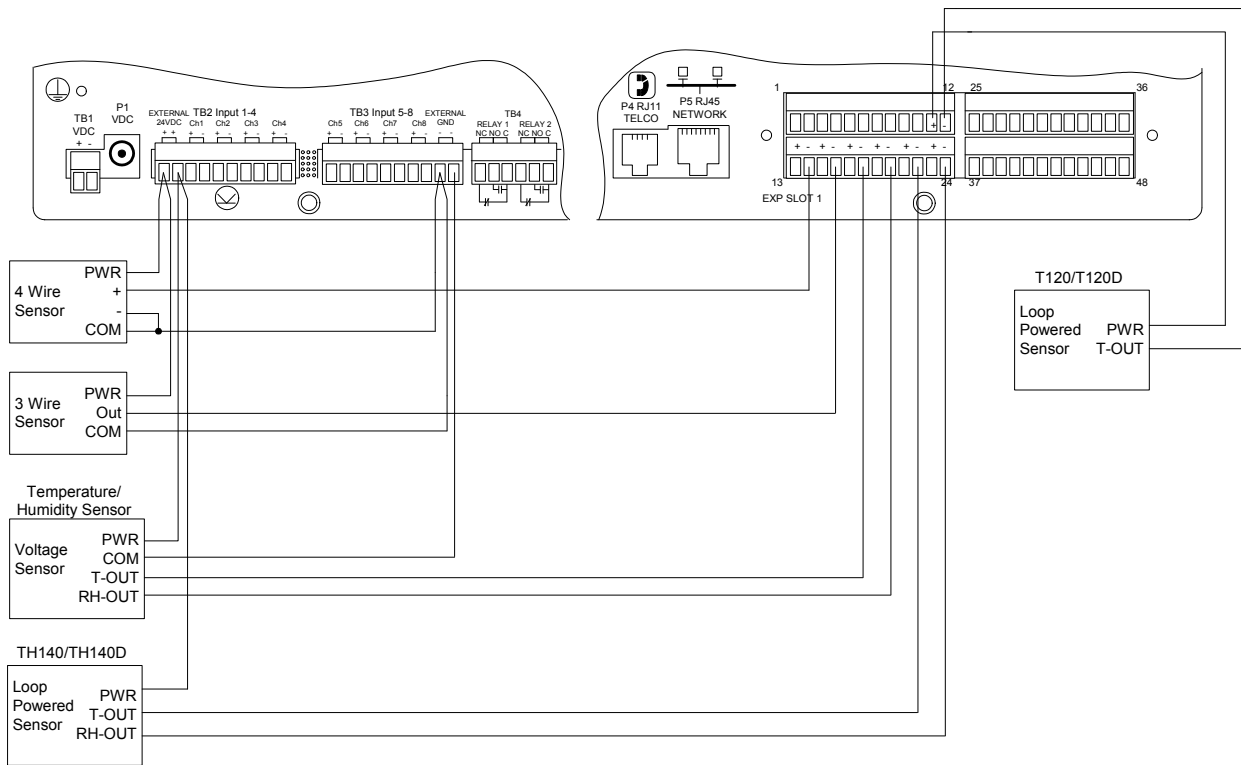


Figure 2-13: Analog Input Wiring for Expansion Card A

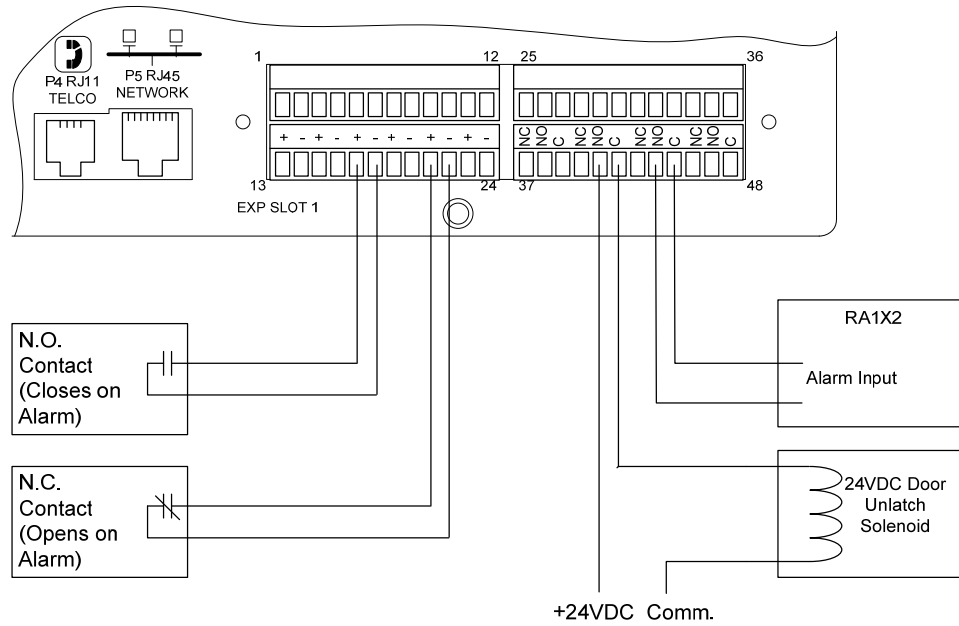


Figure 2-14: Dry Contact Inputs with Individual Ground and Relay Outputs, Card A

2-2.11 Expansion Card C Connections

Expansion Card C has 24 dry contact input channels.

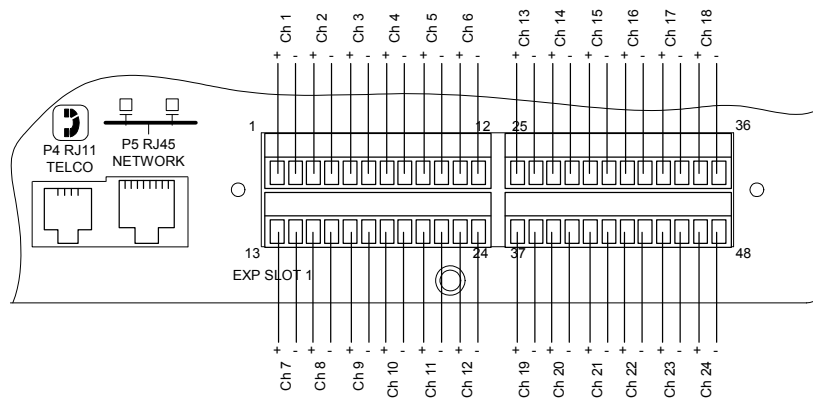


Figure 2-15: Expansion Card C I/O Terminals

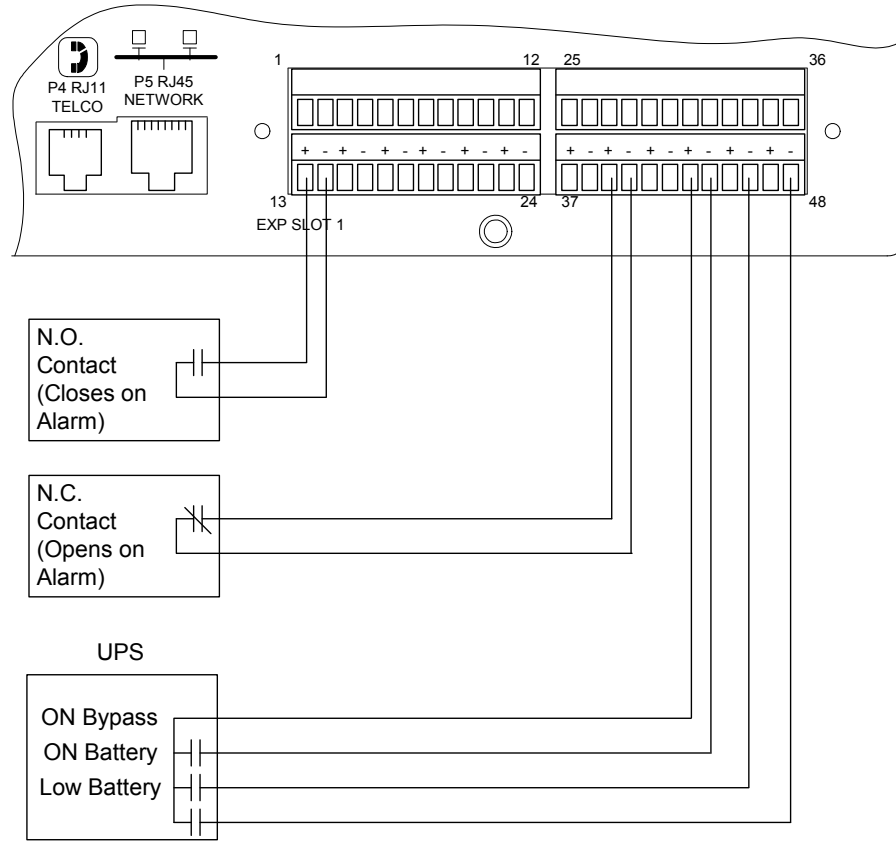
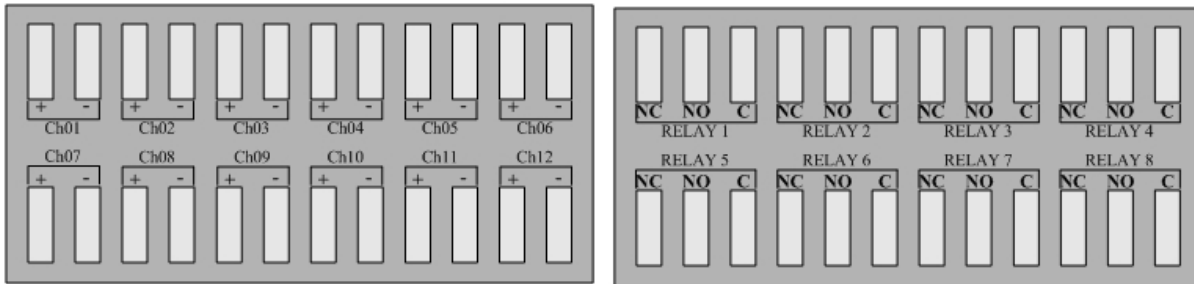


Figure 2-16: Typical Wiring for Expansion Card C

Option Card "A" - 12 Analog Input Option Card with 8 Relay Output Option Card



Option Card "C" - 24 Digital Input Option Cards

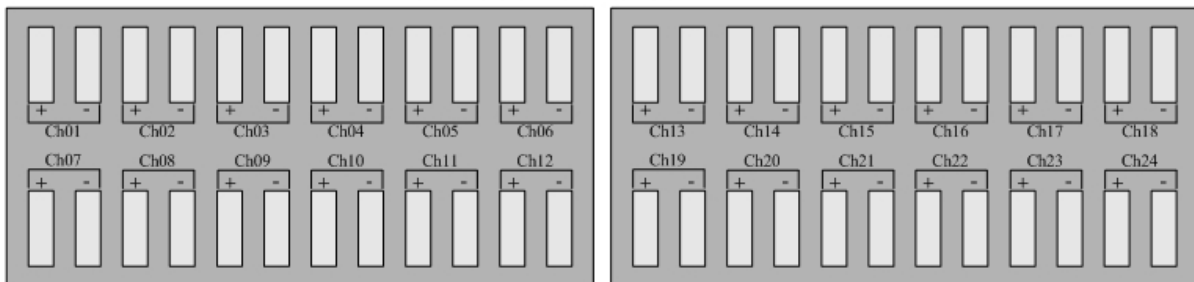


Figure 2-17: Falcon FMS Expansion Cards A & C

2-3 COMMUNICATION

The FMS will not communicate over a user's network the first time it is connected to the network. The manufacturer programs the FMS with a default IP address: **10.0.0.189**, Subnet Mask: **255.255.255.0**. This default address must be changed to an IP address that corresponds with the user's network before the FMS can communicate over the network.

2-4 SET THE FMS IP ADDRESS

There are three ways to set the FMS IP address:

- via the ARP and PING commands
- via the Web browser
- via the EIA232 interface

2-4.1 Set the IP Address Using the ARP and PING Commands

To set the IP address of a manufacturer programmed FMS, you can use the ARP (Address Resolution Protocol) command together with the PING (ICMP echo request) command. However, before using these commands, you must know the Ethernet address of the FMS.

2-4.1.1 Obtain the Ethernet Address (MAC Address)

Each network device must have its own unique identification. This identification sets it apart from all other manufacturers and ensures that no two network devices have the same address. Each manufacturer must use a six digit numbering convention (six sets of two digits with both letters and numbers). The first three digits determine the actual manufacturer, and the remaining three digits determine the unique network serial number of each individual FMS.

A typical Ethernet address (also known as a MAC address - Media Access Control) from the FMS looks like this: 00:90:5B:00:02:45

The Ethernet (MAC) address for the FMS is on the model number sticker located on the bottom of the device.

2-4.1.2 Use the ARP Command

Once you know the Ethernet address of the FMS, use the ARP command with the correct parameters from any computer located on the FMS subnet (e.g., Class C with a subnet of 255.255.255.0).

For example, enter the following from a command prompt:

```
arp -s 192.168.1.14 00-90-5b-00-02-45
```

This command tells the computer (from which the ARP command was entered) that the network device with an IP address of 192.168.1.14 uses the Ethernet (MAC) address of 00-90-5b-00-02-45.

2-4.1.3 Use the PING Command

After the ARP command has been entered, the PING command must be entered from the same computer in order to set up the IP address of the FMS. The PING command will use the ARP entry added from Section 2-4.1.1, pg. 4, to send the IP address information directly to the FMS (which is just one of several methods to initially configure the IP address on a new FMS).

To do this, enter the following from a command prompt:

```
PING ip_address
```

Where 'ip_address' is the IP address you entered using the ARP command. In the above example, the following would be entered:

```
PING 192.168.1.14
```

This command changes the IP address of the FMS to: 192.168.1.14.

2-4.1.4 Troubleshooting the ARP/PING Commands

If problems are encountered, it may be for one of the following reasons:

- The FMS already has a non-default TCP/IP address. Once the IP address of the FMS has been changed from the default of 10.0.0.189, it is not possible to change it again with the ARP/PING commands. This method of setting up the FMS IP address can only be used on an FMS that still has its original default IP address, as shipped from the manufacturer.
- The device is not on the same Class C subnet as the computer from which the ARP/PING commands were sent. The FMS default router and Subnet Mask must be changed via a Web browser pointed at the FMS default IP address (i.e., <http://10.0.0.189>) or via a direct EIA232 terminal connection to the FMS—both of which are alternate methods for setting up the FMS IP address.

2-4.2 Set the IP Address Using a Web Browser

1. Plug the blue and yellow crossover network cable that shipped with the FMS unit into the laptop or workstation that will be used to configure the FMS. This cable is not intended to be connected to a network hub.
2. Write down the computer's IP address and Subnet Mask. Then change the IP address and Subnet Mask of the computer from its existing address to one that will allow it to communicate with the FMS, such as 10.0.0.188. It may be beneficial to set the IP address to one that is one number different from the FMS IP address. Consult the computer's manual or your IT Department before attempting this.
3. Connect the other end of the network cable to the Ethernet port on the back of the FMS. Access the FMS through a Web browser by typing the IP address (10.0.0.189) into the location bar. Enter the FMS user name and password when prompted.



NOTE:

The default user name is “**falcon**” and there is no default password - leave the password field empty.

4. Select the **Configuration Menu** link, then select the **System** link. Select the **IP Configuration Menu** link and change the IP address, Subnet Mask, and default Gateway to one provided by the network administrator. Press the **Submit Changes** button. The FMS will save the new IP address and reboot. Once the FMS reboots, the system status LED stops flashing. You must now use the new IP address and reset the computer to its original IP address and Subnet Mask.
5. Change the IP address of the computer back to its original IP address. If the computer was configured as DHCP (the network domain controller assigns an IP address) return it to this state. This may require assistance from your IT Department, or you may need to consult the computer's manual.
6. The computer and the FMS are now both configured to communicate on the network. Both should be accessible via the network. Connect the PC and the FMS to the network. From the PC Web browser, type in the IP address of the FMS. Enter the user name and password as stated above to verify network access to the FMS.

2-4.3 Set the FMS IP Address using an EIA232 Connection

To use the EIA232 interface:

1. Connect the EIA232 port (P3 – Com2) on the FMS to a terminal or PC running terminal emulation software (HyperTerminal) with a 9-pin male-female straight through serial cable.
2. Set the appropriate communication port to **9600 baud, NO parity, 8 data bits, 1 stop bit, (9600/N/8/1)**, and **no software or hardware flow command**.
3. Once the terminal emulation software starts, press **Enter** on the keyboard and the Main Menu should appear. If the Main Menu does not appear, check the communication settings and make sure the unit is powered on.
4. From the Main Menu type “**SC**” to select the System Configuration Menu.
5. From the main configuration menu type “**2**” to select the IP Configuration Menu.
6. From the IP Configuration Menu type “**i**” to change the IP address.
7. Enter the new IP address for the FMS. Separate each field with a decimal point – for example type 10.0.0.50 <enter>.
8. From the IP Configuration Menu type “**m**” to change the Subnet Mask.
9. Enter the new Subnet Mask for the FMS. Separate each field with a decimal.
10. From the IP Configuration Menu type “**d**” to change the default Gateway.
11. Enter the new default Gateway for the FMS. Separate each field with a decimal
12. Enter “**x**” to Exit and Save the new IP address. The FMS will erase a memory block and copy data to Flash memory before rebooting.
13. The FMS IP address is now set and the FMS can be accessed through a Web browser using the new IP address.

Refer to Chapter 6: EIA232 Interface, pg. 88, for more information on the EIA232 command set.

CHAPTER 3: FMS CONFIGURATION

3-1 FMS WEB INTERFACE OVERVIEW

The FMS Web interface provides a convenient way to configure basic settings from any Internet-enabled computer. This chapter will walk users through the steps of configuring the FMS. It will cover the following configuration options:

- Inputs and Relays
- System (Configuration for the FMS unit)
- Network Statistics
- ICMP PING
- BACnet
- User Administration (Web Access)
- Web User Access Log
- SNMP/SYSLOG
- URL Links 1-5 and 6-10
- Links
- Nest/Egg
- Modem
- Alarm Management
- Keypad/DTMF Access Users
- Schedules
- Battery
- Clock
- Email/DNS
- Network Time Protocol (NTP)
- Modbus/Com Port 1
- Modbus/Slave Units
- Flash Program
- Product Registration

The FMS is shipped to the user with the IP address configured as **10.0.0.189** and a Subnet Mask of **255.255.255.0**. The user name is preconfigured as **falcon**. The unit is configured without a password; when a password is requested, leave the space blank.



Figure 3-1: Initial Login for the FMS

These pre-configurations can be customized through the **System** link on the **Configuration Menu** of the Web interface. To change the FMS IP address, refer to section 2-4 Set FMS IP Address on page 17.

Netscape's "Smart Browsing" feature complicates use of the FMS Web interface. To avoid complications, turn off Smart Browsing by following the steps below:

1. In the menu bar at the top of the Netscape browser, click on Edit, then on Preferences.
2. Smart Browsing is a subcategory of the Navigator category. Access Smart Browsing and then click the box in front of the "Enable 'What's Related'" option. Eliminate the check mark to disable this option.

3-2 MAIN MENU

To access the FMS **Main Menu**, type the IP address of the FMS into the location bar of the Web browser. When the prompt appears, enter the default user name (**falcon**) and password (**none—leave blank**).

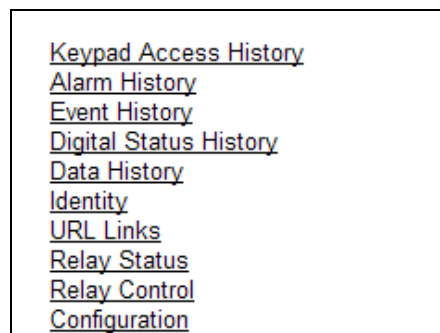


Figure 3-2: Main Menu/Homepage of the FMS

The top of the page provides links to other pages for additional monitoring, control and configuration. To Configure the FMS, select the **Configuration** option from the Main Menu of the FMS Homepage.

The **Configuration** page allows authorized users—with administrator or read-write privileges—to adjust the FMS settings. Each link on the Configuration page displays more information about specific configuration settings.



Figure 3-3: Sample FMS Configuration Main Menu

3-3 INPUT AND RELAY

Input and Relay Configuration Menu							
Inputs							
S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label
(1)	ZHI40 Temperatu	(2)	ZHI40 Humiditv:	(3)	MD3: Motion Det	(4)	SMK: Smoke Det
(5)	CRIS Current:	(6)	Rack 1 Temperat	(7)	Rack 2 Temperat	(8)	Data Center Doo
1.1 (9)	IDRA6: Zone 1 T	1.2 (10)	IDRA6: Zone 2 T	1.3 (11)	IDRA6: Zone 3 T	1.4 (12)	IDRA6: Zone 4 T
1.5 (13)	IDRA6: Zone 5 T	1.6 (14)	IDRA6: Zone 6 T	1.7 (15)	Server 1: Offli	1.8 (16)	Server 2: Offli
1.9 (17)	Server 3: Offli	1.10 (18)	Server 4: Offli	1.11 (19)	Server 5: Offli	1.12 (20)	Server 6: Offli
2.1 (38)	Server 7: Offli	2.2 (34)	UPS 1: On Batte	2.3 (35)	UPS 2: On Batte	2.4 (36)	UPS 3: On Batte
2.5 (37)	UPS 4: On Batte	2.6 (38)	UPS 5: On Batte	2.7 (39)	UPS 6: On Batte	2.8 (40)	UPS 7: On Batte
2.9 (41)	ANALOG #2_9	2.10 (42)	ANALOG #2_10	2.11 (43)	ANALOG #2_11	2.12 (44)	ANALOG #2_12
3.1 (57)	ANALOG #3_1	3.2 (58)	ANALOG #3_2	3.3 (59)	ANALOG #3_3	3.4 (60)	ANALOG #3_4
3.5 (61)	ANALOG #3_5	3.6 (62)	ANALOG #3_6	3.7 (63)	ANALOG #3_7	3.8 (64)	ANALOG #3_8
3.9 (65)	ANALOG #3_9	3.10 (66)	ANALOG #3_10	3.11 (67)	ANALOG #3_11	3.12 (68)	ANALOG #3_12
6.1 (105)	Internal Temper	6.2 (106)	Internal Humidi				

Relays							
S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label
(1)	RELAY #1	(2)	RELAY #2	1.1 (3)	RELAY #1.1	1.2 (4)	RELAY #1.2
1.3 (5)	RELAY #1.3	1.4 (6)	RELAY #1.4	1.5 (7)	RELAY #1.5	1.6 (8)	RELAY #1.6
1.7 (9)	RELAY #1.7	1.8 (10)	RELAY #1.8	2.1 (11)	RELAY #2.1	2.2 (12)	RELAY #2.2
2.3 (13)	RELAY #2.3	2.4 (14)	RELAY #2.4	2.5 (15)	RELAY #2.5	2.6 (16)	RELAY #2.6
2.7 (17)	RELAY #2.7	2.8 (18)	RELAY #2.8	3.1 (19)	RELAY #3.1	3.2 (20)	RELAY #3.2
3.3 (21)	RELAY #3.3	3.4 (22)	RELAY #3.4	3.5 (23)	RELAY #3.5	3.6 (24)	RELAY #3.6
3.7 (25)	RELAY #3.7	3.8 (26)	RELAY #3.8				

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-4: Sample FMS Input/Output Configuration Menu

Input and Relay allows users to program specific parameters for each FMS input and relay. Different FMS models allow different numbers of inputs and relays. Only installed inputs and relays are displayed. Inputs and relays are identified by their name and slot channel number (S.Ch). Clicking an input link will display one of three input configuration pages: (1) Main Board Inputs 1-8, (2) Expansion Card “A” Inputs or (3) Expansion Card “C” Inputs.



NOTE:

Users must push the Submit Changes button after they configure each input. Changes not submitted before proceeding to the next input will be lost.

3-3.1 Main Board Input Configuration (Channels 1-8)

To configure the FMS main board inputs (channels 1-8), select the appropriate input number. A page similar to figure 4-3 will appear.

Configuration: Input #1 Current Readings: Raw = 14.771 mA Calc = 79.6

[Next Input >>](#)

Select Input type: Digital Alarm ID: 10

Gain: [Calculator](#) High Limit2: Alarm ID: 13

Offset: High Limit1: Alarm ID: 11

Hysteresis: Low Limit1: Alarm ID: 12

Unit of Measure: Low Limit2: Alarm ID: 14

Alarm Delay: Seconds Alarm Dial Out:

Label:

Label (Digital input normal):

"OR Gate" Relay (1-16) Control: [Relay Configuration](#)

"OR Gate" Relay (17-32) Control:

Email Recipient Notification

1: 2: adhgkjlflkjasdf@yahoo.com

3: tfletcher@rletech.com 4:

5: 6:

7: 8:

Alarm Disable by Schedule: None A B

Snmp Trap: Enabled Disabled Disabled during Schedule A Disabled during Schedule B

Trap Recipients: 1: 2: 10.0.0.184

3: 4:

5: 6:

7: 8:

High1/Low1 Snmp Traps: Enabled Disabled

Display Value: Signed Unsigned

Individual Ground Type (digital in only): Individual Ground Common Ground

BACnet Instance: BACnet Units:

[Return to Input/Output Relay Configuration Menu](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-5: Sample FMS Main Board Input Configuration

The number of the input that is being configured will appear in the upper left-hand corner, above the Submit Changes button. Options on this configuration page are described below.

Current Readings: Displays the input current as sensed by the FMS and the calculated value based on the offset and gain settings.

Example: The example illustrated above shows a current input of 14.771mA from the temperature sensor. The FMS converts this value to 79.6°F. When the input Type is Digital NO, Digital NC or Digital Status, the measured Raw Current Reading will typically be 0mA or 24mA (depending on input). The Calculated Value will be a 0 or 1, with 1 representing an alarm condition.

Select Input Type: Select based on the type of device connected to the input channel. Options include:

- Not Configured: Select when there is nothing connected to the input.
- Analog 4-20mA: Select when the device connected to the input provides a 4-20mA output.
- Digital NO: Select when the device connected to the input is a dry contact that is normally open and closes on an alarm condition.
- Digital NC: Select when the device connected to the input is a dry contact that is normally closed and open on an alarm condition.
- Digital Status: Select when the device connected to the input is a dry contact that only needs to be monitored (status only), without alarms.

Select Input Type:

- Physical: This allows users to configure the channel to display a sensor that is wired to a FMS Input, Channel 1 – 104.
- Modbus Import: This allows users to employ a channel to display Modbus Register information on the main page of the FMS. Virtual Slots can be added to the main page of the FMS to display more Modbus Points; see Chapter 5: Communication, pg. 64.

Gain and Offset: Applies only to Analog 4-20mA input types. Inputs like temperature, humidity, pressure, etc. connected to the FMS convert information to a 4-20mA signal. The FMS reads this raw 4-20mA signal and calculates a value based on the input and the predetermined gain and offset settings. The idea is to determine the correct gain and offset values so that the FMS calculates and displays an accurate reading. Without setting the correct gain and offset, the FMS will not convert the raw data correctly. As a result, missed alarms or nuisance alarms could occur.

To set gain and offset values, click the **Calculator** link.

Figure 3-6: Gain and Offset Calculator

Enter the sensor's range and press the **Calculate** button. Click the **Return to Input 1 Configuration** link so that the gain and offset fields are automatically entered with the correct offset and gain settings. Gain and offset values can also be determined by using the following formulas:

Gain for 4-20mA Transducer = (Sensor High Range Value – Sensor Low Range Value) / 4

Offset for 4-20mA Transducer = Sensor Low Range Value – Gain

Example: Temperature sensor with a sensing range of 50-95°F – displayed in Fahrenheit

Gain = $(95-50) / 4 = 11$ (round to the nearest integer)

Offset = $50 - 11 = 39$

Example: Temperature sensor with a sensing range of 50-95°F – displayed in Celsius

Convert 50-95°F to 10-35°C and use the Celsius range for the calculations
Gain = $(35-10) / 4 = 6$ (round to the nearest integer)
Offset = $10 - 6 = 4$

Example: Humidity sensor with a range of 0 – 100% RH
Gain = $(100-0) / 4 = 25$
Offset = $0 - 25 = -25$

Hysteresis (Deadband): The number that designates the amount an input reading must sway from its preset alarm reading before it is classified as returned to normal. The Hysteresis provides a dead band around the limit settings to prevent several alarms and return to normal alarms when the input is the same as a limit setting.

The Hysteresis applies when the input type is Analog 4-20mA and is active for High Limit 1, High Limit 2, Low Limit 1 and Low Limit 2.

Example: A temperature sensor alarms when it reaches its High Limit 1 of 80°F. If Hysteresis is set at four, the sensor must register less than 76°F before the FMS reports it as returned to normal. In another example, a humidity sensor alarms when it reaches its Low Limit 2 of 30% RH. If the Hysteresis is set at five, the humidity must register more than 35% before the FMS reports it as returned to normal.

Unit Of Measure (UOM): The 10 character field used to assign a unit of measure label to analog values, such as °F, °C, % RH, Amps, Volts, PSI, etc. The unit of measure field is only required when the input type is Analog 4-20mA. The unit of measure field is displayed on the Main Menu and in notification (email/pager messages and SNMP Trap).

Alarm Delay: The amount of time the FMS waits to send an alert after an alarm condition is detected. The FMS uses this same time delay to report a return to normal after the alarm condition clears. The alarm delay is active for all input types except Not Configured.

Example: An input is configured as a digital NO, labeled “CRAC UNIT ALARM” and has an alarm delay of 10 seconds. When the CRAC unit alarms, it closes the contact to the FMS. If the CRAC unit returns to normal and opens the contact to the FMS within the 10 second alarm delay, no alarm is generated in the FMS. If the CRAC unit remains in alarm for 10 seconds or more, the FMS records the alarm and generates notification per the input settings. If the CRAC unit returns to normal and alarms within the 10 second alarm delay, the FMS does not record it as a return to normal. Once the CRAC unit returns to normal for the 10 second alarm delay, the FMS records a return to normal and generates notification per the FMS settings.

High Limit 2: Applies only when the input type is Analog 4-20mA. The FMS will record an alarm and send notification when the FMS calculated value exceeds this limit. The High Limit 1 and High Limit 2 are disabled when they are both set to 0. High Limit 2 will also activate any designated relays.

High Limit 1: Applies only when the input type is set for Analog 4-20mA. The FMS will record an alarm and send notification when the FMS calculated value exceeds this limit. The High Limit 1 and High Limit 2 are disabled when they are both set to 0.

Low Limit 1: Applies only when the input type is Analog 4-20mA. The FMS will record an alarm and send notification when the FMS calculated value falls below this limit. The Low Limit 1 and Low Limit 2 are disabled when they are both set to 0.

Low Limit 2: Applies only when the input type is Analog 4-20mA. The FMS will record an alarm and send notification when the FMS calculated value falls below this limit. The Low Limit 1 and Low Limit 2 are disabled when they are both set to 0. Low Limit 2 will also activate any designated relays.

Alarm Dial Out (Internal Modem): The list of up to five pager numbers to which the FMS sends alarm notification. The numbers correspond to phone numbers configured from the Configure Phone Number links at the bottom of the Modem Configuration page. Separate each ID number with a comma. Enter zero to disable. The FMS will dial the lowest number listed *regardless* of the order the numbers are listed; see section 3-15.1 Configure Phone Numbers on page 42 for more information.

Example: If the Alarm dial out string is set to “3, 5, 1, 0, 0”, the FMS will dial Pager #1, Pager #3 and then Pager #5 when an alarm occurs. Pager notification will be sent when an input alarms (high limit 2, high limit 1, low limit 1, low limit 2 is exceeded or the digital input is in alarm). The “Dial Back on Returns” option on the Pager Configuration page determines if the FMS will send a page when an input returns to normal; see section 3-15.1 Configure Phone Numbers, pg. 42.

Label: Used for input identification. Applies to all input types except “Not Configured”. For Analog input types, this label is displayed on the FMS Main Menu and the Input Configuration Menu. When the input alarms and/or returns to normal, the label is included in the Alarm History and notification messages. For Digital NO and Digital NC inputs, the label is displayed on the FMS Main Menu, Input Configuration Menu, Alarm History page and in notification messages only when the device is in alarm. For Digital Status inputs, the label is displayed on the FMS Main Menu when the input is on. When the input turns on, the label is also included in the Digital Status History.

Label (Digital input normal): Applies to input types Digital NO, Digital NC and Digital Status. This field may be left blank. If it is left blank, the FMS displays the Label (from above). This label is displayed on the main page when the input is normal, in the Alarm History when the input returns to normal and in notification messages. For Digital Status inputs, the label is displayed on the Home page when the input is off. When the input turns off, the label is also included in the Digital Status History.

Relay Configuration Link: Used to assign a High Level 2, Low Level 2, or Digital Alarm generated by this input to the OR gate function block of the Relay Control Logic to a specific relay. To select the relay(s), click on the link and check the relay box(es); see APPENDIX G: Relay Control Logic, pg. 125.

Email Recipient Notification: Designates up to eight email addresses for notification if the input goes into alarm. Email addresses will be displayed once they are entered on the Email Configuration page. Email notification will be sent to recipients whose names are checked when an input alarms and, if designated, when an alarm returns to normal.

Alarm Disable by Schedule: Used to designate a period of time the input will be disabled or inactive. To do this, select either the A or B schedules, which are defined in the Schedule Configuration menu. Within the scheduled time, the point on the Main Menu will turn Blue to indicate that the input is currently being disabled during its scheduled time. Once the scheduled time has past, the point will reactivate and return to its normal color.

SNMP Trap: Used to enable or disable traps. The trap can also be disabled during one of the schedules.

High1/Low1 SNMP Traps: Used to disable the first level analog alarm until the alarm reaches the more critical level 2.

Display Value: Used to show either Signed or Unsigned Values for the Displayed value calculated by the FMS.

Example: If you have Unsigned value selected, the FMS will not display a negative number on the calculated reading.

**NOTE:**

Press the Submit Changes button when done to save all changes.

Individual Ground Type (digital in only): Defines the type of digital input as either Individual Ground or Common Ground.

- **Individual Ground:** used if the monitored input is a single relay contact and two contacts—common and NO or NC—are accessible.
- **Common Ground:** used if multiple relays are to be monitored that have the commons bussed or tied together (only one common input connection) and only the NO or NC contacts are available for each individual relay output. See the example below or refer to section 2-2 Falcon FMS Wiring on page 4, for more information.

Example: Configure input channels 1–2 for Individual Ground, and configure input channels 4–6 for Common Ground.

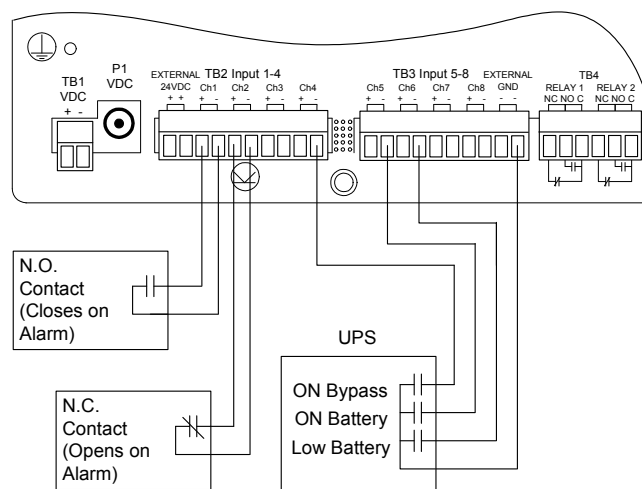


Figure 3-7: NO/NC Wiring Example

BACnet Instance: The BACnet object identifier. It is a numerical code used to identify the input. This code must be unique within the BACnet device.

BACnet Units: A numerical code used to assign engineering units to this BACnet Instance. Refer to the BACnet standard for further information.

3-3.2 Expansion Card “A” Input Configuration

To configure Expansion Card A, select the desired input or relay from the Input and Relay Configuration page; see Figure 3-4, pg. 22. While units will vary depending on individual configurations, Expansion Card A is typically numbered 1.1–1.12, 2.1–2.12, etc.

Configuration: Input #1.5 (13) Current Readings: Raw = 0.012 mA Calc = -25.0

Submit Changes << Prev Input Next Input >>

Select Input type: ANALOG 4-20 MA Physical Digital Alarm ID: 1050

Gain: 25 Calculator High Limit2: 0 Alarm ID: 1053

Offset: -25 High Limit1: 0 Alarm ID: 1051

Hysteresis: 0 Low Limit1: 0 Alarm ID: 1052

Unit of Measure: Low Limit2: 0 Alarm ID: 1054

Alarm Delay: 0 Seconds Alarm Dial Out: 0.0.0.0.0

Label: Digital n/o

Label (Digital input normal):

OR Gate Relay (1-16) Control: 0 Relay Configuration

OR Gate Relay (17-32) Control: 0

Email Recipient Notification: 1 mlaa@rlotech.com 2

3 4

5 6

7 8

Alarm Disable by Schedule: None A B

Snmp Trap: Enabled Disabled Disabled during Schedule A Disabled during Schedule B

High/Low1 Snmp Traps: Enabled Disabled

BACnet Instance: 713 BACnet Units: 0

[Return to Input/Output Relay Configuration Menu](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-8: Expansion Card “A” Input Card

This page will be displayed when configuring an input on an Expansion Card “A”. It is identical to the FMS Main Board Input Configuration page—see section 3-3.1, Main Board Input Configuration (Channels 1-8), pg. 23—with the following exceptions:

- The Expansion Card “A” does not except common ground digital inputs. Therefore, the option for Individual Ground Type (digital in only) is removed.
- Analog 0-5VDC and Analog 0-10VDC options are added to the Input Type. The Expansion Card “A” accepts analog inputs individually configurable through internal jumpers, as 4-20mA, 0-5VDC or 0-10VDC.

3-3.3 Expansion Card “C” Input Configuration

To configure Expansion Card C, select the desired input or relay from the Input and Relay Configuration page; see Figure 3-4, pg. 22. While units will vary depending on individual configurations, Expansion Card C is typically numbered 1.1–1.24, 2.1–2.24, etc.

Configuration: Input #1.1 (9) Current Readings: Raw = 0.048 mA Calc = 0.0

Submit Changes << Prev Input Next Input >>

Select Input type: DIGITAL STATUS Physical Digital Alarm ID: 1010

Gain: 11 Calculator High Limit2: 0 Alarm ID: 1013

Offset: 39 High Limit1: 0 Alarm ID: 1011

Hysteresis: 0 Low Limit1: 0 Alarm ID: 1012

Unit of Measure: Low Limit2: 0 Alarm ID: 1014

Alarm Delay: 0 Seconds Alarm Dial Out: 0.0.0.0.0

Label: Battery Fan 2

Label (Digital input normal): Battery Fan 2

OR Gate Relay (1-16) Control: 0 Relay Configuration

OR Gate Relay (17-32) Control: 0

Email Recipient Notification: 1 mlaa@rlotech.com 2

3 4

5 6

7 8

Alarm Disable by Schedule: None A B

Snmp Trap: Enabled Disabled Disabled during Schedule A Disabled during Schedule B

High/Low1 Snmp Traps: Enabled Disabled

BACnet Instance: 809 BACnet Units: 0

[Return to Input/Output Relay Configuration Menu](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-9: Sample of Falcon FMS Configuration Main Menu

Figure 3-9 will be displayed when configuring inputs for Expansion Card “C”. It is similar to the FMS Main Board Input Configuration page—see 3-3.1, Main Board Input Configuration (Channels 1-8), pg. 23—with the following exceptions:

- The Input Type options do not include Analog 4-20mA since Expansion Card “C” only accepts dry contact inputs.
- The Gain, Offset, Hysteresis, Unit of Measure, High Limit 2, High Limit 1, Low Limit 1, and Low Limit 2 are not available since Expansion Card “C” does not accept analog inputs.
- The option for Individual Ground Type (digital in only) is removed. Expansion Card “C” accepts Individual and Common Ground inputs; however, it does not require any software configuration.

3-3.3.1 Internal Temperature and Internal Humidity Configuration

Internal Temperature, Ch. 105, and Internal Humidity, Ch. 106, have the same options as a standard channel configured as an analog input, but the gain value cannot be changed—it has a fixed value internally. The Input Type for Internal Temperature is used to specify and display the input in Fahrenheit or Celsius.

3-3.4 Relay Configuration

Figure 3-10: Sample FMS Relay Configuration

A screen similar to Figure 3-10 will be displayed when configuring relays. Options on this page are described below:

Type: Each relay output can be configured for one of the following types—only one type per relay output:

- **NO (Non-Supervised):** Configures the relay output to be normally de-energized. The relay output will energize when activated by an input or by a schedule. The silkscreen labeling for the relay outputs (NC, NO and C) refer to the state of the relay output when it is de-energized.
- **NC (Supervised):** Configures the relay output to be normally energized. The relay output will de-energize when activated by an input or by a schedule. The silkscreen labeling for the relay outputs (NC, NO and C) refer to the state of the relay output when it is de-energized.
- **Force On:** Energizes the relay out and allows a user with Read-Write or Administrator privileges to turn on a relay output for control or testing purposes.
- **Force Off:** Energizes the relay out and allows a user with Read-Write or Administrator privileges to turn off a relay output for control or testing purposes.
- **Button Controlled:** Adds a button to the Relay Control page allowing users with Read-Only privileges to turn on or off a relay output for control purposes.

- **Keypad Controlled:** Configures the relay output to be controlled by a keypad code or DTMF code. The User Code Configuration link appears once the Keypad Controlled option is selected and submitted; see Figure 3-11, pg. 30. The User Code Configuration link allows users to link which access code will activate the relay output.

#	Id Code	User Name	K1.1 (3)
1	123456	Rick	<input checked="" type="checkbox"/>
2	911	Emergency	<input checked="" type="checkbox"/>
3	9999	Boss	<input type="checkbox"/>
4	1234	Dave	<input checked="" type="checkbox"/>
5	11	Technician	<input type="checkbox"/>
6	555	Maint.	<input type="checkbox"/>
7	7823	Paul	<input checked="" type="checkbox"/>
8			<input type="checkbox"/>
9			<input type="checkbox"/>
10			<input type="checkbox"/>
11			<input type="checkbox"/>
12			<input type="checkbox"/>
13			<input type="checkbox"/>
14			<input type="checkbox"/>
15			<input type="checkbox"/>
16			<input type="checkbox"/>
17			<input type="checkbox"/>
18			<input type="checkbox"/>
19			<input type="checkbox"/>
20			<input type="checkbox"/>

Figure 3-11: Sample FMS Keypad/Relay Configuration

Label: Used for relay identification. This label appears on the Relay Status and Relay Control pages.

BACnet Instance: The BACnet object identifier. It is a numerical code used to identify the input. This code must be unique within the BACnet device.

OR'd Alarm IDs: Displays the Alarm IDs of the inputs specified through the Relay Configuration link on the Input Configuration Menu. The Alarm IDs displayed can be translated by using APPENDIX E: Alarm ID Reference Tables, pg. 115. The Alarm IDs are also displayed on the Input Configuration page. The Relay Control Logic diagram in APPENDIX G: Relay Control Logic, pg. 122, shows how the OR'd Alarm IDs, AND'd Alarm IDs and the Combo Gate are internally connected.

AND'd Alarm IDs: Allows up to four Alarm IDs (High Limit, Low Limit or Digital Alarms) to be specified for the AND Gate Function Block input of the Relay Control Logic. Alarm IDs can be obtained from APPENDIX E: Alarm ID Reference Tables, pg. 115. The Alarm IDs are also displayed on the Input Configuration page. The Combo Gate Function Block of the Relay Control Logic will either OR or AND the OR'd Alarm and AND'd Alarm inputs together. The Relay Control Logic diagram in APPENDIX G: Relay Control Logic, pg. 122, shows how the OR'd Alarm IDs, AND'd Alarm IDs and the Combo Gate are internally connected.

On-Delay Time: Specifies the number of seconds the Relay Control Logic will be delayed before activating the relay on alarm.

On-Duration Time: Specifies how long the relay will be active after a valid alarm combination is recognized through the Relay Control Logic. A positive number entry in seconds will keep the relay in its alarm state (activated) for the fixed period specified. A negative number entry in seconds will keep the relay in its alarm state (activated) after the alarm condition has returned to normal for the fixed period specified. A zero entry will configure the relay to be active until the alarm condition returns to normal.

Latch Mode (Non-Latching, Latching, Silenceable): Latching will cause the relay to latch, or remain in its alarm state, when activated until it is reset by the user. If latching is selected, the on-duration time function will be disabled.

Schedule: Designates which of the schedules (None, A or B) the relay will follow. The schedules are specified in the Configuration Menu. If schedule A or B is selected, all other function blocks of the Relay Control Logic for that relay will be disabled. This allows the relay output to be energized based on day-of-week and time-of-day.

Logic Diagram: Refer to APPENDIX G: Relay Control Logic, pg. 125, for a complete relay logic diagram.

3-4 SYSTEM

The **System** link allows users to configure basic FMS information. The FMS IP Address and Point-to-Point Protocol may also be configured through this menu via the IP Configuration Menu link; see Chapter 8: Point-to-Point Protocol, pg. 94, for more information.

Figure 3-12: Sample FMS System Configuration

System Name: Appears on the FMS Main Menu. The system name is also included as part of email and pager notifications.

Web Title Bar Text: Appears at the top of every FMS webpage. This text will be visible when the FMS webpage is minimized.

BACnet Device Name, BACnet Device ID and BACnet Description: Required for the FMS to allow a Building Management System (BMS) to poll the FMS inputs using the BACnet protocol over LAN connections. For further information regarding BACnet Device Name, BACnet Device ID and BACnet Description, consult the BACnet Standard or your IT Department.

Web Refresh Rate: The rate at which the FMS webpages refresh themselves within the Web browser. Only pages that display monitoring points are automatically refreshed (e.g., Main Menu, Relay Status, View Points, and Modbus Slave pages). The default is 0 seconds (disabled), but is typically set for 15 to 20 seconds.



WARNING!!

DO NOT SET THE WEB REFRESH RATE LOWER THAN 5 SECONDS. This could cause the screen to freeze or lock-up.

PDA Screen Width: Sets the width of the PDA webpages in the FMS to match the PDA device. The PDA webpages can be accessed from the Web browser by entering `/pda` after the IP Address (e.g., 10.0.0.189/pda). The FMS includes a PDA webpage view for the Main Menu, Identity and Alarm History pages only.

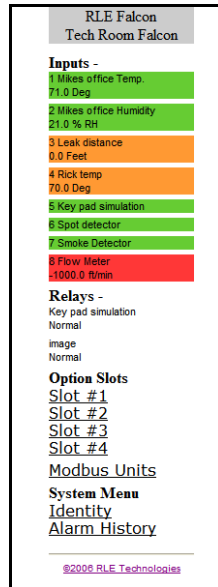


Figure 3-13: Sample FMS PDA Width Configuration

Analog Average: Allows users to change the averaging method for analog inputs. Normally, the system samples analog points once a second while tracking high and low values for each analog point. After sixty seconds, the high and low values for these points and the average of these readings are recorded in the Minute Log. To alter this method of averaging, change the value to one of the values listed in the drop down menu. Zero or one maintains the method described above; a higher value changes the method of averaging, and the manner by which high and low values are recorded. Refer to APPENDIX B: Analog Averaging, pg. 106, for a more information.

HTML Main Page Points: Determines the number of monitoring points displayed on the Main Menu. With the default of '0', the Summary Alarm Box, Internal Temperature and Humidity Box and a link to View All Points are displayed. Settings greater than '0' will display the selected points with links to the remaining points. It is typical to display all installed points. If the FMS is continuously monitored with a Web browser, it may be desirable to set the HTML Main Page Points to '0' and monitor the View all Points page.

Digital Status Color: Determines the color of Digital Status points on the Main Menu when the input is turned on. The options are green, gold and magenta. Typically, points are configured to be green and turn red on alarm. However, inputs configured for Digital Status do not trigger notification. For these points, this setting determines the color of the point when the input is on.

Main Webpage Frames: The default main page will use frames if 'Yes' is selected. This reduces the amount of information that the webpage has to update on a page refresh and may minimize "Page Not Found" errors when continuously monitoring the FMS from a Web browser.

**NOTE:**

Changes will not go into effect until the **Submit Changes** button is clicked.

3-4.1 IP Configuration Menu

IP Configuration

Warning: Changing these parameters will cause the network interface to operate differently, only change parameters if you are sure the changes are correct.

IP Address:

Net Mask:

Def Route:

Http Port: (Default 0 = 80)

TFTP Server Enable (udp port 69): Yes No

TCP Max Seg Size: 1436 536

Disable Network Watchdog: No Yes

PPP Server:

PPP Assignment:

[Return to System Configuration Menu](#)

Figure 3-14: Sample FMS IP Configuration Menu

The **IP Configuration** link found on the System Configuration page allows users to change a variety of settings, including the FMS IP Address (used in point-to-point ‘PPP’), Default Router and Net Mask. Contact a network administrator to obtain a valid IP Address for the network. Then, type the appropriate IP Address, Net Mask (subnet), and Default Router into their respective fields.

HTTP Port: The FMS broadcasts its webpages on Port: 80 of the IP Address assigned. A zero in the field block defaults the FMS to Port: 80. This can be changed to a specific port allowing increased security of the webpage broadcast.


TFTP Server Enable (udp port: 69): This setting opens or closes Port 69 on the LAN connection to the FMS. The TFTP port is used to upgrade firmware and save and load configurations. It can be disabled for security reasons and only opened for short periods of time during firmware upgrades; see Chapter 9: Upgrading Firmware, Loading & Saving Configuration Data, pg. 95, for more information.

TCP Max Segment Size: The FMS is defaulted to send webpages at a 1436 TCP segment size. A smaller TCP segment size helps with a congested network. The 536 TCP segment size may be required if the FMS is accessed through a VPN connection.

Disable Network Watchdog: This should be left at the “No” default. *Do not select “Yes” unless instructed by RLE.*

PPP Server: Sets the IP Address of the FMS network connection when accessing the FMS via its internal modem. This is required to allow a remote PC to view the FMS webpages over a dial-up connection; see Chapter 8: Point-to-Point Protocol, pg. 94, for more information.

PPP Assignment: Sets the IP Address of the remote PC’s network connection when accessing the FMS via its internal modem. This is required to allow a remote PC to view the FMS webpages over a dial-up connection. The remote PC’s dial-up settings should be set to “Obtain an IP Address Automatically”.

 **NOTE:**
Changes will not go into effect until the Submit Changes button is clicked.

3-5 NETWORK STATISTICS

```
Ethernet Port - DP83905:
Stats Last Reset At: 08/24/06 12:10:10 (auto)
 39707 ints      43461 pkts rcvd      1 refused      0 m
  305 dropped    0 FCS errs      0 fifo          0
  0 underflows  0 overflows     0 dribbles     0
35547 pkts sent 35547 rdys      1 colls        0 ex
  0 txerrors    0 tx timeout
```

[Refresh netstats page](#)
[Reset netstats](#)
[Return to Configuration Menu Page](#)

Figure 3-15: Sample FMS Network Status Page

Network Statistics: Displays network and EIA485 statistics including: network packets received, packets transmitted, and errors.

3-6 ICMP PING

Ping sent to ip address 10.0.0.251

Icmp Ping

IP Address to Ping:

Last Ping Results:
Last pinged ip address: 10.0.0.251
Last ping response: 10.0.0.251 1ms

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-16: Sample FMS ICMP Ping Page

ICMP Ping: Allows a user to ping an IP address from the FMS. The results of the ping will display below in the “Last Ping Results” table.

3-7 BACNET

Figure 3-17: Sample FMS BACnet Configuration

BACnet Device Name, BACnet Device ID, and BACnet Description: Required for the FMS to allow Building Management System (BMS) to poll the FMS inputs using the BACnet protocol over LAN connections. For further information regarding BACnet Device Name, BACnet Device, and BACnet Description, consult the BACnet Standard or your IT Department.

3-8 USER ADMINISTRATION (WEB ACCESS)

#	User Name	Password	Privilege	Last Web Access
1	falcon	horse2	Administrator	03/10/04 15:39:01
2	falcon	demo	Read-write	03/10/04 15:37:57
3	falcon		Read-only	03/08/04 13:41:36
4	John Doe	read	Read-only	
5	John Doe Jr.	write	Read-write	
6			None	
7			None	
8			None	

Figure 3-18: Sample FMS Web Access Configuration

The **User Administration (Web Access)** page allows the administrator to configure eight separate accounts, usernames, passwords and privileges for Web access accounts.

- **Read-Only** privileges allow the user to view the Main Menu, Keypad Access History, Alarm History, Event History, Digital Data History, Identity, Relay Status, Relay Control and URL Links webpages. The Configuration page cannot be viewed or changed by a Read-Only user. A Read-Only user can acknowledge alarms by entering their acknowledge code at the bottom of the Alarm History page. A Read-Only user cannot change any settings.
- **Read-Write** privileges allow the user to have full access to all pages (viewing and changing) except the User Administration (Web Access) page shown above.

- **Administrator** privileges allow the user to have full access to all pages including the User Administration (Web Access) page shown above.

3-9 WEB USER ACCESS LOG

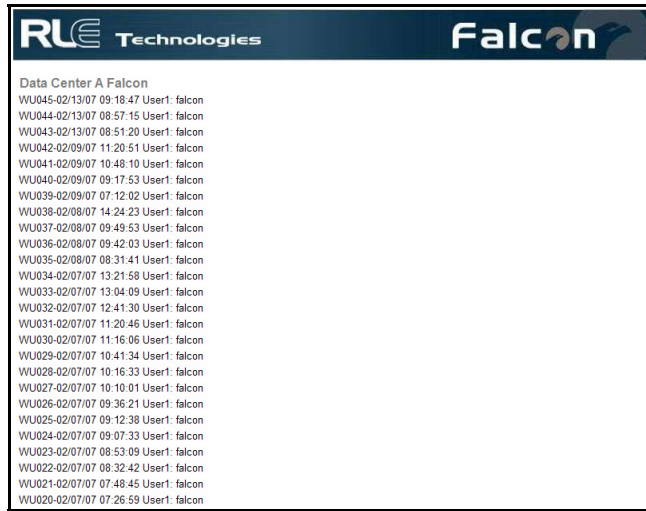


Figure 3-19: Sample FMS Web User Access Log

The **Web User Access Log** records the most recent 100 Web interface users.

3-10 SNMP/SYSLOG

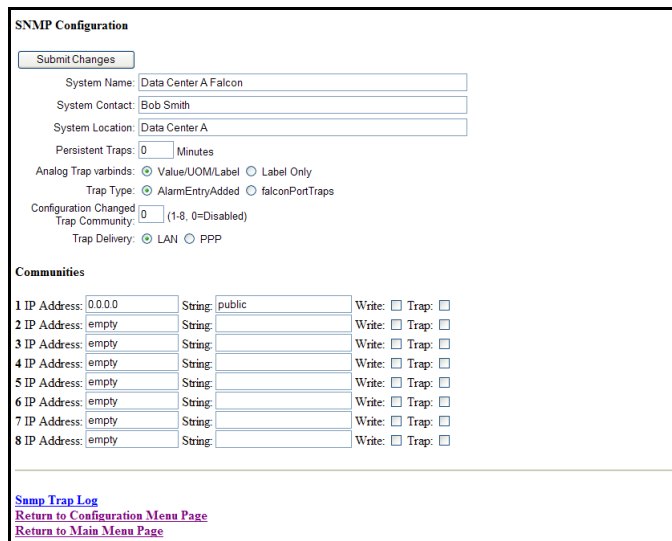


Figure 3-20: Sample FMS SNMP Configuration

SNMP/Syslog Configuration allows users to configure SNMP and Syslog notification options; see definitions below:

System Name: Appears on the FMS Main Menu and is included as part of email and pager notifications. The System Name can also be viewed and changed in the System Configuration Menu.

System Contact: Lists the individual responsible for the FMS. The System Contact is only available through SNMP Gets and is *not* included in email, pager, or SNMP Trap notifications.

System Location: Lists the location of the FMS. It is used to help identify the FMS when viewing the webpages. The System Location is *not* included in email, pager, or SNMP Trap notifications.

Persistent Traps: Enables the FMS to issue continuous SNMP Traps until an alarm acknowledgement is received by the FMS or until the alarming point returns to normal. The parameter is a user defined time interval that is set in minutes. Traps can be acknowledged from the Alarm Management page. The SNMP Traps do not include any delivery verification. A Persistent Trap setting of 5 or 10 minutes will trigger the FMS to send the Trap on a regular interval in case the previous Trap did not reach the Network Management System (NMS). Typically, the NMS can be set to ignore duplicate Traps to prevent re-alarms at the NMS.

Analog Trap Varbinds: Used for communication to an NMS via SNMP Traps. The default will add the Value, UOM (Unit of Measure), and the Label fields. The FMS can be configured to send only the label on analog Traps, if preferred. This makes analog Traps the same format as digital Traps which may make parsing the Traps easier for the NMS.

Trap Type: The default is set to send an “Alarm Entry Added” type Trap. The Trap Type can be set to a Port Type Trap (falconPortTraps). Selecting “AlarmEntryAdded” enables the “AlarmEntryAdded” and “AlarmEntryRemoved” Trap. An “AlarmEntryAdded” Trap will be sent anytime a new alarm is added to the Alarm History log. The contents of the “AlarmEntryAdded” Trap contain the Alarm Label. The NMS can receive the Trap, extract and display the Alarm Label. An “AlarmEntryRemoved” Trap will be sent anytime a Return to Normal Alarm is added to the Alarm History log. The contents of the “AlarmEntryRemoved” Trap contain the Alarm Label. Selecting “falconPortTraps” enables two Traps per FMS input: a “FalconPortxxTrap” and a “FalconPortxxTrapClear”. For example, when input #1 goes into alarm, the FMS sends a “FalconPort01Trap”. When input #1 returns to normal, the FMS sends a “FalconPort01TrapClear”.

Selecting “AlarmEntryAdded” makes configuring the NMS easier, since the NMS only needs to be configured for a couple Traps. Choosing “falconPortTraps” requires more configuration at the NMS, but may make it easier to display, set severity, and parse the data in the NMS.

Trap Delivery: Determines if the SNMP Trap is sent out the LAN connection or dials out and sends the SNMP Trap over the modem connection. If PPP is selected, the dial-up connection, or phone number 16, needs to be configured. Phone numbers are configured through the Modem Configuration page by clicking the 16 (PPP) link.

Communities: Identifies devices that receive SNMP Traps and/or Syslog messages from the FMS and interacts with the FMS over the network. To add a device to the Communities list, select a community number posted as “empty”. Enter the receiving device’s IP Address and a string that identifies the device. An IP Address of 0.0.0.0 in this field allows any device to access the FMS through an MIB browser. Select “Write” if the device will have Read/Write network access. This allows the FMS to be configured over the network. Select “Traps” if the device will receive Traps from the FMS.

**NOTE:**

Refer to the “MIB Files Information” document located on the FMS webpage of our website (www.rletech.com) for more information on the SNMP Trap format and MIB Files.

**NOTE:**

Changes will not go into effect until the Submit Changes button is clicked.

3-11 URL LINKS (1-5)

URL Links (1-5) Configuration

URL Link #1 Image:

URL Link #1 Home:

URL Link #1 Label:

URL Link #2 Image:

URL Link #2 Home:

URL Link #2 Label:

URL Link #3 Image:

URL Link #3 Home:

URL Link #3 Label:

URL Link #4 Image:

URL Link #4 Home:

URL Link #4 Label:

URL Link #5 Image:

URL Link #5 Home:

URL Link #5 Label:

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-21: Sample FMS URL (1-5) Links Configuration

The Main Menu of the FMS Web interface displays a large image and links to other images. These images can be graphics, logos or images from an IP camera. The **URL Links (1-5)** page allows users to specify which images and URLs will be available from the first five links on the FMS Main Menu.

For Axis207 Web Cameras set the URL link to the following:

- URL Link #x Image: <http://xxx.xxx.xxx.xxx/jpg/image.jpg>
- URL Link #x Home: <http://xxx.xxx.xxx.xxx>
- URL Link #x Label: Enter the Camera’s Label

For Panasonic KX-HCM110A Web Cameras set the URL link to the following:

- URL Link #x Image: <http://xxx.xxx.xxx.xxx/snapshotjpeg?resolution=320x240&quality=standard>
- URL Link #x Home: <http://xxx.xxx.xxx.xxx/ImageViewer?Mode=Motion&resolution=320x240&quality=standard>
- URL Link #x Label: Enter the Camera’s Label

3-12 URL LINKS (6-10)

WebCam (6-10) Configuration

URL Link #6 Image:

URL Link #6 Home:

URL Link #6 Label:

URL Link #7 Image:

URL Link #7 Home:

URL Link #7 Label:

URL Link #8 Image:

URL Link #8 Home:

URL Link #8 Label:

URL Link #9 Image:

URL Link #9 Home:

URL Link #9 Label:

URL Link #10 Image:

URL Link #10 Home:

URL Link #10 Label:

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-22: Sample FMS URL (6-10) Links Configuration

The **URL Links (6-10)** page allows users to specify which images and URLs will be available from links 6-10 on the FMS Main Menu.

3-13 LINKS

Figure 3-23: Links Configuration Page

The Main Menu allows users to link to up to four other FMS units. The **FMS Links** page allows users to designate the IP Addresses of these additional FMS units.

3-14 NEST/EGG

The **Nest/Egg** page allows users to configure the FMS Nest/Egg capabilities. More specifically, the FMS contains a webpage, or “Nest”, that can monitor up to 32 other FMSs, or “Eggs”. The Nest will display the name and a summary alarm from each Falcon Egg. The summary alarm status of each Egg will automatically refresh based on the Web refresh rate determined for that individual FMS.

The Nest also provides a link for each Falcon Egg. When an alarm occurs, the summary alarm box turns red and the operator can select the link to open the alarming FMS webpage to view the alarm.

Once configured, a “Falcon Nest” link appears at the bottom of the Main Menu. Clicking the “Falcon Nest” link opens the Falcon Nest page where all configured Falcon Eggs are displayed; see Figure 3-24.

Figure 3-24: Sample FMS Nest Egg Page

3-14.1 Falcon Nest Configuration

Falcon Nest Configuration

Nest Type:

Egg Login:

Egg Alternate IP Address: (0.0.0.0 = Use lan IP address)

Egg Alternate Http Port: (Default 0 = 80)

[Egg Link #1 Configuration](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-25: Sample FMS Nest Configuration

The **Falcon Nest** link appears at the bottom of the Main Menu after the Nest/Egg has been configured. The Falcon Nest page and all configured Falcon Eggs are displayed. The **Nest Type** option enables or disables the Falcon nest page. Selecting “Frames” enables the nest page.

3-14.2 Egg Configuration

Falcon Egg #1 Configuration

[Next >>](#)

IP Address:

Http Port: (Default 0 = 80)

[Return to Nest Configuration](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-26: Sample FMS Egg Configuration

The **Egg #1 Configuration** link on the Falcon Nest page allows users to enter the IP Address and HTTP port for each Falcon Egg. The HTTP port can be changed for added security. The HTTP port must be set the same as the FMS HTTP configuration setting, located under the System Configuration Menu.

3-15 MODEM

The **Modem** link allows users to configure the FMS internal modem. This instructs the FMS when, how, and whom to call when an alarm occurs; see definitions below for more information.

Modem Configuration

Submit Changes

Initialization String:

Dial Prefix:

Pager Deliveries: (0-255)

Pager Interval: (5-255) Minutes

Pager No Ack Alarm: (0=Disabled, 1-15)

Pager Log Full Alarm: (0=Disabled, 1-15)

Pager Baud Rate: 7 bit, even parity 8 bit, no parity

Pager Unsuccessful Traps: Yes No

Pager Resend: Yes No

Modem Password:

Redial Attempts: (0-255)

Redial Interval: (0-255) Minutes

Comm Check Phone: (0=Disabled, 1-15)

Comm Check Time: (HH.MM)

Force Alarm Acknowledge Code:

Pager Message Strip Timestamp:

Config Phone Number: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) (PPP)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-27: Sample FMS Modem Configuration

Initialization String: A maximum of 38 characters. **&c1** and **&d3** are mandatory. **s0=1** sets the modem to answer after one ring. **s0=0** disables the auto answer and prevents dial-in access.

Dial Prefix: Should be a specific Hayes compatible command or dial modifier depending on pager requirements. It is also limited to 38 characters. The default is set to **atdt**.

Pager Deliveries: Designates the number of times (0-255) the pager is called until the alarm is acknowledged. Pagers are called in sequence.

Example: If Pager Deliveries is set to 3 and pagers 1, 7, and 10 are programmed to be notified, the FMS dials 1, 7, 10, 1, 7, 10, 1, 7, 10. As soon as the alarm is acknowledged, the FMS quits dialing the pagers with that particular access code. Pagers with different access codes are still dialed.

Pager Interval: Determines the number of minutes to wait between redials.

Pager No Ack Alarm: Defines which numbered pager contact (1-15) is called if an alarm is not acknowledged. Enter 0 to disable this function.

Pager Log Full Alarm: Defines which numbered pager contact (1-15) is notified when the Alarm History Log is full.

Pager Baud Rate: Allows the user to set the pager communications settings. Select **7 bit, even parity** or **8 bit, no parity** to match the settings of the pager service provider's TAP service phone number.

Pager Unsuccessful Traps: Select **yes** to allow the FMS to send an SNMP Trap to the NMS in this event.

Pager Resend: Select **yes** for the FMS to send *all* unacknowledged alarms in the Alarm History Menu. Select **no** to send only the *last* unacknowledged alarm. If **no** is selected, the FMS will auto-acknowledge all alarms associated with that particular pager once a successful page has occurred.

Modem Password: Defines a remote access password, seven characters maximum. The password is used when remotely logging into the FMS through a modem.

Redial Attempts: Determines the number of times (1–255) to call a number until the call is successful. Enter 0 to disable this function.

Redial Interval: Establishes the number of minutes (1–255) to wait between redials. Enter 0 to disable this function.

Comm Check Phone: Defines which numbered pager contact (1–15) is called to verify communications. Enter 0 to disable this function.

Comm Check Time: Determines when (time in 24 hour format) a communications check will occur.

Force Alarm Acknowledge Code: Establishes a code that acknowledges all unacknowledged alarms. This acts as a master code and can override all other alarm acknowledge codes.

Pager Message Strip Timestamp: Check to remove the alarm timestamp from the pager message. This reduces the size of the pager message as the user can estimate when the alarm occurred based on when the page was received.



NOTE:

Changes will not go into effect until the **Submit Changes** button is clicked.

3-15.1 Configure Phone Numbers

Figure 3-28: Sample FMS Phone Number Configuration

A screen similar to Figure 3-28 is accessed through the **Config Phone Number** link at the bottom of the Modem Configuration page. This screen allows users to configure pager and cell phone numbers that are used for alarm notification.

Select Phone Type: Determines which type of device the FMS calls. Select the **Text** option to dial a PC receiving ASCII strings. Select **Numeric Pager** to dial a numeric pager. Choose the **Alpha-numeric Pager** option to dial an alphanumeric pager.

Number: Enter the pager service number for numeric and alphanumeric pager entries. Each comma after the pager number represents a two second delay. This delay allows time for the pager service to answer before requesting the pager ID. *Typically, it will only be necessary to use **one comma** between pager numbers.* However, based on set-up and pager services, users may need to experiment with the number of commas that are used. In some cases, a **9** must be entered to access an outside line.

Pager ID: Mandatory for numeric and alphanumeric pagers.

- **Alphanumeric pager:** The ID entered is sent to the paging service along with all queued alarm messages. The ID is the unique PIN for a specific pager. The ID may be a maximum of 16 characters.
- **Numeric pager:** The ID entered may be configured to deliver different numeric messages. The ID can contain 15 characters: any combination of the numerals 0 through 9 and a * or #. These are the only characters that will be transmitted to the paging service. A \$ can be added or inserted anywhere in the message. This is converted into a 5 digit alarm code: YZZZZ.

Y - Binary Alarm Condition: 1=on, 0=return to normal (RTN)

ZZZZ - Alarm ID Number; see APPENDIX E: Alarm ID Reference Tables, pg. 115.

Example: A **10011** message is an Input 1, High Limit 1 Alarm. A **04030** message means that Digital Input #83 (in slot 4) has Returned to Normal.



NOTE:

When using the \$, if multiple unacknowledged alarms are present in the Alarm History Log, the alarm code will be 99999.

An effective numeric page depends largely on the parameters established by the paging service. Users may need to experiment with different parameters in order to achieve desired results.

Acknowledgement Code: Any number, up to six digits, used to acknowledge receipt of an alarm and to terminate any additional call outs for this phone number. This code will acknowledge only those alarms sent to this phone number. The alarms can be acknowledged using this code by dialing the FMS with a touch tone phone and entering this code followed by the # sign. It can also be acknowledged by selecting the Acknowledge Alarms button on the bottom of the Alarm History page.

Multiple phone numbers can use the same acknowledge code. This allows one user to acknowledge alarms sent to multiple pager numbers.



NOTE:

The Acknowledge Code should be different than the access codes. If this code is the same as one of the access codes, the Falcon will acknowledge the alarms associated with the acknowledge code, enter a successful entry in the Access Log, and activate the relay outputs which are set for keypad activation.

Dial Back on Returns: Determines whether to call the number again once the alarm condition returns to normal.



NOTE:

Changes will not go into effect until the Submit Changes button is clicked.

3-15.2 Configure Phone Number 16 (PPP)

Figure 3-29: Sample FMS Phone Number 16 (PPP) Configuration

This page is accessed through the **16 (PPP)** link at the bottom of the Modem Configuration page. This screen allows users to configure a dial-up networking account.

DUN Phone #: Specifies the phone number of the ISP to which you wish to connect.

DUN User Name: Enter your ISP account user name.

DUN Password: Enter the password associated with your ISP account.

3-16 ALARM MANAGEMENT

Figure 3-30: Sample FMS Alarm Settings Menu

The **Alarm Management** link allows users to perform the following tasks:

- Acknowledge current FMS alarms.
- Clear the FMS Alarm and Access History Logs.
- Enter the appropriate code or user’s initials to acknowledge or clear alarm histories.
- Enable or disable maintenance time.
- Designate a maintenance window by selecting the **Set Maintenance Time** button, which will disable alarm notifications for a designated period of time.
- Enable or disable alarm logging during the maintenance window.

3-17 KEYPAD/DTMF ACCESS USERS

Keypad/DTMF Access User Configuration

Submit Changes

#	Id Code:	User Name:	Type:	#	Id Code:	User Name:	Type:
1	123456	Rick	Permanent	2	911	Emergency	Permanent
3	9999	Boss	Permanent	4	1234	Dave	Permanent
5	11	Technician	Permanent	6	555	Maint.	Temporary
7	7823	Paul	Permanent	8			Permanent
9			Permanent	10			Permanent
11			Permanent	12			Permanent
13			Permanent	14			Permanent
15			Permanent	16			Permanent
17			Permanent	18			Permanent
19			Permanent	20			Permanent

Exit Request Input: 0

Alarm Bypass Input: 0

Temporary Time: 1 Hr [Set Temporary Time]

Temporary Time Remaining: 0:59:20 (HH:MM:SS)

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-31: Sample FMS URL (6-10) Links Configuration

The **Keypad/DTMF Access Users** link allows configuration of a maximum of 20 access codes and user names. The access code can be up to six digits long. The user name can be up to 20 characters long. Each ID Code/User can be selected as a “Permanent” or “Temporary” type. Temporary users are only allowed access during the time specified in the Temporary Time drop box. This time may be set by selecting the Set Temporary Time button.

Once the time frame has expired, the temporary users will not be allowed access. However, their information will remain in the Keypad/DTMF field until it is manually removed. While temporary users will not be allowed access to a facility after their allotted time slot, no alarm notification will be transmitted if they try to re-enter the facility through the keypad. Their information must be manually removed from the system in order to activate the alarm notification.

Exit Request Inputs are used to prevent unnecessary alarms from being triggered. Exit Request Inputs register when a motion sensor or keypad entry is entering or leaving a facility and then overrides the normal alarm notification process (i.e., it prevents the system from registering normal entries or exits as forced). The Exit Request input provides a dry contact that will signal a relay to unlock a door when the contact closes from a button or motion sensor.

The **Alarm Bypass Input** is used in conjunction with the controlled access function of the FMS (digital inputs 1-104). Typically a magnetic-based contact installed in a door detects the position of the door. This contact sends a signal to the FMS to report door conditions such as “Forced” and “Held”. When enabled, the alarm on the door is bypassed upon entry of this valid access code.

NOTE:

Press the **Submit Changes** button after configuration is complete or all access user configuration changes will be lost.



NOTE:

The Acknowledge code should be different than the access codes. If this code is the same as one of the access codes, the Falcon will acknowledge the alarms associated with the acknowledge code, enter a successful entry in the Access log and activate the relay outputs which are set for keypad activation.

3-18 SCHEDULES

Schedule Configuration

Submit Changes

Schedule A Configuration
Status: Active
Begin DOW: Monday
End DOW: Friday
Begin Time: 08:00
End Time: 17:00

Schedule B Configuration
Status: Inactive
Begin DOW: Sunday
End DOW: Sunday
Begin Time: 00:00
End Time: 00:00

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-32: Sample FMS Schedule Configuration

The **Schedules** page allows users to schedule the activation and deactivation of relay outputs. This is useful for cycling redundant equipment such as chillers, generators, etc. Relays are assigned these schedules through the Relay Configuration menus. **Begin DOW** is the day of the week the schedule will begin. **End DOW** is the day of the week the schedule will end.



NOTE:

Press the Submit Changes button when done to save all schedule changes.

3-19 BATTERY

Battery Configuration

Submit Changes

Input Voltage Reading: 25.34
Battery Alarm: Installed
Low Voltage Trip: 22
Alarm Dial Out: 0,0,0,0
Input Voltage Offset: 0.00

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-33: Sample FMS Battery Page

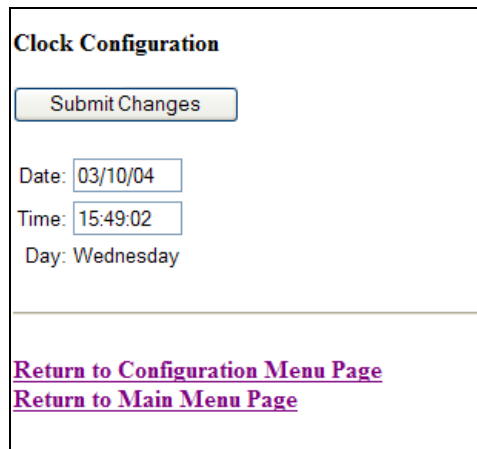
The **Battery** page allows users to configure power monitoring when the FMS is running off a 48V battery.

Low Voltage Trip: The input voltage value below which an alarm occurs.

Alarm Dial Out: Specifies which of the pre-programmed phone numbers and which order to dial them if a low input voltage condition occurs.

Input Voltage Offset: A negative or positive number used to adjust the input voltage reading: + adds offset and – subtracts offset.

3-20 CLOCK



Clock Configuration

Submit Changes

Date: 03/10/04

Time: 15:49:02

Day: Wednesday

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 3-34: Sample FMS Clock Configuration

The **Clock** page allows users to set the date and time on the FMS internal clock.

- Enter the date using a MM/DD/YY format, where MM is a two digit month, DD is a two digit day, and YY is a two digit year.
- Enter the time using a HH/MM/SS format, where HH is a two digit hour (1-24), MM is a two digit minute, and SS is a two digit second.



NOTE:

Press the **Submit Changes** button when done to save all changes.

3-21 EMAIL/DNS

E-Mail Configuration

[Submit Changes](#)

Access Type: None LAN PPP

Primary DNS Server: 10 | 0 | 0 | 20 Secondary DNS Server: 10 | 0 | 0 | 20

Mail (SMTP) Server: mail.rletech.com

Mail Sender Address: falcon@rletech.com

Mail Subject: Rick Dohmen Falcon Alarm

Mail Recipient (1): rdohmen@rletech.com

Mail Recipient (2):

Mail Recipient (3):

Mail Recipient (4):

Mail Recipient (5):

Mail Recipient (6):

Mail Recipient (7):

Mail Recipient (8):

Email Message Strip TimeStamp: Append Falcon link to message:

Smtip Authentication: None Plain Login (Do not enable this unless instructed by your ISP or IT dept)

Smtip Username: rie01 Smtip Password: rletech

Alarm History Entries: 57 Emails sent: 2 Emails unsent: 0

Mail Server Dns address logged for: "mail.rletech.com" 209.162.192.170
 Mail Server Dns TTL: 97
 Stp Server Dns address logged for: "" 0.0.0.0
 Stp Server Dns TTL: 0

[View Smtip Log](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-35: Sample FMS E-mail Configuration

The **email** page allows users to configure the FMS to send notifications via email when inputs are in an alarm state. The FMS will send one email message per alarm instance to a maximum of eight email recipients.

Access Type: Specifies whether to send the message through a local network or over a PPP dial-up connection.

DUN User Name and Password: Only used if PPP is selected. This option specifies the dial-up network user name and password. Contact your ISP for this information.

DUN Phone Number: The number the FMS dials to connect to the ISP. Contact your IT Department to obtain this phone number.

DNS Servers: Information provided by your ISP. It is needed to deliver the email message.

Mail (SMTP) Server: Specifies the email server used to receive and send mail.

Mail Sender Address: The address displayed in the “From” field of the email message.

Mail Subject: Displayed in the subject field of the received email messages. Adding **&m** inserts the MAC Address of the FMS into the email subject line. This ensures the email subject is always unique to a FMS.

Mail Recipient (1)–Mail Recipient (8): Specifies the addresses of up to eight email recipients.

SMTP User Name: Used for ESMTTP. Use the recommended default setting unless instructed differently by your IT Department.

SMTP Password: Used for ESMTTP. Use the recommended default setting unless instructed differently by your IT Department.

SMTP Authentication: Used for ESMTTP. Use the recommended default setting unless instructed differently by your IT Department.

**NOTE:**

When the information is complete, click **Submit Changes** for the changes to take effect.

3-22 NETWORK TIME PROTOCOL (NTP)

```

Network Time Protocol (NTP) Configuration
Submit Changes

Network Time (NTP) Server: _____ (IP address or hostname)
Update Interval: 0 (5-1440 Minutes - 0 for disabled)
Retry Interval: 10 (10-120 Seconds)
Select Time Zone: Mountain US (UTC-7)
Daylight Savings Time: 2:00 AM Local
DST Begin Date: First Sunday - April
DST End Date: Last Sunday - October

Mail Server DNS address logged for: "mail.rletechnologies.com" 209.142.192.170
Mail Server Dns TTL: 1198
Ntp Server DNS address logged for: "" 0.0.0.0
Ntp Server Dns TTL: 0

sysUpTime: 3017504
NextNtpRetry: 0
LastNtpRequestTime: 0
NextNtpRequestTime: 0
LastTanmlTimestamp: 00000000
Last Ntp Updates: 37 (UTC 0)

Return to Configuration Menu Page
Return to Main Menu Page

```

Figure 3-36: Sample FMS Network Time Protocol (NTP) Configuration

Network Time Protocol (NTP) is widely used on the Internet to synchronize computer clocks to national standard time or Coordinated Universal Time (UTC). It synchronizes the time of a computer or server—in this case, the FMS—to another server or reference time source. NTP is important in maintaining a high level of accuracy and reliability in time stamped events. This page allows users to configure the FMS NTP feature.

Network Time (NTP) Server: The IP address or hostname of the Network Time Protocol Server with which the FMS will synchronize. Examples of public NTP Servers include “us.pool.ntp.org” and “time.nist.gov”.

Update Interval: The time in minutes the FMS takes to request time updates from the NTP Server. This can be set from 5-1440 minutes. Enter 0 to disable.

Retry Interval: The time in seconds the FMS waits before retrying a failed connection to the NTP Server. This can be set from 10-120 seconds.

Select Time Zone: Enter the time zone in which the FMS resides.

Daylight Savings Time: Select the hour Daylight Savings Time occurs. Typically, this is 2:00 A.M. local time.

DST Begin Date: Enter the date Daylight Savings Time will begin.

DST End Date: Enter the date Daylight Savings Time will end.

3-23 MODBUS/COM PORT 1

The **Modbus/COM1 Configuration** pages allow users to configure Com Port 1 *or* Modbus features. If Modbus is not configured, there will be no Modbus options in the drop down box. Configuration for the Modbus/ Com Port 1 Configuration are explained in greater detail in Section 5-3: Modbus/COM1 Configuration (Modbus MASTER & Slave), pg. 66.

NOTE:
 The FMS unit does not come with Modbus communication. The EXP-MBCS option installed in order to have the option of configuring Modbus Communication. To configure a unit, contact RLE.

NOTE:
 Figure 3-38 will only be displayed if the EXP-MBCS option is installed.

Figure 3-37: Sample FMS Modbus/Com1 Configuration

3-24 MODBUS / SLAVE UNITS

The **Modbus Slave Unit Configuration** pages are available only when the FMS is configured with the EXP-MBCS option; to configure an FMS unit for the EXP-MBCS, contact RLE Technologies.

The **Modbus Slave Unit Configuration** can only be configured after the Modbus/Com Port 1 Communication has been set-up; see Figure 3-38. In other words, users must tell the FMS that they are using it for Modbus communication before users can configure the Modbus slave units.

The **Slave Unit Configuration** page will change depending on what type of Serial Protocol users set it up for (i.e., Modbus Master BCM – 4 Units, Modbus Master Generic – 16 Units, or Modbus Master BCM – 16 Units) selected on the Modbus/COM1 Configuration page; see Figure 3-38. For more information on Modbus Slave Unit configuration see section 5-3 Modbus/COM1 Configuration (Modbus MASTER & Slave), pg. 66.

Modbus Slave Unit Configuration		
Unit #	Address	Unit Description
1	1	LD5000 Leak Detection Panel
2	0	PDU #3
3	3	SiteScan12
4	0	(Blank)
5	0	(Blank)
6	0	(Blank)
7	0	(Blank)
8	0	(Blank)
9	0	(Blank)
10	0	(Blank)
11	0	(Blank)
12	0	(Blank)
13	0	(Blank)
14	0	(Blank)
15	0	(Blank)
16	0	(Blank)
Modbus Registers 1-100 Modbus Registers 101-200 Modbus Registers 201-300 Modbus Registers 301-400 Modbus Registers 401-500 Modbus Registers 501-600 Modbus Registers 601-628 Read / Preset Register		

Figure 3-38: Sample Modbus Generic Slave Unit Configuration (most common configuration)

Modbus BCM Unit Configuration			
Unit #	Address	Unit Description	Register Link
1	4	PDU1, Panel 1	Registers
2	5	PDU1, Panel 2	Registers
3	0	BCM #3	
4	0	BCM #4	
5	0	BCM #5	
6	0	BCM #6	
7	0	BCM #7	
8	0	BCM #8	
9	0	BCM #9	
10	0	BCM #10	
11	0	BCM #11	
12	0	BCM #12	
13	0	BCM #13	
14	0	BCM #14	
15	0	BCM #15	
16	0	BCM #16	
Return to Configuration Menu Page Return to Main Menu Page			

Figure 3-39: Sample Modbus BCM 16 Unit Configuration Webpage

Modbus BCM Unit Configuration			
Unit #	Address	Unit Description	Register Link
1	4	PDU1, Panel 1	Registers
2	5	PDU1, Panel 2	Registers
3	0	BCM #3	
4	0	BCM #4	

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 3-40: Sample Modbus BCM 4 Units Configuration Webpage

3-25 FLASH PROGRAM

Flash Program Configuration
Flash #2 Program: Falcon-EM V7.0 B18 02/23/04 Checksum: E20C Serial #: 0001 (active)
Flash #1 Program: Falcon-EM V7.0 B18 02/23/04 Checksum: E20C Serial #: 0000 (backup)
<input type="button" value="Erase Backup"/>
Return to Configuration Menu Page Return to Main Menu Page

Figure 3-41: Sample FMS Schedule Configuration

The **Flash Program** link displays which versions of FMS firmware are loaded onto the FMS. Only two copies can be loaded onto the FMS at a time. In order to upload a Firmware update, the backup Flash must be blank. If it is not, click the **Erase Backup** button to erase it. This erases the oldest version of firmware stored on the FMS; see Chapter 9: Upgrading Firmware, Loading & Saving Configuration Data, pg. 95 .

Using a TFTP client software program, send the falcon(vx.x bx).bin file to the IP address of the FMS. The FMS verifies the file name starts with **FAL8EM** and ends with **.bin**. Other file names or file types will not be accepted. The FMS will accept TFTP block sizes of 64, 128, 256, 512, or 1024. Once the program has been successfully uploaded, the FMS will automatically reboot; see Chapter 9: Upgrading Firmware, Loading & Saving Configuration Data, pg. 95, for more details.

3-26 PRODUCT REGISTRATION

The screenshot shows the RLE Technologies Product Registration Webpage. The page layout includes a navigation menu on the left, a main registration form in the center, and contact information on the right. The registration form is titled "Product Registration Form" and includes a privacy notice: "Any information provided through the registration form will be regarded as confidential. See our Privacy Policy for more information. Required fields are marked with an asterisk." The form fields are as follows:

- *Company Name
- *Contact First Name
- *Contact Last Name
- *Address line 1
- Address line 2
- *City
- *State (dropdown menu)
- *Zip Code
- *Phone Number
- *E-mail
- *Serial Number(s) (text area with a note: "Enter multiple Serial #'s separated by commas.")
- *Purchased From
- *Date Of Purchase
- *Installed By
- Installer's Phone
- Installer's Email

Below the form, there are checkboxes for "Please notify me about:"

- Free Firmware Upgrades
- RLE Announcements

A "Register" button is located at the bottom of the form. The right sidebar contains contact information for RLE Technologies, including the address (104 Raquette Dr, Fort Collins, CO 80524), phone contact (1-800-518-1519, (970) 484-6510, Fax: (970) 484-6650), email (Sales: sales@rletech.com, Support: support@rletech.com), business hours (Monday - Friday 8:00am - 5:00pm MST), and a Google Map link.

Figure 3-42: Product Registration Webpage

The **Product Registration** link allows users to register their FMS with RLE at the time of configuration. The FMS IP Address, Subnet Masks, and Default Gateway must be configured before this link will be operational. Once configured, complete the registration form and click the Register button to submit your information to RLE.

CHAPTER 4: FMS WEB INTERFACE

The FMS Web interface provides a convenient way to check and monitor the FMS status via the Web. To access the FMS **Main Menu, or Home page**, type the IP address of the FMS into the location bar of the Web browser. When the prompt appears, enter the default user name (**falcon**) and password (**none—leave blank**); for more information on accessing the FMS Home page, see Chapter 3: FMS Configuration, pg. 20.

4-1 MAIN MENU/ HOME PAGE

The Falcon logo (default), IP camera image and/or company logo can be displayed on the Main Menu; see section 3-11 URL Links (1-5), pg. 38, for more information. Figure 3-3 shows a sample of what the FMS homepage could look like when configured.

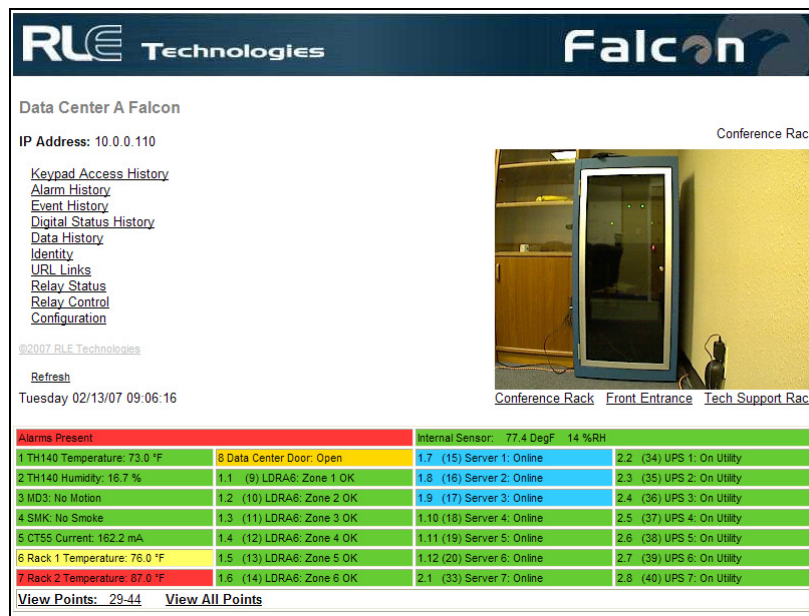









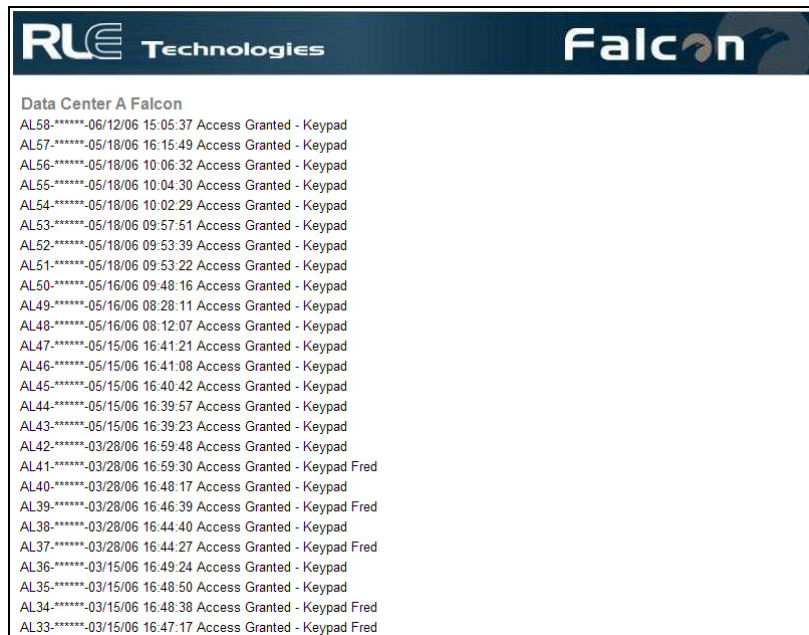
Figure 4-1: An example of what a configured FMS could look like.

The bottom of the FMS Main Menu features columns that list the FMS configured inputs. The number of inputs displayed is configurable from the Configuration menu; see Chapter 3: FMS Configuration, pg. 20. Each input has a box with its number, name, and status. The box is shaded to signal the inputs status. Color codes are as follows:

Table 4-1: Color Definitions

	Green	Input is normal—not in an alarm state.
	Yellow	Analog inputs only—input is in a high alarm 1 or low alarm 1 state.
	Red	Analog input is in a high alarm 2 or low alarm 2 state. Digital input is in an alarm state.
	Blue	Alarm/Input disabled by a schedule.
	White (no shading)	Input is not configured—spare point for future use.
	Magenta, Green, or Gold	
		Digital Status point is on. This color is configurable under the System Configuration Menu.

4-2 KEYPAD (DTMF) ACCESS HISTORY



Access Log Index (ALxxx)	Date and Time	Access Status	Method of Entry
AL58.*	06/12/06 15:05:37	Access Granted	Keypad
AL57.*	05/18/06 16:15:49	Access Granted	Keypad
AL56.*	05/18/06 10:06:32	Access Granted	Keypad
AL55.*	05/18/06 10:04:30	Access Granted	Keypad
AL54.*	05/18/06 10:02:29	Access Granted	Keypad
AL53.*	05/18/06 09:57:51	Access Granted	Keypad
AL52.*	05/18/06 09:53:39	Access Granted	Keypad
AL51.*	05/18/06 09:53:22	Access Granted	Keypad
AL50.*	05/16/06 09:48:16	Access Granted	Keypad
AL49.*	05/16/06 08:28:11	Access Granted	Keypad
AL48.*	05/16/06 08:12:07	Access Granted	Keypad
AL47.*	05/15/06 16:41:21	Access Granted	Keypad
AL46.*	05/15/06 16:41:08	Access Granted	Keypad
AL45.*	05/15/06 16:40:42	Access Granted	Keypad
AL44.*	05/15/06 16:39:57	Access Granted	Keypad
AL43.*	05/15/06 16:39:23	Access Granted	Keypad
AL42.*	03/28/06 16:59:48	Access Granted	Keypad
AL41.*	03/28/06 16:59:30	Access Granted	Keypad Fred
AL40.*	03/28/06 16:48:17	Access Granted	Keypad
AL39.*	03/28/06 16:46:39	Access Granted	Keypad Fred
AL38.*	03/28/06 16:44:40	Access Granted	Keypad
AL37.*	03/28/06 16:44:27	Access Granted	Keypad Fred
AL36.*	03/15/06 16:49:24	Access Granted	Keypad
AL35.*	03/15/06 16:48:50	Access Granted	Keypad
AL34.*	03/15/06 16:48:38	Access Granted	Keypad Fred
AL33.*	03/15/06 16:47:17	Access Granted	Keypad Fred

Figure 4-2: Keypad Access History View

Keypad Access History displays the last 100 entries captured by the FMS. The following information is displayed:

- Access Log Index (ALxxx)
- Date and Time of Event
- Access Granted or Denied
- Access denied is entered into the log when three consecutive invalid codes are entered.
- Access is granted when a valid code is entered followed by the # key. The * key clears the code allowing a user to reenter their code.
- Method of Entry (keypad or DTMF)
- Access Code Description

4-3 ALARM HISTORY

Alarm History displays the last 256 alarms captured by the FMS. Alarms are ranked from most recent (top of the list) to least recent (bottom of the list); see Figure 4-3, pg. 56.

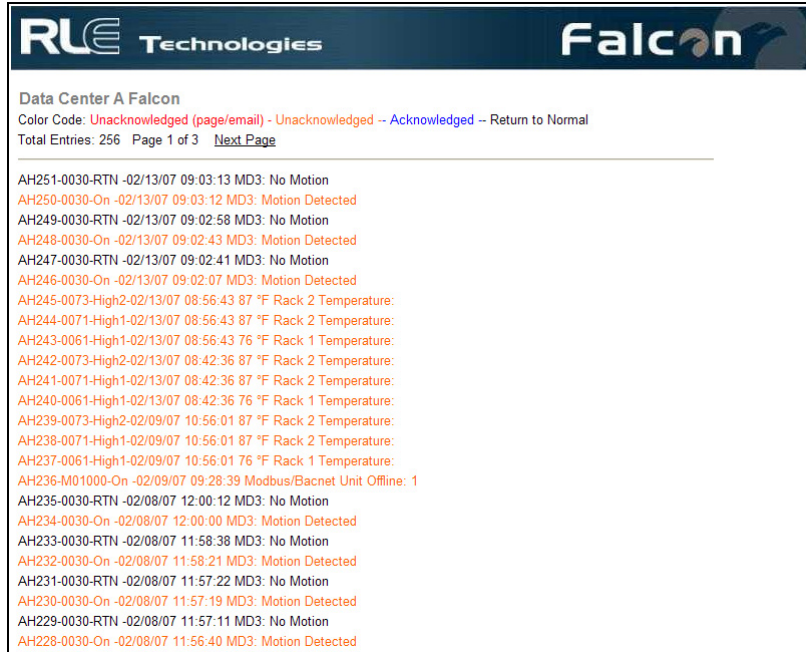






Figure 4-3: Sample FMS Alarm History Page

The following format is used to record each alarm entry:

AH###-ID-Condition-Date Time (Value UOM) Label

- AH### is the alarm entry index.
- ID is the alarm identifier number; see APPENDIX E: Alarm ID Reference Tables, pg. 115.
- Condition is On, High1, High2, Low1, Low2, or RTN (Returned to Normal).
- Date and Time is the internal date and time stamp of the alarm condition.
- Label is the alarm descriptor, up to 64 characters long.
- Value and Unit of Measure (UOM) is captured for analog channels only. The value recorded is the actual analog value that exceeded its alarm threshold.

The Alarm History log entries are color coded as follows:

-  **Red** A point that is configured for dial out (pager) is in alarm and is unacknowledged.
The alarm will be red if the point is configured for both pager and email notification.
-  **Orange** A point that is **not** configured for dial out (pager) is in alarm and is unacknowledged.
-  **Blue** The alarm has been acknowledged.
-  **Black** The alarm has returned to normal.

Unacknowledged dial out alarms (marked in red) can be acknowledged from this page. To do so, type the appropriate code in the box at the bottom of the page and click the Acknowledge Alarms by Code button. Acknowledge codes are set under the Phone Number or Email Configuration pages; see section 3-15.1 Configure Phone Numbers, pg. 42, for more information on configuring phone numbers.

4-4 EVENT HISTORY

RLE Technologies		Falcon	
Data Center A Falcon			
EL66-02/13/07	08:56:32	System Booted - 20	
EL65-02/13/07	08:42:25	System Booted - 20	
EL64-02/09/07	10:55:50	System Booted - 20	
EL63-02/09/07	10:55:34	Data Upload - Tftp	
EL62-02/09/07	10:12:56	Data Upload - Tftp	
EL61-02/09/07	09:46:53	Data Upload - Tftp	
EL60-02/09/07	09:46:19	Data Upload - Tftp	
EL59-02/09/07	09:44:02	Data Upload - Tftp	
EL58-02/08/07	10:14:35	System Booted - 20	
EL57-02/08/07	09:59:44	System Booted - 20	
EL56-02/08/07	09:49:45	System Booted - 20	
EL55-02/08/07	09:48:46	Prgrm Upload - Tftp	
EL54-02/08/07	09:42:35	Data Upload - Tftp	
EL53-02/08/07	09:40:15	Data Upload - Tftp	
EL52-02/08/07	09:39:53	System Booted - 20	
EL51-02/08/07	09:39:08	System Booted - 20	
EL50-02/08/07	09:38:47	Data Upload - Tftp	
EL49-02/08/07	09:36:13	System Booted - 20	
EL48-02/08/07	08:31:13	System Booted - 20	
EL47-02/08/07	07:50:01	System Booted - 20	
EL46-02/08/07	07:21:36	System Booted - 20	
EL45-02/07/07	13:18:34	Data Upload - Tftp	
EL44-02/07/07	13:13:33	System Booted - 20	
EL43-02/07/07	13:11:22	System Booted - 20	
EL42-02/07/07	13:11:01	Data Upload - Tftp	

Figure 4-4: Sample FMS Event History Page

Event History displays the past 100 events, as recorded by the FMS. Typical events that are logged include System Booted, Email Accepted by Server, No Dial Tone, Busy, No Carrier, Page Successful, Alarm History Cleared, Digital Status History Cleared, Force Acknowledge by <initials>, Program Upload – TFTP.

4-5 DIGITAL STATUS HISTORY

RLE Technologies		Falcon	
Data Center A Falcon			
SH086-0080-On	-02/13/07	08:56:42	Data Center Door: Open
SH085-0080-On	-02/13/07	08:42:35	Data Center Door: Open
SH084-0080-On	-02/09/07	10:56:00	Data Center Door: Open
SH083-0080-On	-02/08/07	10:14:45	Data Center Door: Open
SH082-0080-On	-02/08/07	09:59:54	Data Center Door: Open
SH081-0080-On	-02/08/07	09:49:55	Data Center Door: Open
SH080-0080-On	-02/08/07	09:42:41	Data Center Door: Open
SH079-0080-On	-02/08/07	09:36:23	Data Center Door: Open
SH078-0080-On	-02/08/07	08:31:23	Data Center Door: Open
SH077-0080-On	-02/08/07	07:21:45	Data Center Door: Open
SH076-0080-On	-02/07/07	13:27:35	Data Center Door: Open
SH075-3050-On	-02/07/07	09:33:13	ANALOG #3.5
SH074-2120-On	-02/07/07	09:29:15	ANALOG #2.12
SH073-0030-On	-01/08/07	11:34:45	MD3: Motion Detected
SH072-0030-RTN	-01/08/07	11:34:42	MD3: No Motion
SH071-0030-On	-01/08/07	11:33:36	MD3: Motion Detected
SH070-0030-RTN	-01/08/07	11:33:32	MD3: No Motion
SH069-1020-RTN	-01/08/07	11:25:44	LDRA6: Zone 2 OK
SH068-1020-On	-01/08/07	11:22:39	LDRA6: Zone 2 Leak
SH067-1020-RTN	-01/08/07	11:22:28	LDRA6: Zone 2 OK
SH066-1020-On	-01/08/07	11:21:29	LDRA6: Zone 2 Leak
SH065-1020-RTN	-01/08/07	11:21:28	LDRA6: Zone 2 OK
SH064-1020-On	-01/08/07	11:21:18	LDRA6: Zone 2 Leak
SH063-1020-RTN	-01/08/07	11:20:53	LDRA6: Zone 2 OK
SH062-1020-On	-01/08/07	11:20:40	LDRA6: Zone 2 Leak
SH061-1020-RTN	-01/08/07	11:20:36	LDRA6: Zone 2 OK
SH060-1020-On	-01/08/07	11:20:28	LDRA6: Zone 2 Leak

Figure 4-5: Sample FMS Event Digital Status History Page

Digital Status History displays a history of the state of digital points configured as “Status” points. A digital input can be configured as NO (normally open), NC (normally closed) or Status. If the digital input is configured as Status, it will not alarm, but any changes will be noted and appear on this page. The log displays the past 100 status changes, as recorded by the FMS.

4-6 DATA HISTORY

CH	Description	View	View	View
1	TH140 Temperature:	Minute	Hour	Day
2	TH140 Humidity:	Minute	Hour	Day
5	CT55 Current:	Minute	Hour	Day
6	Rack 1 Temperature:	Minute	Hour	Day
7	Rack 2 Temperature:	Minute	Hour	Day
2.9 (41)	ANALOG #2.9	Minute	Hour	Day
2.10 (42)	ANALOG #2.10	Minute	Hour	Day
2.11 (43)	ANALOG #2.11	Minute	Hour	Day
2.12 (44)	ANALOG #2.12	Minute	Hour	Day
3.1 (57)	ANALOG #3.1	Minute	Hour	Day
3.2 (58)	ANALOG #3.2	Minute	Hour	Day
3.3 (59)	ANALOG #3.3	Minute	Hour	Day
3.4 (60)	ANALOG #3.4	Minute	Hour	Day
3.5 (61)	ANALOG #3.5	Minute	Hour	Day
3.6 (62)	ANALOG #3.6	Minute	Hour	Day
3.7 (63)	ANALOG #3.7	Minute	Hour	Day
3.8 (64)	ANALOG #3.8	Minute	Hour	Day
3.9 (65)	ANALOG #3.9	Minute	Hour	Day
3.10 (66)	ANALOG #3.10	Minute	Hour	Day
3.11 (67)	ANALOG #3.11	Minute	Hour	Day
3.12 (68)	ANALOG #3.12	Minute	Hour	Day
TS	Internal Temperature Sensor	Minute	Hour	Day
HS	Internal Humidity Sensor	Minute	Hour	Day

[Data History Text Downloads](#)
[Main Menu](#)
 ©2007 RLE Technologies

Figure 4-6: Sample FMS Data History Page

Data History provides an intermediate page to assist in navigating to the desired data. Only points configured as analog 4-20mA are shown.

- The **Modbus Points** links are shown if the FMS is equipped with the EXP-MBCS option. These links provide access to the Modbus Data History pages.
- The **Data History Text Downloads** link allows the Alarm History Log to be downloaded as a text (.txt) file and the Minute, Hour, and Day logs to be downloaded as a comma separated variable (.csv) file (except for Modbus imports).

4-6.1 Minute, Hour, and Day View

Data History			
System Name: Data Center A Falcon			
Channel: 1			
Data Type: Daily			
Description: TH140 Temperature:			
Unit of Measure: °F			
Date Time	Avg	High	Low
02/07/07 00:00	65	77	-55
02/08/07 00:00	72	76	40
02/09/07 00:00	71	74	69
02/10/07 00:00	69	71	69
02/11/07 00:00	70	72	69
02/12/07 00:00	72	76	69
02/13/07 00:00	69	73	68
Data History Menu Main Menu			

Figure 4-7: Sample FMS Minute, Hour, and Day Page

The **Minute**, **Hour**, and **Day** links on the Data History page display the detailed information the FMS records in its logs. The Minute log displays the high, low, and average values per minute for the last 60 minutes. The Hour log displays the high, low, and average values per hour for the last 24 hours. The Day log displays the high, low, and average values per day for the last seven days. These values can be downloaded to a comma separated variable (.csv) file via the Data History Text Downloads button.

4-6.2 Data History Text Downloads





Falcon Index of /data
File Name
 Daily/
 Hourly/
 Minute/
 alarmhistory.txt
Return to data history menu
Falcon/1.3.0 Server at Port 80

Figure 4-8: Sample FMS Data History Text Downloads Page

The Data History Text Downloads located on the Minute/Hour/Day View page provides a view of the types of data users can download. To save a desired set of information, choose the type (i.e., daily, hourly, minute).

4-6.2.1 Daily, Hourly, Minute

Falcon Index of /data/hourly		
File Name	Type	Point Label
Parent Directory	-	
logh1.csv	Hourly	Temperature
logh2.csv	Hourly	Relative Humidity
logh6.csv	Hourly	LD5000 Leak Detected @
loghTS.csv	Hourly	Internal Temperature Sensor
loghHS.csv	Hourly	Internal Humidity Sensor

[Return to data history menu](#)

Figure 4-9: Sample FMS Index of Page

Once the type of data is selected, a screen similar to Figure 4-9 will appear. Choose the file name to download, and click the link for the desired data to be saved to the hard drive.

4-6.2.2 Alarm History Text (alarmhistory.txt)

```
Falcon Alarm History
Site Name: Data Center A Falcon
AH251-0030-RTN -02/13/07 09:03:13 MDS: No Motion
AH250-0030-On -02/13/07 09:03:12 MDS: Motion Detected
AH249-0030-RTN -02/13/07 09:02:58 MDS: No Motion
AH248-0030-On -02/13/07 09:02:43 MDS: Motion Detected
AH247-0030-RTN -02/13/07 09:02:41 MDS: No Motion
AH246-0030-On -02/13/07 09:02:07 MDS: Motion Detected
AH245-0073-High2-02/13/07 08:56:43 87 °F Rack 2 Temperature:
AH244-0071-High1-02/13/07 08:56:43 87 °F Rack 2 Temperature:
AH243-0061-High1-02/13/07 08:56:43 76 °F Rack 1 Temperature:
AH242-0073-High2-02/13/07 08:42:36 87 °F Rack 2 Temperature:
AH241-0071-High1-02/13/07 08:42:36 87 °F Rack 2 Temperature:
AH240-0061-High1-02/13/07 08:42:36 76 °F Rack 1 Temperature:
AH239-0073-High2-02/09/07 10:56:01 87 °F Rack 2 Temperature:
AH238-0071-High1-02/09/07 10:56:01 87 °F Rack 2 Temperature:
AH237-0061-High1-02/09/07 10:56:01 76 °F Rack 1 Temperature:
AH236-M01000-On -02/09/07 09:28:39 Modbus/Sacnet Unit Offline: 1
AH235-0030-RTN -02/08/07 12:00:12 MDS: No Motion
AH234-0030-On -02/08/07 12:00:00 MDS: Motion Detected
AH233-0030-RTN -02/08/07 11:58:38 MDS: No Motion
AH232-0030-On -02/08/07 11:58:21 MDS: Motion Detected
AH231-0030-RTN -02/08/07 11:57:22 MDS: No Motion
AH230-0030-On -02/08/07 11:57:19 MDS: Motion Detected
AH229-0030-RTN -02/08/07 11:57:11 MDS: No Motion
AH228-0030-On -02/08/07 11:56:40 MDS: Motion Detected
AH227-0073-High2-02/08/07 10:14:46 87 °F Rack 2 Temperature:
AH226-0071-High1-02/08/07 10:14:46 87 °F Rack 2 Temperature:
AH225-0061-High1-02/08/07 10:14:46 76 °F Rack 1 Temperature:
AH224-0073-High2-02/08/07 09:59:55 87 °F Rack 2 Temperature:
AH223-0071-High1-02/08/07 09:59:55 87 °F Rack 2 Temperature:
AH222-0061-High1-02/08/07 09:59:55 76 °F Rack 1 Temperature:
AH221-0073-High2-02/08/07 09:49:56 87 °F Rack 2 Temperature:
AH220-0071-High1-02/08/07 09:49:56 87 °F Rack 2 Temperature:
AH219-0061-High1-02/08/07 09:49:56 76 °F Rack 1 Temperature:
AH218-0073-High2-02/08/07 09:42:36 87 °F Rack 2 Temperature:
AH217-0071-High1-02/08/07 09:42:36 87 °F Rack 2 Temperature:
AH216-0061-High1-02/08/07 09:42:36 76 °F Rack 1 Temperature:
```

Figure 4-10: Sample FMS Alarm History Text Page

The **alarmhistory.txt** link opens the Alarm History log as a text (.txt) file in the Web browser. Select “Save As” to save the file to the hard drive.

4-7 IDENTITY



Figure 4-11: Sample of Falcon FMS Identity

Identity displays basic FMS information including Model Number, System Name, MAC Address, Expansion Cards installed, Firmware Version, and IP Address.

4-8 URL LINKS

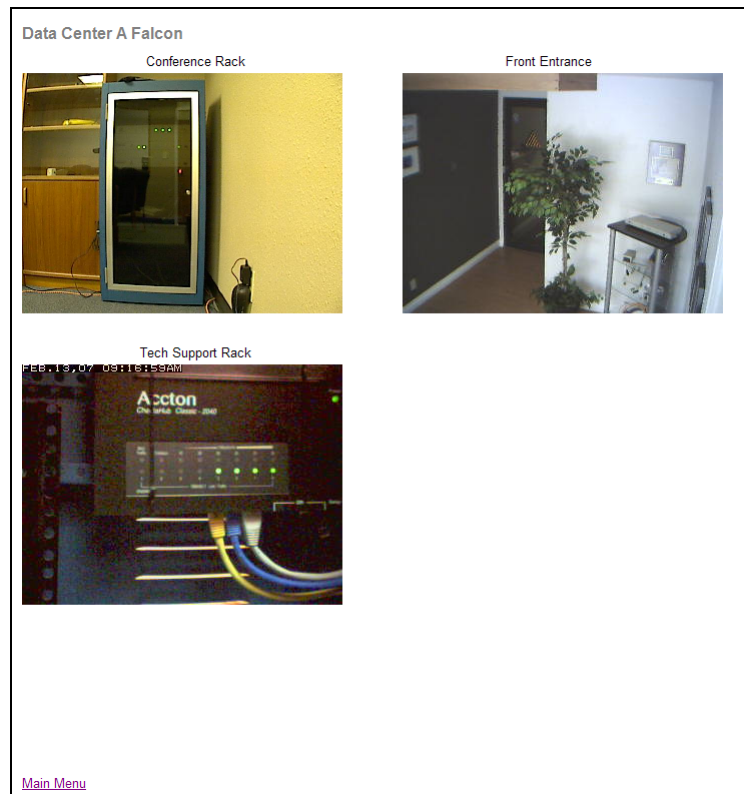


Figure 4-12: Sample FMS Still images from IP Cameras

URL Links displays still images (.jpg) from all IP cameras and other URLs linked to the FMS.

4-9 RELAY STATUS

Relay Status				
Channel	Type	Status	Schedule	Description
K1	NO (Non-Supervised)	Normal	None	RELAY #1
K2	Keypad Controlled	Normal	None	RELAY #2
K1.1 (3)	NO (Non-Supervised)	Normal	None	RELAY #1.1
K1.2 (4)	NO (Non-Supervised)	Normal	None	RELAY #1.2
K1.3 (5)	NO (Non-Supervised)	Normal	None	RELAY #1.3
K1.4 (6)	NO (Non-Supervised)	Normal	None	RELAY #1.4
K1.5 (7)	NO (Non-Supervised)	Normal	None	RELAY #1.5
K1.6 (8)	NO (Non-Supervised)	Normal	None	RELAY #1.6
K1.7 (9)	NO (Non-Supervised)	Normal	None	RELAY #1.7
K1.8 (10)	NO (Non-Supervised)	Normal	None	RELAY #1.8
K2.1 (11)	NO (Non-Supervised)	Normal	None	RELAY #2.1
K2.2 (12)	NO (Non-Supervised)	Normal	None	RELAY #2.2
K2.3 (13)	NO (Non-Supervised)	Normal	None	RELAY #2.3
K2.4 (14)	NO (Non-Supervised)	Normal	None	RELAY #2.4
K2.5 (15)	NO (Non-Supervised)	Normal	None	RELAY #2.5
K2.6 (16)	NO (Non-Supervised)	Normal	None	RELAY #2.6
K2.7 (17)	NO (Non-Supervised)	Normal	None	RELAY #2.7
K2.8 (18)	NO (Non-Supervised)	Normal	None	RELAY #2.8
K3.1 (19)	NO (Non-Supervised)	Normal	None	RELAY #3.1
K3.2 (20)	NO (Non-Supervised)	Normal	None	RELAY #3.2
K3.3 (21)	NO (Non-Supervised)	Normal	None	RELAY #3.3
K3.4 (22)	NO (Non-Supervised)	Normal	None	RELAY #3.4
K3.5 (23)	NO (Non-Supervised)	Normal	None	RELAY #3.5
K3.6 (24)	NO (Non-Supervised)	Normal	None	RELAY #3.6
K3.7 (25)	NO (Non-Supervised)	Normal	None	RELAY #3.7
K3.8 (26)	NO (Non-Supervised)	Normal	None	RELAY #3.8

Figure 4-13: Sample FMS Relay Display Status

Relay Status displays the current status of each FMS relay output. The Status field is color coded. White indicates the relay output is de-energized; red indicates that the relay output is energized.

4-10 RELAY CONTROL

Relay Control				
Channel	Select	Status	Schedule	Description
K1	Set Relay K1	Normal	None	Baseboard Heater
K2		Normal	None	Heater Temperature Cutoff
K1.1 (3)	Set Relay K3	Normal	None	Burn In Room Power Supply Relay
K1.2 (4)		Normal	None	Over Temperature cut out for Power Supplies
K1.3 (5)	Set Relay K5	Normal	None	Enclosure Ventilation Fan
K1.4 (6)		Normal	None	RA1x2 Input Trigger
K1.5 (7)		Normal	None	RELAY #1.5
K1.6 (8)		Normal	None	RELAY #1.6
K1.7 (9)		Normal	None	RELAY #1.7
K1.8 (10)		Normal	None	RELAY #1.8

Figure 4-14: Sample FMS Relay Control Page

Relay Control contains a button for each relay output that is configured for button control. Selecting the button turns on the associated relay output. Pressing the button again will turn it off.

4-11 CONFIGURATION

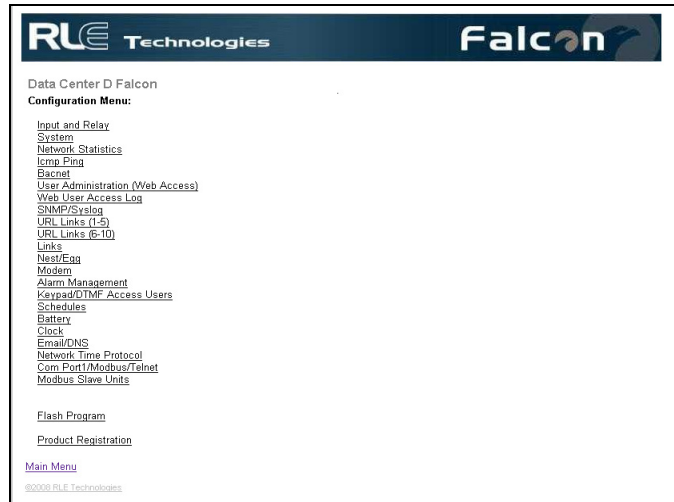


Figure 4-15: Sample FMS Configuration Page

The **Configuration** link provides access to a series of menus from which qualified users can make adjustments to the FMS settings; see Chapter 3: FMS Configuration, pg. 20, for more details.

CHAPTER 5: COMMUNICATION

5-1 MODBUS

When configured by the factory with the EXP-MBCS “M” option, the FMS supports the following:

- Modbus Master (RTU) over EIA485 or EIA232
- Modbus Slave (RTU) over EIA485 or EIA232
- Modbus Master (TCP/IP)
- Modbus Slave (TCP/IP Port 502) over Ethernet

The FMS can operate as a Master over EIA485 (or EIA232) and as a Slave over Ethernet at the same time. The FMS can operate as a Slave over EIA485 (or EIA232) and as a Slave over Ethernet at the same time. The FMS can **NOT** operate as a Master over EIA485 (or EIA232) and as a Slave over EIA485 (or EIA232) at the same time.

5-2 HARDWARE CONNECTIONS

The Modbus connections are located on the back of the FMS. There are status LEDs to indicate if COM Port 1 is configured (in software) for EIA232 or EIA485. The COM Port 1 Transmit and Receive LEDs are also located on the back of the FMS.

5-2.1 EIA232

The EIA232 COM Port 1 on the FMS is used to connect the FMS—as a Modbus Master—to one Modbus Slave device, or it is used to connect a Modbus Master device to the FMS as a Modbus Slave. The Modbus EIA232 (DTE) is active over COM1 (DB9 male connector). The EIA232 port allows communications between the FMS and one other device (point to point connection). The EIA232 port has maximum cable length of 50 feet (15.2m).

COM1 DB9 Male Pin Out

- Pin 1 = Data Carrier Detect
- Pin 2 = Receive Data
- Pin 3 = Transmit Data
- Pin 4 = Data Terminal Ready
- Pin 5 = Signal Ground
- Pin 6 = No Connection
- Pin 7 = Request to Send (internally connected to Pin 8)
- Pin 8 = Clear to Send (internally connected to Pin 7)
- Pin 9 = No Connection

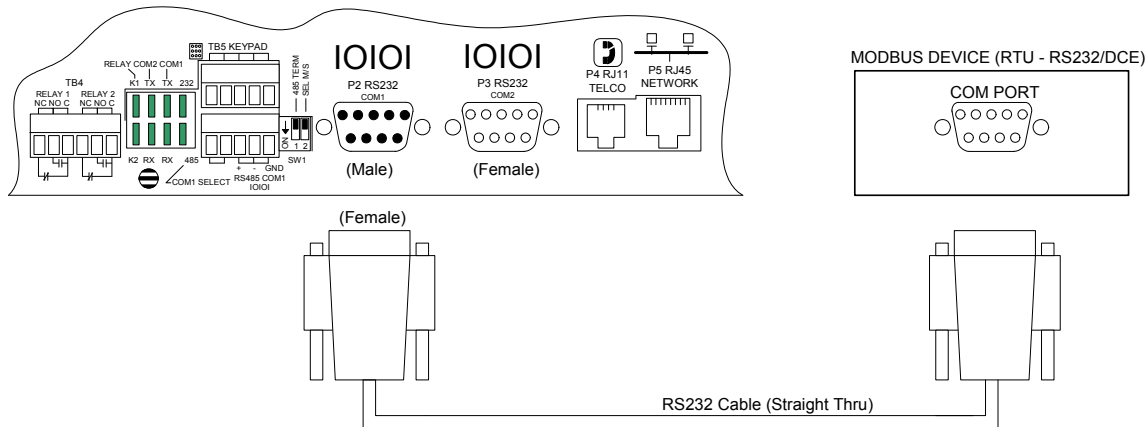


Figure 5-1: FMS Modbus EIA232 Connection to an EIA232 DCE Device

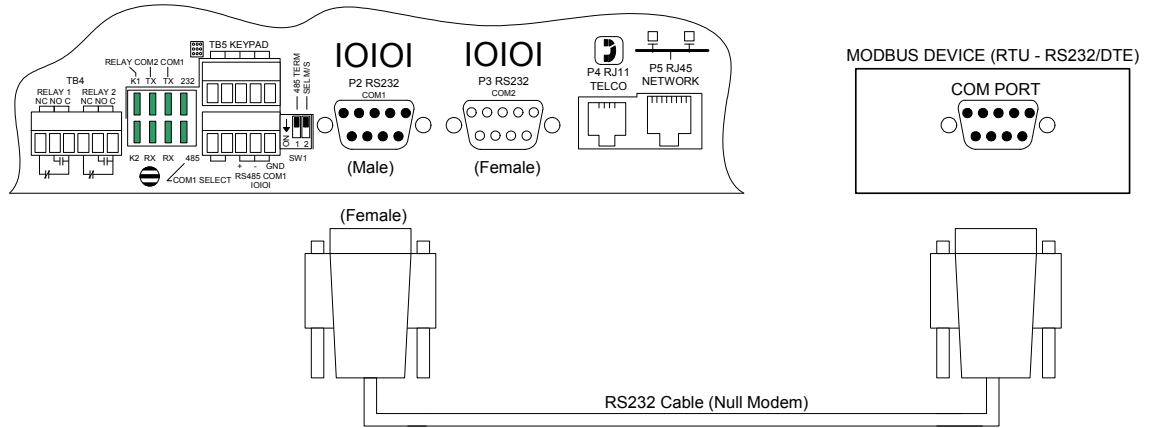


Figure 5-2: FMS Modbus EIA232 Connection to an EIA232 DTE Device

5-2.2 EIA485

The EIA485 COM Port 1 on the FMS is used to connect the FMS—as a Modbus Master—to one or more Modbus Slave devices or it is used to connect a Modbus Master device to the FMS as a Modbus Slave. The Modbus EIA485 is active over COM1 (TB5 Pins 8, 9 and 10). The EIA485 port allows communications between one Modbus Master and one or more Modbus Slave devices. EIA485 can accommodate up to 4,000 feet (1,219m) of cable length. There are many variations on how terminals are labeled on EIA485 2-wire (e.g., some devices use (+) and (-) or A and B, and some use (-) and (+) or B and A. Therefore, if a Slave unit is not responding, try swapping the wires.

COM1 TB5 Pin Out

- Pin 8 = EIA485(+)
- Pin 9 = EIA485(-)
- Pin 10 = Ground

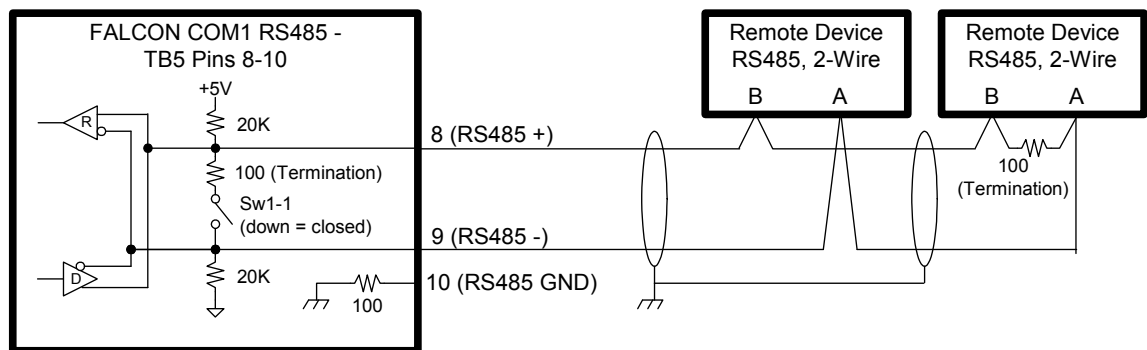


Figure 5-3: EIA485 Wiring Connections

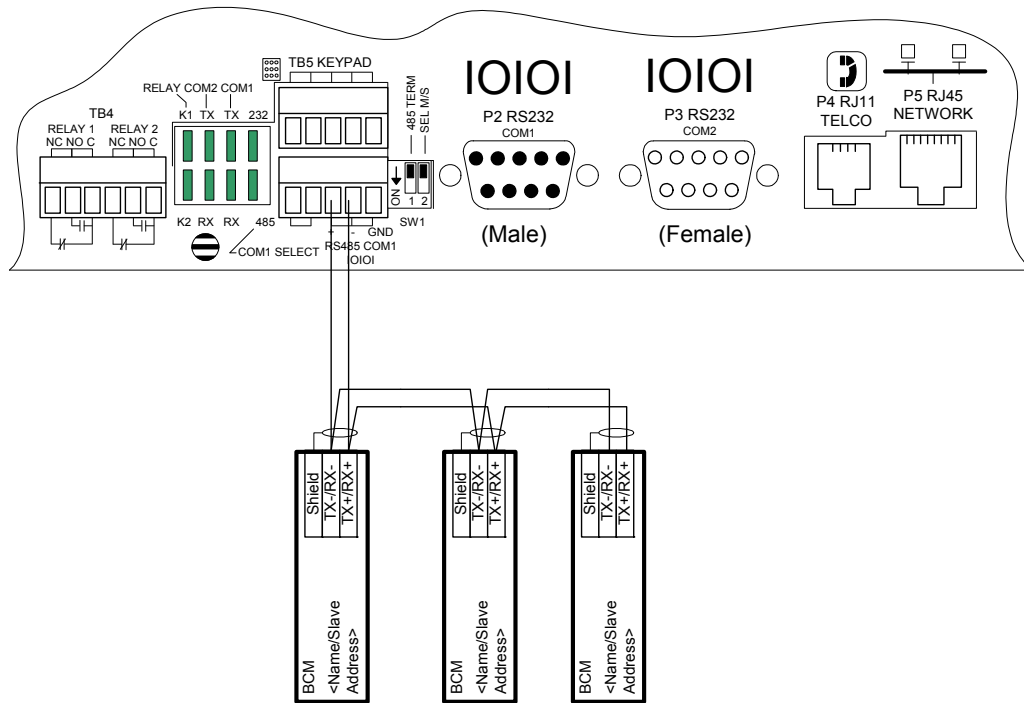


Figure 5-4: EIA485 Wiring to RLE/Veris BCMs (Branch Circuit Monitors)

5-3 MODBUS/COM1 CONFIGURATION (MODBUS MASTER & SLAVE)

The **Modbus/COM1 Configuration** page allows users to configure the FMS Modbus features. Enter the information as required. Figure 5-5 shows a Modbus/ COM Port 1 link with the EXP-MBCS Option installed.

Modbus / Com Port 1 Configuration

Modbus/TCP Slave Enable: Yes No

Modbus/TCP Slave Unit Identifier: (1-254, 0 = disabled)

Serial Com 1 Protocol Type: ▼

Serial Baud Rate: 1200 2400 9600

Serial Interface Type: EIA-485 EIA-232

Telnet Inactivity Timeout: Minutes

Modbus Serial Slave Address: (1-254, 0 = disabled)

EIA-485 DE TX Delay: (10 - 50) mS

EIA-485 DE Off Delay: (0 - 50) mS

Master Poll Timeout: (1 - 10) Seconds

Master Poll Interval: (250 - 2000) mS

Master Retry Attempts: (1 - 99)

Enable Virtual Slot #2:

Enable Virtual Slot #3:

Enable Virtual Slot #4:

BCM Zero Amp Alarm Level: (0.000 - 1.000)

BCM Status Display: Left-Right Vertical

[Modbus Master Poll Data Log](#)

[Modbus Slave Register Display Log](#)

[Modbus Packet Log](#)

[Reset Modbus Port](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 5-5: Sample FMS Modbus/Com1 Configuration with EXP-MBCS Option installed

Modbus / Com Port 1 Configuration

Modbus/TCP Slave Enable: Yes No

Modbus/TCP Slave Unit Identifier: (1-254, 0 = disabled)

Serial Com 1 Protocol Type: ▼

Serial Baud Rate: 1200 2400 9600

Serial Interface Type: EIA-485 EIA-232

Telnet Inactivity Timeout: Minutes

Modbus Serial Slave Address: (1-254, 0 = disabled)

EIA-485 DE TX Delay: (10 - 50) mS

EIA-485 DE Off Delay: (0 - 50) mS

[Modbus Slave Register Display Log](#)

[Modbus Packet Log](#)

[Reset Modbus Port](#)

[Return to Configuration Menu Page](#)

[Return to Main Menu Page](#)

Figure 5-6: Modbus / COM Port 1 link without the EXP-MBCS Option Installed

Modbus/TCP Slave Enable: Enables the FMS as a Modbus Slave over Ethernet TCP/IP.

Modbus/TCP Slave Unit Identifier: Sets the FMS Modbus/TCP Slave address (1-254).

Serial Com1 Protocol Type: Configures the Serial COM Port 1 (EIA232 or EIA485) Master or Slave operation. The options are:

- **None:** Disables Modbus support on Serial Port COM1.
- **Modbus Master Generic – 16 Units:** Modbus Master Generic–16 Units is the most typical configuration for the FMS when using Modbus communication. Select this option when there is at least one Slave unit that is **not** an RLE/Veris BCM. This option can be configured to poll data from up to 16 Slave devices.
- **Modbus Master BCM – 4 Units:** Select this option when there are 1 to 4 BCMs (Branch Circuit Monitors) and no other Slave devices. This option enables webpages that are unique to the BCM allowing for easier setup. SNMP (Get, Set and Traps) is supported for the BCMs.
- **Modbus Master BCM – 16 Units:** Select this option when there are 5 to 16 BCMs and no other Slave devices. This option enables webpages that are unique to the BCM allowing for easier setup. SNMP (Get, Set and Traps) is **not** supported for the BCMs. SNMP is still supported for the local I/O (Inputs 1 – 104). If SNMP is required for the BCMs, additional FMSs are required to allow a maximum of 4 BCMs per FMS.
- **Modbus Slave:** Enables the FMS to operate as a Modbus Slave over the Serial Port COM1.
- **None-BACnet/IP:** Enables the FMS operate as a BACnet Master and request data from BACnet devices.
- **Telnet:** Enables the FMS to communicate via Serial Com Port 1.

Serial Baud Rate: Sets the Serial COM Port 1 to 1200, 2400 or 9600 Baud. All the devices connected to the FMS Serial COM Port 1 must be set to operate at the same Baud rate.

Serial Interface Type: Enables the FMS Modbus to operate on the EIA-485 or EIA-232 COM Port 1.

Telnet Inactivity Timeout: Allows users to set the Telnet Inactivity Timeout in minutes. This time tells the FMS when to timeout of the Telnet communication.

Modbus Serial Slave Address: Required when the Serial Protocol is set to “Modbus Slave”. This option sets the FMS Modbus Slave address for the Serial COM Port 1. Each Slave device on the Modbus network must have a unique address.

EIA-485 DE TX Delay: Normally left at the 10ms default and is active only when the Serial Interface Type is “EIA485”. During the start of transmission, the transmit line is driven high for this amount of time prior to transmitting the message. The time is adjustable from 0ms to 990ms.

EIA-485 DE Off Delay: Normally left at the default of 10ms and is active only when the Serial Interface Type is “EIA485”. After a message is sent, the transmit line is held high for this amount of time prior to turning off. The time is adjustable from 10 to 990ms.

Modbus Master Poll Timeout: Sets the amount of time the FMS waits for a response from the Slave device before moving on to read the next register. It is normally set to the default of one second and is active only when the Serial Protocol is set to “Modbus Master Generic – 16 Units”, “Modbus Master BCM – 4 Units” or “Modbus Master BCM – 16 Units”. It is adjustable from 1 to 10 seconds.

Modbus Master Poll Interval: Sets the amount of time when a response is received from a Slave to when the FMS will ask for the next register and is adjustable from 250 to 2000ms. It is normally left at the 250ms default and is active only when the Serial Protocol is set to a Modbus Master option. The interval effects the overall scan rate. If the FMS is configured to read 60 Modbus variables and the poll interval is set to 1000ms (1second), each Modbus variable will be read approximately once per minute.

Master Retry Attempts: Determines how many times the FMS will request the same register when there is no response from the Slave before moving on to read the next register. It is normally left at the default of one second and is adjustable from 1 to 99 seconds.

Enable Virtual Slot #1-4: Enables additional virtual inputs for use with the FMS main interface. These virtual points can be used in conjunction with Modbus registers to allow individual alarming, notification and relay activation per Modbus register.

BCM Zero Amp Level Alarm: Determines if the branch circuit current is zero (CB open or tripped). It is active when Serial Protocol is set to “Modbus Master BCM – 4 Units” or “Modbus Master BCM – 16 Units”. This applies to all branch circuits in all the BCMs. Each branch circuit has a “Zero Amp” Enable to enable or disable the zero amp alarm. This setting is adjustable from 0 to 1 Amp.

BCM Status Display: Displays the how the BCM status is displayed (i.e, left/right or vertical).

5-3.1 Modbus Master Poll Data Log

This link allows users to view the raw data the FMS receives from the Slave(s). This log is only visible when the EXP-MBCS option is installed.

Column 1= Falcon Modbus Master Register Number (1-628).

Column 2= Time the Data is received, in HH (hour): MM (minute): SS (second) format where HH is a number 1-24.

Column 3= Number of Bytes Reserved for Data. This will be 2 unless the Modbus Master register is configured to read a Long or Float value, in which case it would be 4.

Column 4= Slave Data in decimal form.

```

1   16:43:21 2 0
2   16:43:21 2 0
3   16:43:22 2 0
4   16:43:22 2 0
5   16:43:23 2 4446
101 16:43:23 2 0
102 16:43:24 2 0
103 16:43:24 2 0
104 16:43:25 2 0
105 16:43:25 2 0
106 16:43:26 2 0
107 16:43:26 2 0
108 16:43:27 2 0
109 16:42:43 2 0
110 16:42:44 2 144
111 16:42:44 2 91

```

Figure 5-7: Modbus Master Poll Data Log

5-3.2 Modbus Slave Register Display Log

This link displays the current contents of the FMS Slave Registers. The rows correspond to the FMS channel numbers (inputs 1 – 104) with each row containing the Modbus Slave Registers that pertain to that particular input.

1:	40001: 31	40201: 5	40301: 2 (a)
2:	40002: -25	40202: 10	40302: 2 (a)
3:	40003: 0	40203: 0	40303: 1 (a)
4:	40004: 0	40204: 0	40304: 1 (a)
5:	40005: 0	40205: 0	40305: 3 (a)
6:	40006: 0	40206: 0	40306: 3 (a)
7:	40007: 0	40207: 0	40307: 1 (a)
8:	40008: -6	40208: 10	40308: 2 (a)
9:	40009: 0	40209: 0	40309: 3 (a)
10:	40010: 0	40210: 0	40310: 5 (a)
11:	40011: 0	40211: 0	40311: 1 (a)
12:	40012: 0	40212: 0	40312: 1 (a)
13:	40013: 0	40213: 0	40313: 1 (a)
14:	40014: 0	40214: 0	40314: 1 (a)
15:	40015: 0	40215: 0	40315: 1 (a)
16:	40016: 0	40216: 0	40316: 1 (a)
17:	40017: 0	40217: 0	40317: 1 (a)
18:	40018: 0	40218: 0	40318: 1 (a)
19:	40019: 0	40219: 0	40319: 1 (a)
20:	40020: 0	40220: 0	40320: 1 (a)

Figure 5-8: Modbus Slave Register Display Log

Column 1 = Displays the Falcon Channel or Input Number (1-104).

Column 2 = Displays the Falcon Slave Register Number for the Channel Input Reading.

Column 3 = Displays the Value of the Current Channel Input. Channels configured for digital will be a “0” when the input is normal and “1” when the input is in alarm.

Column 4 = Displays the Falcon Slave Register Number for the Channel Input Alarm Status.

Column 5 = Displays the Contents of the Channel Input Alarm Register.

- 0 = No Alarm
- 1 = High 1 Alarm
- 2 = Low 1 Alarm
- 4 = High 2 Alarm
- 8 = Low 2 Alarm
- 10 = Digital Alarm



NOTE:

The number displayed will be the sum of all active alarms. For example, if an input is above the High1 and High2 limits, the number displayed will be 5 (1 + 4 = 5).

Column 6 = Displays the Falcon Slave Register Number for the Channel Input Configuration Status.

Column 7 = Displays the contents of the Channel Input Configuration Register.

- 0 = Not Installed.
- 1 = Not Configured
- 2 = Analog 4-20 mA
- 3 = Digital NO
- 4 = Digital NC
- 5 = Digital Status
- 6 = Analog 0-5VDC
- 7 = Analog 0-10VDC

Column 8 = Provides Additional Information for the Falcon Input.

- (0) = Input is Not Installed (an Expansion Card not installed for this channel).
- (a) = This Channel is an Analog Input (Main Board input or Expansion Card “A”).
- (d) = This Channel is a Digital Input (Expansion Card “C”).
- (R) = This Channel is a Relay Output.

5-3.3 **Modbus Packet Log**

This link displays a log of the Modbus packets that the FMS is sending and receiving.

```

0002059912 M0001 Out: 01 04 00 00 00 01 31 CA
0002059925 M0001 In: 01 04 02 00 00 B9 30
0002059952 M0002 Out: 01 04 00 00 00 01 31 CA
0002059975 M0002 In: 01 04 02 00 00 B9 30
0002060000 M0003 Out: 01 04 00 01 00 01 60 0A
0002060025 M0003 In: 01 04 02 00 00 B9 30
0002060052 M0004 Out: 01 04 00 04 00 01 70 0B
0002060075 M0004 In: 01 04 02 11 5D 74 99
0002060100 M0100 Out: 03 03 00 00 00 01 85 E8
0002060125 M0100 In: 03 03 02 00 00 C1 84
0002060152 M0101 Out: 03 03 00 01 00 01 D4 28
0002060175 M0101 In: 03 03 02 00 00 C1 84
0002060200 M0102 Out: 03 03 00 02 00 01 24 28
    
```

Figure 5-9: Modbus Packet Log

- Column 1 = System Up Time.
- Column 2 = Modbus Master Register Number.
- Column 3 = Direction of Packet:
 OUT = Packet Sent from the Falcon (Master Request).
 IN = Packet Received by the Falcon (Slave Response).
- Column 4 = Modbus Packet.

5-3.4 Reset Modbus Port

This link allows users to reset the Modbus port so that the contents of the polling registers will be cleared.

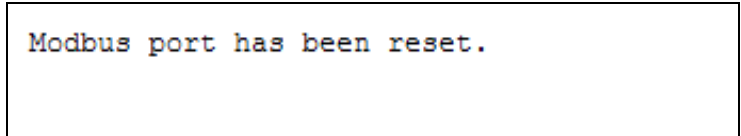


Figure 5-10: Modbus Rest Port Confirmation

5-4 CONFIGURING INPUTS AND RELAYS FOR SLAVE UNITS (MODBUS & BACNET)

Select any input not currently in use.

Input and Relay Configuration Menu							
Inputs							
S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label
(1)	Mikes_office_Ts	(2)	Mikes_office_Ra	(3)	Leak_distance	(4)	Risk_sump
(5)	Rev_rad_simulat	(6)	Battery_Fan_1	(7)	Digital_n/S	(8)	Digital_n/S
1.1 (9)	Battery_Fan_2	1.2 (10)	Digital_n/S	1.3 (11)	Digital_n/S	1.4 (12)	Digital_n/S
1.5 (13)	Digital_n/S	1.6 (14)	Digital_n/S	1.7 (15)	Digital_n/S	1.8 (16)	Digital_n/S
1.9 (17)	Digital_n/S	1.10 (18)	Digital_n/S	1.11 (19)	Digital_n/S	1.12 (20)	Digital_n/S
2.1 (21)	INPUT_2.1	2.2 (22)	INPUT_2.2	2.3 (23)	INPUT_2.3	2.4 (24)	INPUT_2.4
2.5 (25)	INPUT_2.5	2.6 (26)	INPUT_2.6	2.7 (27)	INPUT_2.7	2.8 (28)	INPUT_2.8
2.9 (29)	INPUT_2.9	2.10 (30)	INPUT_2.10	2.11 (31)	INPUT_2.11	2.12 (32)	INPUT_2.12
3.1 (33)	INPUT_3.1	3.2 (34)	INPUT_3.2	3.3 (35)	INPUT_3.3	3.4 (36)	INPUT_3.4
3.5 (37)	INPUT_3.5	3.6 (38)	INPUT_3.6	3.7 (39)	INPUT_3.7	3.8 (40)	INPUT_3.8
3.9 (41)	INPUT_3.9	3.10 (42)	INPUT_3.10	3.11 (43)	INPUT_3.11	3.12 (44)	Input_3.12
4.1 (45)	INPUT_4.1	4.2 (46)	INPUT_4.2	4.3 (47)	INPUT_4.3	4.4 (48)	INPUT_4.4
4.5 (49)	INPUT_4.5	4.6 (50)	INPUT_4.6	4.7 (51)	INPUT_4.7	4.8 (52)	INPUT_4.8
4.9 (53)	INPUT_4.9	4.10 (54)	INPUT_4.10	4.11 (55)	INPUT_4.11	4.12 (56)	INPUT_4.12
4.13 (57)	Input_4.13	4.14 (58)	Input_4.14	4.15 (59)	Input_4.15	4.16 (60)	Input_4.16
4.17 (61)	Input_4.17	4.18 (62)	Input_4.18	4.19 (63)	Input_4.19	4.20 (64)	Input_4.20
4.21 (65)	Input_4.21	4.22 (66)	Input_4.22	4.23 (67)	Input	4.24 (68)	Input_4.24
5.1 (69)	Internal_Temper	5.2 (70)	Internal_Humidi				
Relays							
S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label	S.Ch (#)	Label
(1)	Rev_rad_simulat	(2)	alarm	1.1 (3)	RELAY_1.1	1.2 (4)	RELAY_1.2
1.3 (5)	RELAY_1.3	1.4 (6)	RELAY_1.4	1.5 (7)	RELAY_1.5	1.6 (8)	RELAY_1.6
1.7 (9)	RELAY_1.7	1.8 (10)	RELAY_1.8	2.1 (11)	RELAY_2.1	2.2 (12)	RELAY_2.2
2.3 (13)	RELAY_2.3	2.4 (14)	RELAY_2.4	2.5 (15)	RELAY_2.5	2.6 (16)	RELAY_2.6
2.7 (17)	RELAY_2.7	2.8 (18)	RELAY_2.8	3.1 (19)	RELAY_3.1	3.2 (20)	RELAY_3.2

Figure 5-11: Input and Relay Configuration Menu

This page allows users to configure the input features.

Changes accepted.

Configuration: Input #4 Current Readings: Raw = 0.000 mA Calc = 76.0

Submit Changes << Prev Input Next Input >>

Select Input type: ANALOG 4-20 MA [Physical] Digital Alarm ID: 40

Gain: 51 Calculator High Limit2: 100 Alarm ID: 43

Offset: 70 High Limit1: 95 Alarm ID: 41

Hysteresis: 0 Low Limit1: 60 Alarm ID: 42

Unit of Measure: Deg Low Limit2: 50 Alarm ID: 44

Alarm Delay: 0 Seconds Alarm Dial Out: 0,0,0,0,0

Label: Rick temp

Label (Digital input normal):

OR Gate Relay (1-16) Control: 0 Relay Configuration

OR Gate Relay (17-32) Control: 0

Email Recipient Notification 1 mlae@rlotech.com 2

3 4

5 6

7 8

Alarm Disable by Schedule: None A B

Snmp Trap: Enabled Disabled Disabled during Schedule A Disabled during Schedule B

High/Low1 Snmp Traps: Enabled Disabled

Individual Ground Type (digital in only): Individual Ground Common Ground

BACnet Instance: 704 BACnet Units: 0

Figure 5-12: Individual Input Configuration Screen

Select Input Type: Select the type based on the values of the register is measured in a normal state. Change the drop down menu from “Physical” to “Modbus Import” and submit changes before continuing. Once Modbus Import has been submitted, a new field will appear called Register/Instance Index. Once this has been configured as a Modbus Import, the physical channel is no longer available for additional equipment.

Register/Instance index: Enter the register index number on the register screen for the selected function.

High Limit 2/1: Enter the high value(s) at which the user wants to be notified in an alarm state.

Low Limit 2/1: Enter the low value(s) at which the user wants to be notified in an alarm state.

Default Value: Enter the value at which the unit is in a normal state.

Hysteresis: Enter the value that designates the amount an input must sway from its present alarm reading before it is classified as returned to normal.

Unit of Measure: Enter the value at which the unit outputs data.

Alarm Delay: Enter the alarm time delay in seconds.

Alarm Dial Out: Enter the phone number configuration entry ID for up to five pager numbers to which the FMS will send notification when any alarm for this slave occurs. The entry ID numbers correspond to phone numbers configured from the phone number links at the bottom of the Modem Configuration page. Separate the ID numbers with commas. Enter zero (0) to disable. The FMS will dial the lowest number listed regardless of the order the numbers are listed.

Label: Enter a label to describe the input being monitored.

“OR gate” Relay Control: Enter the value displayed in the relay control table in APPENDIX G: Relay Control Logic, pg. 125. Select the appropriate value of the relay to activate it. Or, add the respective values of the appropriate alarm condition. To activate more than one output relay, each input can have individual control values.

Email Recipient Notification: Check the recipient email addresses that require notification when any alarm occurs on this slave. Email addresses are displayed once they are entered on the email configuration page.

Alarm Disable by Schedule: Select the Schedule the user desires

SNMP Trap: Allows users to configure SNMP Trap notification options.

High1/Low1 SNMP Traps: Determines how the notification is sent.

Individual Ground Type: Select ground type

BACnet Instance: This is a BACnet object identifier. The BACnet Instance is a numerical code used to identify the input. This code must be unique within the BACnet device. Refer to the BACnet standard for further information.

BACnet Units: Designated BACnet engineering unit, which represents the units of measurement for the input. Refer to the BACnet standard for further information.

5-5 MODBUS / SLAVE UNITS CONFIGURATION – MODBUS GENERIC (TYPICAL)

This **Modbus Slave Unit Configuration** page is available when the FMS is configured for “Modbus Master Generic – 16 Units”. This is used to configure the information regarding the Modbus Slave device that the FMS will poll data from. This option is only available when the unit is configured by the factory with the EXP-MBCS option.

Modbus Slave Unit Configuration		
Unit #	Address	Unit Description
1	1	LD5000 Leak Detection Panel
2	0	PDU #3
3	3	SiteScan12
4	0	(Blank)
5	0	(Blank)
6	0	(Blank)
7	0	(Blank)
8	0	(Blank)
9	0	(Blank)
10	0	(Blank)
11	0	(Blank)
12	0	(Blank)
13	0	(Blank)
14	0	(Blank)
15	0	(Blank)
16	0	(Blank)
Modbus Registers 1-100		
Modbus Registers 101-200		
Modbus Registers 201-300		
Modbus Registers 301-400		
Modbus Registers 401-500		
Modbus Registers 501-600		
Modbus Registers 601-628		
Read / Preset Register		

Figure 5-13: Modbus Slave Unit Configuration

5-5.1 Unit Number Links

Select the Slave’s **Unit #** link, located on the left side of the screen, to display the individual unit configuration page; see Figure 5-13.

Figure 5-14: Sample Modbus Slave Unit

Communications: Configures the FMS to send Modbus requests to a specific slave device over either a serial connection (EIA232 or EIA485) or over TCP/IP. This configuration can be different for each slave unit.

RTU Station Address: Enter the address of the Modbus Slave device. Be sure this matches the address programmed on the particular Slave device.

Protocol: The FMS supports three versions of the Modbus protocol.

- Modbus Standard
- Modbus Extended
- JBus

Selecting these options will configure the FMS to send appropriate requests to each slave device. See the documentation of the slave device for proper configuration.

Description: Enter a description for the Slave device.

Alarm Dial Out: Enter the Phone Number Configuration Entry ID for up to five pager numbers to which the FMS will send notification when any alarm for this Slave occurs. The Entry ID numbers correspond to phone numbers configured from the Configure Phone Number links at the bottom of the Modem Configuration page. Separate the ID numbers with commas. Enter zero to disable. The FMS will dial the lowest number listed *regardless* of the order the numbers are listed.

Example: If the Alarm dial out string is set to “3, 5, 1, 0, 0”, the FMS will dial Pager #1, Pager #3 and then Pager #5 when an alarm occurs.

Email Recipient Notification: Check the recipient email addresses that require notification when any alarm occurs on this Slave. Email addresses are displayed once they are entered on the Email Configuration page.

5-5.2 **Modbus Register Links**

Selecting a **Modbus Register** link at the bottom of the Modbus Slave Unit Configuration page will display a page similar to Figure 5-15. This page is used to navigate among the Modbus Master configuration registers.

#	Unit-Reg	Label	#	Unit-Reg	Label
1	-1	-32001-Leak Alarm	51	-0	-00000-Register #51
2	-1	-32001-Cable Fault	52	-0	-00000-Register #52
3	-1	-32001-Contamination Alarm	53	-0	-00000-Register #53
4	-1	-32004-Cable Leakage Current	54	-0	-00000-Register #54
5	-1	-32005-Cable Length	55	-0	-00000-Register #55
6	-1	-32007-Distance to Leak (Feet)	56	-0	-00000-Register #56
7	-0	-00000-Register #7	57	-0	-00000-Register #57
8	-0	-00000-Register #8	58	-0	-00000-Register #58
9	-0	-00000-Register #9	59	-0	-00000-Register #59
10	-2	-32001-Zone 1 Leak Alarm	60	-0	-00000-Register #60
11	-2	-32001-Zone 1 Cable Fault	61	-0	-00000-Register #61
12	-2	-32003-Zone 1 Leakage Current	62	-0	-00000-Register #62

Figure 5-15: Modbus Register Configuration Menu

Selecting a link to an individual register displays the configuration options for that register; see Figure 5-16. Instructions for completing the options on this page are described below.

Modbus Register #1 Configuration

[Next >>](#)

Unit: (0 - 16) (Modbus Std)

Register/Offset: (10000 - 49999)

Type:

Scaler:

Offset: (-32767..32767 or -2000000000)

Bitflag: (Read Holding/Input Registers Only)

Word Order: Big-Endian Little-Endian

Label:

Log Index: (Range: 1-232 None=0)

UOM Conversion:

[Return to Modbus Register Cfg Menu](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-16: Individual Modbus Configuration Screen

Unit: Enter the Slave Unit Number. This is **NOT** the Slave address, but the Slave Unit Number shown on the Modbus Slave Unit Configuration page; see Figure 5-13, pg. 73.

Register: Enter the Register Number for the data to be read. The Register Number is located on the Slave Units Modbus Register Map; see section 5-8.1 Slave Register Map, pg. 80.

Type: Select the Data Type of the Register.

- Unsigned Int
- Signed Int
- Long
- Float
- Alarm Bit/ ON= ALARM
- Alarm Bit/ OFF=ALARM
- Status Bit – No Log
- Status Bit – Logged
- Coil Status
- Input Status



NOTE:

Refer to the manufacturers equipment guide for the register numbers and the data type.

Scaler: Select a multiplier for the data value.

Bitflag: Applies to Data Types, Alarm Bit, Status Bit–Logged and Status Bit – No Log. Selects which bit is read from the 16 bit register value.

Word Order: Applies to Data Types Long and Float. Long and Float Data Types read two consecutive registers. The word order selects if the first register is the larger or smaller part of the number.

Label: Enter a label to describe the Data Point.

Log Index: Applies to Data Types Signed Int, Unsigned Int, Long and Float. The FMS has 232 entries reserved for logging (Min, Hour and Day Logs). Enter a value of 1 to 232 if the point is to be internally logged on the FMS. Each register to be logged requires a unique entry number.

UOM Conversion: Select an appropriate unit of measure conversion if polled data is not in the format desired.

- deg C – deg F (1,10,100,1000 Scale)
- deg C – deg F (1/32 Scale)
- kPa – PSI (1/8, 1/28 Scale)

5-5.3 Read/Preset Single Register

The **Read/Preset Single Register** link at the bottom of the Modbus Slave Unit Configuration page will display the following. This page reads or writes individual registers for troubleshooting and for configuring Slave parameters.

```

Outs: 03 03 00 00 00 01 85 E8
Ins:
Ins: 03 03 02 00 00 C1 84

Data Value = 0
    
```

Read / Preset Single Register

Unit Address:

Register: (Preset 4xxxx)

Data: Decimal Hex

R/W: Read Set/Write

[Return to Modbus Cfg Page](#)

Figure 5-17: Return to Configuration Menu

5-6 MODBUS / SLAVE UNITS CONFIGURATION – MODBUS MASTER BCM – 4

This **Modbus Slave Unit Configuration** page is available when the FMS is configured for Modbus Master BCM – 4 Units and is used to configure the information regarding the Modbus Slave BCMs from which the FMS will poll data.

Modbus BCM Unit Configuration			
Unit #	Address	Unit Description	Register Link
1	4	PDU1, Panel 1	Registers
2	5	PDU1, Panel 2	Registers
3	0	BCM #3	
4	0	BCM #4	

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-18: Modbus BCM Unit Configuration

5-6.1 Unit Number Links

Select the Slave’s **Unit #** link to display the following page and allow for individual Slave configuration. Instructions for completing the options on this page are described below.

Modbus BCM #1 Configuration

Submit Changes

[Next >>](#)

Communications: Serial TCP IP Address:

RTU Station Address: (1-254, 0 = disabled)

Protocol: ▼

Description:

Alarm Dial Out:

Email Recipient Notification

<input type="checkbox"/> 1 mlae@rletech.com	<input type="checkbox"/> 2
<input type="checkbox"/> 3	<input type="checkbox"/> 4
<input type="checkbox"/> 5	<input type="checkbox"/> 6
<input type="checkbox"/> 7	<input type="checkbox"/> 8

[Return to Modbus Unit Cfg Page](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-19: Individual Slave Configuration Screen

Communications: Configures the FMS to send Modbus requests to a specific slave device over either a serial connection (EIA232 or EIA485) or over TCP/IP. This configuration can be different for each slave unit.

RTU Station Address: Enter the address of the Modbus Slave device. Be sure this matches the address set by the Dip Switches on the BCM. Each BCM requires a unique address.

Protocol: The FMS supports three versions of the Modbus protocol.

- Modbus Standard
- Modbus Extended
- JBus

Selecting these options will configure the FMS to send appropriate requests to each slave device. See the documentation of the slave device for proper configuration.

Description: Enter a description for the BCM.

Alarm Dial Out: Enter the Phone Number Configuration Entry ID for up to five pager numbers to which the FMS will send notification when any alarm for this Slave occurs. The Entry ID numbers correspond to phone numbers configured from the Configure Phone Number links at the bottom of the Modem Configuration page. Separate the ID numbers with commas. Enter zero to disable. The FMS will dial the lowest number listed *regardless* of the order the numbers are listed.

Example: If the Alarm dial out string is set to “3, 5, 1, 0, 0”, the FMS will dial Pager #1, Pager #3 and then Pager #5 when an alarm occurs.

Email Recipient Notification: Check the recipient email addresses that require notification when any alarm occurs on this BCM. Email addresses are displayed once they are entered on the Email Configuration page.

5-6.2 Modbus Register Links

Pressing a **Modbus Registers** link next to the BCM on the Modbus BCM Unit Configuration page will display.

Modbus BCM #1 Configuration			
CB #	Description	CB #	Description
1	Rack 1	22	Rack 6
2	Rack 2	23	Rack 7
3	Rack 3	24	Rack 8
4	Rack 4	25	Rack 9
5	Rack 5	26	Rack 10
6	Server 1	27	Server 3
7	Server 2	28	Server 4
8	West Wall Outlets	29	East Wall Outlets
9	North Wall Outlets	30	South Wall Outlets
10	(Blank)	31	(Blank)
11	(Blank)	32	(Blank)
12	(Blank)	33	(Blank)
13	(Blank)	34	(Blank)
14	(Blank)	35	(Blank)
15	(Blank)	36	(Blank)
16	(Blank)	37	(Blank)
17	(Blank)	38	(Blank)
18	(Blank)	39	(Blank)
19	(Blank)	40	(Blank)
20	(Blank)	41	(Blank)
21	(Blank)	42	(Blank)
Labels CB #1-21		Labels CB #22-42	

Figure 5-20: Modbus Registers Screen

5-6.2.1 CB# Links

Pressing a **CB #** link will display the Circuit Breaker Configurations for each BCM.

Configuration: BCM #01 CB #01

Submit Changes [Next >>](#)

Label:

Zero Amp Alarm Enable:

Breaker Size: Amps

Warning Threshold: Percent

Alarm Threshold: Percent

Warning Time Delay: Seconds

Alarm Time Delay: Seconds

[Return to BCM Register Cfg Page](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-21: Circuit Breaker Configurations for Individual BCM's

Label: Enter a label to describe the circuit breaker. The label is included in notifications and for identification on the Slave Unit Monitoring page.

Zero Amp Enable: Check to enable alarm and notification if the branch circuit current falls below the zero amp level as set on the Modbus /COM Port 1 Configuration page.

Breaker Size: Enter the circuit breaker size in the BCM.

Warning Threshold: Enter the warning threshold level—in percent—in the BCM.

Alarm Threshold: Enter the alarm threshold level—in percent—in the BCM.

Warning Time Delay: Enter the warning time delay—in seconds—in the BCM.

Alarm Time Delay: Enter the alarm time delay—in seconds—in the BCM.

5-7 MODBUS / SLAVE UNITS CONFIGURATION – MODBUS MASTER BCM - 16

This **Modbus Slave Unit Configuration** page is available when the FMS is configured for Modbus Master BCM—16 Units and is used to configure the information regarding the Modbus Slave BCMS that the FMS will poll data from. Setup is the same as the 4 BCM option, except that the FMS can be configured to monitor 16 BCMS. Refer to section 5-4 Configuring Inputs and relays for Slave Units (Modbus & BACnet) on page 71 for details on how to configure the FMS unit for Modbus Master BCM-16.



NOTE:

The 16 BCM option does not support SNMP for the BCMS. SNMP is still supported for the other Falcon features.

Modbus BCM Unit Configuration			
Unit #	Address	Unit Description	Register Link
1	4	PDU1, Panel 1	Registers
2	5	PDU1, Panel 2	Registers
3	0	BCM #3	
4	0	BCM #4	
5	0	BCM #5	
6	0	BCM #6	
7	0	BCM #7	
8	0	BCM #8	
9	0	BCM #9	
10	0	BCM #10	
11	0	BCM #11	
12	0	BCM #12	
13	0	BCM #13	
14	0	BCM #14	
15	0	BCM #15	
16	0	BCM #16	

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-22: Modbus BCM Unit Configuration Page

5-8 ADDITIONAL MODBUS INFORMATION

5-8.1 Slave Register Map

Table 5-1: Slave Register Map

Register	Desc	Range
40001	Input #1 value	-32678 - 32767
..
40104	Input #104 value	-32678 - 32767
40105	Internal Temperature Sensor	-32678 - 32767
40106	Internal Humidity Sensor	-32678 - 32767
40107-40187	Reserved	
40188-40193	MAC address	00:90:5b:01:01:01
40194-40197	IP address	10.0.0.203
40198	Model Number	100
40199	Firmware Version	73
40200	Number of Alarms Present	0-65535
40201	Input #1 alarm bit map	0 - 0x0010
..
40304	Input #104 alarm bit map	0 – 0x0010
40305	Internal Temperature Sensor - alarm bit map	0 – 0x0010
40306	Internal Humidity Sensor - alarm map	0 – 0x0010
40307-40400	Reserved	
40401	Input #1 config code	0 - 7
..
40504	Input #104 config code	0 – 7

5-8.2 Alarm Bit Map (Reg 40201-40306)

0x0000 = No Alarm
 B:0 0x0001 = High1 Alarm
 B:1 0x0002 = Low1 Alarm
 B:2 0x0004 = High2 Alarm
 B:3 0x0008 = Low2 Alarm
 B:4 0x0010 = Digital Alarm

5-8.3 Configuration Codes (Reg 40401-40504)

0 = Not Installed
 1 = Not Configured
 2 = Analog 4-20ma
 3 = Digital NO
 4 = Digital NC
 5 = Digital Status
 6 = Analog 0-5V
 7 = Analog 0-10V

5-9 BACNET

The BACnet Configuration page allows the user to enable the FMS for BACnet Master or BACnet slave configuration.



NOTE:

The FMS has BACnet slave capabilities automatically built in. For the FMS to be a Master on the BACnet network the EXP-MBCS option must be installed and the “Master Protocol Selection” must be set to BACnet.

BACnet Configuration

Submit Changes

BACnet Device Name: Falcon Tech Room 1

BACnet Device ID: 3185

BACnet Description:

BACnet UDP Port: 0 (0 = 47808)

BACnet BBMD-BDT:

Falcon IP Address: 10.0.0.110 Mask: 32 (FFFFFFF)

(Primary) #1 IP Address: 10.0.0.42 Port: 47808 Mask: 32 (1-32) FFFFFFFF

#2 IP Address: 10.0.0.253 Port: 47807 Mask: 32 (1-32) FFFFFFFF

#3 IP Address: 0.0.0.0 Port: 0 Mask: 32 (1-32) FFFFFFFF

#4 IP Address: 0.0.0.0 Port: 0 Mask: 32 (1-32) FFFFFFFF

Master Protocol Selection: Modbus

Master Poll Timeout: 1 (1 - 10) Seconds

Master Poll Interval: 250 (250 - 2000) mS

Master Retry Attempts: 1 (1 - 99)

Enable Virtual Slot #4:

[BACnet Packet Log](#)

Preset Input Instance Numbers

Figure 5-23: BACnet Configuration Screen

BACnet Device Name: The name of the FMS as it will appear on the BACnet network

BACnet Device ID: The unique identifier for the FMS on the BACnet network

BACnet Description: The description of the FMS as it will appear on the BACnet network

BACnet UDP Port: The port to which the FMS will respond to BACnet requests. The default number of zero in this field will configure the FMS to listen on the standard BACnet port of 47808; see the BACnet standard for more information.

BACnet BBMD-BDT, FMS IP Address, #1 IP Address, #2 IP Address, #3 IP Address, #4 IP Address: These fields give the user a reference and edit capabilities of the BACnet Broadcast Distribution Table. These fields DO NOT need to be configured by the user. If the FMS is acting as a BACnet router, these fields will automatically be populated by the BACnet network controller.

Master Protocol Selection: The FMS can be configured to act either as a BACnet master or a Modbus master. The FMS can not support both protocols as a master at the same time.

Master Poll Timeout: Sets the amount of time the FMS waits for a response from the Slave device before moving on to read the next instance. It is normally set to the default of 1 second but it is adjustable from 1 to 10 seconds.

Master Poll Interval: Sets the amount of time between when a response is received from a Slave to when the FMS will ask for the next instance and is adjustable from 250 to 2000ms. It is normally left at the 250ms default. The interval affects the overall scan rate. If the FMS is configured to read 60 variables and the poll interval is set to 1000ms (1second), each variable will be read approximately once per minute.

Master Retry Attempts: Determines how many times the FMS will request the same instance when there is no response from the Slave before moving on to read the next instance. It is normally left at the default of 1 second and is adjustable from 1 to 99.

Enable Virtual Slots (#1-4): Enabling virtual slots allows the FMS to create virtual points up to the maximum 104 available inputs. These virtual points can accept imported Modbus or BACnet values and then allow notification and alarming of individual registers or instances. The number of available slots will be determined by the number of expansion cards already installed on the FMS. The total number of slots can not exceed four.

Present Input Instance Numbers: Clicking this button tells the FMS to auto populate the BACnet Instance Number field on each available input. The BACnet Instance Number field can be configured manually by the user but this button gives the user a more efficient way to assign default values to this field; see section 5-9.3 BACnet Instance Register Links, pg. 83, for more details.

5-9.1 BACnet /Slave Units Configuration

This **BACnet Slave Unit Configuration** page is available when the FMS is configured for “BACnet/IP” and is used to configure the information regarding the Modbus Slave Units that the FMS will poll data; see section 5-4 Configuring Inputs and relays for Slave Units (Modbus & BACnet) , pg. 71, for details on how to configure an input for a BACnet slave device.

Bacnet Unit Configuration		
Unit #	Address	Unit Description
1	0.0.0.1	LD5000
2	0.0.0.0	(Blank)
3	0.0.0.0	(Blank)
4	0.0.0.0	(Blank)
5	0.0.0.0	(Blank)
6	0.0.0.0	(Blank)
7	0.0.0.0	(Blank)
8	0.0.0.0	(Blank)
9	0.0.0.0	(Blank)
10	0.0.0.0	(Blank)
11	0.0.0.0	(Blank)
12	0.0.0.0	(Blank)
13	0.0.0.0	(Blank)
14	0.0.0.0	(Blank)
15	0.0.0.0	(Blank)
16	0.0.0.0	(Blank)

[Bacnet Instances 1-50](#)
[Bacnet Instances 51-100](#)
[Bacnet Instances 101-150](#)
[Bacnet Instances 151-200](#)
[Bacnet Instances 201-250](#)
[Bacnet Instances 251-300](#)
[Bacnet Instances 301-350](#)
[Bacnet Instances 351-400](#)
[Bacnet Instances 401-450](#)
[Bacnet Instances 451-500](#)
[Bacnet Instances 501-550](#)
[Bacnet Instances 551-600](#)
[Bacnet Instances 601-628](#)

[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-24: BACnet /Slave Unit Configuration

5-9.2 Unit Number Links

Select the Slave’s **Unit #** link to display the following page and allow for individual Slave configuration. Refer to section 5-4 Configuring Inputs and relays for Slave Units (Modbus & BACnet), pg. 71, for details on how to configure the option presented here.

Bacnet Slave #01 Configuration	
<input type="button" value="Submit Changes"/>	
Next >>	
IP Address:	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>
Port:	<input type="text" value="1"/> (0=47808)
Description:	<input type="text" value="LD5000"/>
Return to Bacnet Unit Cfg Page Return to Configuration Menu Page Return to Main Menu Page	

Figure 5-25: Individual Slave Unit Configuration Screen

5-9.3 BACnet Instance Register Links

Selecting a **BACnet Instance Register** link at the bottom of the BACnet Slave Unit Configuration page will display the following. Figure 5-26, pg. 84, shows the navigation screen for configuring the BACnet registers.

Bacnet Instance Configuration Menu									
#	Unit	Type	Instance	Label	#	Unit	Type	Instance	Label
1.	0	Analog Input	0	Register #1	26.	0	Analog Input	0	Register #26
2.	1	Binary Output	30005	Cable Length	27.	0	Analog Input	0	Register #27
3.	1	Analog Output	30002	Leak Distance	28.	0	Analog Input	0	Register #28
4.	0	Analog Input	0	Register #4	29.	0	Analog Input	0	Register #29
5.	0	Analog Input	0	Register #5	30.	0	Analog Input	0	Register #30
6.	0	Analog Input	0	Register #6	31.	0	Analog Input	0	Register #31
7.	0	Analog Input	0	Register #7	32.	0	Analog Input	0	Register #32
8.	0	Analog Input	0	Register #8	33.	0	Analog Input	0	Register #33
9.	0	Analog Input	0	Register #9	34.	0	Analog Input	0	Register #34
10.	0	Analog Input	0	Register #10	35.	0	Analog Input	0	Register #35
11.	0	Analog Input	0	Register #11	36.	0	Analog Input	0	Register #36
12.	0	Analog Input	0	Register #12	37.	0	Analog Input	0	Register #37
13.	0	Analog Input	0	Register #13	38.	0	Analog Input	0	Register #38
14.	0	Analog Input	0	Register #14	39.	0	Analog Input	0	Register #39
15.	0	Analog Input	0	Register #15	40.	0	Analog Input	0	Register #40
16.	0	Analog Input	0	Register #16	41.	0	Analog Input	0	Register #41
17.	0	Analog Input	0	Register #17	42.	0	Analog Input	0	Register #42
18.	0	Analog Input	0	Register #18	43.	0	Analog Input	0	Register #43
19.	0	Analog Input	0	Register #19	44.	0	Analog Input	0	Register #44
20.	0	Analog Input	0	Register #20	45.	0	Analog Input	0	Register #45
21.	0	Analog Input	0	Register #21	46.	0	Analog Input	0	Register #46
22.	0	Analog Input	0	Register #22	47.	0	Analog Input	0	Register #47
23.	0	Analog Input	0	Register #23	48.	0	Analog Input	0	Register #48
24.	0	Analog Input	0	Register #24	49.	0	Analog Input	0	Register #49
25.	0	Analog Input	0	Register #25	50.	0	Analog Input	0	Register #50

[Return to Bacnet Unit Cfg Page](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-26: BACnet Configuration Registers Screen

Selecting a link to an individual register displays the configuration options for that register. Refer section 5-4 Configuring Inputs and relays for Slave Units (Modbus & BACnet) on page 71, for details on how to configure the option presented here.

Bacnet Instance #1 Configuration

[Next >>](#)

Unit: (0 - 16)

Type: ▾

Instance:

Label:

[Return to Bacnet Instance Cfg Menu](#)
[Return to Configuration Menu Page](#)
[Return to Main Menu Page](#)

Figure 5-27: BACnet Instance Configuration

5-10 TELNET

The FMS supports a Telnet connection over IP port 23. When properly configured a telnet user can use the Com1 port of the FMS to communicate to external EIA232 enabled devices. For instance, a user could properly configure the FMS, open a telnet session and then connect to an LD5100 interface over Com1 EIA232.

5-10.1 Hardware Connections

The Com1 port is located on the back of the FMS. The COM1 Transmit and Receive LEDs are also located on the back of the FMS.

The EIA232 port allows communications between the FMS and one other device (point-to-point connection). The EIA232 port has maximum cable length of 50 feet (15.2m).

COM1 DB9 Male Pin Out

- Pin 1 = Data Carrier Detect
- Pin 2 = Receive Data
- Pin 3 = Transmit Data
- Pin 4 = Data Terminal Ready

- Pin 5 = Signal Ground
- Pin 6 = No Connection
- Pin 7 = Request to Send (internally connected to Pin 8)
- Pin 8 = Clear to Send (internally connected to Pin 7)
- Pin 9 = No Connection

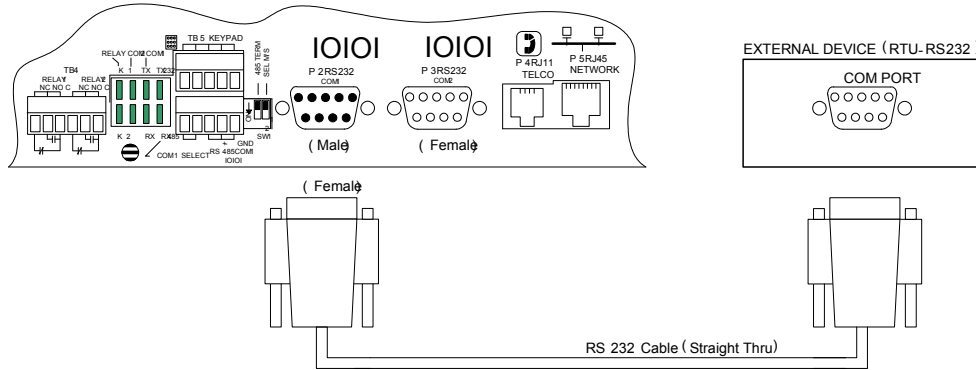


Figure 5-28: FMS connection to a EIA232 device.

5-10.2 Telnet/COM1 Configuration

The Com1 Port/Modbus/Telnet Configuration page allows the user to configure the FMS Telnet features.

Modbus / Com Port 1 Configuration

Submit Changes

Modbus/TCP Slave Enable: Yes No

Modbus/TCP Slave Unit Identifier: (1-254, 0 = disabled)

Serial Com 1 Protocol Type:

Serial Baud Rate: 1200 2400 9600

Serial Interface Type: EIA-485 EIA-232

Telnet Inactivity Timeout: Minutes

Modbus Serial Slave Address: (1-254, 0 = disabled)

EIA-485 DE TX Delay: (10 - 50) mS

EIA-485 DE Off Delay: (0 - 50) mS

Master Poll Timeout: (1 - 10) Seconds

Master Poll Interval: (250 - 2000) mS

Master Retry Attempts: (1 - 99)

Enable Virtual Slot #2:

Enable Virtual Slot #3:

Enable Virtual Slot #4:

BCM Zero Amp Alarm Level: (0.000 - 1.000)

BCM Status Display: Left-Right Vertical

[Modbus Master Poll Data Log](#)

[Modbus Slave Register Display Log](#)

[Modbus Packet Log](#)

[Reset Modbus Port](#)

Figure 5-29: Telnet/Com1 Configuration Page

Serial Protocol: Configures the Serial COM Port 1 (EIA232 or EIA485) Master or Slave operation. The options are:

- **None:** Disables Modbus support on Serial Port COM1.

- **Modbus Slave:** Enables the FMS to operate as a Modbus Slave over the Serial Port COM1.
- **Telnet:** Enables telnet connections to the FMS and communication with an external EIA232 device through the COM1 port.

Serial Baud Rate: Sets the Serial COM Port 1 to 1200, 2400 or 9600 Baud. All the devices connected to the FMS Serial COM Port 1 must be set to operate at the same Baud rate.

Serial Interface Type: Enables the FMS Modbus to operate on the EIA485 or EIA232 COM1 Port.

Telnet Inactivity Timeout: Sets the amount of time for the FMS to timeout due to inactivity. The time is adjustable from 0 to 999 minutes.

5-10.3 Telnet Communication

To access a device through the FMS, open a Command Prompt window and type the following:
Telnet[sp](Falcon IP address)[sp](Port number)



NOTE:

If the FMS is going to be looped back into itself, the Command Prompt line feed must be set to carriage return (CR) only.



WARNING!!

Do not Telnet back into the Falcon. This could cause severe problems including system freezing or complete shutdown of the system.

```
C:\WINDOWS\system32\cmd.exe
C:\>Telnet 10.0.0.108 3201_
```

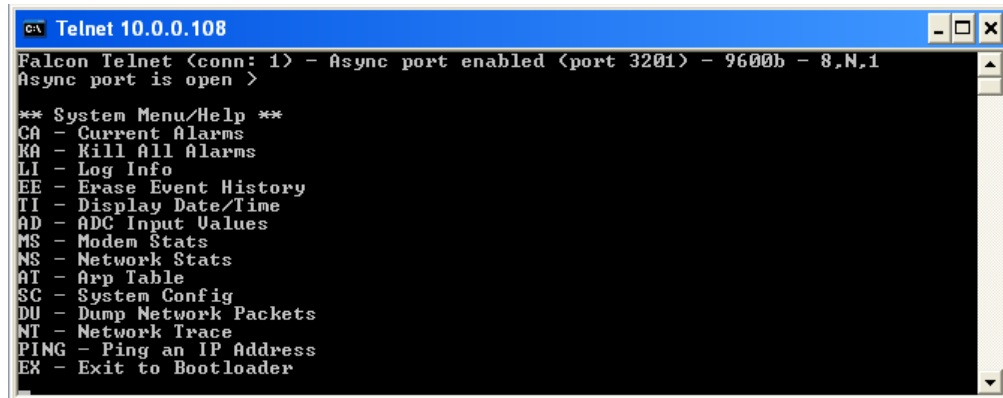
Figure 5-30: Telnet Communication showing a FMS IP address of 10.0.0.108 accessing port 3201.

Press **Enter** and the device will connect.

```
Telnet 10.0.0.108
Falcon Telnet (conn: 1) - Async port enabled (port 3201) - 9600b - 8,N,1
Async port is open >_
```

Figure 5-31: Example of Telnet connection through port 3201 at 9600 baud, 8 data bits, no parity, and 1 stop bit.

The following menu will depend on the device the FMS is communicating to.

A screenshot of a Telnet window titled "Telnet 10.0.0.108". The window shows a terminal interface with the following text:

```
GA Telnet 10.0.0.108
Falcon Telnet <conn: 1> - Async port enabled <port 3201> - 9600b - 8,N,1
Async port is open >

** System Menu/Help **
CA - Current Alarms
KA - Kill All Alarms
LI - Log Info
EE - Erase Event History
TI - Display Date/Time
AD - ADC Input Values
MS - Modem Stats
NS - Network Stats
AT - Arp Table
SC - System Config
DU - Dump Network Packets
NT - Network Trace
PING - Ping an IP Address
EX - Exit to Bootloader
```

Figure 5-32: Example of Telnet Menu (device-specific)

CHAPTER 6: EIA232 INTERFACE

The FMS EIA232 interface provides a more detailed and intricate view of the FMS. It also allows a user to access more elaborate configuration options. It also allows users to access more elaborate IP configurations and diagnostics.

In order to proceed through this chapter, the FMS must be connected to a PC via the EIA232 port. If the FMS is not yet connected to a PC, connect the FMS EIA232 COM2 port as follows:

1. Connect the EIA232 port on the FMS to a terminal or PC running terminal emulation software (HyperTerminal) with a 9-pin male-female straight through serial cable.
2. Set the appropriate COM Port to **9600 baud, NO parity, 8 data bits, 1 stop bit, (9600/N/8/1), and no software or hardware flow control.**
3. Once the terminal emulation software starts, press **Enter** on the keyboard and the Main Menu should appear. If the Main Menu does not appear, check the communication settings and make sure the unit is powered on.



WARNING!!

The Bootloader section is designed for experienced technicians or users responsible for maintaining the system. Exit immediately if you have not been trained in the use of the Bootloader commands. Contact RLE for more information regarding the commands in this section.

6-1 UNIT START UP

When the unit is powered up, diagnostic tests are performed and the Flash Program code is verified. The main system code is executed after a ten second delay. During the boot up sequence, the System Status LED will flash at a rapid rate of 10 flashes per second. If the System Status LED continues to flash for more than 20 seconds, there is a fault with the unit and service is required, contact RLE Tech support for more information.

6-2 FLASH EXECUTABLE CODE

After the boot up sequence, the main program executes from Flash memory. In order to run properly, the unit must have a unique MAC address (assigned by the manufacturer) and an IP address. The factory default for the IP address is **10 . 0 . 0 . 189**. If the unit is connected to the enterprise's network, an IP address must be obtained from the network administrator. The FMS must be reconfigured with this new IP address. This reconfiguration can be done in the field; see the EIA232 Main Menu, Table 6-1, pg. 86.

Once the system reaches this point, press **Enter** to display the System Main Menu.

6-3 MAIN MENU

All system functions begin in the Main Menu. Two letter commands display information, execute commands and display submenus for additional inquiry and system configuration functions.


Table 6-1: EIA232 Main Menu

COMMAND	DESCRIPTION	FUNCTION
CA	Current Alarms	CA displays all active alarms on the master unit. If alarms are present, the System Status LED is red.
KA	Kill Alarms	KA acknowledges all alarms and terminates all dial-out communications and network Traps.
TI	Display Date/Time	TI displays the FMS current time and date.
AD	ADC Input Values	AD allows the user to examine the readings of the 4-20mA inputs. These readings can be referenced during start-up to verify gain and offset calculations. Data displayed depends on the expansion card(s) installed.
MS	Modem Statistics	MS provides a summary of all modem information.
NS	Network Statistics	NS displays network and EIA485 statistics including: network packets received, packets transmitted, and errors.
SC	Main Configuration	SC displays a submenu that lists all items for system setup and configuration.
DU	Dump Network Packets	DU dumps the headers of all network packets received and sent. Only active until the next command is entered. This item is for network debugging only and is not normally enabled .
NT	Network Trace	NT displays troubleshooting messages during the processing of network packets. Only active until the next command is entered. Network Trace is for network troubleshooting only and is not normally enabled .
PING	PING	Allows user to PING another device on the network.
EX	Exit to Bootloader	EX is used to enter the Bootloader command section. The unit will stop monitoring the inputs and allow firmware updates to be loaded. To restore normal operation after updating firmware, type run and press Enter on the keyboard, or power the unit off and back on again.

6-3.1 Main Configuration Menu - SC

Typing **SC** at the command prompt on the Main Menu displays the **Main Configuration Menu** that lists all items for system setup and configuration. This menu may be password protected. If it is, the password must be entered when the **SC** menu selection is made. To enter the password, type **SC**, press the space bar once, and then type the appropriate password.

Table 6-2: Main Configuration Menu Options (SC)

COMMAND	DESCRIPTION	FUNCTION
2	IP Configuration Menu	2 displays the IP Configuration Menu.
4	Factory Menu	4 displays the Factory Menu. This menu provides a means to change the MAC address and erase the user configuration stored in Flash memory. This area is password protected. If you are familiar with MAC assignments and configuring the FMS, contact RLE Technologies for the password to this menu.
 <p>WARNING!! Once you receive the password for this menu, you assume full responsibility for the system configuration and proper MAC addressing of the FMS.</p>		
5	Load/Save Configuration Data	<p>5 allows user configurations to be saved and reloaded onto other FMS units. Windows HyperTerminal application software may be used to perform the load/save functions.</p> <p>Before the configuration can be loaded onto other FMS units, it must be checked for accuracy. Blank spaces or unwanted characters, such as the <i>“Press <enter> to download the file”</i> text, may be saved into the beginning of the configuration file. Open the file in notepad and examine the first few lines. Delete any characters that were accidentally embedded into the file.</p>
6	Configuration Password	6 allows the user to password protect the configuration section of the FMS Firmware. The password can be any combination of seven numbers and/or characters.
x	Exit	X exits the Main Configuration Menu and returns to the Main Menu.

6-3.1.1 IP Configuration Menu

The **IP Configuration Menu** is accessed by typing a **2** at the command prompt in the Main Configuration Menu. This menu is used to establish IP/TCP and PPP interaction with the network. The FMS must be set up with an IP address, Subnet Mask, and default router. These addresses can be obtained from your Network Administrator or IT Department. To enable the SNMP receiving stations, or to create communities, the FMS MIB, provided on a CD with every unit, must be loaded on a system(s) running a Network Operating System (NOS). This MIB is compiled through standard functions of the NOS. Consult with your Network Administrator for proper installation of the FMS MIB on the NOS. Once the MIB is loaded, the FMS can be discovered and configured over the network. For proper operation, the IP addresses configured in the FMS communities must match the IP addresses on the receiving stations.

Only the administrator's username/password may be changed from this menu. All other Web users must be changed via the Web interface.

Table 6-3: IP Configuration Menu

COMMAND	DESCRIPTION	FUNCTION
i	LAN IP Address	Designates the LAN IP address.
m	Net Mask	Designates the Net Mask.
d	Default Route	Establishes the default IP address.
u	Web Administrator Username	Edits the Web administrator username.
p	Web Administrator Password	Edits the Web administrator password.
f	Web Refresh Rate	Changes the Web refresh rate.
s	PPP Server IP Address	Designates the PPP server IP address.
c	PPP Client IP Address	Designates the PPP client IP address.
z	Max Seg Size (TCP)	Establishes the maximum segment size.
h	HTTP Port (TCP)	Designates the HTTP port.

	Communities	Communities are computers that receive SNMP Traps from the FMS and interact with the FMS over the network. To add a computer to the communities list, select a menu number posted as "empty." Enter the receiving computer's IP address, the type of network access the machine will have (r - read, w - read/write, n - none), and whether the computer will receive Traps or not (y - yes, n - no). Separate each of these items with a space and press Enter when done. The newly configured community member will appear in the appropriate space in the community listing. Type delete to remove an existing community.
q	Quit	DOES NOT save changes and returns user to the Main Menu.
x	Exit & Save	Saves changes and returns user to the Main Menu.

CHAPTER 7: REMOTE ACCESS

7-1 REMOTE ACCESS CONFIGURATION

The FMS can be remotely accessed with any terminal emulation software package. To establish a proper dial-out session, set the appropriate modem port as follows:

- 33.6K baud
- NO parity
- 8 bits
- 1 stop bit
- (2400/N/8/1)
- No software or hardware flow control

Once the proper settings are made, dial the phone number assigned to the FMS. Once communication is established, press **Enter**. A login prompt will appear on the screen. Type the login and press **Enter**; type the password and press **Enter**. The session will begin.



NOTE:

The factory default settings are:

Username: **falcon**

Password: **rletech**

Type a question mark (?) to view the **System Menu**. To terminate the session, execute the command in the software package that disconnects the modem. The commands for accessing the system remotely are identical to the ones described in section 6-3.1 Main Configuration Menu - SC, on page 90. There is, however, a limited command set for remote access. The available commands are:

- Current Alarms (**CA**)
- Kill All Alarms (**KA**)
- Display Date/Time (**TI**)
- ADC Input Values (**AD**)
- Modem Stats (**MS**)
- System Configuration (**SC**)

Pages can be acknowledged by phone number during a remote access session by entering **aa** followed by the alarm acknowledgement code for that phone number.

CHAPTER 8: POINT-TO-POINT PROTOCOL

Point-To-Point Protocol (PPP) is an alternate method that may be used to communicate with the FMS. PPP can only be used through a modem, over a phone line. Both the FMS and the user's computer must be configured correctly in order for PPP to work.

8-1 CONFIGURING THE FMS

1. Access the FMS Web interface.
2. Click the **Configuration** link. Enter the correct user name and password (if necessary).
3. From the **Configuration Menu**, click on the **System** link.
4. On the **System Configuration** page, click on the **IP Configuration Menu** link.

The **IP Configuration** page lists the IP addresses configured on the FMS. Both the **PPP Server** and **PPP Assignment** fields need to be completed in order for PPP to work.

PPP Server: Assigns an IP address to the FMS for PPP communications. Any IP address may be used, as long as it is not in the same subnet as the FMS primary IP address. A good example of an IP address to use is: **192 . 168 . 1 . 2** . Use this address to view the FMS Web interface through a browser when communicating with the FMS through PPP.

PPP Assignment: Tells the FMS what IP address to assign to the PC the user dials in from. Again, any IP address may be used, as long as it is in the same subnet as the PPP Server IP address. A good example of an IP address to use is: **192 . 168 . 1 . 3**

8-2 CONFIGURING THE PC

Now the user is ready to configure the PC they will be dialing in from. These directions were written from a Windows XP machine. To configure the PC:

1. Click on **Start, Control Panel**, then **Network**. Select **New Connection**.
2. When the **Internet Properties** window appears, select the **Connections** tab at the top of the window and click on the **Setup** button to start the **New Connection Wizard**.
3. Click the **Next** button to begin the Wizard.
4. Select **Connect to the Internet** and click the **Next** button.
5. Select the **Set up my connection manually** button and click **Next**.
6. Select the **Connect using a dial-up modem** button and click **Next**.
7. Type "**Falcon**" as the name of the ISP in the space provided and click **Next**.
8. Enter the **phone number** of the phone line that connects to the FMS. Click the **Next** button.
9. Enter the FMS Modem **User name** and **Password** (see page 42) and click **Next**.
10. Add a shortcut to the desktop. Click the **Finish** button. Use this desktop shortcut to establish a PPP connection with the FMS.

CHAPTER 9: UPGRADING FIRMWARE, LOADING & SAVING CONFIGURATION DATA

9-1 UPDATING FMS FIRMWARE

It is important that you confirm the correct version of firmware before you download and attempt to install it. The FMS MAC ID is printed on a sticker on the bottom of the unit. FMS units with MAC IDs **00.90.5B.02.00.00 and above** accept different firmware than other Falcons.

- FMS8002, 8126, and 2006 Falcons support firmware version 5.X only
- FMS8, 20, 20U and FMS32 Falcons support firmware version 6.x only.
- FLS8 and FLS8-M (Falcon Lite), and F-Series support firmware version 2.x only.
- FMS-X/FMS-XXXX support firmware version 7.x only.



WARNING!!

DO NOT ATTEMPT TO LOAD THE WRONG FIRMWARE ONTO A FMS!
If you have any questions regarding firmware compatibility, visit our FMS webpage at www.rletech.com or call us directly.

Download the most recent version of firmware appropriate for your FMS from the Documentation/Files section of the FMS webpage www.rletech.com. Save it to the hard drive of your computer. Do not change the name of the file. **The name of the file, as downloaded from the RLE website, must remain the same.**

The FMS can only accept one copy of firmware at a time. Before a new version can be uploaded, the oldest version must be deleted. To do this, access the **Flash Program** link on the **Configuration Menu** of the FMS Web interface. Click the **Erase Backup** button to erase the oldest version of firmware. It will take approximately 10 seconds for the firmware to be erased. A confirmation screen will appear once the firmware has been erased.

Click the **Back** button on your browser to return to the **Flash Program** screen. Reload this page to ensure the oldest firmware has been erased. A **Checksum** value of **FFFF** tells you the oldest firmware has been completely erased.



NOTE:

A FMS Firmware Upgrade Program is available for download from the Documentation/Files section of the FMS webpage at www.rletech.com.

9-1.1 Updating FMS Firmware via TFTP Client

This is the preferred method. However, it does not work with a PPP connection.

1. Uploading firmware via TFTP requires a TFTP Client. It may be possible to download a free license TFTP Client from the Internet. Consult your IT department to determine a compatible client program.

2. Verify that your PC and the FMS are on the same subnetwork (LAN).
3. Open your TFTP client. Configure the client as follows.
 - a) **Host** = Falcon IP Address
 - b) **Port** = 69
 - c) **Block Size** = 64, 128, 256, 512, or 1024
 - d) **NOTE:** The file must be sent in BINARY (not ASCII).
4. Send or PUT the firmware file to the FMS. It may take ~10 seconds for the firmware upload to begin. This will put the new firmware into effect. Once the transfer is complete, the FMS will reboot.
5. After one minute, refresh the FMS Flash program webpage. Notice that the active Flash now contains the latest firmware. Repeat the above steps to upgrade firmware in the second Flash chip.

9-1.2 Updating FMS Firmware via the EIA232 COM2 Port (X-Modem)

1. Connect to the FMS using HyperTerminal. For instruction on how to do so, see our support document “Connect HyperTerminal” on the Documentation/Files section of the FMS webpage at www.rletech.com.
2. Start firmware updates by either:
 - a) pressing any key after power-up when a 10 second window provides an opportunity to abort the Flash Main Program, or
 - b) typing **EX** to exit to Bootloader once the Main Menu appears.
3. From the FMS Boot prompt, type **?** and press Enter to see the list of available commands.
4. From the FMS Boot prompt, type **ID** and press Enter. Note which Flash has the lowest serial number. The Flash with the lowest serial number is the backup. The idea is to erase the backup, load the new version—which becomes the active Flash—then erase and load the other Flash.
5. From the FMS Boot Prompt, erase the back up Flash program (the one with the lowest serial number) by typing **ERASE PRGM1** or **ERASE PRGM2** followed by Enter. After a second or so, the screen will update with an **OK**.
6. From the FMS Boot prompt, type **LOAD PRGM1 XMODEM** or **LOAD PRGM2 XMODEM** followed by Enter. Select the same program that was erased.
7. From the HyperTerminal menu select **Transfer -> Send File**. Use the browse button to select the FMS firmware file from the computer’s directory. The file must be binary and have a **.bin extension**. Select the file and upload it using the **1K X-Modem protocol**. Then click **Send**.
8. A transfer status screen will be displayed. The transfer time will take about 10 minutes. Once the transfer is complete, the transfer status window will automatically close. The HyperTerminal window will indicate that the upload is complete.
9. From the FMS Boot prompt, type **RUN** or power down the FMS and restart it to verify that the new Flash program runs.

10. Press **Enter** to display the FMS Main Menu and repeat the steps above to erase and download to the other Flash program chip.
11. Once the firmware upgrade is complete, disconnect the serial cable and close HyperTerminal.

9-2 **LOADING/SAVING FMS CONFIGURATION DATA**

This menu allows user configurations to be saved and reloaded onto other FMS units. In the unlikely event the FMS fails, a replacement FMS can be placed back in service faster by loading the saved configuration information onto it from the previous FMS. The configuration settings are saved to a binary file for backup purposes, which cannot currently be edited off line.

9-2.1 **Saving Configuration Data via TFTP Client**

1. Verify that your PC is connected to the FMS over the LAN and that port 69 is open between your PC and the FMS.
2. Open your TFTP client. Configure the client as follows.
 - a) **Host** = Falcon IP Address
 - b) **Port** = 69
 - c) **Block Size** = 64, 128, 256, 512, or 1024
 - d) **NOTE:** The file must be sent in BINARY (not ASCII).
3. The file name of the configuration being saved must contain the **.cfg** extension (eg., config.cfg).
4. **Fetch** or **GET** the file. After a few seconds, the TFTP software should indicate when it is complete.
5. If the FMS Modbus is used and configured, the Modbus configuration file is saved in a separate file. Change the **.cfg** extension to **.mfg** and **Fetch** or **GET** the file (e.g., modbusconfig.cfg). The TFTP software should indicate when it is complete.
6. Use Windows Explorer to verify that the files exist on the PC's hard drive. Copy the files to your desired file backup location.

9-2.2 **Saving Configuration Data via EIA232 COM2 Port (X-Modem)**

1. Before starting, make sure the HyperTerminal properties are set correctly to perform load/save. Select the **Properties Menu** (under File) to establish a direct connection through an available COM Port. This port should be set to **9600 Baud, 8 Data bits, NO Parity, 1 Stop bit, and NO Flow control**.

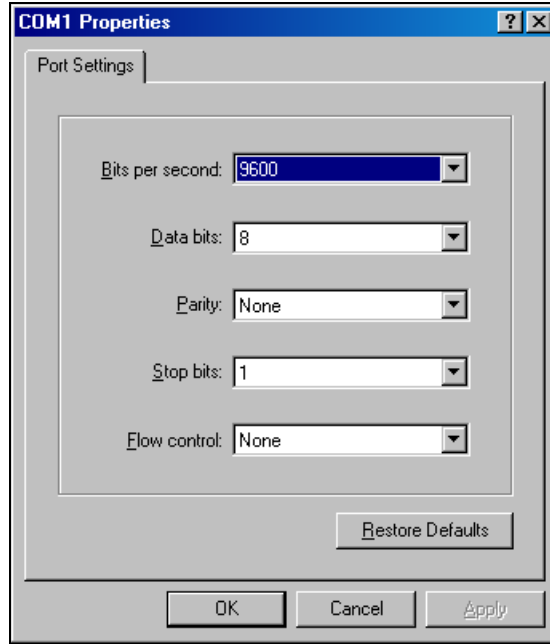


Figure 9-1: Correct COM1 Port Settings

2. Select the **Settings** tab for additional changes. The parameters under the Settings tab should reflect what is shown below.

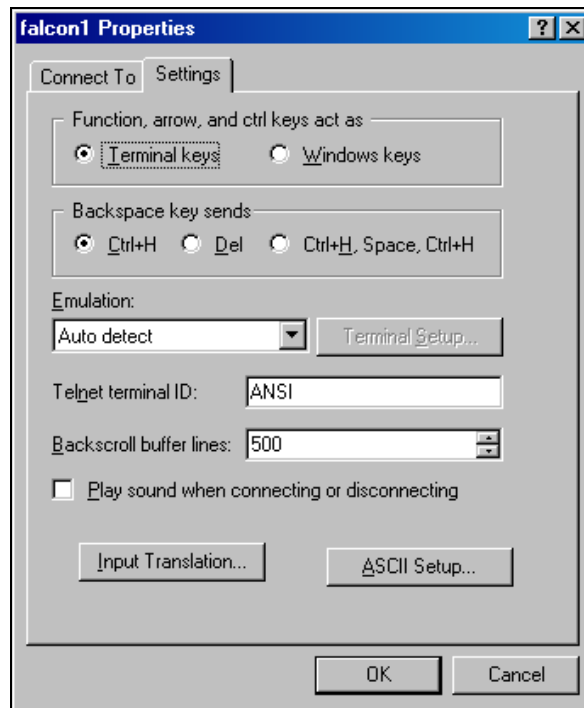


Figure 9-2: COM1 Port Settings

3. To save settings, log into the FMS (COM2) through HyperTerminal (Terminal Emulation Program). Navigate to the **Load/Save Configuration Data Menu (5)** under the **Main Configuration Menu (SC)**.
4. Select option **1** from the Load/Save Configuration Data Menu followed by the **Enter** key. Then select the **Transfer/Receive File** from the menu at the top of the HyperTerminal screen.
5. Specify the file location and select the **1K X-Modem** receiving protocol. Then click on the **Receive/Start** button and enter the Filename for the Configuration file.
6. Wait until the download is completed and enter **X** to exit the Load/Save Configuration Menu.

9-2.3 Loading Configuration Data via TFTP Client

1. Verify that your PC is connected to the FMS over the LAN and that port 69 is open between your PC and the FMS.
2. Open your TFTP client. Configure the client as follows.
 - a) **Host** = Falcon IP Address
 - b) **Port** = 69
 - c) **Block Size** = 64, 128, 256, 512, or 1024
 - d) **NOTE:** The file must be sent in BINARY (not ASCII).
3. The file name of the configuration being loaded must contain the **.cfg** extension.
4. **Send** or **PUT** the file. After a few seconds, the TFTP software should indicate when it is complete.
5. If the FMS Modbus is used and configured, the Modbus configuration file is loaded in a separate file. **Send** or **PUT** the **.mfg** configuration file. The TFTP software should indicate when it is complete.
6. Configurations are now loaded onto the replacement FMS. View the FMS webpages to verify that the configurations are as expected.

9-2.4 Loading Configuration Data via EIA232 COM2 Port (X-Modem)

1. To load settings, log into the FMS (COM2) through HyperTerminal (Terminal Emulation Program). Navigate to the **Load/Save Configuration Data Menu (5)** under the Main Configuration Menu.
2. Select option **2** from the Load/Save Configuration Menu and press the **Enter** key. Then select **Transfer/Send File** from the menu at the top of the HyperTerminal screen.
3. Select the **1K X-Modem** protocol. Locate the correct configuration file under **Filename** (Browse), select **Open**, and then select the **Send** button.
4. Wait until the Upload is completed and enter **X** to exit the Load/Save Configuration Menu.

APPENDIX A: FMS EXPANSION CARDS

A-1 EXPANSION CARD DESCRIPTIONS

Four different Expansion Cards can populate the FMS expansion slots; however, Expansion Card B and Expansion Card M are no longer available. Expansion Card M is no known as the EXP-MBCS option that must be configured into an FMS unit at the factory. The Expansion Cards are populated as follows:

Table A-1: Expansion Card Descriptions

CARD	FEATURES	RLE PRODUCT #
A	12 Analog Inputs (AI) Individually configurable, through jumpers, as 4-20mA, 0-5VDC, or 0-10VDC 8 Relay Outputs (RO)	EXP-A-24/48
B	12 Digital Inputs (DI) 8 Relay Outputs (RO)	EXP-B-24 (24VDC) EXP-B-48 (48VDC)
C	24 Digital Inputs (DI)	EXP-C-24 (24VDC) EXP-C-48 (48VDC)
M	Modbus	EXP-M-24/48

A-2 EXPANSION CARD INSTALLATION

Expansion Cards may be installed by the manufacturer at the time of the initial product order, or may be ordered at a later date and installed by the customer. If a customer orders an expansion card after they have possession of the FMS unit, they must install the expansion card themselves.

A-2.1 Installing an Expansion Card into a One Rack Unit FMS

Expansion Cards are shipped with a ribbon cable and five screws, although only one screw will be used for the installation process. To install a FMS Expansion Card:

1. Remove the four screws that secure the lid to the FMS. Lift off the lid. Then, remove the four screws on the two COM1 Ports.
2. Remove the terminal blocks.
3. Remove the cover plate, labeled Expansion Card from the back of the lid.
4. Set the Dip Switch Address Card to address 1. Position 1 = ON; Positions 2-4 = OFF.

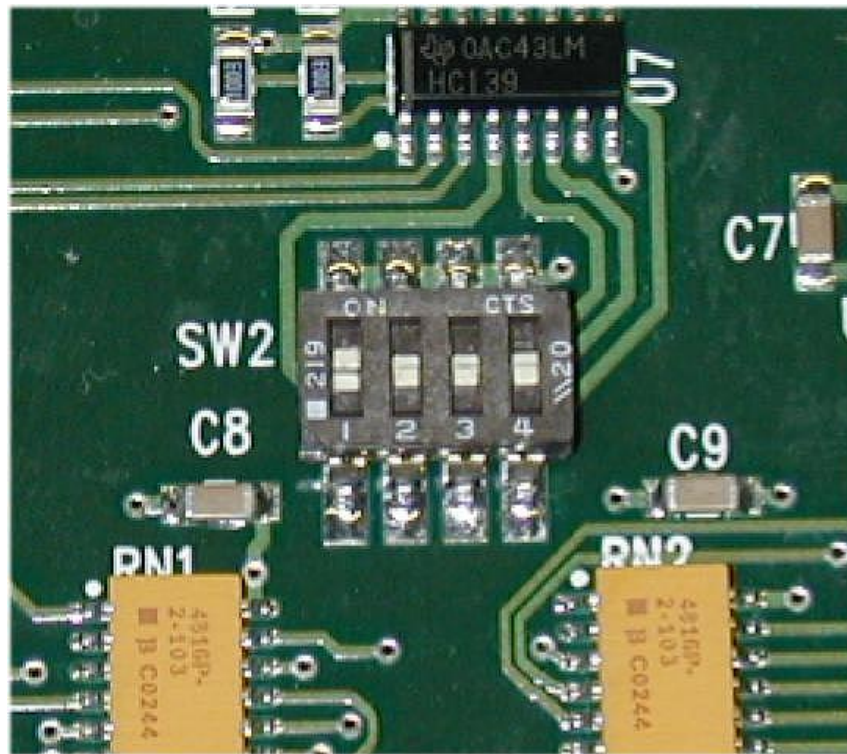


Figure A-1: Expansion Card SW2 Dip Switch

5. Align the holes in the card with the four posts and one screw setting on the main FMS unit. Make sure the two double rows of pins align next to each other, and the green inputs point toward the rear of the unit.



Figure A-2: Expansion Card Mounting in a One Rack Unit

6. Snap the card onto the four posts and secure the provided screw into the remaining hole. Once the card snaps into place, it is very difficult to remove. **DO NOT** overlook installation of the screw. This screw grounds the expansion card and is critical to the FMS performance.
7. The main FMS board must now be connected to the card. The two are connected with a ribbon cable provided by the manufacturer. The ends of the ribbon cable are keyed, which means they will only fit onto the two double rows of pins—one on the main board, one on the expansion card—in one direction. Align the keyed sides of the ribbon cable with the notches in the plastic surrounding the rows of pins, and push down securely. Always place and remove the ribbon cable with a straight up and down motion. Pulling the cable to one side or another will bend the pins in the connectors and damage the boards.
8. Installation is complete. Place the lid back on the FMS and secure it with the eight screws.

A-2.2 Installing an Expansion Card into a Two Rack Unit FMS

The FMS expansion card is shipped with five screws. Remove the two screws that hold the Expansion Card plate from the slot on the FMS where the card will be installed. Place the screws back into the holes once the plate is removed.

1. Remove the four hex standoffs from the COM1 and COM2 connectors located on the back panel. Remove the bottom two screws located along the bottom edge of the back of the unit.
2. Remove the two top screws that attach the side plate (rack ears) to the unit from both sides.
3. Gently lift and hinge the top lid to the left (looking at the front of the unit) and lay it next to the base (bottom chassis); see Figure A-3, pg.100.
4. Set the Card Slot Address (SW2 Dip Switch) to the Slot number where the card will reside (1-4). If the card will reside in Slot 2, set Position 2 to ON and Positions 1, 3 and 4 to OFF. If the card will reside in Slot 3, set Position 3 to ON and Positions 1, 2 and 4 to OFF. If the card will reside in Slot 4, set Position 4 to ON and Positions 1, 2 and 3 to OFF; see Figure A-2, pg. 98.
5. If the Expansion Card is to be mounted in the base (Slot 1), attach the ribbon cable and refer to Section A-2.1 Installing an Expansion Card into a One Rack Unit Falcon, pg. 90, steps 2 through 6. (Follow the same instructions for mounting an Expansion Card in a One Rack Unit FMS.)
6. If the Expansion Card is to be mounted in the lid (Slots 2-4), mount the card(s) as follows:
 - a) Attach the ribbon cable to the Expansion Card making sure that the correct connector is attached; see Figure A-4, pg. 100, for details. Place the card onto the five mounting posts with the bottom of the card facing out and the terminal blocks positioned in the rear opening.
 - b) The ends of the ribbon cable are keyed, which means they will only fit onto the two double rows of pins in one direction. Align the keyed side of the ribbon cable with the notches in the plastic surrounding the rows of pins, and push down securely. Always place and remove the ribbon cable with a straight up and down motion. Pulling the cable to one side or another will damage the pins in the connector and damage the board.
7. Secure the board to the lid using the five mounting screws supplied; see Figures A-5 and A-6, pg. 101.
8. Hinge the lid back in place over the base and reattach the side brackets using the two mounting screws on the back plate and the hex posts for COM1 and COM2; see Figure A-3, pg. 100.

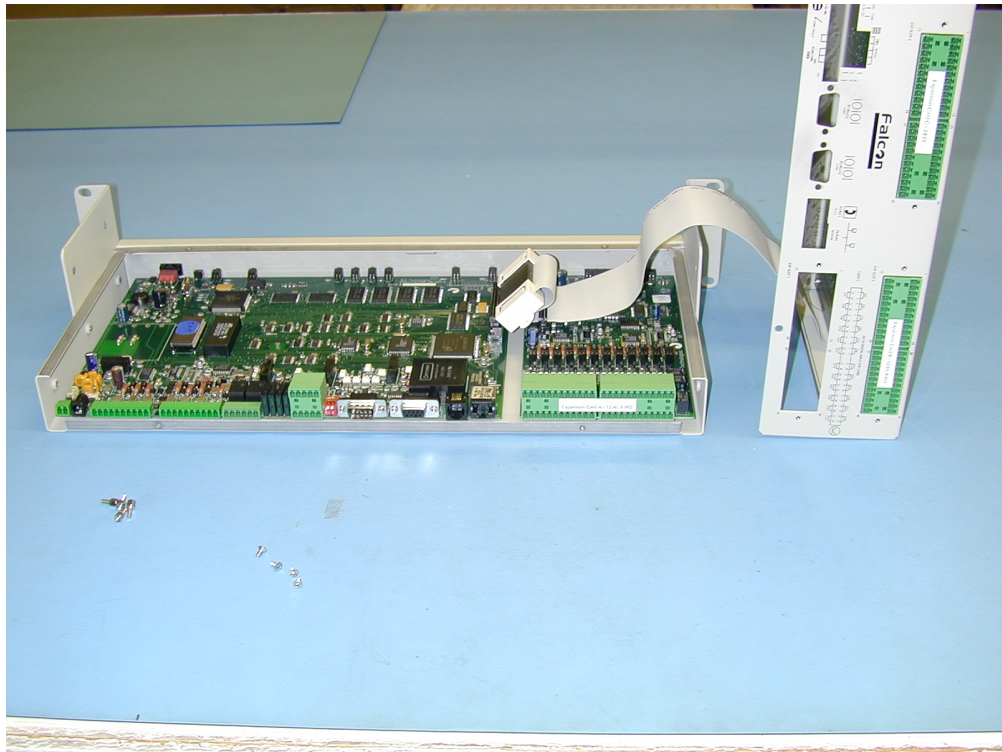


Figure A-3: Opening and Closing a Two Rack Unit

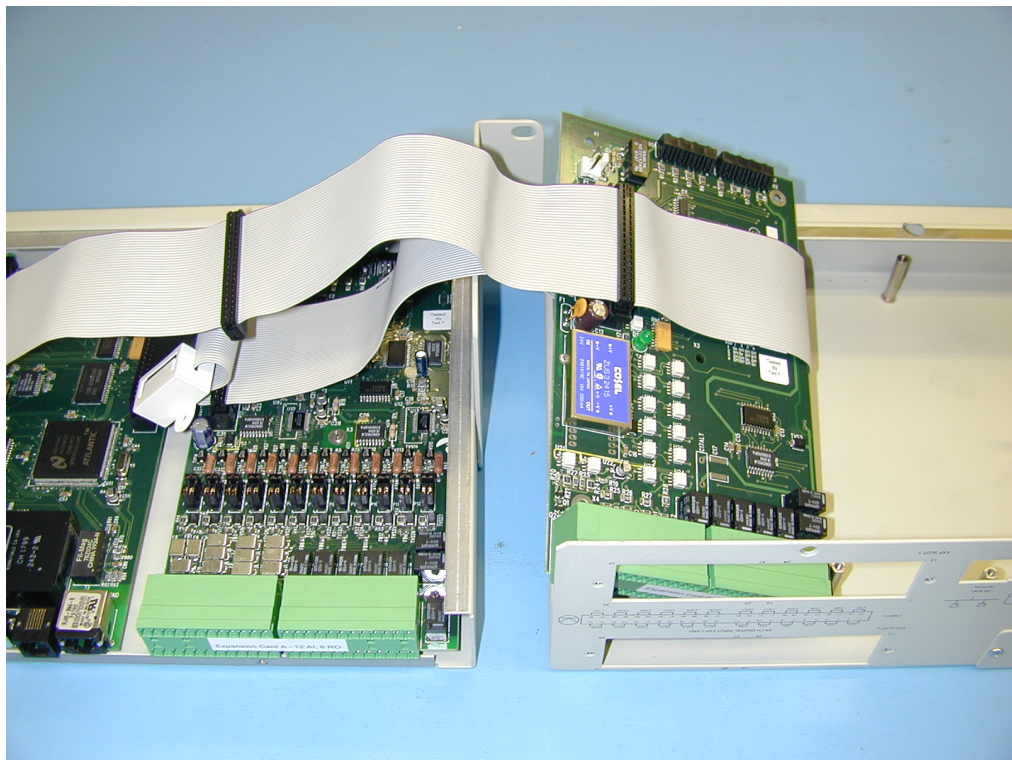


Figure A-4: Expansion Card Ribbon Cable Placement in a Two Rack Unit

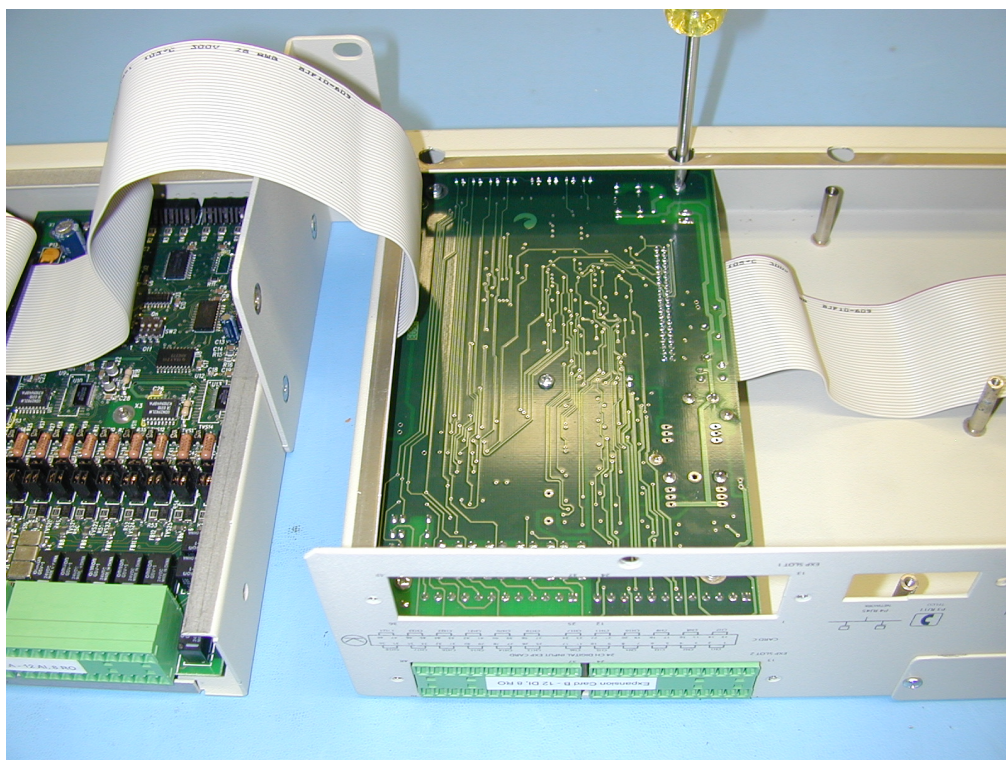


Figure A-5: Expansion Card Mounting in a Two Rack Unit

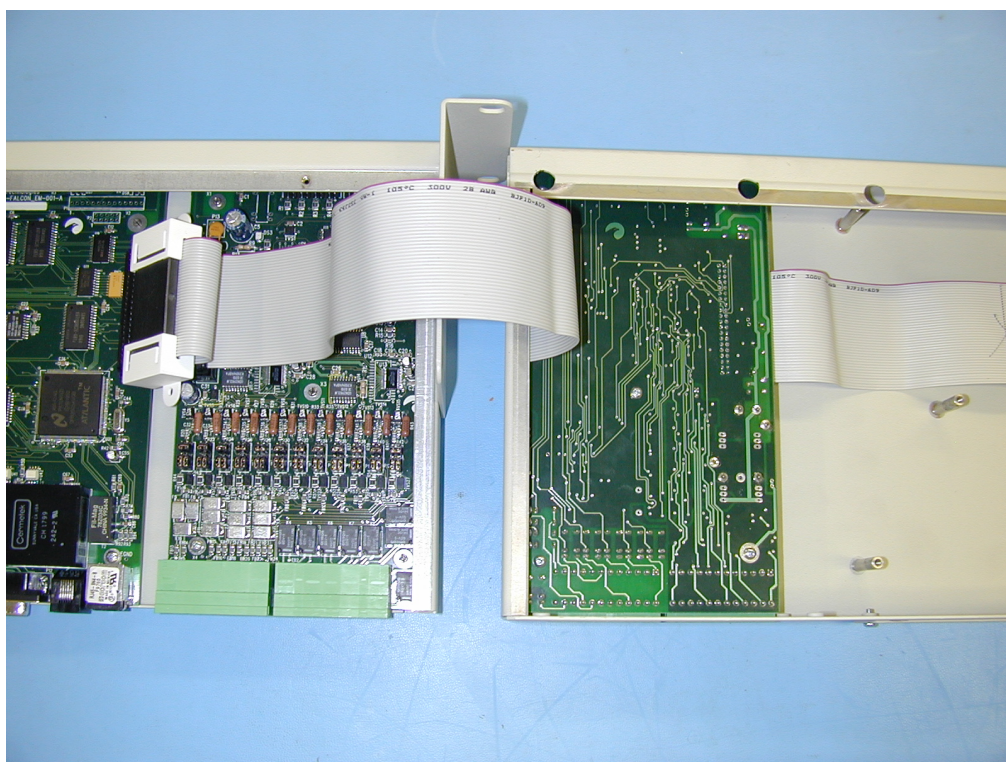


Figure A-6: Expansion Card Final Placement in a Two Rack Unit

A-3 CONVERTING CURRENT INPUT CHANNELS TO VOLTAGE INPUT CHANNELS ON EXPANSION CARD A

When the FMS optional 12 channel analog input card is delivered, its channels are configured for current inputs (4-20mA). Some sensors, however, may require voltage input channels (0-5V or 0-10V). The customer may manually reconfigure any or all current input channels as voltage input channels if necessary.

The headers on the expansion card are labeled P1 through P12. Each number corresponds with a channel (e.g., P1 corresponds with channel 1, while P10 with channel 10.) Each header has two parallel columns of five pins. Some pins are connected with jumpers. Changing these header settings converts a current channel to a voltage channel and vice versa.

To configure a header as a **current channel (4-20mA)**, connect pins 1 and 3 with one jumper. Connect pins 2 and 4 with another jumper. Connect pins 7 and 8 with a third jumper.



NOTE:

Expansion cards are shipped from the factory with all headers configured as current channels.

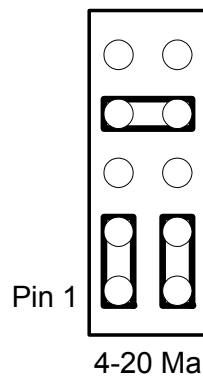


Figure A-7: Expansion Card Final Placement in Two Rack Enclosure

To configure a header as a **voltage channel (0-5V or 0-10V)**, connect pins 3 and 5 with one jumper. Connect pins 4 and 6 with another jumper. Connect pins 9 and 10 with a third jumper.

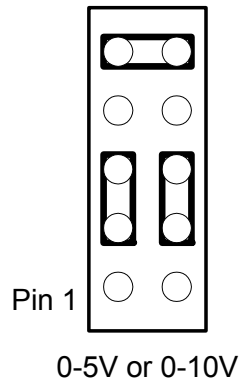


Figure A-8: Expansion Card Final Placement in Two Rack Enclosure

APPENDIX B: ANALOG AVERAGING

B-1 ANALOG AVERAGING OVERVIEW

Analog averaging allows the user to change the averaging method for analog inputs. Normally, the FMS samples analog points once a second while keeping track of high and low values for each analog point. After 60 seconds, the average of these readings and the high and low values for these points are recorded in the minute log.

B-2 HOW ANALOG AVERAGING AFFECTS VALUES

Analog averaging can be changed through either the Web interface or the EIA232 interface. An example of how averaging is altered and how it impacts high and low recordings is shown here.

- Analog averaging value is set to 5.
- The analog point is a temperature sensor.
- Temperature readings are displayed for an eleven second period

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 70, High Value = 70, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 70, High Value = 70, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 71, High Value = 71, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 71, High Value = 71, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 72, High Value = 72, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 72, High Value = 72, Low Value = 70

70, 70, 70, 71, 71, 72, 72, 73, 73, 74, 74
Average = 73, High Value = 73, Low Value = 70

Under normal conditions, the average reading would equal 71, the high value would equal 74, and the low value would equal 70. By changing the averaging method, the average reading is 73, the high value at 73, and the low value for this example remains the same. In a sense, averaging slows down the sensor response and the rate of change.

APPENDIX C: ANALOG INPUT 4-20MA REFERENCE CHART

Analog 4-20Ma Gain/Offset Conversion Formula:

$$\text{Gain} = \text{Sensor Range (High Value - Low Value)} / 4$$

$$\text{Offset} = \text{Sensor Low Value} - \text{Gain}$$

Example: TH140 Humidity

$$\text{Gain} = (\text{High Value (100)} - \text{Low Value (0)}) / 4 = 25$$

$$\text{Offset} = (\text{Sensor Low Value (0)} - \text{Gain (25)}) = -25$$

Table C-1: Analog Input 4-20mA Reference Chart

RLE PRODUCT #	TRANSDUCER TYPE	RANGE	GAIN	OFFSET
TEMPERATURE				
TH140	Temperature (Display in Deg F)	50°F - 95°F	11	39
	Temperature (Display in Deg F)	32°F - 122°F	22	10
	Temperature (Display in Deg C)	50°F - 95°F	6	4
	Temperature (Display in Deg C)	32°F - 122°F	13	-13
	Humidity	0% - 100% RH	25	-25
T120	Temperature (Display in Deg F)	50°F - 95°F	11	39
	Temperature (Display in Deg F)	32°F - 122°F	22	10
	Temperature (Display in Deg C)	50°F - 95°F	6	4
	Temperature (Display in Deg C)	32°F - 122°F	13	-13
CURRENT				
CT55	Current	0 - 5 Amps	1	-1
		0 - 55 Amps	13	-13
CT20	Current	0 - 30 Amps	7	-7
		0 - 60 Amps	15	-15
		0 - 120 Amps	30	-30
CT200	Current	0 - 20 Amps	5	-5
		0 - 200 Amps	50	-50
CT300	Current	0 - 100 Amps	25	-25
		0 - 300 Amps	75	-75

VOLTAGE				
PT300	Voltage – Single Phase	0 – 300 VAC	75	-75
3PT300	Voltage – Three Phase	0 – 300 VAC	75	-75
PT600	Voltage – Single Phase	0 – 600 VAC	150	-150
3PT600	Voltage – Three Phase	0 – 600 VAC	150	-150
DISTANCE READ LEAK DETECTION				
LD5000	Leak Detection 4-20mA Output (Calc. in ft/m)	0 – 500 ft / 152m	143	-179
		0 – 1000 ft / 305m	286	-357
		0 – 1500 ft / 457m	429	-536
		0 – 2000 ft / 610m	571	-714
		0 – 2500 ft / 762m	714	-893
		0 – 3000 ft / 914m	857	-1071
		0 – 3500 ft / 1067m	1000	-1250
		0 – 4000 ft / 1219m	1143	-1429
		0 – 4500 ft / 1372m	1286	-1607
		0 – 5000 ft / 1524m	1429	-1786
LD5100	Leak Detection 4-20mA Output (Calculated in ft/m)	0 – 1000 ft / 305m	250	-250
		0 – 2500 ft / 762m	625	-625
		0 – 5000 ft / 1524m	1250	-1250

APPENDIX D: FMS ACCESSORIES WIRING

The following figures show the typical wiring between the FMS monitoring system and other products offered by RLE Technologies.

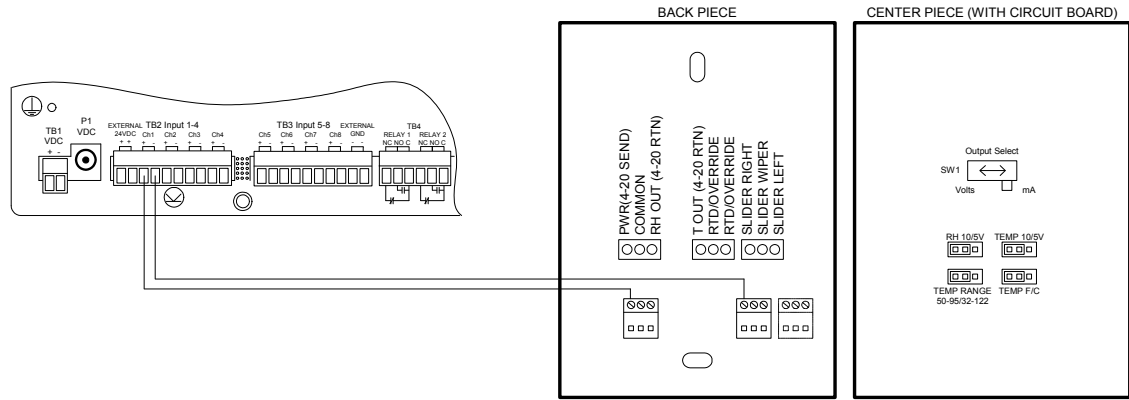


Figure D-1: T120 & T120D Temperature Sensors

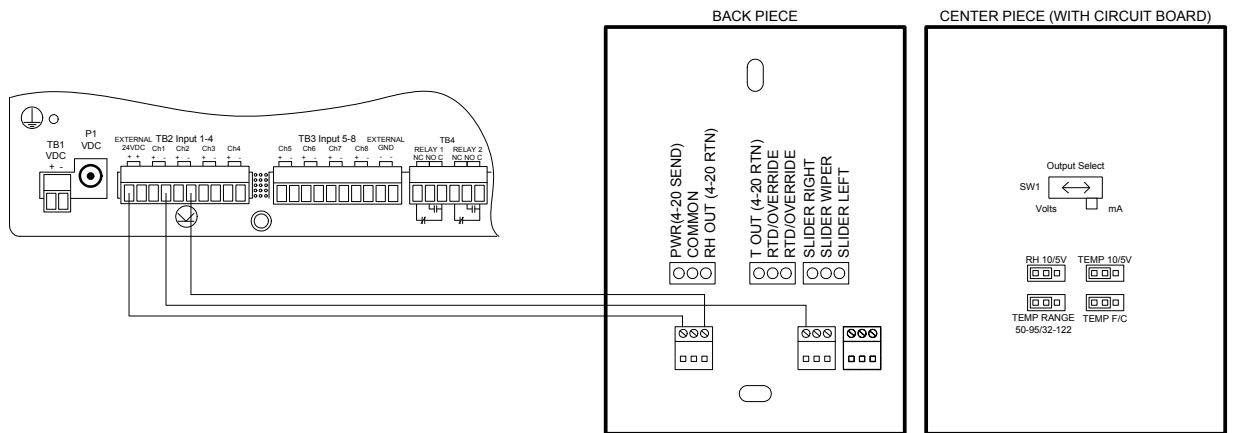


Figure D-2: TH140 & TH140D Temperature/Humidity Sensors

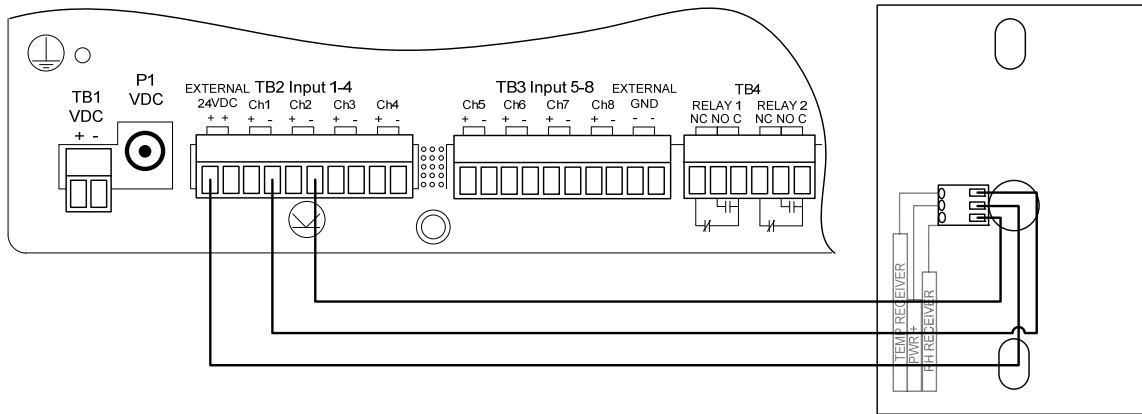


Figure D-3: Dwyer Temperature/Humidity Sensor

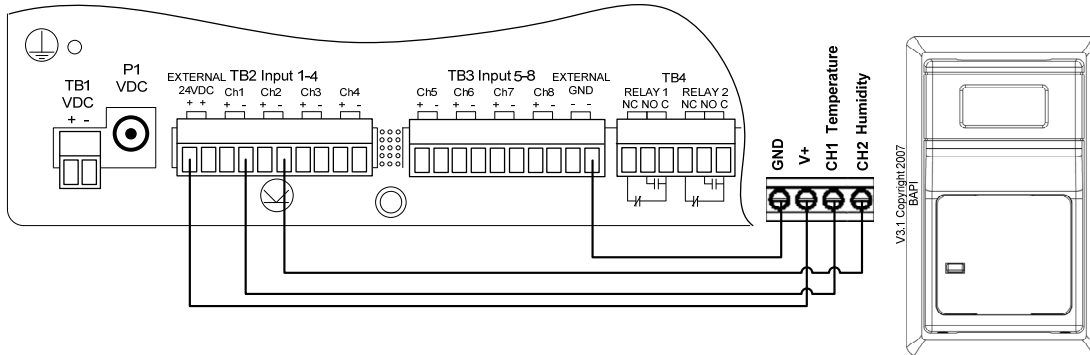


Figure D-4: BAPI Temperature/Humidity Sensor

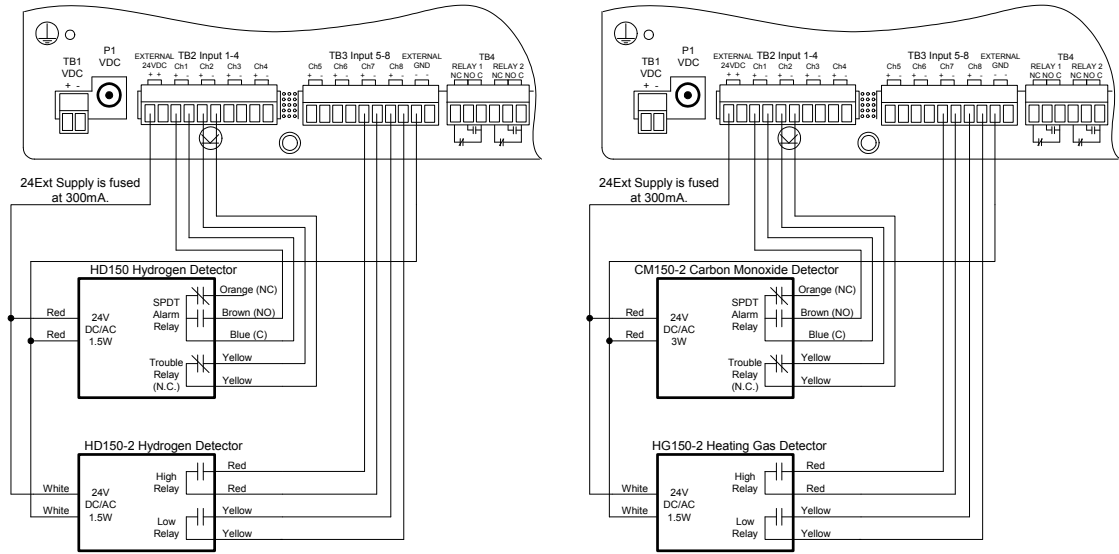


Figure D-5: HD150, HD150-2, CM150-2, & HG150-2 Gas Sensors

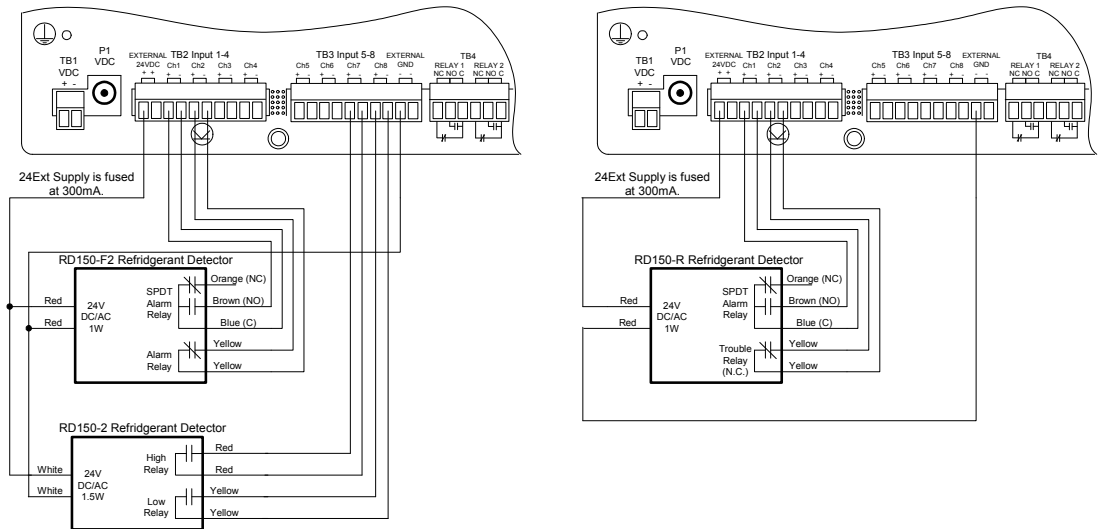


Figure D-6: RD150-F2, RD150-2 & RD150-R Refrigerant Detectors

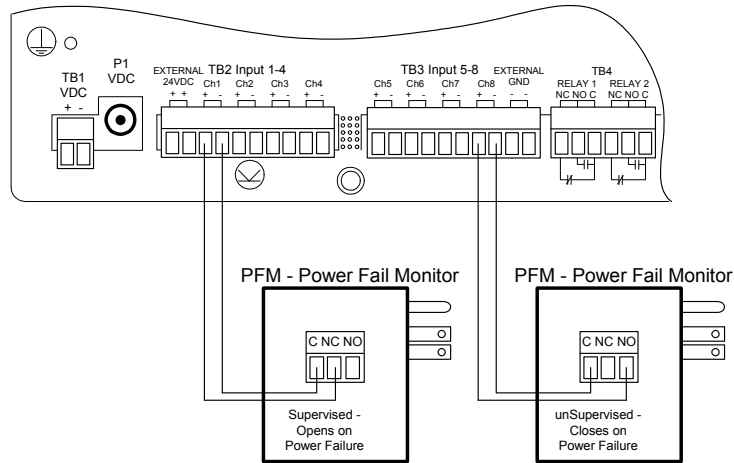


Figure D-7: PFM Power Fail Monitor

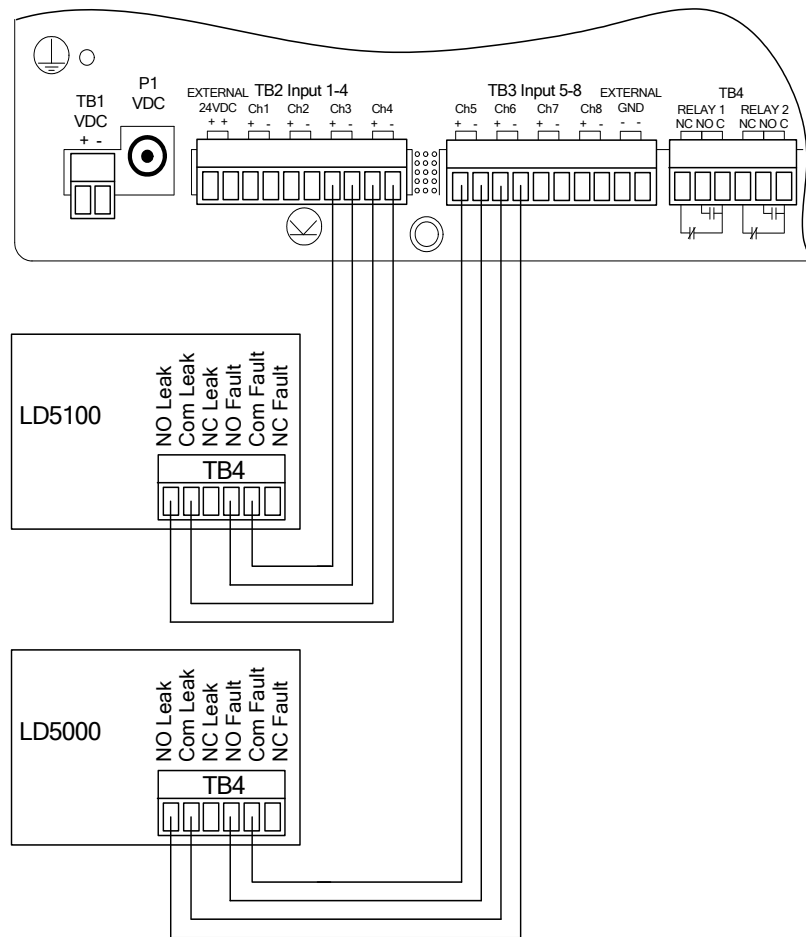


Figure D-8: SeaHawk LD5100 / LD5000 Distance Read Water Leak Detection System (Dry Contact)

Configuring the SeaHawk LD5100 as an Analog Input:

The FMS averages/filters the analog inputs. Therefore, the alarm delay for RLE’s SeaHawk LD5100 input must be set to a value equal to or greater than the averaging time set in the FMS. The LD5100 will output 4mA when there is no leak. The LD5100 will output a value between 4mA and 20mA when there is a water leak. The low range (4mA) will always correspond to zero feet. The high range (20mA) will always correspond to the LD5100’s set 4-20mA Max Range (1000, 2500, or 5000 feet).

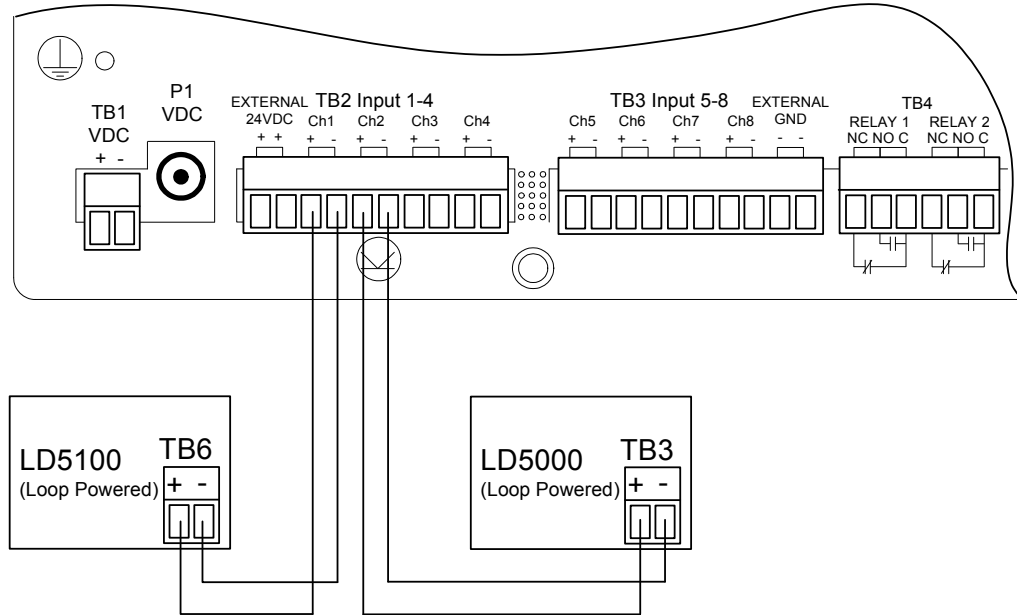
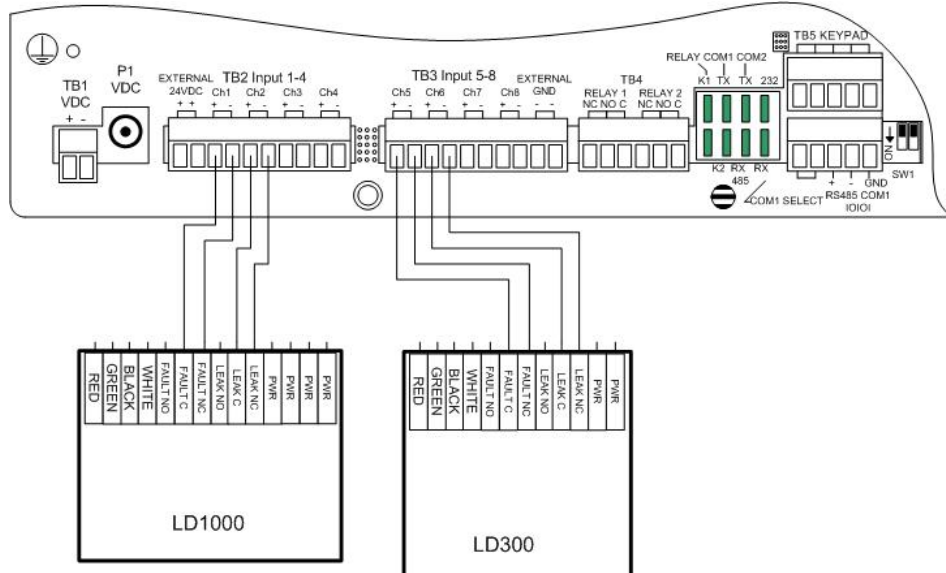


Figure D-9: SeaHawk LD5100 / LD5000 Distance Read Water Leak Detection System (4-20mA)



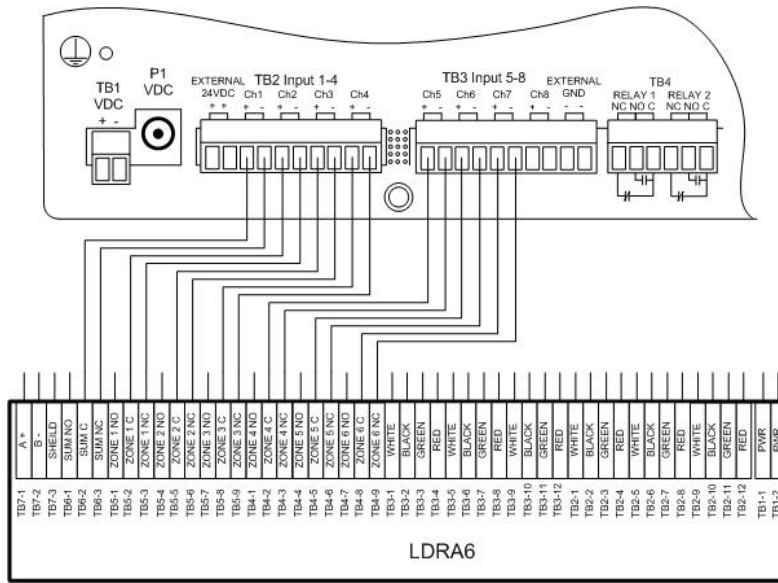


Figure D-10: SeaHawk LD1000, LD300, and LDRA6 Zone Water Leak Detection Systems

For assistance wiring the following Falcon FMS Accessories also offered by RLE, please contact Technical Support at (970) 484-6510:

- CT55 and CT200 Single Phase Current Sensor
- CT300 and CT800 Single Phase Current Sensor
- PT150 Single Phase Voltage Sensor
- PT300 Three Phase Voltage Sensor
- PT600 Three Phase Voltage Sensor
- MD3 Motion Sensor
- MDS Magnetic Door Sensor
- SMK Photoelectric Smoke Detector
- SeaHawk SD & SD-RO1 Spot Detectors
- PS-RC Relay Controlled Two Outlet Receptacle

APPENDIX E: ALARM ID REFERENCE TABLES

E-1 ANALOG TABLES

Table E-1: Analog Alarm ID Reference Tables

Analog Inputs 1 through 8

Channel	Condition	ID	Channel	Condition	ID
1	High Limit 1	0011	5	High Limit 1	0051
1	Low Limit 1	0012	5	Low Limit 1	0052
1	High Limit 2	0013	5	High Limit 2	0053
1	Low Limit 2	0014	5	Low Limit 2	0054
2	High Limit 1	0021	6	High Limit 1	0061
2	Low Limit 1	0022	6	Low Limit 1	0062
2	High Limit 2	0023	6	High Limit 2	0063
2	Low Limit 2	0024	6	Low Limit 2	0064
3	High Limit 1	0031	7	High Limit 1	0071
3	Low Limit 1	0032	7	Low Limit 1	0072
3	High Limit 2	0033	7	High Limit 2	0073
3	Low Limit 2	0034	7	Low Limit 2	0074
4	High Limit 1	0041	8	High Limit 1	0081
4	Low Limit 1	0042	8	Low Limit 1	0082
4	High Limit 2	0043	8	High Limit 2	0083
4	Low Limit 2	0044	8	Low Limit 2	0084

Analog Input Slot 1				Analog Input Slot 2			
Slot				Slot			
Chan	Number	Condition	ID	Chan	Number	Condition	ID
1	9	High Limit 1	1011	1	33	High Limit 1	2011
1	9	Low Limit 1	1012	1	33	Low Limit 1	2012
1	9	High Limit 2	1013	1	33	High Limit 2	2013
1	9	Low Limit 2	1014	1	33	Low Limit 2	2014
2	10	High Limit 1	1021	2	34	High Limit 1	2021
2	10	Low Limit 1	1022	2	34	Low Limit 1	2022
2	10	High Limit 2	1023	2	34	High Limit 2	2023
2	10	Low Limit 2	1024	2	34	Low Limit 2	2024
3	11	High Limit 1	1031	3	35	High Limit 1	2031
3	11	Low Limit 1	1032	3	35	Low Limit 1	2032
3	11	High Limit 2	1033	3	35	High Limit 2	2033
3	11	Low Limit 2	1034	3	35	Low Limit 2	2034
4	12	High Limit 1	1041	4	36	High Limit 1	2041
4	12	Low Limit 1	1042	4	36	Low Limit 1	2042
4	12	High Limit 2	1043	4	36	High Limit 2	2043
4	12	Low Limit 2	1044	4	36	Low Limit 2	2044
5	13	High Limit 1	1051	5	37	High Limit 1	2051
5	13	Low Limit 1	1052	5	37	Low Limit 1	2052
5	13	High Limit 2	1053	5	37	High Limit 2	2053
5	13	Low Limit 2	1054	5	37	Low Limit 2	2054
6	14	High Limit 1	1061	6	38	High Limit 1	2061

Analog Input Slot 1, Continued

Analog Input Slot 2, Continued

Slot				Slot			
Chan	Number	Condition	ID	Chan	Number	Condition	ID
6	14	Low Limit 1	1062	6	38	Low Limit 1	2062
6	14	High Limit 2	1063	6	38	High Limit 2	2063
6	14	Low Limit 2	1064	6	38	Low Limit 2	2064
7	15	High Limit 1	1071	7	39	High Limit 1	2071
7	15	Low Limit 1	1072	7	39	Low Limit 1	2072
7	15	High Limit 2	1073	7	39	High Limit 2	2073
7	15	Low Limit 2	1074	7	39	Low Limit 2	2074
8	16	High Limit 1	1081	8	40	High Limit 1	2081
8	16	Low Limit 1	1082	8	40	Low Limit 1	2082
8	16	High Limit 2	1083	8	40	High Limit 2	2083
8	16	Low Limit 2	1084	8	40	Low Limit 2	2084
9	17	High Limit 1	1091	9	41	High Limit 1	2091
9	17	Low Limit 1	1092	9	41	Low Limit 1	2092
9	17	High Limit 2	1093	9	41	High Limit 2	2093
9	17	Low Limit 2	1094	9	41	Low Limit 2	2094
10	18	High Limit 1	1101	10	42	High Limit 1	2101
10	18	Low Limit 1	1102	10	42	Low Limit 1	2102
10	18	High Limit 2	1103	10	42	High Limit 2	2103
10	18	Low Limit 2	1104	10	42	Low Limit 2	2104
11	19	High Limit 1	1111	11	43	High Limit 1	2111
11	19	Low Limit 1	1112	11	43	Low Limit 1	2112
11	19	High Limit 2	1113	11	43	High Limit 2	2113
11	19	Low Limit 2	1114	11	43	Low Limit 2	2114
12	20	High Limit 1	1121	12	44	High Limit 1	2121
12	20	Low Limit 1	1122	12	44	Low Limit 1	2122
12	20	High Limit 2	1123	12	44	High Limit 2	2123
12	20	Low Limit 2	1124	12	44	Low Limit 2	2124

Analog Input Slot 3				Analog Input Slot 4			
Slot				Slot			
Chan	Number	Condition	ID	Chan	Number	Condition	ID
1	57	High Limit 1	3011	1	81	High Limit 1	4011
1	57	Low Limit 1	3012	1	81	Low Limit 1	4012
1	57	High Limit 2	3013	1	81	High Limit 2	4013
1	57	Low Limit 2	3014	1	81	Low Limit 2	4014
2	58	High Limit 1	3021	2	82	High Limit 1	4021
2	58	Low Limit 1	3022	2	82	Low Limit 1	4022
2	58	High Limit 2	3023	2	82	High Limit 2	4023
2	58	Low Limit 2	3024	2	82	Low Limit 2	4024
3	59	High Limit 1	3031	3	83	High Limit 1	4031
3	59	Low Limit 1	3032	3	83	Low Limit 1	4032
3	59	High Limit 2	3033	3	83	High Limit 2	4033
3	59	Low Limit 2	3034	3	83	Low Limit 2	4034
4	60	High Limit 1	3041	4	84	High Limit 1	4041
Analog Input Slot 3, Continued				Analog Input Slot 4, Continued			
Slot				Slot			
Chan	Number	Condition	ID	Chan	Number	Condition	ID

4	60	Low Limit 1	3042	4	84	Low Limit 1	4042
4	60	High Limit 2	3043	4	84	High Limit 2	4043
4	60	Low Limit 2	3044	4	84	Low Limit 2	4044
5	61	High Limit 1	3051	5	85	High Limit 1	4051
5	61	Low Limit 1	3052	5	85	Low Limit 1	4052
5	61	High Limit 2	3053	5	85	High Limit 2	4053
5	61	Low Limit 2	3054	5	85	Low Limit 2	4054
6	62	High Limit 1	3061	6	86	High Limit 1	4061
6	62	Low Limit 1	3062	6	86	Low Limit 1	4062
6	62	High Limit 2	3063	6	86	High Limit 2	4063
6	62	Low Limit 2	3064	6	86	Low Limit 2	4064
7	63	High Limit 1	3071	7	87	High Limit 1	4071
7	63	Low Limit 1	3072	7	87	Low Limit 1	4072
7	63	High Limit 2	3073	7	87	High Limit 2	4073
7	63	Low Limit 2	3074	7	87	Low Limit 2	4074
8	64	High Limit 1	3081	8	88	High Limit 1	4081
8	64	Low Limit 1	3082	8	88	Low Limit 1	4082
8	64	High Limit 2	3083	8	88	High Limit 2	4083
8	64	Low Limit 2	3084	8	88	Low Limit 2	4084
9	65	High Limit 1	3091	9	89	High Limit 1	4091
9	65	Low Limit 1	3092	9	89	Low Limit 1	4092
9	65	High Limit 2	3093	9	89	High Limit 2	4093
9	65	Low Limit 2	3094	9	89	Low Limit 2	4094
10	66	High Limit 1	3101	10	90	High Limit 1	4101
10	66	Low Limit 1	3102	10	90	Low Limit 1	4102
10	66	High Limit 2	3103	10	90	High Limit 2	4103
10	66	Low Limit 2	3104	10	90	Low Limit 2	4104
11	67	High Limit 1	3111	11	91	High Limit 1	4111
11	67	Low Limit 1	3112	11	91	Low Limit 1	4112
11	67	High Limit 2	3113	11	91	High Limit 2	4113
11	67	Low Limit 2	3114	11	91	Low Limit 2	4114
12	68	High Limit 1	3121	12	92	High Limit 1	4121
12	68	Low Limit 1	3122	12	92	Low Limit 1	4122
12	68	High Limit 2	3123	12	92	High Limit 2	4123
12	68	Low Limit 2	3124	12	92	Low Limit 2	4124

E-2 DIGITAL TABLES

Table E-2: Digital Alarm ID Reference Tables

Digital Inputs 1 through 8

Channel	Condition	ID
1	On/Off	0010
2	On/Off	0020
3	On/Off	0030
4	On/Off	0040
5	On/Off	0050
6	On/Off	0060
7	On/Off	0070
8	On/Off	0080

Digital Input Slot 1				Digital Input Slot 2			
Slot Chan	Number	Condition	ID	Slot Chan	Number	Condition	ID
1	9	On/Off	1010	1	33	On/Off	2010
2	10	On/Off	1020	2	34	On/Off	2020
3	11	On/Off	1030	3	35	On/Off	2030
4	12	On/Off	1040	4	36	On/Off	2040
5	13	On/Off	1050	5	37	On/Off	2050
6	14	On/Off	1060	6	38	On/Off	2060
7	15	On/Off	1070	7	39	On/Off	2070
8	16	On/Off	1080	8	40	On/Off	2080
9	17	On/Off	1090	9	41	On/Off	2090
10	18	On/Off	1100	10	42	On/Off	2100
11	19	On/Off	1110	11	43	On/Off	2110
12	20	On/Off	1120	12	44	On/Off	2120
13	21	On/Off	1130	13	45	On/Off	2130
14	22	On/Off	1140	14	46	On/Off	2140
15	23	On/Off	1150	15	47	On/Off	2150
16	24	On/Off	1160	16	48	On/Off	2160
17	25	On/Off	1170	17	49	On/Off	2170
18	26	On/Off	1180	18	50	On/Off	2180
19	27	On/Off	1190	19	51	On/Off	2190
20	28	On/Off	1200	20	52	On/Off	2200
21	29	On/Off	1210	21	53	On/Off	2210
22	30	On/Off	1220	22	54	On/Off	2220
23	31	On/Off	1230	23	55	On/Off	2230
24	32	On/Off	1240	24	56	On/Off	2240

Digital Input Slot 3				Digital Input Slot 4			
Slot Chan	Number	Condition	ID	Slot Chan	Number	Condition	ID
1	57	On/Off	3010	1	81	On/Off	4010
2	58	On/Off	3020	2	82	On/Off	4020
3	59	On/Off	3030	3	83	On/Off	4030
4	60	On/Off	3040	4	84	On/Off	4040
5	61	On/Off	3050	5	85	On/Off	4050
6	62	On/Off	3060	6	86	On/Off	4060
7	63	On/Off	3070	7	87	On/Off	4070
8	64	On/Off	3080	8	88	On/Off	4080
9	65	On/Off	3090	9	89	On/Off	4090
10	66	On/Off	3100	10	90	On/Off	4100
11	67	On/Off	3110	11	91	On/Off	4110
12	68	On/Off	3120	12	92	On/Off	4120
13	69	On/Off	3130	13	93	On/Off	4130
14	70	On/Off	3140	14	94	On/Off	4140
15	71	On/Off	3150	15	95	On/Off	4150
16	72	On/Off	3160	16	96	On/Off	4160
17	73	On/Off	3170	17	97	On/Off	4170
18	74	On/Off	3180	18	98	On/Off	4180
19	75	On/Off	3190	19	99	On/Off	4190
20	76	On/Off	3200	20	100	On/Off	4200
21	77	On/Off	3210	21	101	On/Off	4210
22	78	On/Off	3220	22	102	On/Off	4220
23	79	On/Off	3230	23	103	On/Off	4230
24	80	On/Off	3240	24	104	On/Off	4240

APPENDIX F: FMS SLOT DESIGNATIONS

F-1 INPUT SLOT DESIGNATION TABLE

Alarm ID format:

- XYZ - X is the Slot # 0-4
- YY is the CH # 1-24
- Z is the type: 0=digital, 1=HighLevel1, 2=LowLevel1, 3=HighLevel2, 4=LowLevel2

Table F-1: Input Slot Designation Table

	Slot0				
	#	Port/ CH	CH ID	Analog Alarm ID	Digital Alarm ID
FMS-Cxxx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCxx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCCx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCCC	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CAxx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CAAx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CAAA	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCAx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCAA	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-CCCA	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-Axxx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-AAxx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-AAAx	8	1-8	0.1-0.8	0011-0084	0010-0080
FMS-AAAA	8	1-8	0.1-0.8	0011-0084	0010-0080
IntTempSensor			5.1	5011-5014	
IntHumidSensor			5.2	5021-5024	
LowBatteryAlarm					6010
PagerAlarm					6020

Slot1					
	#	Port/ CH	CH ID	Analog Alarm ID	Digital Alarm ID
FMS-Cxxx	24	9-32	1.1-1.24		1010-1240
FMS-CCxx	24	9-32	1.1-1.24		1010-1240
FMS-CCCx	24	9-32	1.1-1.24		1010-1240
FMS-CCCC	24	9-32	1.1-1.24		1010-1240
FMS-CAxx	24	9-32	1.1-1.24		1010-1240
FMS-CAAx	24	9-32	1.1-1.24		1010-1240
FMS-CAAA	24	9-32	1.1-1.24		1010-1240
FMS-CCAx	24	9-32	1.1-1.24		1010-1240
FMS-CCAA	24	9-32	1.1-1.24		1010-1240
FMS-CCCA	24	9-32	1.1-1.24		1010-1240
FMS-Axxx	12	9-20	1.1-1.12	1011-1124	1010-1120
FMS-AAxx	12	9-20	1.1-1.12	1011-1124	1010-1120
FMS-AAAx	12	9-20	1.1-1.12	1011-1124	1010-1120
FMS-AAAA	12	9-20	1.1-1.12	1011-1124	1010-1120

Slot2					
	#	Port/ CH	CH ID	Analog Alarm ID	Digital Alarm ID
FMS-Cxxx	0				
FMS-CCxx	24	33-56	2.1-2.24		2010-2240
FMS-CCCx	24	33-56	2.1-2.24		2010-2240
FMS-CCCC	24	33-56	2.1-2.24		2010-2240
FMS-CAxx	12	33-44	2.1-2.12	2011-2124	2010-2120
FMS-CAAx	12	33-44	2.1-2.12	2011-2124	2010-2120
FMS-CAAA	12	33-44	2.1-2.12	2011-2124	2010-2120
FMS-CCAx	24	33-56	2.1-2.24		2010-2240
FMS-CCAA	24	33-56	2.1-2.24		2010-2240
FMS-CCCA	24	33-56	2.1-2.24		2010-2240
FMS-Axxx	0				
FMS-AAxx	12	33-44	2.1-2.12	2011-2124	2010-2120
FMS-AAAx	12	33-44	2.1-2.12	2011-2124	2010-2120
FMS-AAAA	12	33-44	2.1-2.12	2011-2124	2010-2120

Slot3					
	#	Port/CH	CH ID	Analog Alarm ID	Digital Alarm ID
FMS-Cxxx	0				
FMS-CCxx	0				
FMS-CCCx	24	57-80	3.1-3.24		3010-3240
FMS-CCCC	24	57-80	3.1-3.24		3010-3240
FMS-CAxx	0				
FMS-CAAx	12	57-68	3.1-3.12	3011-3124	3010-3120
FMS-CAAA	12	57-68	3.1-3.12	3011-3124	3010-3120
FMS-CCAx	12	57-68	3.1-3.12	3011-3124	3010-3120
FMS-CCAA	12	57-68	3.1-3.12	3011-3124	3010-3120
FMS-CCCA	24	57-80	3.1-3.24		3010-3240
FMS-Axxx	0				
FMS-AAxx	0				
FMS-AAAx	12	57-68	3.1-3.12	3011-3124	3010-3120
FMS-AAAA	12	57-68	3.1-3.12	3011-3124	3010-3120

Slot4					
	#	Port/CH	CH ID	Analog Alarm ID	Digital Alarm ID
FMS-Cxxx	0				
FMS-CCxx	0				
FMS-CCCx	0				
FMS-CCCC	24	81-104	4.1-4.24		4010-4240
FMS-CAxx	0				
FMS-CAAx	0				
FMS-CAAA	12	81-92	4.1-4.12	4011-4124	4010-4120
FMS-CCAx	0				
FMS-CCAA	12	81-92	4.1-4.12	4011-4124	4010-4120
FMS-CCCA	12	81-92	4.1-4.12	4011-4124	4010-4120
FMS-Axxx	0				
FMS-AAxx	0				
FMS-AAAx	0				
FMS-AAAA	12	81-92	4.1-4.12	4011-4124	4010-4120

F-2 OUTPUT SLOT DESIGNATION TABLE

Table F-2: Output (Relays) Slot Designation Table

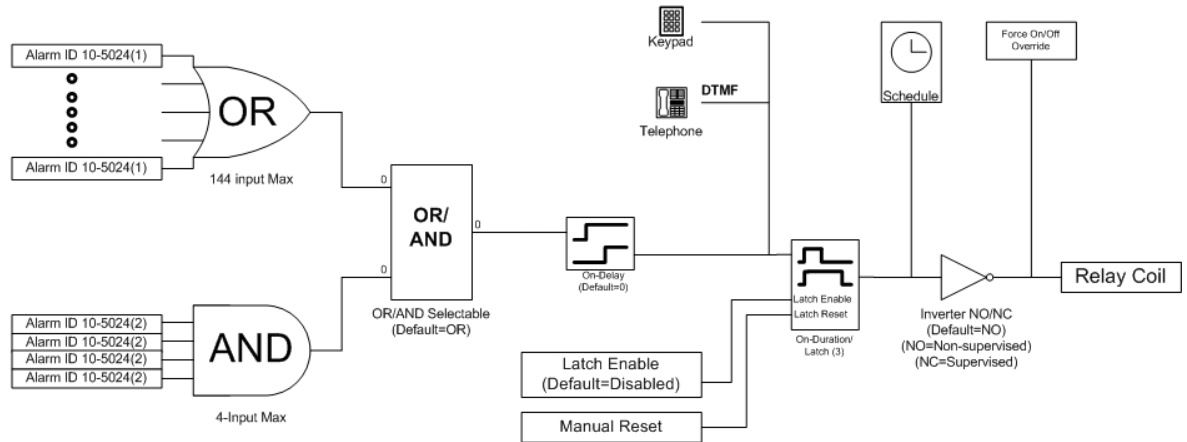
	Slot0			Slot1		
	#	Rly	Rly ID	#	Rly	Rly ID
FMS-Cxxx	2	1-2	0.1-0.2	0		
FMS-CCxx	2	1-2	0.1-0.2	0		
FMS-CCCx	2	1-2	0.1-0.2	0		
FMS-CCCC	2	1-2	0.1-0.2	0		
FMS-CAxx	2	1-2	0.1-0.2	0		
FMS-CAAx	2	1-2	0.1-0.2	0		
FMS-CAAA	2	1-2	0.1-0.2	0		
FMS-CCAx	2	1-2	0.1-0.2	0		
FMS-CCAA	2	1-2	0.1-0.2	0		
FMS-CCCA	2	1-2	0.1-0.2	0		
FMS-Axxx	2	1-2	0.1-0.2	8	2-10	1.1-1.8
FMS-AAxx	2	1-2	0.1-0.2	8	2-10	1.1-1.8
FMS-AAAx	2	1-2	0.1-0.2	8	2-10	1.1-1.8
FMS-AAAA	2	1-2	0.1-0.2	8	2-10	1.1-1.8

	Slot2			Slot3		
	#	Rly	Rly ID	#	Rly	Rly ID
FMS-Cxxx	0			0		
FMS-CCxx	0			0		
FMS-CCCx	0			0		
FMS-CCCC	0			0		
FMS-CAxx	8	11-18	2.1-2.8	0		
FMS-CAAx	8	11-18	2.1-2.8	8	19-26	3.1-3.8
FMS-CAAA	8	11-18	2.1-2.8	8	19-26	3.1-3.8
FMS-CCAx	0			8	19-26	3.1-3.8
FMS-CCAA	0			8	19-26	3.1-3.8
FMS-CCCA	0			0		
FMS-Axxx	0			0		
FMS-AAxx	8	11-18	2.1-2.8	0		
FMS-AAAx	8	11-18	2.1-2.8	8	19-26	3.1-3.8
FMS-AAAA	8	11-18	2.1-2.8	8	19-26	3.1-3.8

	Slot4		
	#	Rly	Rly ID
FMS-Cxxx	0		
FMS-CCxx	0		
FMS-CCCx	0		
FMS-CCCC	0		
FMS-CAxx	0		
FMS-CAAx	0		
FMS-CAAA	8	27-34	4.1-4.8
FMS-CCAx	0		
FMS-CCAA	8	27-34	4.1-4.8
FMS-CCCA	8	27-34	4.1-4.8
FMS-Axxx	0		
FMS-AAxx	0		
FMS-AAAx	0		
FMS-AAAA	8	27-34	4.1-4.8

APPENDIX G: RELAY CONTROL LOGIC

Falcon-EM Relay Logic



- (1) Alarm ID 10-5024: For Analog Inputs only HighLimit2/Low Limit2 alarms are configurable
 (2) Alarm ID 10-5024: All alarm IDs are configurable
 (3) Default is 0 - relay is active until alarm returns to normal
 > 0 the number of seconds to activate relay upon alarm occurrence
 < 0 the number of seconds to stay on after the alarm is removed

Figure G-1: FMS EM Relay Control Logic Diagram

OR Gate 144 Input

The OR Gate can accept any of the High Level 2, Low Level 2 or digital alarms. This option is configured on each input configuration page.

AND Gate 4 Input

The AND Gate can accept up to 4 alarms. These 4 inputs can be any of the analog level 1 or 2 alarms or any digital alarm. This option is configured on each relay configuration page.

OR/AND Gate3

This gate uses the OR Gate and the AND Gate as the inputs. This gate may be either an OR or an AND gate and is configured on each relay configuration page.

On-Delay

This gate will delay the relay operation until the programmed time has expired. The time is configured on each relay configuration page.

On-Duration/Latch

This gate controls how long the relay will stay activated after a valid alarm combination. A positive number will allow the relay to stay on for a fixed number of seconds. A negative number will keep the relay activated for that time after the alarm condition has returned to normal. Zero will force the relay to stay

active until the alarm returns to normal. The time is configured on each relay configuration page. This gate can also be set for latching—the relay will stay active until it is manually reset by a user.

Inverter Gate

This gate can invert the relay activation. This allows the relay to be used in a "supervised" mode. In this mode, if the FMS loses power, the relay will close. The gate is configured on each relay configuration page.

Schedule

Each relay can be activated by either of the two schedules in the FMS. During the scheduled time-of-day the relay is activated. The schedule option is configured on each relay configuration page.

Keypad

Each relay can be controlled by a 3x4 keypad instead of the alarm inputs. The keypad option is configured on each relay configuration page.

DTMF

Each relay that can be programmed to be controlled by the keypad can also be controlled from a DTMF signal received on the phone line.

Force On/Off

Each relay can be forced to ON or OFF. This will override any alarm or keypad control of that relay until the relay operation has been restored.

APPENDIX H: EXPANSION CARD B

H-1.1 Expansion Card B Connections

Expansion Card “B” has 12 dry contact input channels and 8 relay output channels.

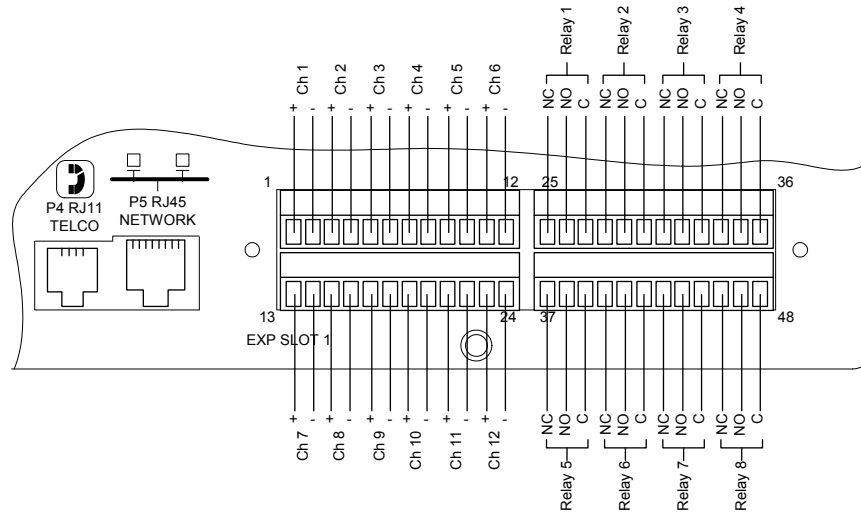


Figure H-1: Expansion Card B I/O Terminals

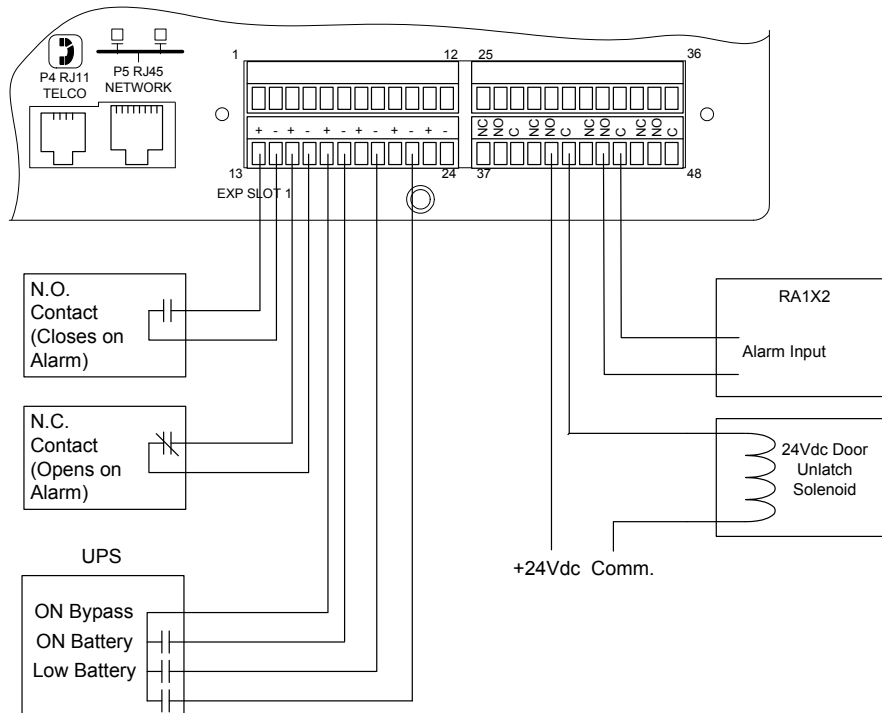


Figure H-2: Typical Wiring for Expansion Card B

Option Card "B" - 12 Digital Input Option Card with 8 Relay Output Option Card

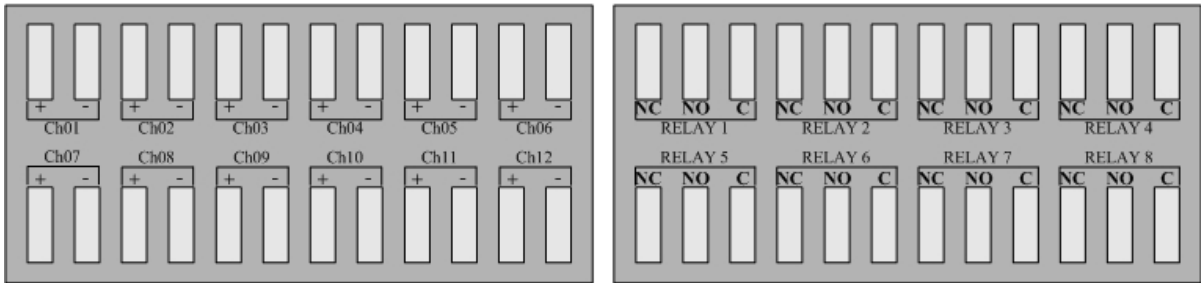


Figure H-3: Expansion Card B

APPENDIX I: TECHNICAL SPECIFICATIONS

Power	1U FMS: 24VDC Model: 24VDC ($\pm 10\%$), 1A max. (power supply included); 48VDC Model: 36-72VDC, 0.5A max. 2U FMS: 24VDC Model: 24VDC ($\pm 10\%$), 2.5A max. (power supply included); 48VDC Model: 36-72VDC, 1.25A max.
Inputs	
Analog/Digital	8 Configurable as 4-20mA (12-bit A/D conversion) or Dry Contact NO/NC (<15mA)
Optional Internal Temperature/Humidity	$\pm 0.5^\circ\text{F}$ (@ 25°C), $\pm 4^\circ\text{F}$ (@ -40° to 185°F); $\pm 3\%\text{RH}$ (@ 20% to $80\%\text{RH}$)
Keypad	Standard 3x4; 3000VAC RMS optically isolated; 20 User Access Codes (also accessible via phone/DTMF through modem)
Outputs	
Relay	2 Dry Contact, Form C, 1A @ 24VDC, 0.5A resistive @ 120VAC (controllable via user programmable logic)
Sensor/Accessory Power	24VDC ($\pm 10\%$) @ 300mA max. (power for external sensors and/or devices)
Expansion Cards	1U accommodates 1 Expansion Card; 2U accommodates up to 4 Expansion Cards
EXP-A-24 / EXP-A-48	48V FMS requires EXP-x-48 expansion cards; 24V FMS requires EXP-x-24 expansion cards
EXP-C-24 / EXP-C-48	12 Analog Inputs (jumper selectable for 4-20mA, 0-5VDC or 0-10VDC) and/or Digital Inputs (non-isolated, individual ground only); 20VAC
Communication Ports	24 Digital Inputs, 3000VAC RMS optically isolated (common ground or individual ground)
Ethernet	10 BaseT, RJ45 connector; 500VAC RMS isolation
EIA232	DB9 female connector; 9600 baud; 3000VAC RMS optically isolated; 15kV ESD protection
EIA485 (selectable as EIA232)	Two-wire half duplex; terminal block (selecting EIA232 switches to DB9 male connector); 1200, 2400, or 9600 baud configurable; 3000VAC RMS optically isolated
Modem (RJ11 Telco)	V.34bis/33.6 kbps; DTMF capable; PPP-Enabled; FCC Part 68 approved; 1500VAC RMS isolation barrier; 2100V peak surge protection
Protocols	
TCP/IP; UDP/IP; ICMP/IP; FTP; NTP	IPv4
HTTP/HTML; Telnet	1.1/4.0; up to 10 URL links to other IP addressable cameras/devices; webpages comply with Rehabilitation Act of 1973, sections 504 and 508, US Dept of Education (website accessibility for computer users with disabilities)
SNMP	V1; MIB-2 compliant; NMS Manageable with Get, Set, and Traps
SMTP (Email)	Supports Client Authentication (plain and login); compatible with ESMTP Servers
Modbus	RTU transmission protocol; function codes: Slave - 03; master - 01,02,03,04
Modbus/IP	Modbus Slave; TCP/IP transmission protocol
BACnet/IP	Conformance Level 1
Terminal Emulation	VT100 compatible
TAP (Pager)	Telocator Alphanumeric Protocol Ver1.8
Alarm Notification	
Pager (Modem)	15 Text, numeric and/or alphanumeric pager numbers; each Digital and Analog Alarm (HighLimit2 and LowLimit2) can notify any 5 of the 15 pagers
Email (Ethernet, Modem PPP)	8 Email recipients; email sent on Alarm and Return To Normal; each Alarm can notify any or all of the 8 email recipients
SNMP Traps (Ethernet)	8 Community Strings
Escalation	Additional notification to 1 of the 15 pager numbers when the initial page results in a Failure To Acknowledge status
Health Check/Self Monitoring	
Communications Check	Daily page to 1 of the 15 pager numbers; configurable for Time Of Day (HH:MM)
Watchdog	Self resetting; captured in Event Log
Internal Hardware	
Real Time Clock	Battery backed; ± 1.53 min/month accuracy
Memory	512K RAM; 128K NVRAM; 64K ROM; 2M Flash
Logging Capabilities	
Alarm Log	Last 256 Alarms
Event Log	Last 100 Events (e.g., Acknowledgement By Code, System Boot, Page Successful, etc.)
Web User Access Log	Last 100 HTML Accesses (User, Date, and Time)
Digital Status Log	Last 100 Digital Status entries
Trending of Analog Inputs	244 Entries per time frame, per channel
Minute	Every minute, high/low/avg for the last 65 minutes
Hour	Every hour, high/low/avg for the last 25 hours
Day	Every day, high/low/avg for the last 7 days
Login Security	
Web Browser Access (Ethernet, Modem PPP)	1 Administrator plus 7 Users individually selectable for Read Only, Read/Write or Administrator
Terminal Emulation Access (Modem, EIA232)	1 Administrator (password for both Modem and EIA232) plus 1 Read Only (password for Modem only, not EIA232)
Front Panel Interface	
Switches	Power: 1 (on/off)
LED Indicators	Power: 1 green (on/off); Status: 1 red (flashing = boot up, on = alarm, off = normal); Network Link: 1 bi-color (green = active, red = not active); Network Activity: 1 green; Modem: 3 green (transmit, receive, and off hook), 1 amber (carrier detect)
Operating Environment	
Temperature	32° to 158°F (0° to 70°C)
Humidity	5% to 95% RH, non-condensing
Altitude	15,000ft (4,572m) max.
Storage Environment	-40° to 185°F (-40° to 85°C)
Dimensions	1U FMS: 16.8"W x 1.8"H x 7.9"D (427mmW x 46mmH x 201mmD) 2U FMS: 16.8"W x 3.5"H x 7.9"D (427mmW x 89mmH x 201mmD)
Weight	1U FMS: 6 lbs. (2.72kg) 2U FMS: 10 lbs. (4.54kg)
Mounting	1U FMS: Rack mount, or wall mount (brackets required): WMB wall mount brackets (not included) 2U FMS: Rack mount, or wall mount (brackets required): WMB2U wall mount brackets (not included)
Certifications	CE; ETL listed: conforms to UL STD 61010A-1, EN STD 61010; certified to CAN/CSA C22.2 STD NO. 1010.1; RoHS compliant

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