FMS

Facilities Monitoring System

User Guide

Version 1.6

Firmware Version 8.6.16

Monitoring

Falcon

RLE
Technologies

Copyright and Trademark Notices

Revision History

Rev. No.	Date
1.0	June 2010
1.1	September 2010
1.2	November 2010
1.3	March 2011
1.4	August 2011
1.5	November 2011
1.6	May 2012

Product Registration

Product registration helps RLE Technologies inform owners of:
- Product upgrades
- Firmware enhancements
- New products and technologies
- Special offers available only to registered users

Access and submit Product Registration information from the FMS Configuration Menu.

Any information provided to RLE Technologies through the registration form will be regarded as confidential. RLE will not sell or distribute any of the information to third parties. To read our Privacy Policy, please visit our website: www.rletech.com.

Technical Support

Personal assistance is available Monday through Friday, from 8:00 a.m. to 5:00 p.m. MST.

A request for assistance may be sent to support@rletech.com.

Otherwise, please call us directly at: **(970) 484-6510**, and press "**2**" for technical support.

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

Product Model Number	
Product Serial Number	
Product Manufacture Date	

RLE Product Warranty

Seller warrants to the Ultimate Purchaser (the purchaser who buys for use and not for resale) that all products furnished under this order and which are manufactured by Seller will conform to final specifications, drawings, samples and other written descriptions approved in writing by Seller, and will be free from defects in materials and workmanship. These warranties shall remain in effect for a period of twelve (12) months after shipment. If the Seller installs the equipment or supplies technical direction of installation by contract, said one year shall run from the completion of installation, provided installation is not unreasonably delayed by Ultimate Purchaser. Parts replaced or repaired in the warranty period shall carry the unexpired portion of the original warranty. A unit placed with the purchaser on consignment and then later purchased will be warranted for twelve (12) months from the time the Seller receives notification of the Purchaser's intent to purchase said consigned item. The foregoing is in its entirety is subject to the provision that in no case will the total warranty period extend beyond 18 months from date Seller ships equipment from point of manufacture.

Products are NOT life and safety certified. In no event shall the Seller be liable for loss, damage, or expense directly or indirectly arising from the use of the units, or from any other cause, except as expressly stated in this warranty. Seller makes no warranties, express or implied, including any warranty as to merchantability or fitness for a particular purpose or use. Seller is not liable for and Purchaser waives any right of action it has or may have against Seller for any consequential or special damages arising out of any breach of warranty, and for any damages Purchaser may claim for damage to any property or injury or death to any person arising out of its purchase or the use, operation, or maintenance of the product. Seller will not be liable for any labor subcontracted or performed by Purchaser for preparation of warranted item for return to Seller's factory or for preparation work for field repair or replacement. Invoicing of Seller for labor either performed or subcontracted by Purchaser will not be considered as a liability by the Seller.

The liability of Seller hereunder is limited to replacing or repairing at Seller's factory or on the job site at Seller's option, any part or parts which have been returned to the Seller and which are defective or do not conform to such specifications, drawings or other written descriptions; provided that such part or parts are returned by the Ultimate Purchaser within ninety (90) days after such defect is discovered. The Seller shall have the sole right to determine if the parts are to be repaired at the job site or whether they are to be returned to the factory for repair or replacement. All items returned to Seller for repair or replacement must be sent freight, prepaid to its factory. Purchaser must obtain Seller's Return Goods Authorization prior to returning items. The above conditions must be met if warranty is to be valid. Seller will not be liable for any damage done by unauthorized repair work, unauthorized replacement parts, from any misapplication of the item, or for damage due to accident, abuse, or act of God.

This warranty shall be exclusive of any and all other warranties express or implied and may be modified only by writing signed by any officer of the Seller. This warranty shall extend to the Ultimate Purchaser but to no one else. Accessories supplied by Seller but manufactured by others carry any warranty the manufacturers have made to Seller and which can be passed on to the Ultimate Purchaser.

Seller makes no warranty with respect to whether the products sold hereunder infringe any patent, U.S. or foreign, and Purchaser represents that any specially ordered products do not infringe any patent. Purchaser agrees to indemnify and hold Seller harmless from any liability by virtue of any patent claims where Purchaser has ordered a product conforming to Purchaser's specifications, or conforming to Purchaser's specific design.

Purchaser has not relied and shall not rely on any oral representation regarding the Product sold hereunder and any oral representation shall not bind Seller and shall not be part of any warranty.

Contents

Figures

Tables

1

SYSTEM OVERVIEW

1.1. Product Description

The Falcon Facilities 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, dry contact, Modbus, and SNMP integer outputs from a wide variety of devices.

During operation, the FMS performs internal diagnostics and monitors its status. It uses 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

Figure 1.1 FMS 2U 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 during initial boot up, approximately 30 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 1.2 FMS Terminal Block Designations

Table 1.1 Terminal Block Designations

TB1-1	(+) Input for 24 or 48VDC (optional) power
TB1-2	(-) Input for 24 or 48VDC (optional) power
P1	24VDC wall adapter input (center +) (not available with 48VDC version)
TB2-1	24VDC positive (+) external output (power for sensors)
TB2-2	24VDC positive (+) external output (power for sensors)
TB2-3	Channel 1 positive (+)
TB2-4	Channel 1 negative (-)
TB2-5	Channel 2 positive (+)
TB2-6	Channel 2 negative (-)
TB2-7	Channel 3 positive (+)
TB2-8	Channel 3 negative (-)
TB2-9	Channel 4 positive (+)
TB2-10	Channel 4 negative (-)
TB3-1	Channel 5 positive (+)
TB3-2	Channel 5 negative (-)
TB3-3	Channel 6 positive (+)
TB3-4	Channel 6 negative (-)
TB3-5	Channel 7 positive (+)
TB3-6	Channel 7 negative (-)
TB3-7	Channel 8 positive (+)
TB3-8	Channel 8 negative (-)
TB3-9	24VDC ground external output (power for sensors)

Table 1.1   Terminal Block Designations (continued)

TB3-10	24VDC ground external output (power for sensors)
TB4-1	Relay 1 normally closed (NC)
TB4-2	Relay 1 normally open (NO)
TB4-3	Relay 1 common (C)
TB4-4	Relay 2 normally closed (NC)
TB4-5	Relay 2 normally open (NO)
TB4-6	Relay 2 common (C)
TB5-1	Keypad column 1
TB5-2	Keypad column 2
TB5-3	Keypad column 3
TB5-4	Keypad row 1
TB5-5	Keypad row 2
TB5-6	Keypad row 3
TB5-7	Keypad row 4
TB5-8	COM1 EIA-485 positive (+) (configurable)
TB5-9	COM1 EIA-485 negative (-) (configurable)
TB5-10	EIA-485 ground
SW1-1	Unit EIA-485 termination switch
SW1-2	Reserved for future use.
P2	COM1 EIA-232 male DB9 pin
P3	COM2 EIA-232 female DB9 pin connector (configurable)
P4	RJ11 telephone line connector
P5	RJ45 Ethernet 10/100BaseT connector

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.
EIA-232 TX (COM2) Interface	Data is being transmitted.
EIA-232 or EIA-485 TX (COM1) Interface	Data is being transmitted.
EIA-232 (COM1) Select Interface	EIA-232 selected (P2)
K2 (Output Relay)	Relay is energized.
EIA-232 RX (COM2) Interface	Data is being received.
EIA-232 or EIA-485 RX (COM1) Interface	Data is being received.
EIA-485 (COM1) Select Interface	EIA-485 selected (TB5)

Figure 1.3 Rear Panel Indicators

1.5. SW1 Switch Settings

◆ SW1-1: EIA-485 Termination switch should be in the down position (ON) if the FMS is an end device on an EIA-485 network.

◆ SW1-2: Reserved for future use.
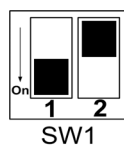
Figure 1.4 SW1-1 Switch and SW1-2 Switch

SW1-1 switch is in the down position (ON) and SW1-2 switch is in the up position (OFF).

2

GETTING STARTED

To begin using the FMS, 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.
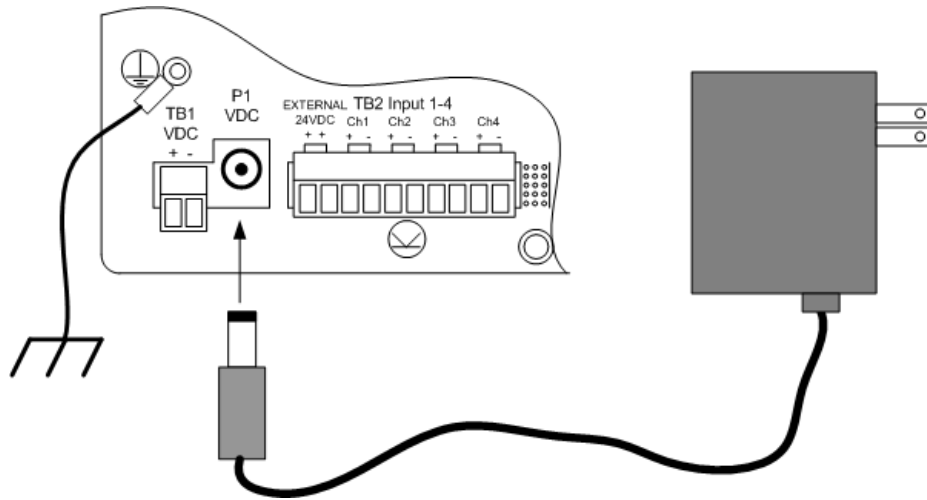
Figure 2.1 24VDC Power Supply Connection

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.
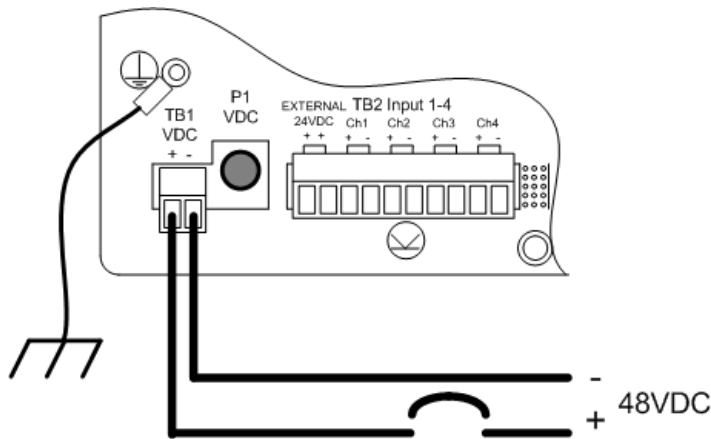
Figure 2.2 48VDC Power Supply Connection

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. See Appendix D, "FMS Accessories Wiring" on page 165, 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.
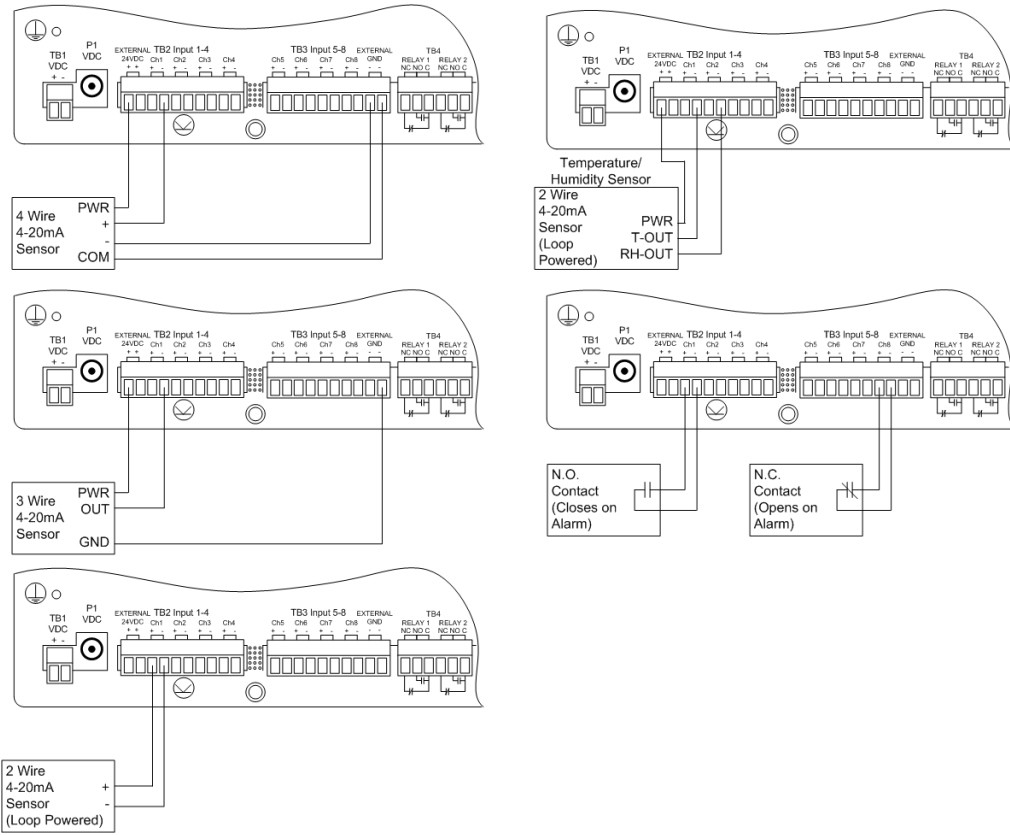
Figure 2.3 Universal Input Wiring Examples

Some equipment may have several dry contact outputs with a Common Ground. Connect this equipment as shown in Figure 2.4.
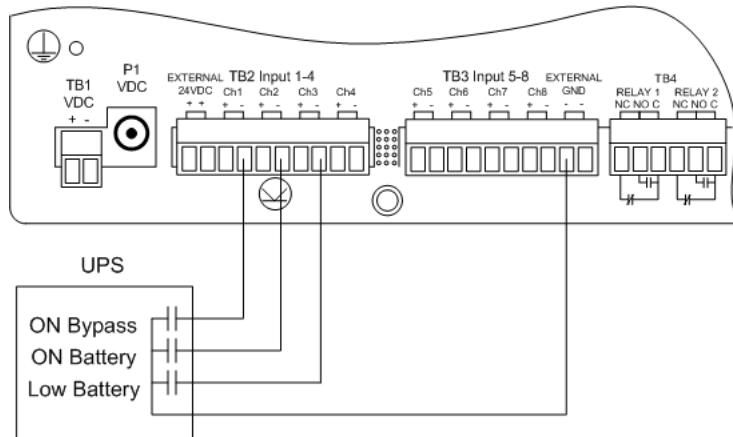
Figure 2.4 Dry Contact Inputs with Common Ground

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 165, 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 for examples.
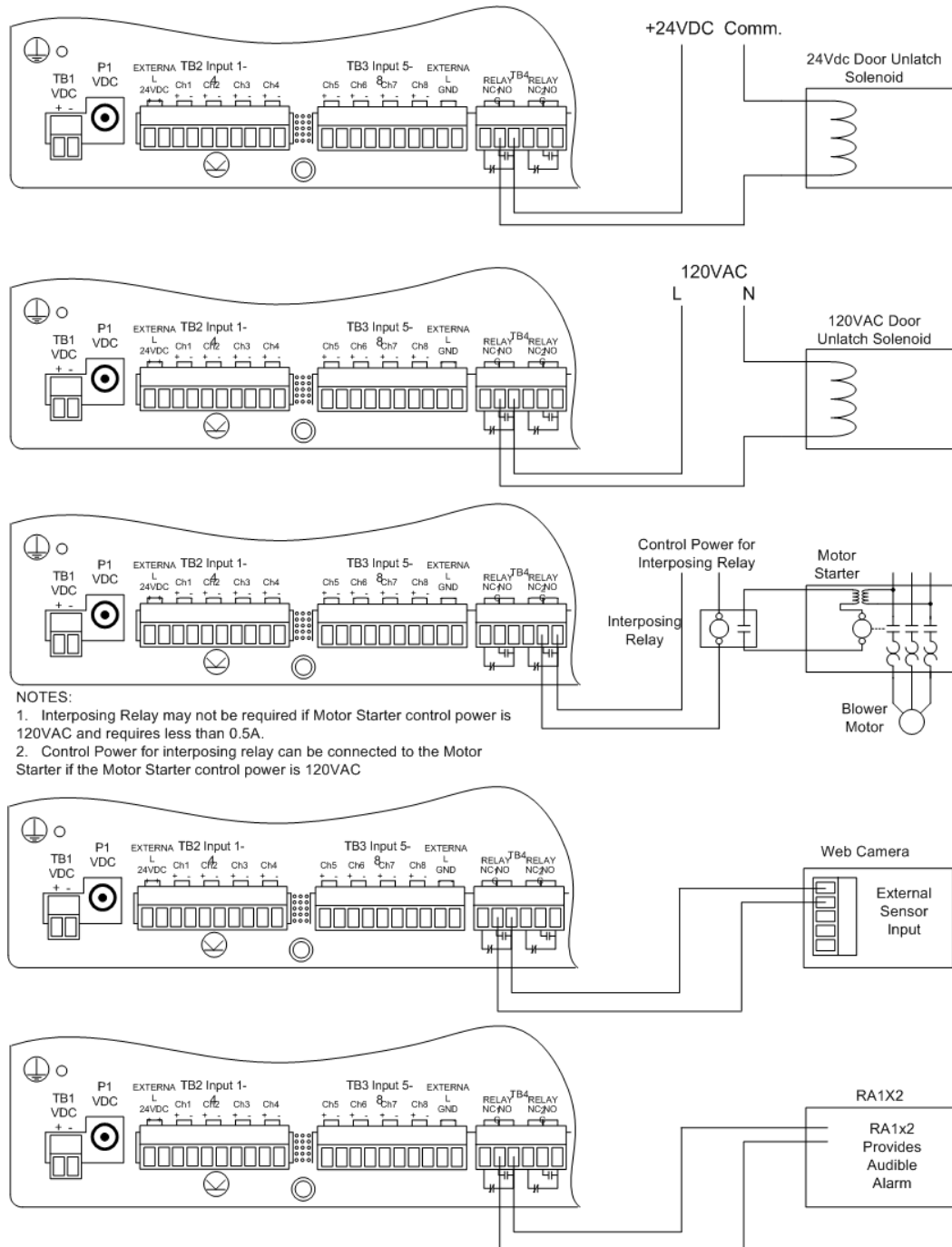
Figure 2.5 Relay Output Wiring Examples

2.2.4 Keypad Connection

The FMS can be configured with a 3 x 4 keypad interface. Entering a user code, configured through software, activates 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 4.15., "Keypad/DTMF Access Users" on page 75.
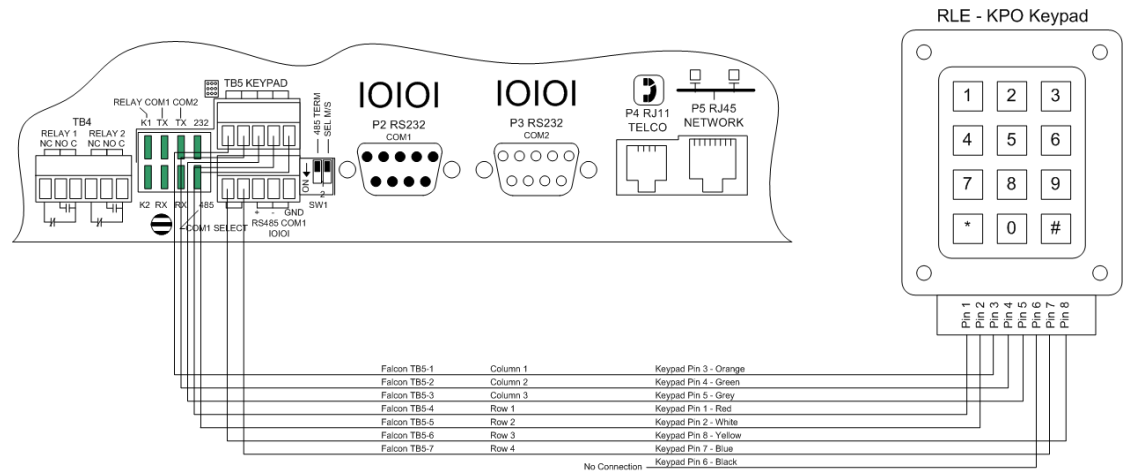
Figure 2.6 Keypad Wiring

2.2.5 EIA-232 COM2 Connection

The EIA-232 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.
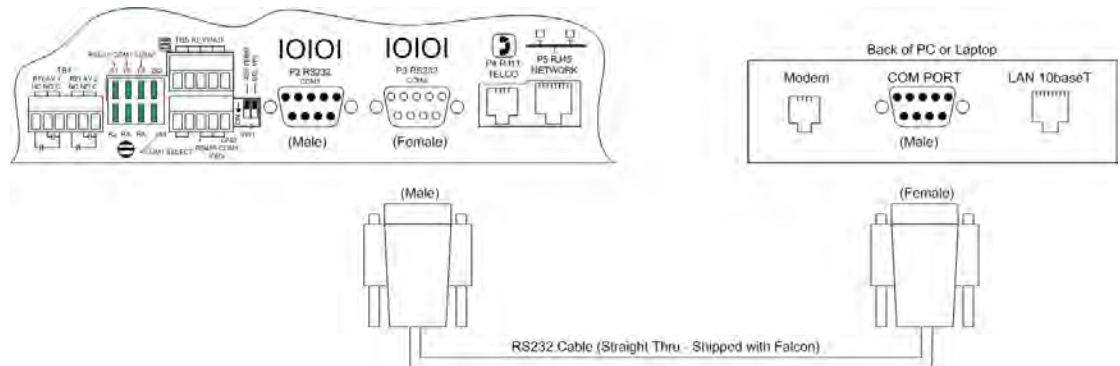
Figure 2.7 EIA-232 COM2 Connection

2.2.6 RJ11 Phone Line Connection

The FMS may contain an optional 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 an alpha-numeric pager or cell phone (TAP changer).

2.2.7 RJ45 Ethernet Connection

The FMS has an internal 10/100BASE-T Ethernet port used to configure and monitor the FMS. The Ethernet port supports Web browser access, email (SMTP), BACnet slave, Modbus slave, SNMP, BACnet master and Modus master. Figure 2.6 and Figure 2.7 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.
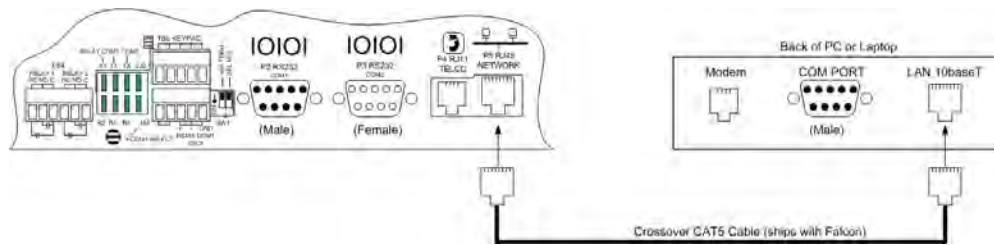
Figure 2.8   FMS Ethernet Connection to a PC using a Crossover Cable
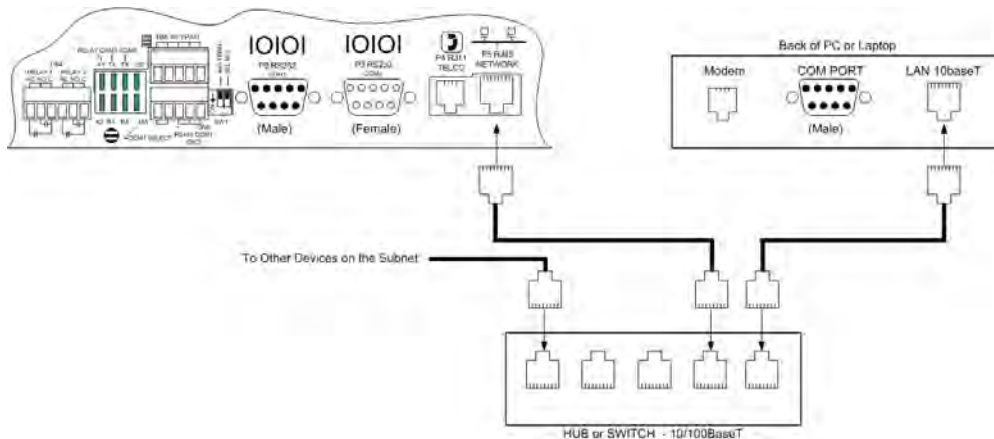
Figure 2.9   FMS Ethernet Connection to a PC on a Subnet

2.2.8 Modbus EIA-485 Connections

The FMS can function as a Modbus Master or Slave over an EIA-485, 2-wire hardware connection.
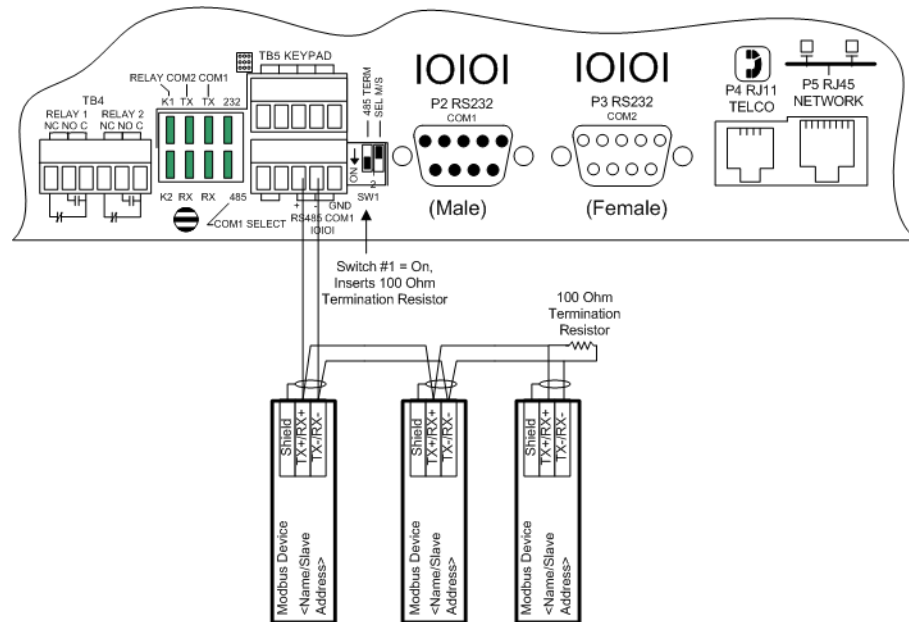
Figure 2.10 FMS EIA-485 Connection

2.2.9 Modbus EIA-232 Connections

The FMS can function as a Modbus Master or Slave over an EIA-232 hardware connection. The EIA-232 port is configured as a DTE device.
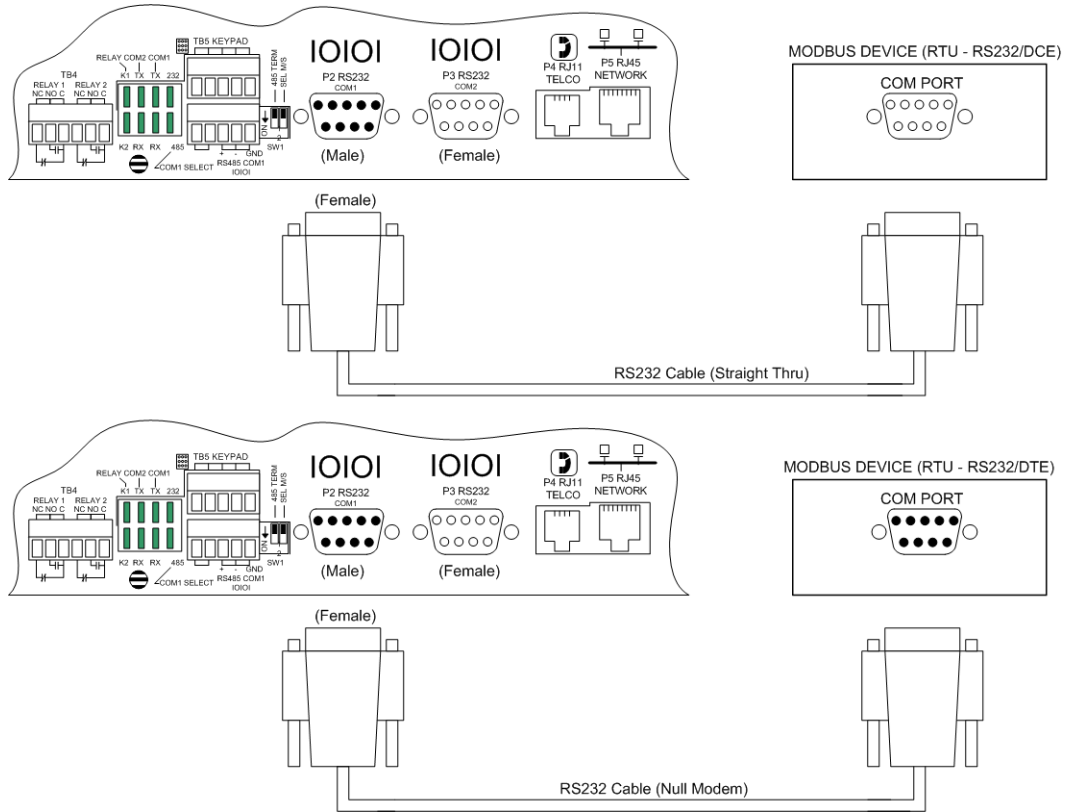
Figure 2.11 FMS EIA-232 Connection to a DCE or DTE Device

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 2.12 and Figure 2.16 for typical wiring. For information on Expansion Card B, see Appendix A, "FMS Expansion Cards" on page 151.

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" on page 151, for jumper location and settings.
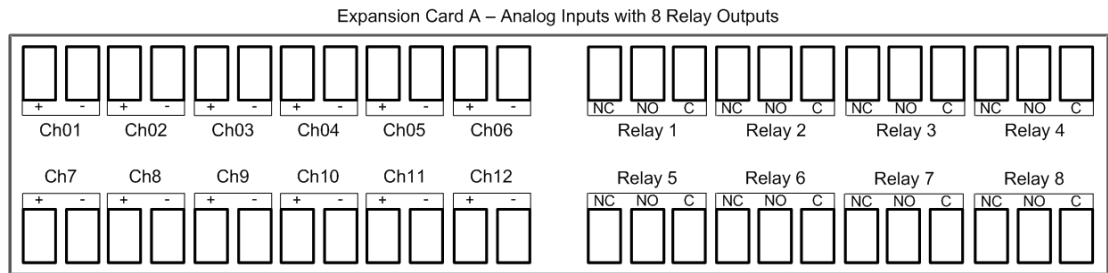
Figure 2.12 I/O Terminals for Expansion Card A
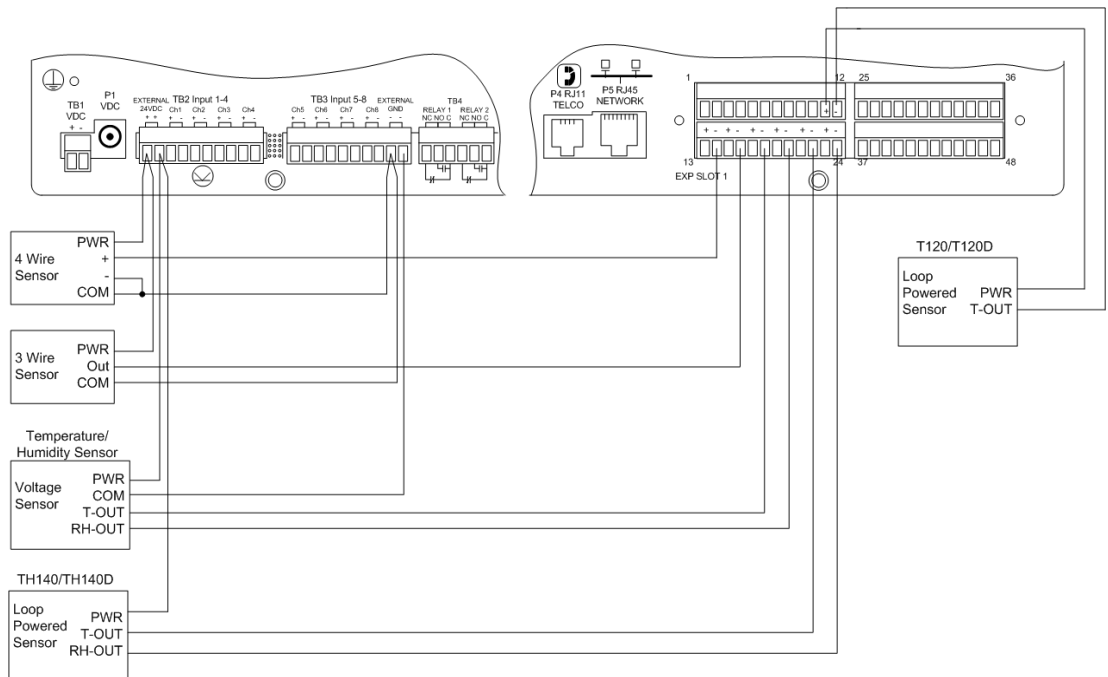
Figure 2.13 Analog Input Wiring for Expansion Card A
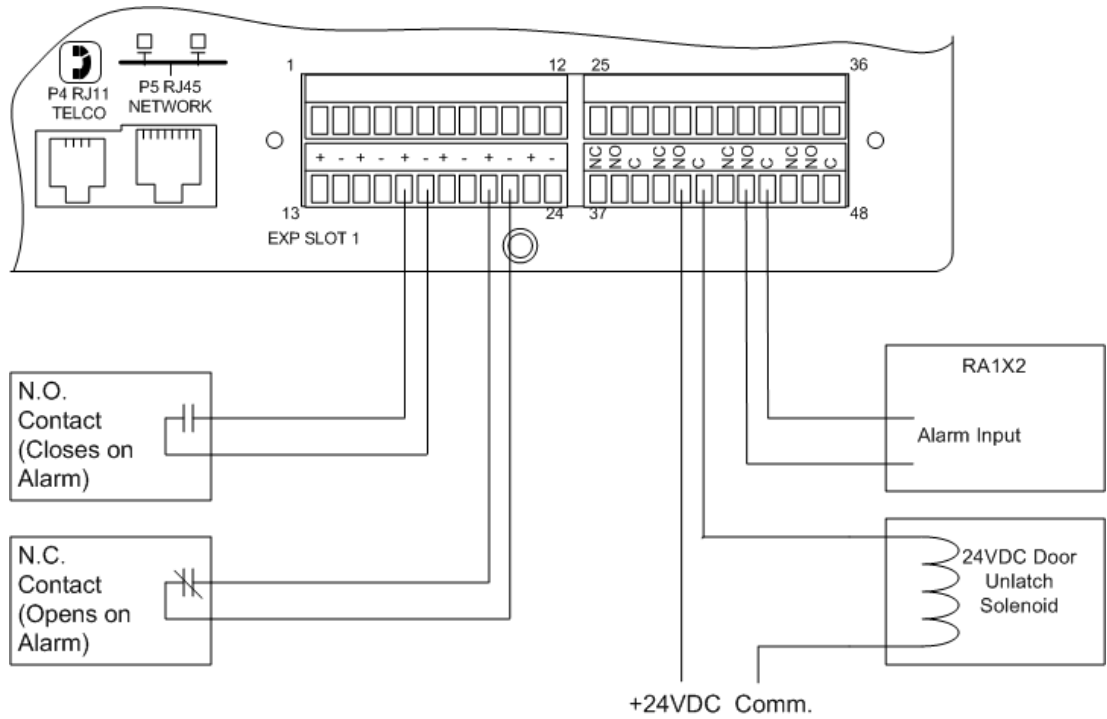
Figure 2.14 Dry Contact Inputs with Ground and Relay Outputs, Expansion Card A

2.2.11 Expansion Card C Connections

Expansion Card C has 24 dry contact input channels.
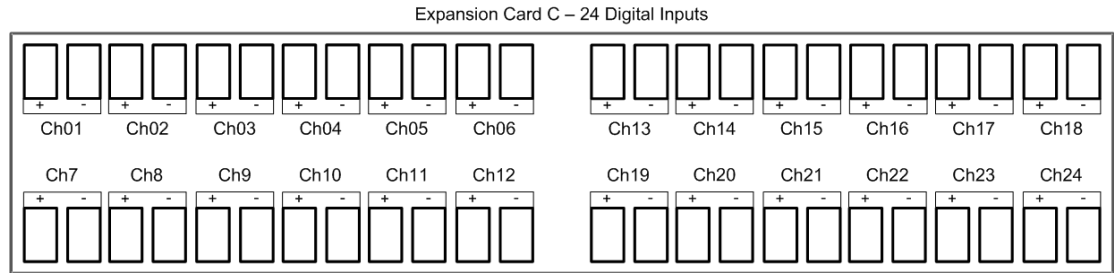
Figure 2.15 I/O Terminals for Expansion Card C
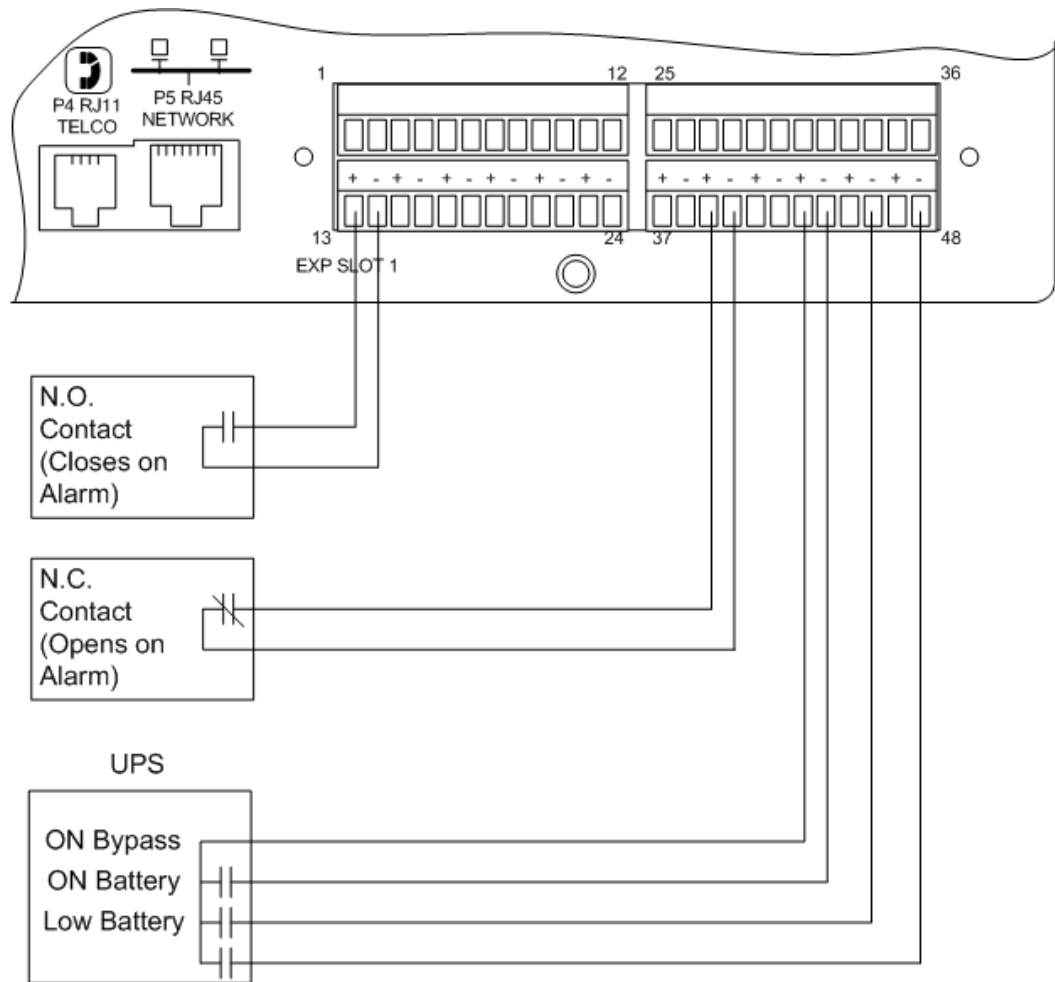
Figure 2.16 Typical Wiring for Expansion Card C

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: 10.0.0.188, 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.

Follow the steps in this section to change the default address.

2.3.1 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 EIA-232 interface

2.3.2 Set the IP Address Using the ARP and PING Commands

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

2.3.2.1 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.

2.3.2.2 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.

2.3.2.3   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 2.3.2.1, "Obtain the Ethernet Address (MAC Address)" on page 32, 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 that was 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.

2.3.2.4   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 10.0.0.188, 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://10.0.0.188) or via a direct EIA-232 terminal connection to the FMS-both of which are alternate methods for setting up the FMS IP address.

2.3.3 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 10.0.0.180. 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 (10.0.0.188) 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. 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 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.

2.3.4 Set the FMS IP Address using an EIA-232 Connection

To use the EIA-232 interface:

1 Connect the EIA-232 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 FCF> should appear. If the FCF> does not appear, check the communication settings and make sure the unit is powered on.

4 **IP Address**: From the FCF> type "**IP**" then press <enter> to view the current IP address. To change the IP address, type IP, <space> and the new address to be assigned, then press the enter key, example: IP 192.168.1.225 <enter>.

5 **Subnet Mask**: From the FCF> type "**NM**" then <enter> to view the current Netmask address. To change the Netmask address, type NM, <space> and the new address to be assigned, then press the enter key, example: NM 255.255.255.243 <enter>.

6 **Default Gateway**: From the FCF> type "**DG**" then press <enter> to view the current Default Gateway address. To change the Default Gateway address, type DG, <space> and the new address to be assigned, then press the enter key, example: DG 192.168.1.1 <enter>.

7 Every time you make a change the Falcon FMS will automatically save the changes.

See Chapter 8, "EIA-232 Interface" on page 135, for more information on the EIA-232 command set.

3

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 4, "FMS Configuration" on page 49.

3.1. Main Menu/ Home Page

The Falcon logo (default), IP camera image and/or company logo can be displayed on the Main Menu; see 4.2., "Homepage and Configuration Menu" on page 51, for more information. Figure 3.1 shows an example of what the FMS homepage could look like when configured.
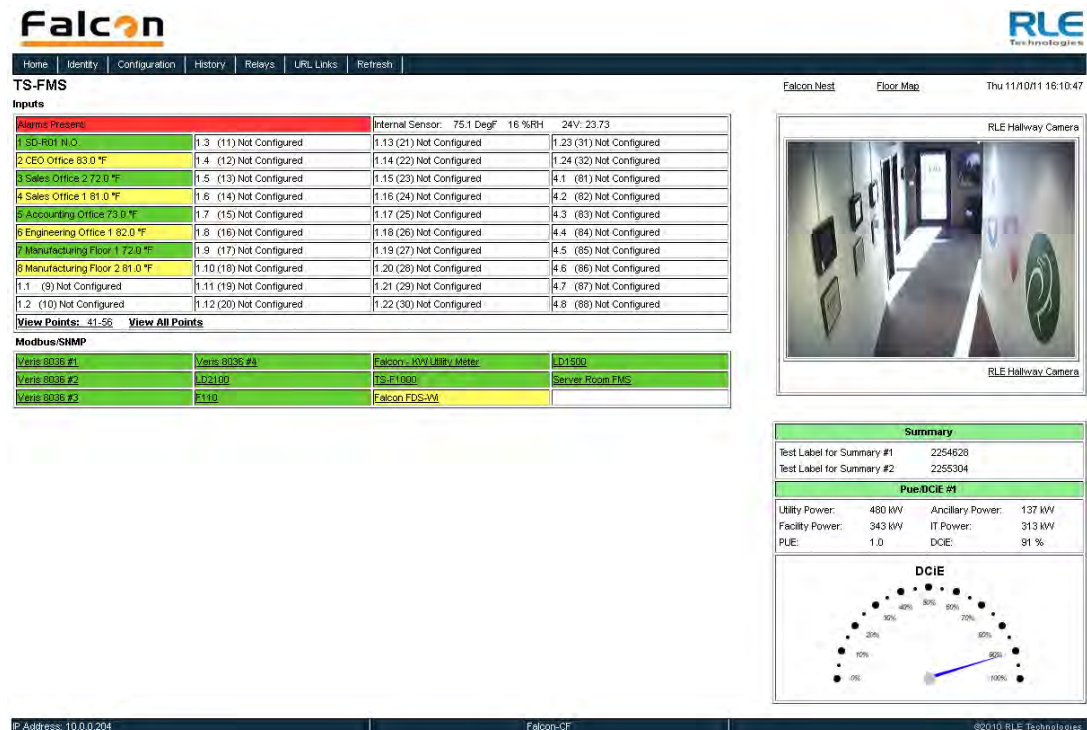
Figure 3.1   Example of a Configured FMS

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 4, "FMS Configuration" on page 49. 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.

Color	Description
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.

Table 3.1 Color Definitions

3.2. Identity

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

Figure 3.2 Identity Menu

3.3.   Configuration

The **Configuration** link provides access to a series of menus from which qualified users can make adjustments to the FMS settings; see Chapter 4, "FMS Configuration" on page 49, for more details.

Configuration Menu

- Inputs and Relays
- System
- Alarm Management
- Trends
- Clock
- Schedules
- Battery/SupplyVoltage
- URL Links (1-5)
- URL Links (6-10)
- Links
- Nest/Egg

- Modem/Phone Numbers/Pagers
- Keypad/DTMF Access Users

- Internet Protocol
- User Administration (Web Access)
- Network Statistics
- Icmp Ping

- Email/DNS
- Network Time Protocol

- SNMP/Syslog
- Bacnet
- Com Port1/Modbus/Snmp/Telnet
- Modbus/Snmp Slave Units

- PUE/DCiE/Summary
- Map

- Flash Program

- Product Registration

Figure 3.3   Configuration Page

3.4. History

The **History** link provides access to a wide variety of logged historical data for the FMS.

3.4.1 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).

Figure 3.4   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" on page 171.

♦ 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:

Color	Description
Red	A point 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 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.

Table 3.2   Alarm History Log Entries

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 Chapter 4, "FMS Configuration" on page 49, for more information on configuring phone numbers.

3.4.2 Event History

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.

```
FMS-AAAA-Y-24
(FCF)


EL08-04/22/10 04:50:32 System Booted - software/bootloader
EL07-04/19/10 07:49:42 Force Acknowledge by EHF
EL06-04/16/10 22:20:40 System Booted - software/bootloader
EL05-04/16/10 13:35:41 System Booted - software/bootloader
EL04-04/16/10 11:43:23 Email accepted by server
EL03-04/16/10 11:43:05 Email accepted by server
EL02-04/13/10 14:01:38 Email accepted by server
EL01-04/13/10 14:01:25 Email accepted by server
EL00-04/05/10 08:24:38 Email accepted by server
EL99-04/05/10 08:24:02 System Booted - software/bootloader
EL98-03/23/10 09:50:33 Email accepted by server
EL97-03/23/10 09:28:27 Alarm History Cleared by RS
EL96-03/17/10 14:17:34 Email accepted by server
EL95-03/17/10 14:17:12 Email accepted by server
EL94-03/16/10 09:33:18 System Booted - software/bootloader
EL93-02/20/10 20:34:13 System Booted - software/bootloader
EL92-02/01/10 13:37:13 System Booted - software/bootloader
EL91-02/01/10 08:17:29 System Booted - software/bootloader
EL90-01/26/10 17:43:57 System Booted - software/bootloader
EL89-01/24/10 12:17:33 System Booted - power up
EL88-01/24/10 12:00:53 Force Acknowledge by EHF
```

Figure 3.5 Event History Page

3.4.3 Digital Status History

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.

```
FMS-CCCC-N-24 (FCF)

SH094-4230-On -01/24/10 07:57:04 Digital Status Input Activated
SH093-4220-On -01/24/10 07:57:04 Digital Status Input Activated
SH092-4210-On -01/24/10 07:57:04 Digital Status Input Activated
SH091-4200-On -01/24/10 07:57:04 Digital Status Input Activated
SH090-4190-On -01/24/10 07:57:04 Digital Status Input Activated
SH089-4230-On -01/24/10 07:43:56 Digital Status Input Activated
SH088-4220-On -01/24/10 07:43:56 Digital Status Input Activated
SH087-4210-On -01/24/10 07:43:56 Digital Status Input Activated
SH086-4200-On -01/24/10 07:43:56 Digital Status Input Activated
SH085-4190-On -01/24/10 07:43:56 Digital Status Input Activated
SH084-4230-On -01/19/10 14:27:50 Digital Status Input Activated
SH083-4220-On -01/19/10 14:27:50 Digital Status Input Activated
SH082-4210-On -01/19/10 14:27:50 Digital Status Input Activated
SH081-4200-On -01/19/10 14:27:50 Digital Status Input Activated
SH080-4190-On -01/19/10 14:27:50 Digital Status Input Activated
SH079-1150-On -01/19/10 14:27:50 Dry Contact Input Alarm
SH078-1140-On -01/19/10 14:27:50 Dry Contact Input Alarm
SH077-1130-On -01/19/10 14:27:50 Dry Contact Input Alarm
SH076-4230-On -01/19/10 13:50:25 Digital Status Input Activated
SH075-4220-On -01/19/10 13:50:25 Digital Status Input Activated
SH074-4210-On -01/19/10 13:50:25 Digital Status Input Activated
SH073-4200-On -01/19/10 13:50:25 Digital Status Input Activated
SH072-4190-On -01/19/10 13:50:25 Digital Status Input Activated
SH071-1150-On -01/19/10 13:50:25 Dry Contact Input Alarm
SH070-1140-On -01/19/10 13:50:25 Dry Contact Input Alarm
```

Figure 3.6 Digital Status History Page

3.4.4 Keypad Access History

Keypad Access History displays the last 100 keypad entries captured by the FMS.

Home	Identity	Configuration	History	Relays	URL Links	Refresh		
			Alarm	Event	Digital Status	Keypad Access	Web Access	Data	Trends	Trap Log

FMS-CCCC-N-24 (FCF)

```
AL07-*******-12/07/09 10:41:18 Access Granted - User #9
AL06-*******-12/07/09 10:41:07 Access Granted - User #8
AL05-*******-12/07/09 10:40:56 Access Granted - User #7
AL04-*******-12/07/09 10:40:17 Access Granted - User #9
AL03-*******-12/07/09 10:40:05 Access Granted - User #8
AL02-*******-12/07/09 10:39:54 Access Granted - User #7
AL01-*******-11/21/09 12:38:04 Access Granted - fred
```

IP Address:	Falcon-CF

Figure 3.7   Keypad Access History View

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

3.4.5 Web Access

Web Access records the most recent 100 Web interface users.

FMS-CCCC-N-24 (FCF)

```
WU022-01/24/10 07:57:21 User1: falcon
WU021-01/24/10 07:43:54 User1: falcon
WU020-01/19/10 14:31:30 User1: falcon
WU019-01/19/10 13:50:23 User1: falcon
WU018-01/19/10 12:57:39 User1: falcon
WU017-01/19/10 12:45:14 User1: falcon
WU016-01/19/10 12:12:26 User1: falcon
WU015-01/19/10 11:28:20 User1: falcon
WU014-01/19/10 11:19:27 User1: falcon
WU013-01/18/10 15:41:59 User1: falcon
WU012-01/18/10 13:12:17 User1: falcon
WU011-01/15/10 16:24:18 User1: falcon
WU010-12/28/09 14:19:27 User1: falcon
WU009-12/28/09 13:54:26 User2:
WU008-12/04/09 16:16:21 User1: falcon
WU007-12/03/09 08:46:19 User1: falcon
WU006-12/02/09 16:27:48 User1: falcon
WU005-12/02/09 16:23:36 User1: falcon
WU004-12/01/09 12:58:03 User1: falcon
WU003-11/24/09 09:00:26 User1: falcon
WU002-11/24/09 08:11:49 User1: falcon
WU001-11/23/09 09:16:45 User1: falcon
```

Figure 3.8   Web User Access Log

3.4.6 Data

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

FMS-AAAA-Y-24
(FCF)

CH	Description	60 Minute		24 Hour		7 Day	
1	Server Isle A Temperature	Text	Graph	Text	Graph	Text	Graph
2	Server Room East Humidity	Text	Graph	Text	Graph	Text	Graph
3	Server Isle B Temperature	Text	Graph	Text	Graph	Text	Graph
4	Server Room North Humidity	Text	Graph	Text	Graph	Text	Graph
5	Server Isle A-3 Temperature	Text	Graph	Text	Graph	Text	Graph
6	Server Isle A-3 Humidity	Text	Graph	Text	Graph	Text	Graph
7	Telco Closet	Text	Graph	Text	Graph	Text	Graph
8	MCC Room	Text	Graph	Text	Graph	Text	Graph
1.1 (9)	Server Isle C Temperature	Text	Graph	Text	Graph	Text	Graph
1.3 (11)	Server Isle D Temperature	Text	Graph	Text	Graph	Text	Graph
1.4 (12)	Server Room West Humidity	Text	Graph	Text	Graph	Text	Graph
1.5 (13)	Server Isle F Temperature	Text	Graph	Text	Graph	Text	Graph
1.6 (14)	Server Isle G Temperature	Text	Graph	Text	Graph	Text	Graph
1.7 (15)	Server Room South Humidity	Text	Graph	Text	Graph	Text	Graph
1.8 (16)	Server Isle I Temperature	Text	Graph	Text	Graph	Text	Graph
1.9 (17)	Server Isle J Temperature	Text	Graph	Text	Graph	Text	Graph
1.10 (18)	Server Isle K Temperature	Text	Graph	Text	Graph	Text	Graph
1.11 (19)	Server Isle L Temperature	Text	Graph	Text	Graph	Text	Graph
1.12 (20)	Server Isle M Temperature	Text	Graph	Text	Graph	Text	Graph
2.1 (33)	Generator Room	Text	Graph	Text	Graph	Text	Graph
2.2 (34)	UPS Room 5th Floor	Text	Graph	Text	Graph	Text	Graph
2.3 (35)	Outside Air Temperature	Text	Graph	Text	Graph	Text	Graph
2.4 (36)	MCC Room 3rd Floor Temperature	Text	Graph	Text	Graph	Text	Graph
2.5 (37)	1st Floor Office Temperature	Text	Graph	Text	Graph	Text	Graph
2.6 (38)	2nd Floor Office Temperature	Text	Graph	Text	Graph	Text	Graph
2.7 (39)	Elevator Motor/Controls Room Temperature	Text	Graph	Text	Graph	Text	Graph
2.8 (40)	Tape Storage Closet	Text	Graph	Text	Graph	Text	Graph
TS	Internal Temperature Sensor	Text	Graph	Text	Graph	Text	Graph
HS	Internal Humidity Sensor	Text	Graph	Text	Graph	Text	Graph

Modbus Points 1-58
Modbus Points 59-116
Modbus Points 117-174
Modbus Points 175-232

Figure 3.9 Data History Page

♦ The **Modbus Points** links at the bottom of the page are shown if the FMS is equipped with the EXP-MBCS option. These links provide access to the Modbus Data History pages. Refer to section 5.5.2 to learn how to configure Modbus points.

♦ Click the **Text** or **Graph** link for each sensor or Modbus point to view the history in text or graph format. If you choose to view a sensor's or point's history in text format, you can download the data to a comma separated value (.csv) file.

3.4.6.1 Minute, Hour, and Day View

The **Minute**, **Hour**, and **Day** columns 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 value (.csv) file via the Data History Text Downloads button.

Figure 3.10 Minute Page

3.4.6.2   Data History Text Downloads

When you choose the Download CSV File link from a Data History Text page (either minute, hour, or day), you have the option to open the file or save it using a standard Windows pop-up screen.
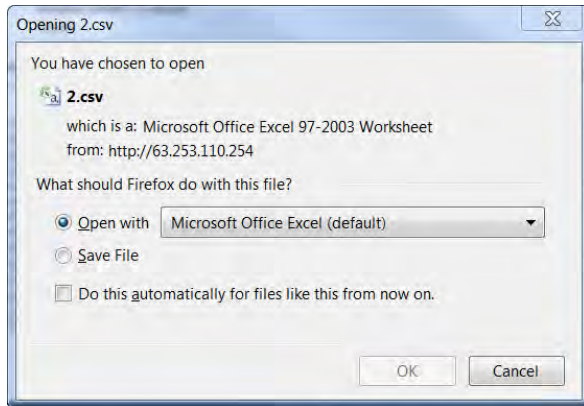
Figure 3.11 Data History Text Downloads Window

3.4.6.3 Alarm History Text (alarmhistory.txt)

The **alarmhistory.txt** link opens the Alarm History log as a text (.txt) file in the Web browser. Select "Download Alarmhistory.txt" to save the file to the hard drive.
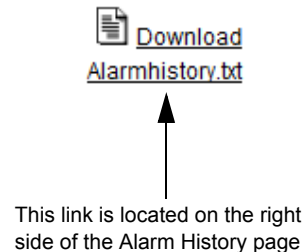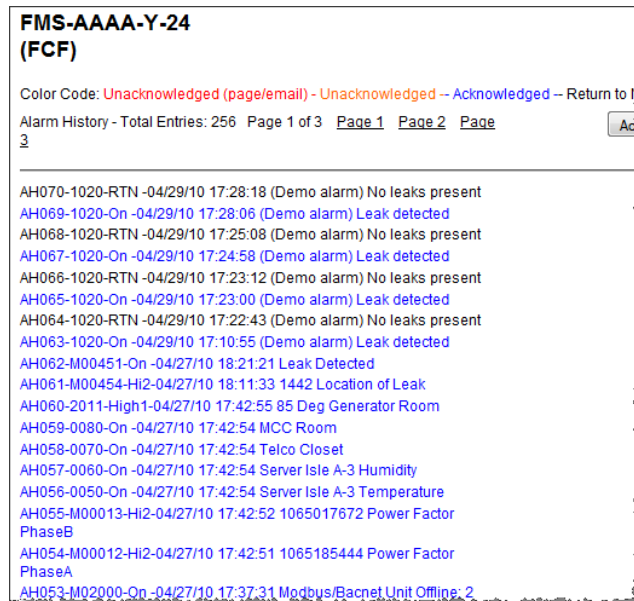
Figure 3.12 Alarm History Text Page

3.4.6.4 Graph

This graph allows users to see a Java-based line graph of any analog point on the Falcon FMS. Using the mouse, stretch or compress the X-axis to adjust the resolution of the time display. Stretch or compress the Y-axis to adjust the resolution of the analog value. Hover over the legend to display the graphed values.
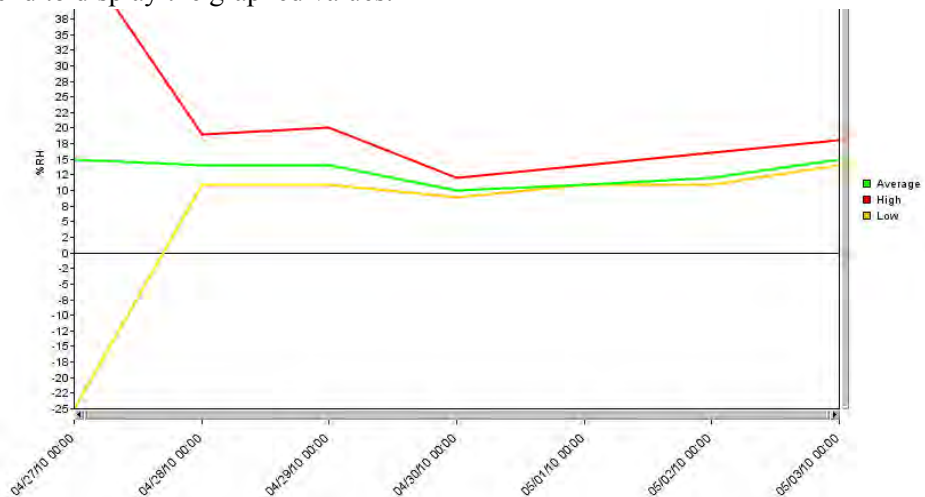
Figure 3.13 FMS Graph

The first time you display a graph, you might see the following Java image as Java loads on your system:

Figure 3.14 Java Loading Image

3.4.7 Trends

Users can view a Java-based graph or download a .CSV file by clicking on the links on this page. The Falcon FMS can track extending trending for up to 32 physical and/or Modbus points.

Point	Description	Graph	CSV
1	Server Isle A Temperature	Graph	CSV
2	Server Room East Humidity	Graph	CSV
3	Server Isle B Temperature	Graph	CSV
4	Server Room North Humidity	Graph	CSV
5	Server Isle A-3 Temperature	Graph	CSV
6	Server Isle A-3 Humidity	Graph	CSV
7	Telco Closet	Graph	CSV
8	MCC Room	Graph	CSV
9	Meter #1 Energy KWH	Graph	CSV
10	Meter #2 Energy KWH	Graph	CSV
11	Meter #3 Energy KWH	Graph	CSV
12	Meter #4 Energy KWH	Graph	CSV
13	Meter #5 Energy KWH	Graph	CSV
14	Meter #6 Energy KWH	Graph	CSV
15	Meter #8 Energy KWH	Graph	CSV
16	Meter #8 Energy KWH	Graph	CSV
17	Meter #9 Energy KWH	Graph	CSV
18	Meter #10 Energy KWH	Graph	CSV
19	Server Isle C Temperature	Graph	CSV
20	Server Isle D Temperature	Graph	CSV
21	Server Room West Humidity	Graph	CSV
22	Server Isle F Temperature	Graph	CSV
23	Server Isle G Temperature	Graph	CSV
24	Server Room South Humidity	Graph	CSV
25	Server Isle I Temperature	Graph	CSV
26	Server Isle J Temperature	Graph	CSV
27	Sensor 2-1 Temperature	Graph	CSV
28	Sensor 3-1 Temperature	Graph	CSV
29	900MHz Wi-THS Temperature	Graph	CSV
30	900MHz Wi-THS Humidity	Graph	CSV
31	900MHz Wi-TS Temperature	Graph	CSV
32	418MHz TH-Bapi Temperature	Graph	CSV

Figure 3.15 Extended Trends Page

3.4.8 Trap Log

This page allows users to view trap information sent from the Falcon FMS to a Network Management Software (NMS).

FMS-CCCC-N-24 (FCF)

```
01/24/10 07:57:13 ip:xx.xx.xx.xx-ICMP: Dest unreachable: 10.0.0.69 UDP port 162
01/24/10 07:57:13 ip:xx.xx.xx.xx-ICMP: Dest unreachable: 10.0.0.69 UDP port 162
01/24/10 07:57:13 ip:10.0.0.69-ch:001-Return-LowAlarm2-Sent
01/24/10 07:57:13 ip:10.0.0.69-ch:001-Return-LowAlarm1-Sent
01/24/10 07:57:12 ip:xx.xx.xx.xx-ICMP: Dest unreachable: 10.0.0.69 UDP port 162
01/24/10 07:57:12 ip:xx.xx.xx.xx-ICMP: Dest unreachable: 10.0.0.69 UDP port 162
01/24/10 07:57:12 ip:10.0.0.69-ch:001-Alarm-LowAlarm2-Sent
01/24/10 07:57:12 ip:10.0.0.69-ch:001-Alarm-LowAlarm1-Sent
01/24/10 07:57:02 ip:xx.xx.xx.xx-ICMP: Dest unreachable: 10.0.0.69 UDP port 162
```

Figure 3.16 Example Trap Log

3.5.   Relays

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

Figure 3.17 Example Relay Status Page

A button is configured for each relay output. Selecting the button turns on the associated relay output. Pressing the button again will turn it off.

3.6.   URL Links

URL Links displays still images (.jpg) from all IP cameras and other URLs linked to the FMS.
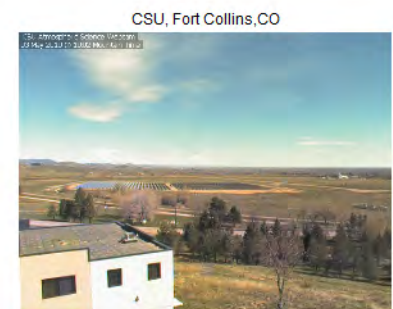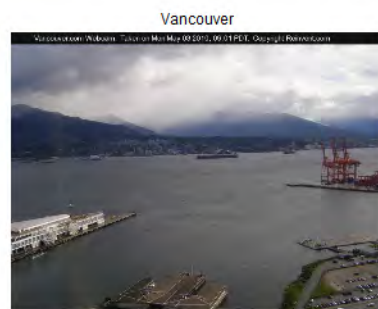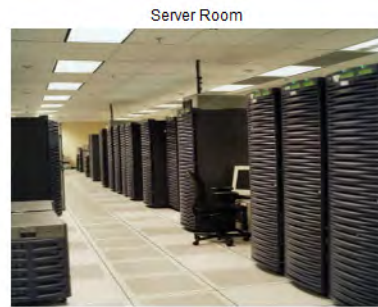
Figure 3.18 Example Still Images from IP Cameras

3.7.   Refresh

Click this link to refresh the FMS web interface.

4

FMS CONFIGURATION

4.1.   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

- ♦ Alarm Management

- ♦ Trends

- ♦ Clock

- ♦ Schedules

- ♦ Battery/Supply Voltage

- ♦ URL Links (1-5)

- ♦ URL Links (6-10)

- ♦ Links

- ♦ Nest/Egg

- ♦ Modem/Phone Numbers/Pagers

- ♦ Keypad/DTMF Access Users

- ♦ Internet Protocol

- ♦ User Administration (Web Access)

◆ Network Statistics

◆ ICMP Ping

◆ Email/DNS

◆ Network Time Protocol

◆ SNMP/Syslog

◆ BACnet

◆ Com Port1/Modbus/SNMP/Telnet

◆ Modbus/SNMP Slave Units

◆ PUE/DCiE/Summary

◆ Map

◆ Flash Program

◆ Product Registration

The FMS is shipped to the user with the IP address configured as `10.0.0.188` 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.

Note The appearance of the login window is browser-dependent.

Figure 4.1   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 2.3.1, "Set the FMS IP Address" on page 32.

The "Smart Browsing" feature available with some browsers complicates use of the FMS Web interface. To avoid complications, turn off Smart Browsing.

4.2. Homepage and Configuration Menu

To access the FMS Homepage, 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 4.2 Top Bar on the FMS Home Page

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 top bar 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.
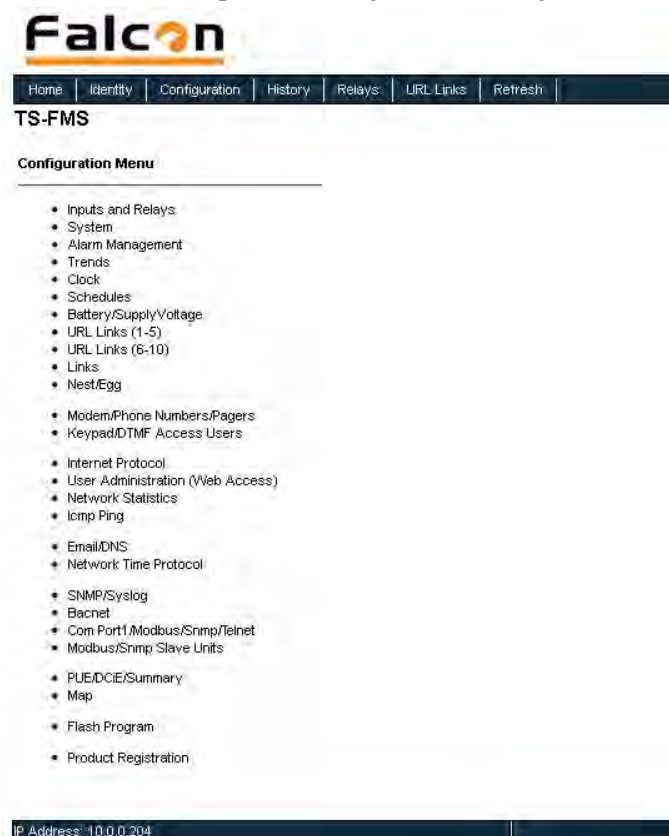
Figure 4.3 FMS Configuration Menu

4.3. Inputs and Relays

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.

Inputs											
S.Ch	(#)	Label	S.Ch	(#)	Label	S.Ch	(#)	Label	S.Ch	(#)	Label
T	(1)	Server Isle A	Eas	(2)	Server Room	T	(3)	Server Isle B	Nor	(4)	Server Room
Al	(5)	FM200 System	Alar	(6)	Water Leak	Alar	(7)	Water Leak	Alar	(8)	Water Leak
1.1 T	(9)	Server Isle C	1.2	(10)	(Demo) Alarm	1.3 T	(11)	Server Isle D	1.4 Wes	(12)	Server Room
1.5 T	(13)	Server Isle F	1.6 T	(14)	Server Isle G	1.7 Sou	(15)	Server Room	1.8 T	(16)	Server Isle I
1.9 T	(17)	Server Isle J	1.10 T	(18)	Server Isle K	1.11 T	(19)	Server Isle L	1.12 T	(20)	Server Isle M
2.1 Room	(33)	Generator	2.2 Fl	(34)	UPS Room 5th	2.3 Tem	(35)	Outside Air	2.4 Fl	(36)	MCC Room 3rd
2.5 Offic	(37)	1st Floor	2.6 Offic	(38)	2nd Floor	2.7 Motor/	(39)	Elevator	2.8 C1	(40)	Tape Storage
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
4.1	(81)	ANALOG #4.1	4.2	(82)	ANALOG #4.2	4.3	(83)	ANALOG #4.3	4.4	(84)	ANALOG #4.4
4.5	(85)	ANALOG #4.5	4.6	(86)	ANALOG #4.6	4.7	(87)	ANALOG #4.7	4.8	(88)	ANALOG #4.8
4.9	(89)	ANALOG #4.9	4.10	(90)	ANALOG #4.10	4.11 Service	(91)	Out Of	4.12 Act	(92)	Dry Contact
5.1 Temper	(105)	Internal	5.2 Humidi	(106)	Internal						

Figure 4.4 FMS Input/Output Configuration Menu

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.

4.3.1 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 4.5 will appear.

Figure 4.5 FMS Main Board Input Configuration

The number of the input that is being configured appears in the upper bar. 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 Modus 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" on page 87.

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 4.6 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 = 11.25
> Offset = 50 - 11 = 38.75
>
> *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 = 6.25
> Offset = 10 - 6 = 3.75
>
> *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 generators 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 4.14., "Modem/Phone Numbers/Pagers" on page 72 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 4.14., "Modem/Phone Numbers/Pagers" on page 72.

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" on page 185.

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 a selected value is Unsigned, 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 see 2.2., "Falcon FMS Wiring" on page 21, for more information.

> *Example:* Configure input channels 1-2 for Individual Ground, and configure input channels 4-6 for Common Ground.
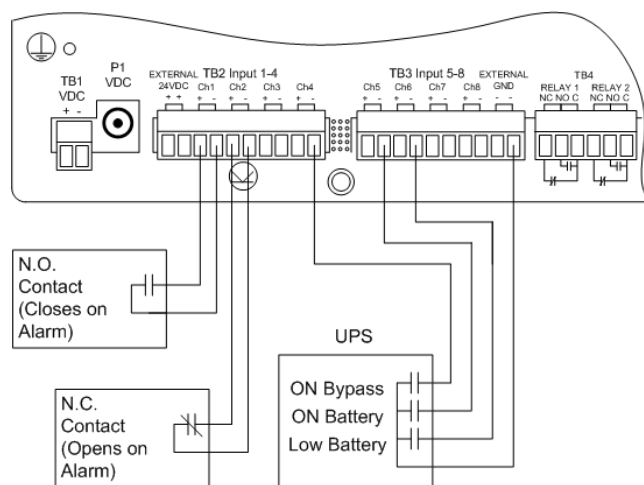
Figure 4.7 NOI/NC Wiring Example

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.

Map Box Size: Customize the size of the mapped object. By default, the height of the object, as it appears on the map, is approximately 20 pixels, and the width automatically adjusts to the length of the text. This setting allows users to expand the size of the object to fill a defined area.

Map Coordinate: Fine tune the location of the object on the map. Refer to "Facility Mapping" on page 127 for further information.

Graphical Mapping: Designate the device's location on the FMS graphical map.

Test Map: View the mapped location of the point you're currently configuring.

4.3.2 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 4.4, "FMS Input/Output Configuration Menu" on page 52. While units will vary depending on individual configurations, Expansion Card A is typically numbered 1.1-1.12, 2.1-2.12, etc.

Figure 4.8   Expansion Card "A" Configuration Page

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 4.3.1, "Main Board Input Configuration (Channels 1-8)" on page 53—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.

4.3.3 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 4.4, "FMS Input/Output Configuration Menu" on page 52. While units will vary depending on individual configurations, Expansion Card C is typically numbered 1.1-1.24, 2.1-2.24, etc.

Figure 4.9 Expansion Card "C" Configuration Page

Figure 4.9 will be displayed when configuring inputs for Expansion Card "C." It is similar to the FMS Main Board Input Configuration page – see 4.3.1, "Main Board Input Configuration (Channels 1-8)" on page 53—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.

4.3.3.1 Internal Temperature and Internal Humidity Configuration (Optional)

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.

4.3.4 Relay Configuration

A screen similar to Figure 4.10 will be displayed when configuring relays. The following options are available on this page:

Figure 4.10 Relay Configuration Page

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.

♦ **Keypad Controlled**: Configures the relay output to be controlled by a keypad code or DTMF code. The User Code Configuration link appears to the right of the Label field once the Keypad Controlled option is selected and submitted; see Figure 4.11. The User Code Configuration link allows users to link which access code will active the relay output.

Access Keypad/Relay #1 Configuration

Submit Changes

#	Id Code:	User Name:	K1
1	1590	Fred	☑
2			☑
3			☑
4			☑
5			☑
6			☑
7			☑
8			☑
9			☑
10			☑
11			☑
12			☑
13			☑
14			☑
15			☑
16			☑
17			☑
18			☑
19			☑
20			☑

Return to Relay 1 Configuration

Figure 4.11 Keypad/Relay Configuration

◆ **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.

◆ **Modbus Controlled**: Configures the relay output to be controlled by a Modbus/SNMP Slave device in alarm.

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" on page 171. The Alarm IDs are also displayed on the Input Configuration page. The Relay Control Logic diagram in Appendix G, "Relay Control Logic" on page 185, 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" on page 171. 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" on page 185, 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" on page 185, for a complete relay logic diagram.

4.4.   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 10, "Point-to-Point Protocol" on page 141, for more information.

Figure 4.12 System Configuration Page

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.

Web Refresh Rate: The rate at which the FMS web pages 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 30 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 web pages in the FMS to match the PDA device. The PDA web pages can be accessed from the Web browser by entering /pda after the IP Address (e.g., 10.0.0.188/pda). The FMS includes a PDA web page view for the Main Menu, Identity and Alarm History pages only.
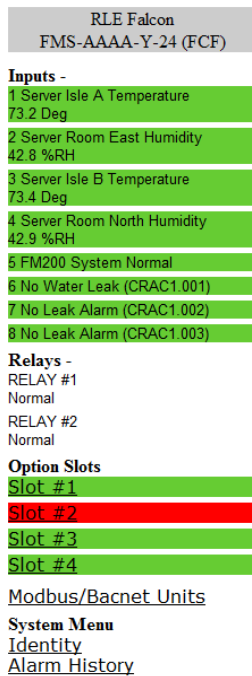
Figure 4.13 PDA Width Configuration

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. See Appendix B, "Analog Averaging" on page 161.

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.

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

Html Alarm History Display: This option allows users to choose how alarms are acknowledged in the Alarm History page. The FMS is defaulted to "And all acknowledgments." This means that at least two people must acknowledge the alarm for the history to show it has been acknowledged. If users want to allow only one person to acknowledge the alarm to have the Alarm History page log it, select the "Or the acknowledgments."

Falcon Unit Map Coordinate: Fine tune the coordinates of the FMS Home Page link. Refer to Chapter 7, "Add a Link to the FMS Home Page" on page 133 for further information.

Graphical Mapping: Designate coordinates for the FMS Home Page link via the map.

4.5.   Alarm Management

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.

Figure 4.14 Alarm Settings Menu

4.6.   Trends

The Trends menu allows users to configure custom trending on an analog point, either physical or Modbus.

#	Point	Type	Interval	Info	Format
1	1	Physical	1 Min	Expedient WI-TS	Format Trend 1
2	2	Physical	5 Min	ANALOG #2	Format Trend 2
3	3	Physical	15 Min	ANALOG #3	Format Trend 3
4	4	Physical	1 Hour	ANALOG #4	Format Trend 4
5	5	Physical	2 Hour	ANALOG #5	Format Trend 5
6	6	Physical	4 Hour	ANALOG #6	Format Trend 6
7	7	Physical	6 Hour	ANALOG #7	Format Trend 7
8	8	Physical	8 Hour	ANALOG #8	Format Trend 8

Figure 4.15 Trends Configuration Page

Data can be trended for up to 32 points. The FMS compiles 3840 entries per point. Once 3840 entries have been logged, the FMS eliminates 40 entries at a time and overwrites the data, from oldest to newest. You determine the time interval for the data collection, depending on how detailed you'd like the information. Time intervals range from 1 minute to 8 hours, and total sample collection is as follows:

Interval	Samples per Day	Total Days
1 minute	1440	2.6
5 minutes	288	13.3
15 minutes	96	40
1 hour	24	160
2 hours	12	320
4 hours	6	640
6 hours	4	960
8 hours	3	1280

Figure 4.16 Trend Interval Chart

Enter the physical channel or Modbus index number in the point field. Select either physical or Modbus/BACnet from the type field. Select the interval desired from the drop down in from the interval field. Click on the Format Trend XX button on the right hand side of the screen once your information has been filled out for that #.

4.7.   Clock

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

Clock Configuration
Submit Changes
Date: 01/24/10
Time: 08:01:22
Day: Sun

Figure 4.17 Clock Configuration

♦ 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.

4.8.   Schedules

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.

Schedule Configuration
Submit Changes
Schedule A Configuration
Status: Inactive
Begin DOW: Monday
End DOW: Friday
Begin Time: 08:00
End Time: 17:00
Schedule B Configuration
Status: Inactive
Begin DOW: Sunday
End DOW: Saturday
Begin Time: 02:00
End Time: 02:15

Figure 4.18 Schedule Configuration

4.9. Battery/Supply Voltage

The **Battery** page allows users to configure power monitoring when the FMS is running off a 48V battery.
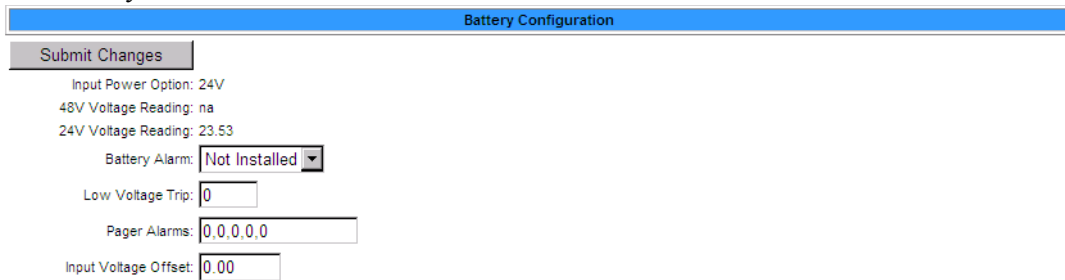
Figure 4.19 Battery Page

Battery/Supply Voltage Alarm: If the **Installed** option is selected, email notification can be sent to any previously designated recipient when the battery enters an alarm state.

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.

4.10. URL Links (1-5)

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.
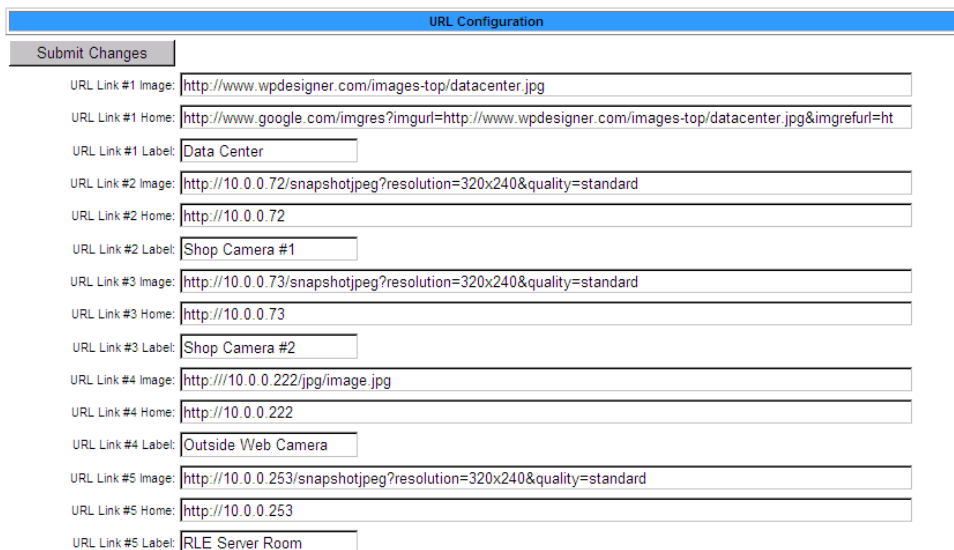
Figure 4.20 URL (1-5) Links Configuration

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.xxxsnapshotjpeg?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

4.11. URL Links (6-10)

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.

Figure 4.21 URL (6-10) Links Configuration

4.12. Links

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.

Figure 4.22 Links Configuration Page

4.13. Nest/Egg

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 4.23.

0	No Alarms	FMS-AAAA-Y-24 (FCF)	1	Alarms!	Technical Support F1000
2	Alarms!	Sever Room A Fort Collins	3	No Alarms	Burn In Room Falcon
4	No Alarms	8126	5	No Alarms	2006
6	No Alarms	FMS20U	7	No Alarms	uninitialized
8	No Alarms	FMS32	9	Alarms!	FalconLite (FLS8)
10	Alarms!	FMS-X-N-24	11	Alarms!	FMS-ABCM-N-24

Figure 4.23 Nest/Egg Configuration Page

4.13.1 Falcon Nest Configuration

The **Falcon Nest** link appears at top right corner of the Home Page once the Nest and Eggs have been configured. The Nest can display either as a table or a map, with the Eggs appearing as links on the map. The nest map is created in much the same way as the FMS floor map, and the instructions are very similar. Basic mapping directions can be found below. For more detailed mapping instructions, refer to Chapter 7, "Facility Mapping" on page 127.

Falcon Nest Configuration

Submit Changes

Nest Type: Map Image

Egg Login: Refered - Nologin

Nest Refresh Rate: 15 Seconds

Egg Refresh Rate: 15 Seconds

Nest/Map Coordinate X: 389 Y: 341 Graphical Mapping Test Map

User Image File Maximum Size is 500KB. Maximum X-Y Mapping is 4000 x 4000 pixels.

User Image Nest File: "usa_map.jpg" 190102 bytes

Delete Nest Image

Nest image upload from your computer:

[ ] Browse...

Upload

Egg Link #1 Configuration

Figure 4.24 Nest Configuration

Nest Types: Select IFrames to display the eggs in a table. Select Map Image to display the eggs on a map.

Egg Login: Determine whether or not a login is requred to view the map.

Nest Refresh Rate: How often the Nest view refreshes.

Egg Refresh Rate: How often the Egg view refreshes.

Nest/Map Coordinate: The spot on the map where the Nest is located. Designate the point by clicking the Graphical Mapping link and designating the locaton. Fine tune it, if you wish, by adjusting the values in the boxes.

Delete Nest Image button: Deletes the currently uploaded nest map image from the FMS memory.

Nest Image Upload box: Click the browse button to designate the map image (saved on your computer) you wish to upload. The image must be a .jpg file, no more than 512kb. Click the Upload button to upload the file. Once uploaded, the file name appears just above the upload box.

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

4.13.2 Egg Configuration

Configure Egg information through the **Egg #1 Configuration** link on the Falcon Nest page.

Figure 4.25 Egg Configuration

<<Prev and Next >> links: Click these link to configure the previous or next Eggs in the nest.

IP Address: Enter the Egg's IP address.

Nest/Map Cooridnate: The spot on the map where the Egg is located. Designate the point by clicking the Graphical Mapping link and designating the location. Fine tune it, if you wish, by adjusting the values in the boxes.

Egg Map Status link: Displays more detailed Egg information, in a text format. This information can be particularly helpful if the Nest experiences a communications problem with the Egg - access this page to help diagnose the problem.

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

4.14. Modem/Phone Numbers/Pagers

This link allows users to configure the FMS internal modem. This instructs the FMS when, how, and whom to call when an alarm occurs.

Figure 4.26 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 Baud Rate: Allows users to determine the connection speed. Select 300, 1200, 2400 or 33.6k.

Pager Bits/Parity: 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 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.

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.

4.14.1 Configure Phone Numbers

A screen similar to Figure 4.27 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.

Phone Number 1 Configuration

Submit Changes

Pots Modem: Not installed

Select Phone type: Alpha-numeric Pager/Cell Phone

TAP Number/SNPP Server: snpp.airtouch.com

Pager Id: 9702319695

Acknowledge Code: 123456

Dial Back on Returns: ○ Yes ◉ No

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

Figure 4.27 Phone Number Configuration

Select Phone Type: Determines which type of device the FMS calls.

♦ Choose the **Alpha-numeric Pager/Cell Phone** option to dial an alphanumeric pager or cell phone.

♦ Choose SMS/TEXT/GSM if using a GSM modem that is connected to the FMS COM1 EIA-232 port.

♦ Choose SNPP for paging over Ethernet - this is a feature some cell/pager providers do not support.

TAP Number/SNPP: Enter the pager service number for alphanumeric pager or cell phone entries. If using the SMS/TEXT/GSM, enter the cell phone number to dial. Each comma after the number represents a two second delay. This delay allows time for the 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 the

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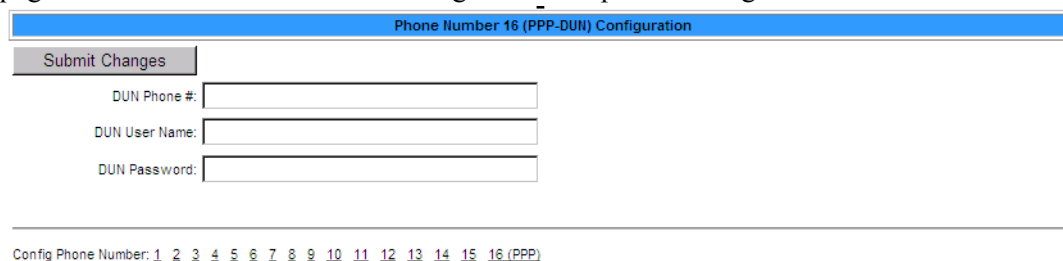
Note The Acknowledge Code should be different than the access codes. If this code is the same as one of the access codes, the Falcon will acknowledge the alarms associated with the acknowledge code, enter a successful entry in the Access Log, and activate the relay outputs which are set for keypad activation.

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.

4.14.2 Configure Phone Number 16 (PPP)

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.

Figure 4.28 Phone Number 16 (PPP) Configuration
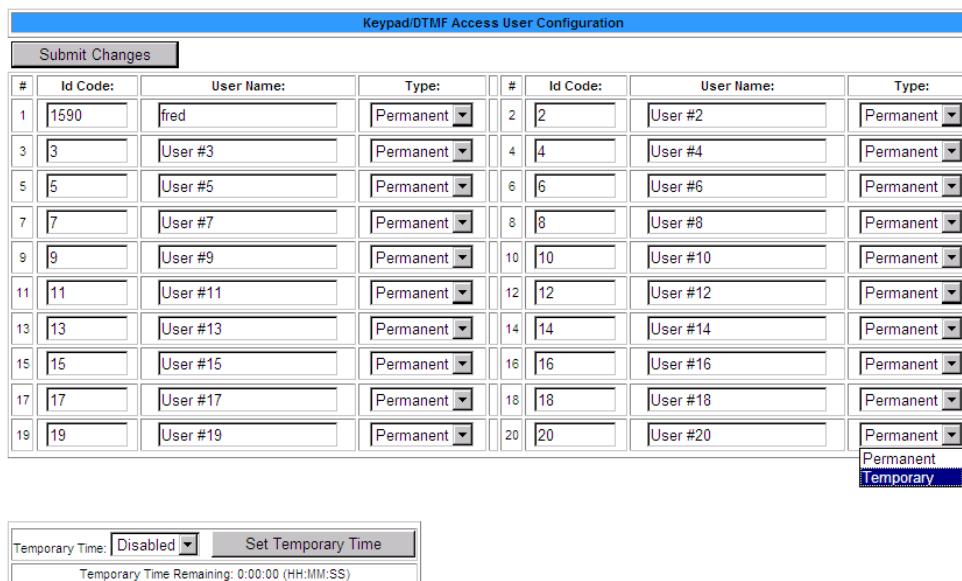
DUN Phone #: Specifies the phone number of the Internet Service Provider (ISP) to connect to.

DUN User Name: Enter your Internet Service Provider (ISP) account user name.

DUN Password: Enter the password associated with the Internet Service Provider (ISP) account.

4.15. Keypad/DTMF Access Users

Use the **Keypad/DTMF Access Users** link to configure a maximum of 20 access codes and user names.

Figure 4.29 Sample URL (6-10) Links Configuration

Each 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. 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.

4.16.   Internet Protocol

The **Internet Protocol** link allows users to change a variety of settings, including the FMS IP Address (used in point-to-point "PPP"), Default Router and Net Mask.

Figure 4.30 Sample IP Configuration Menu

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.

MAC Address: Assigned to the FMS by the manufacturer..

IP Address: Set the FMS IP address.

Net Mask: Set the FMS Subnet Mask address

Def Route: Set the FMS Default Gateway address.

HTTP Port: The FMS broadcasts its webpages on Port: 80 of the assigned IP Address. 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 11, "Loading Firmware and Configuration Data" on page 143, for more information.

TCP Max Seg Size: This adjusts the size of the web page packets being broadcast. Default size is set to 1436, you may need to set it to 536 for VPN access or satellite uplink networks.

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 web pages over a dial-up connection; see , 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."

4.17.   User Administration (Web Access)

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

#	User Name:	Password:	Privilege:	Last Web Access:
1	falcon		Administrator	01/24/10 08:13:40
2	John	Doe	Read-only	
3	Jane	Smith	Read-write	
4			None	
5			None	
6			None	
7			None	
8			None	

Figure 4.31 Web Access Configuration

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

◆ **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.

◆ **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.

4.18. Network Statistics

Network Statistics: Displays network and EIA-485 statistics including: network packets received, packets transmitted, and errors.

```
Netstats for Mac: 00:90:5B:04:03:28 IP: 10.0.0.204

ints:        5511      inpackets:   5494      processed:   5495
refused:     0         arp:         1866      ip:          3593
tx sent:     1958      tx refused:  0         tcp retries: 0
tcp_timeouts:7

RMON_T_DROP        = 0          RMON_T_PACKETS     = 1958
RMON_T_BC_PKT      = 8          RMON_T_MC_PKT      = 0
RMON_T_CRC_ALIGN   = 0          RMON_T_UNDERSIZE   = 0
RMON_T_FRAG        = 0          RMON_T_JAB         = 0
RMON_T_COL         = 0          RMON_T_P64         = 457
RMON_T_P65TO127    = 1179       RMON_T_P128TO255   = 18
RMON_T_P256TO511   = 16         RMON_T_P512TO1023  = 288
RMON_T_P1024TO2047 = 0          RMON_T_P_GTE2048   = 0
RMON_T_OCTETS      = 291293     IEEE_T_DROP        = 0
IEEE_T_FRAME_OK    = 0          IEEE_T_1COL        = 0
IEEE_T_MCOL        = 0          IEEE_T_DEF         = 0
IEEE_T_LCOL        = 0          IEEE_T_EXCOL       = 0
IEEE_T_MACERR      = 0          IEEE_T_MACERR      = 0
IEEE_T_CSERR       = 1958       IEEE_T_SQE         = 0
IEEE_T_FDXFC       = 0          IEEE_T_OCTETS_OK   = 291293
RMON_R_PACKETS     = 6373       RMON_R_BC_PKT      = 2681
RMON_R_CRC_ALIGN   = 0          RMON_R_UNDERSIZE   = 0
RMON_R_OVERSIZE    = 0          RMON_R_FRAG        = 0
RMON_R_JAB         = 0          RMON_R_RESVD_0     = 0
RMON_R_P64         = 3458       RMON_R_P64         = 3458
RMON_R_P65TO127    = 1707       RMON_R_P128TO255   = 77
RMON_R_P256TO511   = 1106       RMON_R_512TO1023   = 25
RMON_R_P_GTE2048   = 0          RMON_R_1024TO2047  = 0
RMON_R_OCTETS      = 768595     IEEE_R_DROP        = 0
IEEE_R_FRAME_OK    = 5518       IEEE_R_CRC         = 0
IEEE_R_ALIGN       = 0          IEEE_R_MACERR      = 0
IEEE_R_FDXFC       = 0          IEEE_R_OCTETS_OK   = 500996
```

Refresh netstats page

Figure 4.32 Network Statistics Page

4.19. ICMP Ping

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.

```
                           Icmp Ping

  Submit Changes

  IP Address to Ping:    0.0.0.0


Last Ping Results:
Last pinged ip address: 0.0.0.0
Last ping response: 0.0.0.0 0ms
```

Figure 4.33 ICMP Ping Page

4.20.   Email/DNS

Use the **Email/DNS** page to configure the FMS to send email notifications when inputs are in an alarm state. The FMS sends one email message per alarm instance to a maximum of eight email recipients.

Figure 4.34 Email/DNS Configuration Page

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

Primary and Secondary DNS Servers: Information provided by your Internet Service Provider. It is needed to deliver the email message.

Alternate SMTP Port: An alternative port value can be assigned for security reasons. Default port value is 25. Consult your IT department or ISP for more information.

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 ESMTP. Use the recommended default setting unless instructed differently by your IT Department.

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

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

4.21.   Network Time Protocol

Network Time Protocol 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.

Figure 4.35 Network Time Protocol Configuration Page

Network Time (NTP) Server: The IP address or host name 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.

4.22. SNMP/Syslog

SNMP/Syslog Configuration allows users to configure SNMP and Syslog notification options.

Figure 4.36 SNMP Configuration Page

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 physical 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.

Select Snmp Trap Type: This drop down lists the three types of SNMP versions; V1-Trap, V2C-Trap, and V2C-Inform.

Persistent Trap/Inform Interval: 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. This user-defined time interval is set in minutes. The SNMP Traps do not include any delivery verification. Traps can be acknowledged from the Alarm Management page.

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-alarming 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" 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.

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 "AlarmEntryAdded" Trap contains the Alarm Label. The NMS can receive the Trap, and 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 "AlarmEntryRemoved" Trap contains 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."

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.

Input Trap Delivery: Selects between LAN or PPP (modem/dial-up).

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.

4.23. BACnet

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, consult the BACnet Standard or your IT Department.

Figure 4.37 BACnet Configuration Pages

4.24. Com Port1/Modbus/SNMP/Telnet

These pages allow users to configure Com Port 1, Modbus, SNMP, and Telnet features. Configuration for Modbus/ Com Port 1 Configuration are explained in greater detail in 5.3., "Modbus/SNMP/COM1 Configuration (Modbus Master and Slave)" on page 91.

Figure 4.38 Com Port1/Modbus/SNMP/Telnet Configuration

4.25. Modbus/SNMP Slave Units

The **Modbus/SNMP Slave Unit Configuration** can only be configured after the Com Port 1/ Modbus/SNMP/Telnet Communication have been set-up; see Figure 4.39. 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 Com Port 1/Modbus/SNMP/Telnet Communication page; see Figure 4.26 on page 72. For more information on Modbus Slave Unit configuration see 5.3., "Modbus/SNMP/COM1 Configuration (Modbus Master and Slave)" on page 91.

Unit #	Protocol	Access	Address	Unit Description
1	Standard	Serial	1	Veris 8036 #1
2	Standard	Serial	2	Veris 8036 #2
3	Standard	Serial	3	Veris 8036 #3
4	Standard	Serial	4	Veris 8036 #4
5	Standard	TCP/IP	1	LD2100
6	Standard	TCP/IP	1	F110
7	Snmp	TCP/IP	0	Falcon - KW Utility Meter
8	Snmp	TCP/IP	0	TS-F1000
9	Standard	TCP/IP	1	Falcon FDS-Wi
10	Snmp	TCP/IP	0	APC_UPS
11	Standard	TCP/IP	1	LD5200
12	Standard	Serial	0	(Blank)
13	Standard	Serial	0	(Blank)
14	Standard	Serial	0	(Blank)
15	Standard	Serial	0	(Blank)
16	Standard	Serial	0	(Blank)

Modbus/Snmp Units 17-32

Registers 1-100
Registers 101-200
Registers 201-300
Registers 301-400
Registers 401-500
Registers 501-600
Registers 601-628
Read / Preset Modbus Register
Preset Configuration

Figure 4.39 Modbus Generic Slave Unit Configuration

Unit #	Protocol	Access	Address	Unit Description	Register Link
1	Standard	Serial	0	BCM #1	
2	Standard	Serial	0	BCM #2	
3	Standard	Serial	0	BCM #3	
4	Standard	Serial	0	BCM #4	
5	Standard	Serial	0	BCM #5	
6	Standard	Serial	0	BCM #6	
7	Standard	Serial	0	BCM #7	
8	Standard	Serial	0	BCM #8	
9	Standard	Serial	0	BCM #9	
10	Standard	Serial	0	BCM #10	
11	Standard	Serial	0	BCM #11	
12	Standard	Serial	0	BCM #12	
13	Standard	Serial	0	BCM #13	
14	Standard	Serial	0	BCM #14	
15	Standard	Serial	0	BCM #15	
16	Standard	Serial	0	BCM #16	

Figure 4.40 Modbus BCM 16-Unit Configuration Page

Modbus BCM Unit Configuration					
Unit #	Protocol	Access	Address	Unit Description	Register Link
1	Standard	Serial	1	BCM #1	Registers
2	Standard	Serial	2	BCM #2	Registers
3	Standard	Serial	3	BCM #3	Registers
4	Standard	Serial	4	BCM #4	Registers

Figure 4.41 Modbus BCM 4-Unit Configuration Page

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

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

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

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.

4.26. PUE/DCiE/Summary

PUE and DCiE calculations are valuable metrics used by data centers to track their energy efficiency. PUE measures the efficiency of the computing equipment, while DCiE measures the efficiency of the data center's infrastructure. Maximizing the energy efficiency of computing equipment and the data center infrastructure helps reduce energy costs and can minimize data center down time.

The FMS provides a set of tools that help track real-time PUE and DCiE information, as well as logging long-term PUE/DCiE trending information.

Refer to Chapter 6, "PUE/DCiE" on page 121 for further information.

4.27. Map

The FMS allows users to upload a map of their facility and populate it with FMS data. This provides users with a real-time view of their facility, and the physical location and status of all their digital, analog, and Modbus/SNMP slave inputs.

Through the FMS mapping process, the Falcon creates an overlay for an uploaded map image. It superimposes the locations of your inputs - based on coordinates you designate - over the top of your map image. Once uploaded and populated, the map is accessible through the Floor Map link on the FMS home page.

The **Map** link in the Configuration menu allows users to upload this initial map image. Refer to Chapter 7, "Facility Mapping" on page 127 for further information.

4.28. Flash Program

The **Flash Program** link displays the Flash Program Configuration page, which allows you to load firmware as well as save and load configuration files for the FMS. For instructions and more information, see Chapter 11, "Loading Firmware and Configuration Data" on page 143.
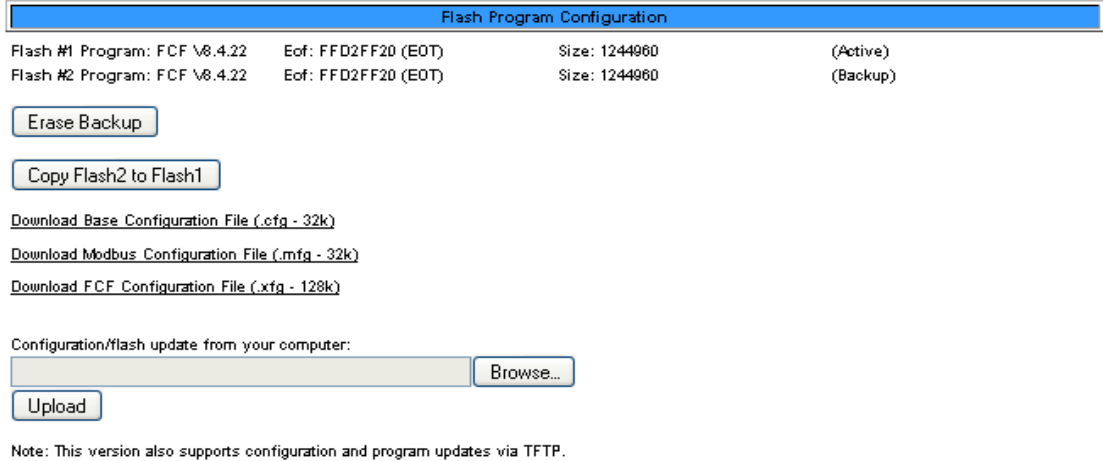
Figure 4.42 Flash Program Configuration Page

4.29. Product Registration

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.

To access RLE's Web site from any browser, enter rletech.com in the browser's address field.

5

COMMUNICATION

5.1. Modbus

The FMS supports the following from the factory:

♦ Modbus Master (RTU) over EIA-485 or EIA-232

♦ Modbus Slave (RTU) over EIA-485 or EIA-232

♦ Modbus Master (TCP/IP)

♦ Modbus Slave (TCP/IP Port 502) over Ethernet

The FMS can operate as a Master over EIA-485 (or EIA-232) and as a Slave over Ethernet at the same time. The FMS can operate as a Slave over EIA-485 (or EIA-232) and as a Slave over Ethernet at the same time. The FMS can NOT operate as a Master over EIA-485 (or EIA-232) and as a Slave over EIA-485 (or EIA-232) 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 EIA-232 or EIA-485. The COM Port 1 Transmit and Receive LEDs are also located on the back of the FMS.

5.2.1 EIA-232

The EIA-232 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 EIA-232 (DTE) is active over COM1 (DB9 male connector). The EIA-232 port allows communications between the FMS and one other device (point to point connection). The EIA-232 port has maximum cable length of 50 feet (15.2m).

Table 5.1   COM1 DB9 Male Pin Out

Pin		Description
Pin 1	=	Data Carrier Detect
Pin	=	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 EIA-232 Connection to an EIA-232 DCE Device
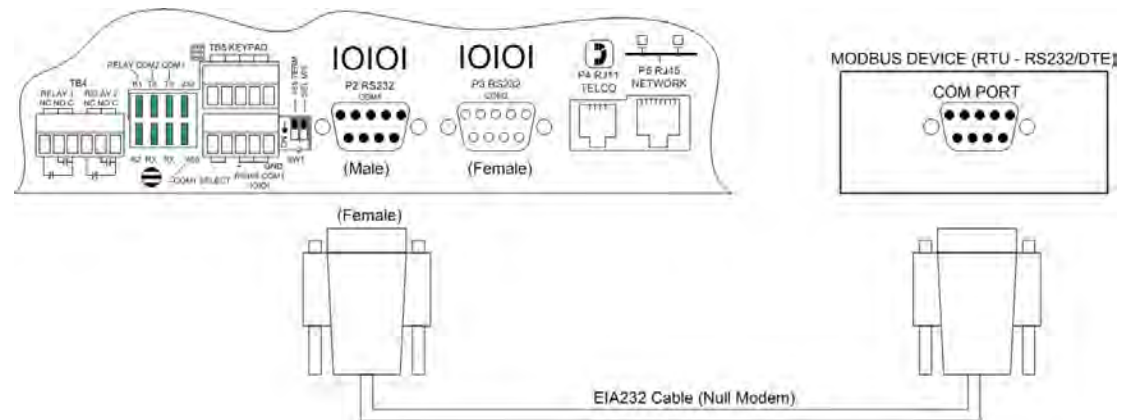
Figure 5.2   FMS Modbus EIA-232 Connection to an EIA-232 DTE Device

5.2.2 EIA-485

The EIA-485 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 EIA-485 is active over COM1 (TB5 Pins 8, 9 and 10). The EIA-485 port allows communications between one Modbus Master and one or more Modbus Slave devices. EIA-485 can accommodate up to 4,000 feet (1,219m) of cable length. There are many variations on how terminals are labeled on EIA-485 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.

Table 5.2 COM1 TB5 Pin Out

Pin		Description
Pin 8	=	EIA-485(+)
Pin 9	=	EIA-485(-)
Pin 10	=	Ground
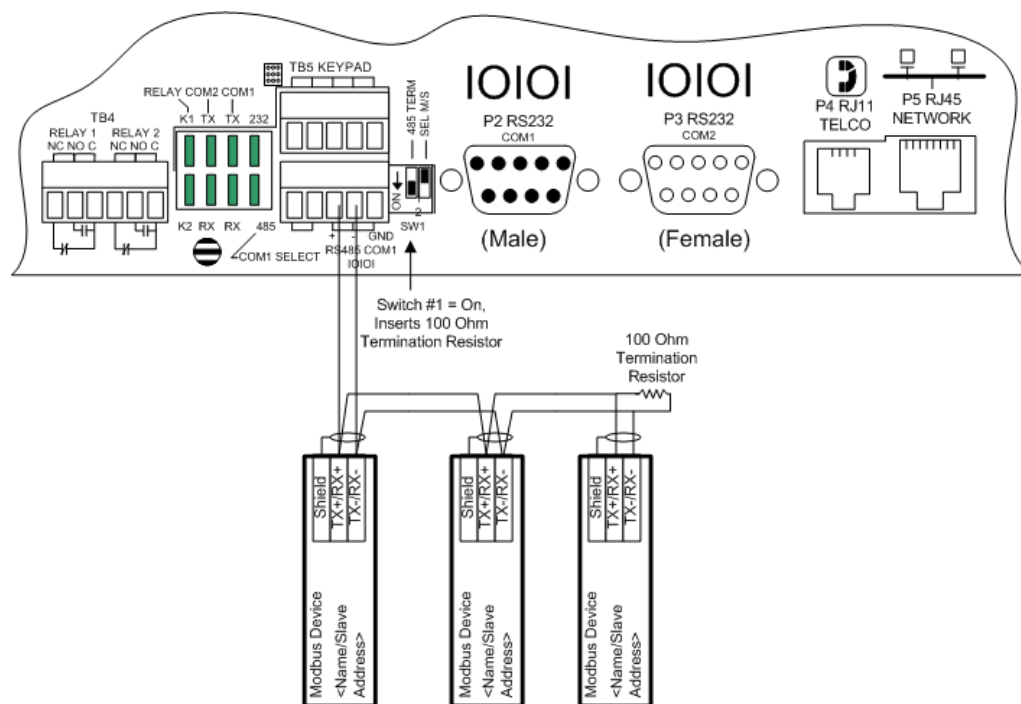
Figure 5.3 EIA-485 Wiring Connections
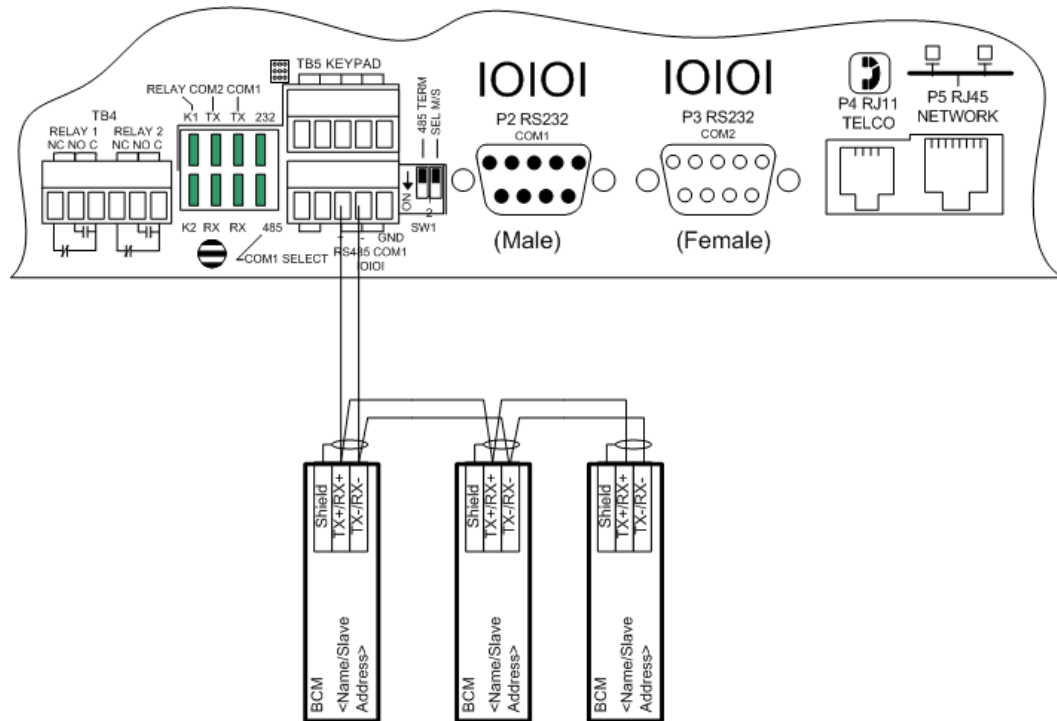
Figure 5.4 EIA-485 Wiring to RLE/Veris BCMs (Branch Circuit Monitors)

5.3. Modbus/SNMP/COM1 Configuration (Modbus Master and Slave)

The **Modbus/SNMP/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.

To access this page, select Com Port1/Modbus/SNMP/Telnet from the Configuration Menu.

Figure 5.5 Example Modbus/SNMP/COM1 Configuration—Modbus Master

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 (EIA-232 or EIA-485). The options are:

♦ **Modbus Master**: Enables the FMS to operate as a Modbus Master over Serial COM1.

♦ **Modbus Slave**: Enables the FMS to operate as a Modbus Slave over Serial COM1.

♦ **Telnet**: Enables the FMS to communicate via Serial COM Port 1.

♦ **SMS/Text**: Enables the FMS to communicate to a SMS modem via Serial COM1.

Master Protocol Type: Configures the FMS Master Protocol type to be used, via Serial or TCP/IP. Select one of the following options:

◆ **None**: Disables Modbus support.

◆ **Modbus/SNMP Master Generic - 32 Units**: Modbus Master Generic-32 Units is the most typical configuration for the FMS when using Modbus communication. Select this option when there is at least one Slave unit. This option can be configured to poll data from up to 32 Slave devices.

◆ **Modbus Master BCM H663 - 4 Units**: Select this option when there are 1 to 4 BCMs (Branch Circuit Monitors) and no other Slave devices. This option enables web pages that are unique to the BCM allowing for easier setup. SNMP (Get, Set and Traps) is supported for the BCMs.

◆ **Modbus Master BCM H663 - 16 Units**: Select this option when there are 5 to 16 BCMs and no other Slave devices. This option enables web pages 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.

◆ **BACnet/IP Master - 16 Units**: Select this option if you are using the FMS as a BACnet Master to control BACnet Slave devices.

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.

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 - 32 Units," "Modbus Master BCM H663 - 4 Units" or "Modbus Master BCM H663 - 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: The number of available virtual slots varies depending on the FMS's physical configuration. Virtual slots can only be created if the slot is not occupied by a physical card. These virtual points can be used in conjunction with Modbus/SNMP 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 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.

```
Modbus slave register map/values

40001 - 40106 Input "live" values
40200         Number of alarms present
40201 - 40306 Input alarm bitfield  (Inputs 1-106)
              Value of 0 = No Alarm
              Bit:0 = High1 Alarm
              Bit:1 = Low1 Alarm
              Bit:2 = High2 Alarm
              Bit:3 = Low2 Alarm
              Bit:4 = Digital Alarm
40401 - 40506 Input configuration (Inputs 1-106)
              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

 1:  40001: 73        40201: 0        40401: 2 (a)
 2:  40002: 42        40202: 0        40402: 2 (a)
 3:  40003: 73        40203: 0        40403: 2 (a)
 4:  40004: 43        40204: 0        40404: 2 (a)
 5:  40005: 0         40205: 0        40405: 3 (a)
 6:  40006: 0         40206: 0        40406: 3 (a)
 7:  40007: 0         40207: 0        40407: 3 (a)
 8:  40008: 0         40208: 0        40408: 3 (a)
 9:  40009: 70        40209: 0        40409: 2 (a)
10:  40010: 0         40210: 0        40410: 3 (a)

11:  40011: 70        40211: 0        40411: 2 (a)
12:  40012: 42        40212: 0        40412: 2 (a)
13:  40013: 70        40213: 0        40413: 2 (a)
14:  40014: 67        40214: 0        40414: 2 (a)
15:  40015: 43        40215: 0        40415: 2 (a)
16:  40016: 69        40216: 0        40416: 2 (a)
17:  40017: 70        40217: 0        40417: 2 (a)
18:  40018: 67        40218: 0        40418: 2 (a)
```

Figure 5.6 Modbus Slave Register Display Log

Table 5.3   Modbus Slave Register Display Log

Column		Description
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 (see note)	=	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
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 4-20mA
		3 = Digital NO
		4 = Digital NC
		5 = Digital Status
		6 = Analog 0–5VDC
		7 = Analog 0–10 VDC
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.

Note   The number displayed will be the sum of all active alarms. For example, if an input is above the High1and High2 limits, the number displayed will be 5 (1 + 4 = 5).

5.3.2 Modbus Packet Log

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

```
0003062706 M0013 485-Tx: 01 03 01 1C 00 02 04 31
0003062716 M0013 485-Rx: 01 03 04 3F 78 51 EC 4A 23
0003062736 M0014 485-Tx: 01 03 01 1E 00 02 A5 F1
0003062746 M0014 485-Rx: 01 03 04 43 F0 80 00 8E 44
0003062766 M0015 485-Tx: 01 03 01 20 00 02 C4 3D
0003062792 M0015 485-Rx: 01 03 04 43 F0 00 00 EF 84
0003062812 M0016 485-Tx: 01 03 01 22 00 02 65 FD
0003062832 M0016 485-Rx: 01 03 04 43 EF 80 00 BF 82
0003062852 M0017 485-Tx: 01 03 01 24 00 02 85 FC
0003062872 M0017 485-Rx: 01 03 04 43 71 00 00 BF AC
0003062892 M0018 485-Tx: 01 03 01 26 00 02 24 3C
0003062902 M0018 485-Rx: 01 03 04 43 70 00 00 EE 6C
0003062922 M0019 485-Tx: 01 03 01 28 00 02 45 FF
0003062932 M0019 485-Rx: 01 03 04 43 6F 00 00 DF AA
0003062952 M0020 485-Tx: 01 03 01 2A 00 02 E4 3F
0003062962 M0020 485-Rx: 01 03 04 42 74 FE 4B AE 06
0003062982 M0021 485-Tx: 01 03 01 2C 00 02 04 3E
0003062992 M0021 485-Rx: 01 03 04 42 70 FE 4B EF C7
0003063020 M0022 485-Tx: 01 03 01 2E 00 02 A5 FE
0003063030 M0022 485-Rx: 01 03 04 42 6C FE 4B 2E 01
0003063050 M0023 485-Tx: 01 03 01 30 00 02 C5 F8
```

Figure 5.7 Modbus Packet Log

Table 5.4 Modbus Packet Log

Column		Description
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.

5.3.3 Reset Modbus Port

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

Modbus Reset

Return
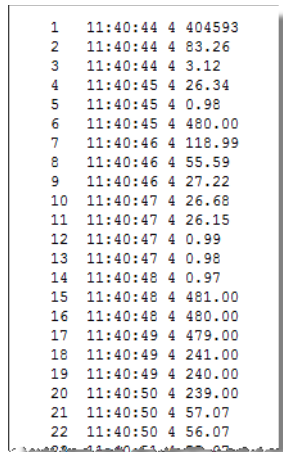
Figure 5.8 Modbus Rest Port Confirmation

5.3.4 Modbus Master Poll Data Log

This link allows users to view the raw data the FMS receives from the Slave(s).

Table 5.5 Modbus Master Poll Data Log

Column		Description
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   11:40:44 4 404593
 2   11:40:44 4 83.26
 3   11:40:44 4 3.12
 4   11:40:45 4 26.34
 5   11:40:45 4 0.98
 6   11:40:45 4 480.00
 7   11:40:46 4 118.99
 8   11:40:46 4 55.59
 9   11:40:46 4 27.22
10   11:40:47 4 26.68
11   11:40:47 4 26.15
12   11:40:47 4 0.99
13   11:40:47 4 0.98
14   11:40:48 4 0.97
15   11:40:48 4 481.00
16   11:40:48 4 480.00
17   11:40:49 4 479.00
18   11:40:49 4 241.00
19   11:40:49 4 240.00
20   11:40:50 4 239.00
21   11:40:50 4 57.07
22   11:40:50 4 56.07
```

Figure 5.9 Example Modbus Master Poll Data Log

5.3.5 SMS/Text Modem Log

This link allows users to view the communications between the FMS and the modem.

5.4. Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)

From the Configuration Menu, click on the **Inputs and Relays** link.

Select any input not currently in use.

Inputs											
S.Ch	(#)	Label	S.Ch	(#)	Label	S.Ch	(#)	Label	S.Ch	(#)	Label
T	(1)	Server Isle A	Eas	(2)	Server Room	T	(3)	Server Isle B	Nor	(4)	Server Room
Al	(5)	FM200 System	Alar	(6)	Water Leak	Alar	(7)	Water Leak	Alar	(8)	Water Leak
1.1 T	(9)	Server Isle C	1.2	(10)	(Demo) Alarm	1.3 T	(11)	Server Isle D	1.4 Wes	(12)	Server Room
1.5 T	(13)	Server Isle F	1.6 T	(14)	Server Isle G	1.7 Sou	(15)	Server Room	1.8 T	(16)	Server Isle I
1.9 T	(17)	Server Isle J	1.10 T	(18)	Server Isle K	1.11 T	(19)	Server Isle L	1.12 T	(20)	Server Isle M
2.1 Room	(33)	Generator	2.2 Fl	(34)	UPS Room 5th	2.3 Tem	(35)	Outside Air	2.4 Fl	(36)	MCC Room 3rd
2.5 Offic	(37)	1st Floor	2.6 Offic	(38)	2nd Floor	2.7 Motor/	(39)	Elevator	2.8 Cl	(40)	Tape Storage
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
4.1	(81)	ANALOG #4.1	4.2	(82)	ANALOG #4.2	4.3	(83)	ANALOG #4.3	4.4	(84)	ANALOG #4.4
4.5	(85)	ANALOG #4.5	4.6	(86)	ANALOG #4.6	4.7	(87)	ANALOG #4.7	4.8	(88)	ANALOG #4.8
4.9	(89)	ANALOG #4.9	4.10	(90)	ANALOG #4.10	4.11 Service	(91)	Out Of	4.12 Act	(92)	Dry Contact
5.1 Temper	(105)	Internal	5.2 Humidi	(106)	Internal						

Figure 5.10 Input and Relay Configuration Menu

This page allows users to configure the input features.

Figure 5.11 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" on page 185. 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.

Map Box Size: Customize the size of the mapped object. By default, the height of the object, as it appears on the map, is approximately 20 pixels, and the width automatically adjusts to the length of the text. This setting allows users to expand the size of the object to fill a defined area.

Map Coordinate: Fine tune the location of the object on the map. Refer to "Facility Mapping" on page 127 for further information.

Graphical Mapping: Designate the device's location on the FMS graphical map.

Test Map: View the mapped location of the point you're currently configuring.

5.5.   Modbus/SNMP Slave Units Configuration—Modbus Generic (Typical)

This Modbus/SNMP (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.

To access this page, select Modbus/SNMP Slave Units from the Configuration Menu.

Unit #	Protocol	Access	Address	Unit Description
1	Standard	Serial	1	Veris 8036 #1
2	Standard	Serial	2	Veris 8036 #2
3	Standard	Serial	3	Veris 8036 #3
4	Standard	Serial	4	Veris 8036 #4
5	Standard	TCP/IP	1	LD2100
6	Standard	TCP/IP	1	F110
7	Snmp	TCP/IP	0	Falcon - KW Utility Meter
8	Snmp	TCP/IP	0	TS-F1000
9	Standard	TCP/IP	1	Falcon FDS-Wi
10	Standard	Serial	10	Veris 8036 #10
11	Standard	Serial	0	(Blank)
12	Standard	Serial	0	(Blank)
13	Standard	Serial	0	(Blank)
14	Standard	Serial	0	(Blank)
15	Standard	Serial	0	(Blank)
16	Standard	Serial	0	(Blank)

Modbus/Snmp Units 17-32

Registers 1-100
Registers 101-200
Registers 201-300
Registers 301-400
Registers 401-500
Registers 501-600
Registers 601-628
Read / Preset Modbus Register
Preset Configuration

Figure 5.12 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 5.12 for the location of the **Unit#** links.

Figure 5.13 Example Modbus Slave Unit

Communications: Configures the FMS to send Modbus requests to a specific slave device over either a serial connection (EIA-232 or EIA-485) or over TCP/IP. This configuration can be different for each slave unit.

Protocol: The FMS supports three versions of the Modbus protocol, as well as SNMP v1:

- ♦ Modbus Standard

- ♦ Modbus Extended

- ♦ JBus

- ♦ SNMP V1

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

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

SNMP Community: Assign a community name to provide an added layer of security, and control access to the SNMP device.

Description: Enter a description for the Slave device.

Pager Alarms: 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.

Summary Relay: When any alarm is activated on the Modbus device, a designated relay can be tripped.

Map Coordinate: If coordinates do not appear in these boxes, then the Slave unit has not been added to the Falcon's graphical map. To add the device, click the Graphical Mapping link and refer to Chapter 7, "Facility Mapping" on page 127.

Once the device has been added to the map, you can use the X and Y coordinate boxes to fine-tune the link's location. If you edit the values in the boxes, be sure to click the Submit Changes button at the top of the screen to save the new information.

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.

Return: Click this link to return to the previous page.

Download xml for this device: Click this link to download xml from this specific Slave device.

Upload xml for this device: Click this link to upload xml to this specific Slave device.

Remove Device Registers: This button provides a quick way to delete one or multiple Modbus slave registers. If you click this button for a particular device, all related

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 the one shown in Figure 5.14. This page is used to navigate among the Modbus Master configuration registers.

Modbus Register Configuration	
# -Ut-Reg Label	# -Ut-Reg Label
1 -1 -40259-Energy KWH	51 -2 -40307-Minimum Demand KW
2 -1 -40261-Demand KW	52 -2 -40309-Maximum Demand KW
3 -1 -40263-Reactive Power VAR	53 -3 -40259-Energy KWH
4 -1 -40265-Apparent Power VA	54 -3 -40261-Demand KW
5 -1 -40267-Power Factor	55 -3 -40263-Reactive Power VAR
6 -1 -40269-Voltage L-L	56 -3 -40265-Apparent Power VA
7 -1 -40271-Voltage L-N	57 -3 -40267-Power Factor
8 -1 -40273-Current-Amps	58 -3 -40269-Voltage L-L
9 -1 -40275-Demand PhaseA-KW	59 -3 -40271-Voltage L-N
10 -1 -40277-Demand PhaseB-KW	60 -3 -40273-Current-Amps
11 -1 -40279-Demand PhaseC-KW	61 -3 -40275-Demand PhaseA-KW
12 -1 -40281-Power Factor PhaseA	62 -3 -40277-Demand PhaseB-KW
13 -1 -40283-Power Factor PhaseB	63 -3 -40279-Demand PhaseC-KW
14 -1 -40285-Power Factor PhaseC	64 -3 -40281-Power Factor PhaseA
15 -1 -40287-Voltage A-B	65 -3 -40283-Power Factor PhaseB
16 -1 -40289-Voltage B-C	66 -3 -40285-Power Factor PhaseC

Figure 5.14 Modbus Register Configuration Menu

Selecting a link to an individual register displays the configuration options for that register; see Figure 5.15. Instructions for completing the options on this page are described below.

Figure 5.15 Individual Modbus Configuration Screen

Switch View: Toggle this option to view either the Modbus Register or SNMP Register

Submit Changes Button: Click this button to save any changes entered on the page. If you access another page, or press the <<Prev or Next>> links without clicking the Submit Changes button, all your changes will be lost.

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 5.12, "Modbus Slave Unit Configuration" on page 100.

Register/Offset: Enter the Register Number for the data to be read. The Register Number is located on the Slave Units Modbus Register Map; see 5.8.1, "Slave Register Map" on page 111.

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 manufacturer's equipment guide for the register numbers and the data type.

Scaler: Select a multiplier for the data value.

Offset: Allows users to fine-tune analog values. Offset adjustment may be required by certain manufacturers.

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.

UOM/Map Label: Specify the unit of measure you are using for this specific 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.

OUM Conversion: Convert a unit of measure from the way it is communicated by the device to the way you would like to have it displayed.

- ◆ **deg C - deg F (1,10,100,1000 Scale)**

- ◆ **deg C - deg F (1/32 Scale**

- ◆ **kPa - PSI (1/8, 1/28 Scale)**

Alarm Thresholds: **High 2, High1, Low1, Low2** - Set high and low - or major and minor - thresholds for alarm analog alarm values being read by these points.

Map Box Size: Customize the size of the mapped object. By default, the height of the object, as it appears on the map, is approximately 20 pixels, and the width automatically adjusts to the length of the text. This setting allows users to expand the size of the object to fill a defined area.

Map Coordinate: Fine tune the location of the object on the map. Refer to for further information.

Graphical Mapping: Designate the device's location on the FMS graphical map.

Test Map: View the mapped location of the point you're currently configuring.

5.5.3 Read/Preset Single Register

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

Figure 5.16 Read/Preset Single Register Page

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.

To access this page, select Modbus Slave Units from the Configuration Menu (you must have already configured the Com Port1/Modbus/Telnet setting to Modbus Master BCM - 4 Units).

Modbus BCM Unit Configuration					
Unit #	Protocol	Access	Address	Unit Description	Register Link
1	Standard	Serial	0	BCM #1	
2	Standard	Serial	0	BCM #2	
3	Standard	Serial	0	BCM #3	
4	Standard	Serial	0	BCM #4	

Figure 5.17 Modbus BCM-4 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.

Figure 5.18 Individual Slave Configuration Screen

Communications: Configures the FMS to send Modbus requests to a specific slave device over either a serial connection (EIA-232 or EIA-485) 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

Clicking a **Modbus Registers** link next to the BCM on the Modbus BCM Unit Configuration page displays the following page.

BCM #1					
CB	Label	Value		CB	Label
1	BCM #1 Circuit Breaker #1	1.353		2	BCM #1 Circuit Breaker #2
3	BCM #1 Circuit Breaker #3	5.018		4	BCM #1 Circuit Breaker #4
5	BCM #1 Circuit Breaker #5	2.475		6	BCM #1 Circuit Breaker #6
7	BCM #1 Circuit Breaker #7	1.324		8	BCM #1 Circuit Breaker #8
9	BCM #1 Circuit Breaker #9	2.070		10	BCM #1 Circuit Breaker #10
11	BCM #1 Circuit Breaker #11	0.000		12	BCM #1 Circuit Breaker #12
13	BCM #1 Circuit Breaker #13	4.565		14	BCM #1 Circuit Breaker #14
15	BCM #1 Circuit Breaker #15	4.806		16	BCM #1 Circuit Breaker #16
17	BCM #1 Circuit Breaker #17	0.000		18	BCM #1 Circuit Breaker #18
19	BCM #1 Circuit Breaker #19	0.000		20	BCM #1 Circuit Breaker #20
21	BCM #1 Circuit Breaker #21	0.000		22	BCM #1 Circuit Breaker #22
23	BCM #1 Circuit Breaker #23	0.000		24	BCM #1 Circuit Breaker #24
25	BCM #1 Circuit Breaker #25	0.000		26	BCM #1 Circuit Breaker #26
27	BCM #1 Circuit Breaker #27	0.000		28	BCM #1 Circuit Breaker #28
29	BCM #1 Circuit Breaker #29	0.000		30	BCM #1 Circuit Breaker #30
31	BCM #1 Circuit Breaker #31	2.015		32	BCM #1 Circuit Breaker #32
33	BCM #1 Circuit Breaker #33	0.000		34	BCM #1 Circuit Breaker #34
35	BCM #1 Circuit Breaker #35	0.000		36	BCM #1 Circuit Breaker #36
37	BCM #1 Circuit Breaker #37	0.000		38	BCM #1 Circuit Breaker #38
39	BCM #1 Circuit Breaker #39	0.000		40	BCM #1 Circuit Breaker #40
41	BCM #1 Circuit Breaker #41	8.560		42	BCM #1 Circuit Breaker #42

Figure 5.19 Modbus Registers (BCM) Page

5.6.2.1 CB# Links

Pressing a **CB #** (CH#) link displays the Circuit Breaker Configurations for each BCM.

BCM #1					
CB	Label	Value	CB	Label	Value
1	BCM #1 Circuit Breaker #1	1.385	2	BCM #1 Circuit Breaker #2	1.357
3	BCM #1 Circuit Breaker #3	4.766	4	BCM #1 Circuit Breaker #4	0.000
5	BCM #1 Circuit Breaker #5	2.667	6	BCM #1 Circuit Breaker #6	0.000
7	BCM #1 Circuit Breaker #7	1.265	8	BCM #1 Circuit Breaker #8	9.104
9	BCM #1 Circuit Breaker #9	1.341	10	BCM #1 Circuit Breaker #10	0.000
11	BCM #1 Circuit Breaker #11	0.000	12	BCM #1 Circuit Breaker #12	0.000
13	BCM #1 Circuit Breaker #13	4.517	14	BCM #1 Circuit Breaker #14	0.000
15	BCM #1 Circuit Breaker #15	4.774	16	BCM #1 Circuit Breaker #16	0.266
17	BCM #1 Circuit Breaker #17	0.000	18	BCM #1 Circuit Breaker #18	0.000
19	BCM #1 Circuit Breaker #19	0.000	20	BCM #1 Circuit Breaker #20	0.000
21	BCM #1 Circuit Breaker #21	0.000	22	BCM #1 Circuit Breaker #22	0.000
23	BCM #1 Circuit Breaker #23	0.000	24	BCM #1 Circuit Breaker #24	0.000
25	BCM #1 Circuit Breaker #25	0.000	26	BCM #1 Circuit Breaker #26	0.000
27	BCM #1 Circuit Breaker #27	0.000	28	BCM #1 Circuit Breaker #28	0.000
29	BCM #1 Circuit Breaker #29	0.000	30	BCM #1 Circuit Breaker #30	0.000
31	BCM #1 Circuit Breaker #31	1.458	32	BCM #1 Circuit Breaker #32	0.000
33	BCM #1 Circuit Breaker #33	0.000	34	BCM #1 Circuit Breaker #34	0.000
35	BCM #1 Circuit Breaker #35	0.000	36	BCM #1 Circuit Breaker #36	0.000
37	BCM #1 Circuit Breaker #37	0.000	38	BCM #1 Circuit Breaker #38	0.000
39	BCM #1 Circuit Breaker #39	0.000	40	BCM #1 Circuit Breaker #40	0.000
41	BCM #1 Circuit Breaker #41	1.930	42	BCM #1 Circuit Breaker #42	0.000

Figure 5.20 Circuit Breaker Configurations for Individual BCMs

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** for Modbus Master BCM-16 Units 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. See 5.4., "Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)" on page 97 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 #	Protocol	Access	Address	Unit Description	Register Link
1	Standard	Serial	0	BCM #1	
2	Standard	Serial	0	BCM #2	
3	Standard	Serial	0	BCM #3	
4	Standard	Serial	0	BCM #4	
5	Standard	Serial	0	BCM #5	
6	Standard	Serial	0	BCM #6	
7	Standard	Serial	0	BCM #7	
8	Standard	Serial	0	BCM #8	
9	Standard	Serial	0	BCM #9	
10	Standard	Serial	0	BCM #10	
11	Standard	Serial	0	BCM #11	
12	Standard	Serial	0	BCM #12	
13	Standard	Serial	0	BCM #13	
14	Standard	Serial	0	BCM #14	
15	Standard	Serial	0	BCM #15	
16	Standard	Serial	0	BCM #16	

Figure 5.21 Modbus BCM-16 Unit Configuration Page

5.8.   Additional Modbus Information

5.8.1 Slave Register Map

Table 5.6   Slave Register Map

Register	Description	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)

Table 5.7 Alarm Bit Map

Bit Map		Description
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)

Table 5.8 Configuration Codes

Code		Description
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 Slave Units Configuration – BACnet/IP Master

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 "Master Protocol Selection" must be set to BACnet.

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.

Preset 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 , for more details.

5.9.1 BACnet 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 5.4., "Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)" on page 97, for details on how to configure an input for a BACnet slave device.

Figure 5.22 BACnet Configuration Page

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.

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 5.9.4, "BACnet Instance Register Links" on page 117, for more details.

5.9.2 BACnet Slave Unit 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 5.4., "Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)" on page 97, for details on how to configure an input for a BACnet slave device.

Bacnet Unit Configuration		
Unit #	Address	Unit Description
1	0.0.0.0	(Blank)
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

Bacnet Packet Log

Bacnet Master Data Log

Figure 5.23 BACnet Unit Configuration

5.9.3 Unit Number Links

Select the Slave's **Unit #** link to display the following page and allow for individual Slave configuration. See Section 5.4., "Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)" on page 97 for details on how to configure the option presented here.

Figure 5.24 Individual Slave Unit Configuration Page

Return to the BACnet Unit Configuration page and click on a BACnet Instances link at the bottom of the page to configure individual instances (registers).

#	Unit	Type	Instance	Label		#	Unit	Type	Instance	Label
1	0	Analog Input	0	Register #1		26	0	Analog Input	0	Register #26
2	0	Analog Input	0	Register #2		27	0	Analog Input	0	Register #27
3	0	Analog Input	0	Register #3		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

Figure 5.25 BACnet Instance Configuration

5.9.4 BACnet Instance Register Links

Selecting a **BACnet Instances** link at the bottom of the BACnet Slave Unit Configuration page displays the following. Figure 5.26 shows the navigation screen for configuring the BACnet registers.

Bacnet Instance #1 Configuration

Submit Changes   Next >>

Unit: 0   (0 - 16)

Type: Analog Input ▼

Instance: 0

Label: Register #1

Binary Alarm: ☐

Return

Figure 5.26 BACnet Configuration Registers Page

Selecting a link to an individual register displays the configuration options for that register. See 5.4., "Configuring Inputs and Relays for Slave Units (Modbus, SNMP, or BACnet)" on page 97, for details on how to configure the option presented here.

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 EIA-232 enabled devices. For instance, a user could properly configure the FMS, open a telnet session and then connect to an LD5100 interface over Com1 EIA-232.

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 EIA-232 port allows communications between the FMS and one other device (point-to-point connection). The EIA-232 port has maximum cable length of 50 feet (15.2m).

Table 5.9 COM1 DB9 Male Pin Out

Pin		Description
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

Table 5.9 COM1 DB9 Male Pin Out

Pin		Description
Pin 7	=	Request to Send (internally connected to Pin 8)
Pin 8	=	Clear to Send (internally connected to Pin 7)
Pin 9	=	No Connection
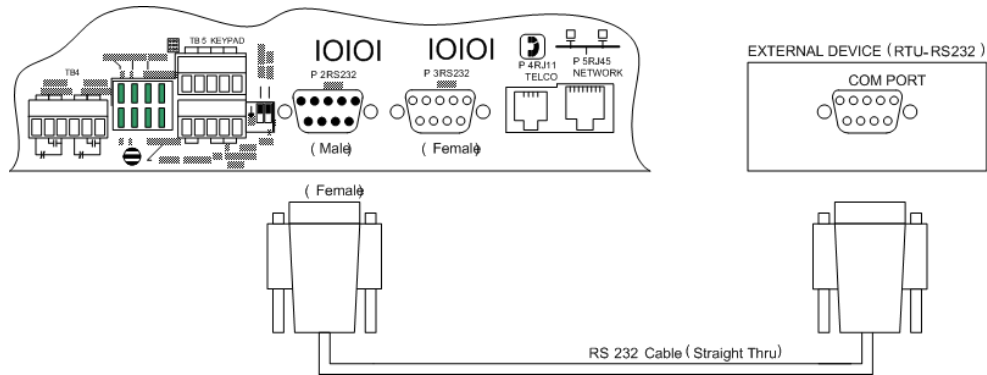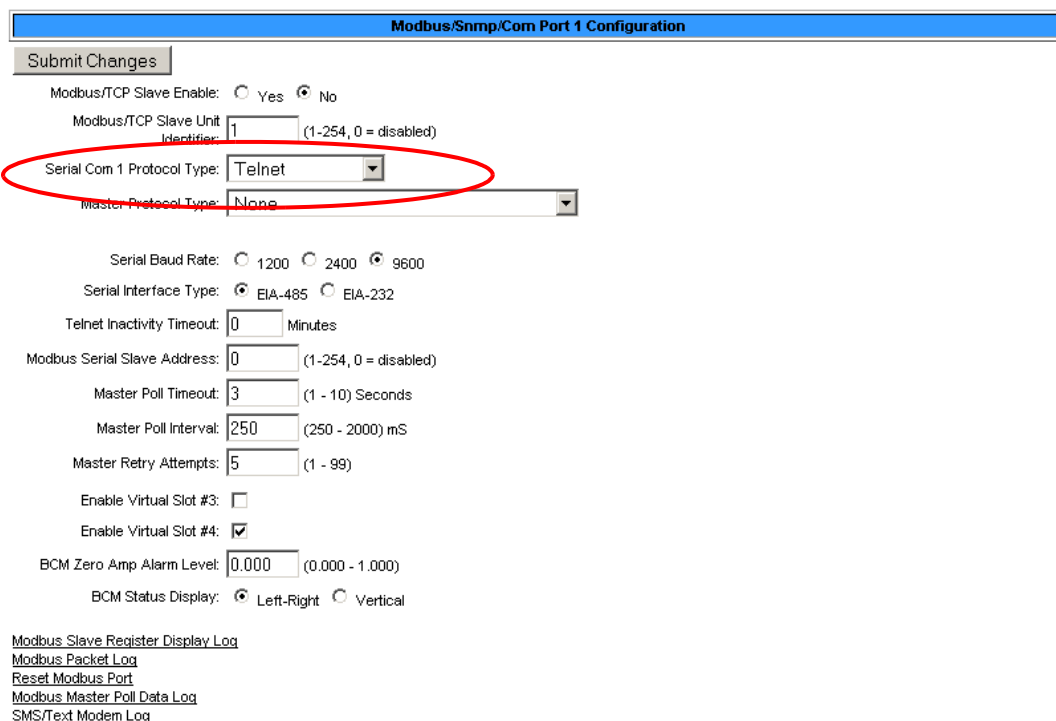
Figure 5.27 FMS Connection to an EIA-232 Device

Connect a nine-pin, straight-through serial cable to the FMS and to the other device.

Once you connect the serial cable, the FMS automatically switches to EIA-232 mode.

5.10.2 Telnet/COM1 Configuration

The COM Port1/Modbus/SNMP/Telnet Configuration page allows the user to configure the FMS Telnet features.

Figure 5.28 COM Port1/Modbus/SNMP/Telnet Configuration Page

Serial Com1 Protocol Type: Configures the Serial COM Port 1 (EIA-232 or EIA-485). The options are:

♦ **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 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:

1 Open a Command Prompt window and type the following:

Telnet[sp](Falcon IP address)[sp](Port number)

See the example in .

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.

Figure 5.29 Telnet Communication, IP Address of 10.0.0.108, Port 3201

2 Press **Enter**. The device connects.

Figure 5.30 Example Telnet Connection Showing Specific Parameters

Once a Telnet connection is established, the menu displays for the connected device. Menus vary depending on the device.

PUE/DCiE

6.1.   Facility Power Monitoring

PUE and DCiE calculations are valuable metrics used by data centers to track their energy efficiency. PUE measures the efficiency of the computing equipment, while DCiE measures the efficiency of the data center's infrastructure. Maximizing the energy efficiency of computing equipment and the data center infrastructure helps reduce energy costs and can minimize data center down time.

The FMS provides a set of tools that help track real-time PUE and DCiE information, as well as logging long-term PUE/DCiE trending information.
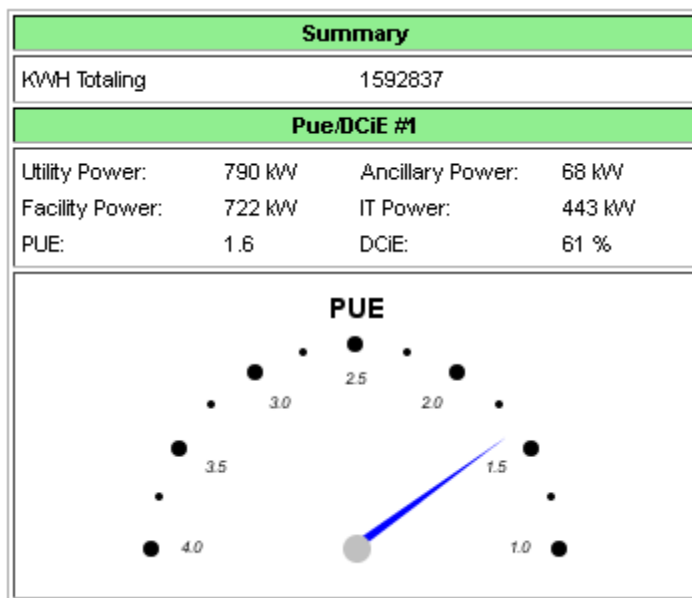
Figure 6.1   PUE/DCiE Data on FMS Home Page

Before you can generate PUE/DCiE data through the FMS, you need some data for the FMS to work with. Submeters need to be wired, or SNMP/Modbus communications need to be established to gather the following kilowatt (kW) readings:

Utility load - The main power feed into the building - usually obtained through a submeter.

IT load - Power consumed by all computing devices - usually obtained through a submeter or through protocol SNMP/Modbus communications.

Ancillary load (optional) - The portions of the building outside the data center, including warehouse space, offices, etc. - usually obtained through a submeter or through protocol SNMP/Modbus communications.

6.2.   Designating PUE/DCiE Data

1 Type the IP address of your FMS into the address bar of your web browser. Enter your username and password.

2 Before you can generate the PUE/DCiE data, you need to know where to tell the FMS to find the raw kW readings. The Modbus registers for this information should already be configured. On the FMS interface, go to Configuration > Modbus/SNMP Slave Units.

3 Click the appropriate link to access the range of Registers where your devices are located. Write down the index numbers of the kW-related Modbus registers. You'll need to enter these index numbers on the PUE/DCiE Configuration page..

Modbus Register Configuration	
# -Ut-Reg Label	# -Ut-Reg Label
1 -1 -40259-Energy KWH	51 -2 -40307-Minimum Demand KW
2 -1 -40261-Demand KW	52 -2 -40309-Maximum Demand KW
3 -1 -40263-Reactive Power VAR	53 -3 -40259-Energy KWH
4 -1 -40265-Apparent Power VA	54 -3 -40261-Demand KW
5 -1 -40267-Power Factor	55 -3 -40263-Reactive Power VAR
6 -1 -40269-Voltage L-L	56 -3 -40265-Apparent Power VA

Modbus Registers - kW Data

Figure 6.2   Gather Modbus Register Information

4 On the FMS interface, go to Configuration>PUE/DCiE.

5 At the top of the PUE/DCiE Configuration page, you'll see a drop down menu to enable or disable the PUE/DCiE feature. Select an option as follows to begin the setup:

DC1 - generate one PUE/DCiE value

DC2 - generate two PUE/DCiE values

DC1+2 - generate two PUE/DCiE values and a summary of those values

Select **Enable** to begin the setup.

6 You can view PUE/DCiE information on the main FMS page in two ways - either as statistics, or as statistics and a gauge. The FMS can generate a gauge graphic on its home page that allows you to see a graphical representation of either your PUE or your DCiE

value. If you'd like to display this gauge, select either PUE or DCiE from the drop down menu next to the PUE/DCiE Gauge field. If you leave this setting disabled, only statistics will display on the FMS home page.

Figure 6.3 Enable PUE/DCiE and Designate Gauge Behavior

7 You can also generate two summary values that will summarize analog points monitored by the FMS. Enable either 1 or 2 summary values in the Summary drop-down menu, or leave this field disabled.

If you've decided to create summary values, enter a label for each summary value in the corresponding box. This label will appear with the summary values on the FMS home page.

8 Next you'll see a table labeled Meters. Up to 32 inputs can be used to develop metrics. Each number represents one submeter or output device's kW reading. First, you'll need to specify if the device is a physical meter or a Modbus/SNMP input. Next, input the Modbus register index number for the data. Then, you'll need to designate if the reading represents an IT load, a utility load, an ancillary load, or a summary value. Since you can generate two sets of metrics, the load types are differentiated with a 1 or a 2. Make sure your selection corresponds with the correct metric.

#	Port	Point	Load Type	Info	Last Reading
1	Modbus/Snmp	2	IT	Demand KW	88
2	Modbus/Snmp	28	IT	Demand KW	92
3	Modbus/Snmp	54	IT	Demand KW	138
4	Modbus/Snmp	80	Ancillary	Demand KW	138
5	Modbus/Snmp	129	Utility	KW Reading	480
6	Physical	0	Utility		
7	Physical	0	Utility		
8	Physical	0	Utility		
9	Physical	0	Utility		
10	Physical	0	Utility		
11	Physical	0	Utility		
12	Physical	0	Utility		
13	Physical	0	Utility		
14	Physical	0	Utility		
15	Physical	0	Utility		
16	Physical	0	Utility		

Figure 6.4 Designate kW Gathering Devices

9 Once all your information has been loaded into the table, click the **Submit Changes** button to save the information. This process may take up to two minutes. Once the data is saved, the Info and Last Reading fields of the table will populate.

10 Information has also populated at the bottom of the chart. Use this information if you wish to output the PUE/DCiE information to a third party application or generate PUE/DCiE trending information. Modbus, BACnet, and SNMP output information is provided.

```
Local Modbus Registers: DCiE #1: 40181 PUE #1: 40182 DCiE #2: 40183
PUE #2: 40184 DCiE #1+2: 40185 PUE #1+2: 40186 Summary #1: 40187 Summary #2: 40188
Local Bacnet Instances:
DCiE #1:    ai:1629 PUE #1:    ai:1630
DCiE #2:    ai:1631 PUE #2:    ai:1632
DCiE 1+2:   ai:1633 PUE 1+2:   ai:1634
Summary #1: ai:1635 Summary #2: ai:1636
Local Snmp Objects:
DCiE #1:    Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.629 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.629
PUE #1:     Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.630 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.630
DCiE #2:    Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.631 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.631
PUE #2:     Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.632 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.632
DCiE #1+2:  Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.633 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.633
PUE #1+2:   Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.634 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.634
Summary #1: Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.635 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.635
Summary #2: Data:  1.3.6.1.4.1.3184.1.5.1.12.4.3.1.3.636 Label: 1.3.6.1.4.1.3184.1.5.1.12.4.3.1.4.636
```

Figure 6.5 Data for Third Party Applications

6.3.   PUE/DCiE Trending

Now that the FMS is generating PUE/DCiE information, it can log long-term trending data. The trending program can log 3840 entries. Once 3840 entries have been logged, the system will eliminate 40 entries at a time and overwrite the data, from oldest to newest. Long-term trending is the most effective way to use PUE/DCiE data.

6.3.1 Format Trends

1 On the FMS interface, go to Configuration>Trends.

2 You may already have some trending tasks operating on the FMS. Select the next available index number. Use the following points to trend your data:

Point Value	Trended Data
629	DCiE 1
630	PUE 1
631	DCiE 2
632	PUE 2
633	DCiE 1 + 2
634	PUE 1 + 2
635	Summary 1
636	Summary 2

3 Select **Modbus/SNMP** as the type.

4 Now, determine the interval at which you wish to trend the data. The interval is selectable, from a 1 minute interval to an 8 hour interval - it just depends how detailed you'd like your data to be. At a 1 minute interval, the FMS will store approximately 2.5 days worth of data

before it begins to overwrite. At an 8 hour interval, the FMS will store approximately 3.5 years of data before it begins to overwrite the oldest data.

#	Point	Type	Interval	Info	Format
				Trends	
1	629	Modbus/Snmp ▾	15 Min ▾	DCiE	Format Trend 1
2	630	Modbus/Snmp ▾	15 Min ▾	PUE	Format Trend 2

Figure 6.6   Establish Trending

5   Click the **Format Trend** button to save your information. Once the information has been saved, you'll notice the Info field for that trend will populate itself.

NOTE   Because of the way the FMS saves its data, you need to fully configure one trend and click the **Format Trend** button on its line before you configure the next trend. If you attempt to configure multiple trends at once, only the data associated with the Format Trend button you click will be saved.

6.3.2 View Trends

1   On the FMS interface, go to History>Extended Trends.

Point	Description	Graph	CSV
1	DCiE Percent	Graph	CSV
2	PUE	Graph	CSV

Figure 6.7   View your Trending Data

2   Locate the point number you configured. Click the **Graph** link to access a Java-based graph of the data. The X and Y axis of the graph are adjustable. Click and drag the bars on the axes to a more or less detailed view of your data.
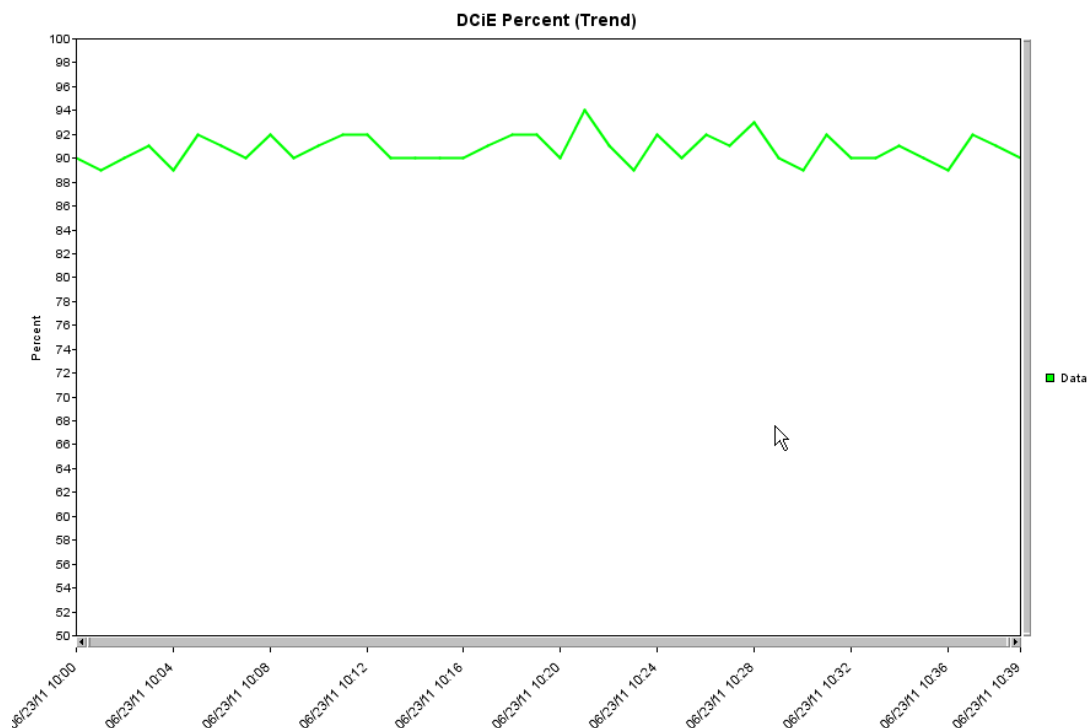
Figure 6.8   Trending Graph

3 Click **CSV** to view a comma separated value download of your information. If you select the CSV option in Internet Explorer and Excel is loaded on your computer, the data will be displayed in an Excel spreadsheet. If you select the CSV option with Mozilla Firefox, the information will display as comma separated values in a separate browser window with no additional formatting.

	A	B	C
1	Name:	TS-FMS	
2	Chan:	629 (modbus)	
3	Type:	Trend - 1 Minute	
4	Desc:	DCiE Percent	
5	UOM:		
6	Entries:	41	
7	Last Sequence Number:	41	
8	Date	Time	Value
9	6/23/2011	10:00	90
10	6/23/2011	10:01	89
11	6/23/2011	10:02	90
12	6/23/2011	10:03	91
13	6/23/2011	10:04	89
14	6/23/2011	10:05	92
15	6/23/2011	10:06	91
16	6/23/2011	10:07	90
17	6/23/2011	10:08	92
18	6/23/2011	10:09	90
19	6/23/2011	10:10	91
20	6/23/2011	10:11	92
21	6/23/2011	10:12	92
22	6/23/2011	10:13	90
23	6/23/2011	10:14	90
24	6/23/2011	10:15	90
25	6/23/2011	10:16	90

```
Name:,TS-FMS
Chan:,629 (modbus)
Type:,Trend - 1 Minute
Desc:,DCiE Percent
UOM:,
Entries:,45
Last Sequence Number:,45
Date,Time,Value
06/23/11,10:00,90
06/23/11,10:01,89
06/23/11,10:02,90
06/23/11,10:03,91
06/23/11,10:04,89
06/23/11,10:05,92
06/23/11,10:06,91
06/23/11,10:07,90
06/23/11,10:08,92
06/23/11,10:09,90
06/23/11,10:10,91
06/23/11,10:11,92
06/23/11,10:12,92
06/23/11,10:13,90
06/23/11,10:14,90
06/23/11,10:15,90
06/23/11,10:16,90
```

IE, exported to Excel   Firefox, exported as CSV

Figure 6.9 CSV Data

7

FACILITY MAPPING

7.1.   FMS Mapping Feature

The FMS allows users to upload a map of their facility and populate it with FMS data. This provides users with a real-time view of their facility, and the physical location and status of all their digital, analog, and Modbus/SNMP slave inputs.

Through the FMS mapping process, the Falcon creates an overlay for an uploaded map image. It superimposes the locations of your inputs - based on coordinates you designate - over the top of your map image. Once uploaded and populated, the map is accessible through the Floor Map link on the FMS home page.
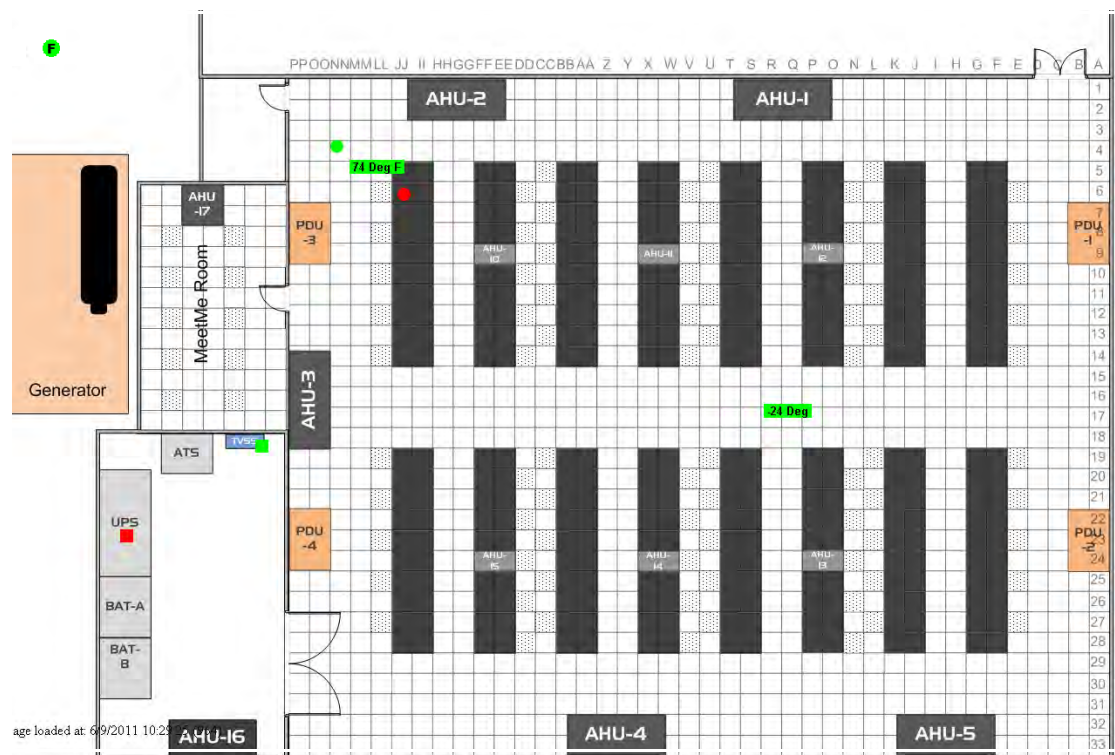
Figure 7.1   FMS Map

Mapping is the last step in the FMS setup process. Do not attempt to map your facility until your monitoring area is completely assembled - all of your sensors and equipment are in place, wired, and functional. Mapping is faster if all your inputs have been configured through the FMS Configuration Menu.

Several tasks are key to the success of facility mapping. First, update the firmware on your FMS (refer to Chapter 9 for firmware uploads). Facility mapping is only available on FMS firmware version 8.6.4 or greater.

Secondly, you'll need a map of your facility. The map needs to be in .jpg format, and must have a file size less than 500kb. The maximum physical size of the map is 4000 x 4000 pixels. Since the Falcon never actually edits your map, if you should need to update your map image, previously designated map points will not need to be reconfigured. As long as you do not change size of your map, previously mapped coordinates should not need to be adjusted when you upload a new version of your map.

7.2.   Upload the Map Image

1 Type the IP address of your FMS into the address bar of your web browser. Enter your username and password.

2 On the FMS interface, go to Configuration>Map.

3 Click the **Browse** button.

4 Locate and select the map file (.jpg) that you have previously created and saved. Click the **Open** button. The path and name of the map file displays in the field to the left of the Browse button.
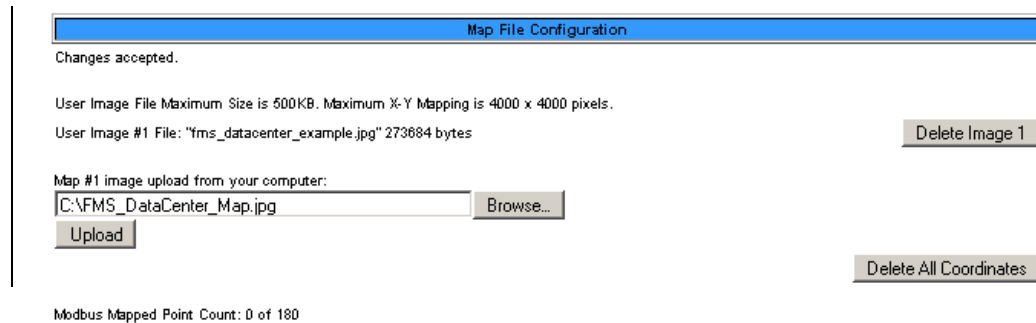
Figure 7.2 Map Configuration Page

5 Click the **Upload** button.

The Upload button displays a *Please Wait* message while the file uploads. The upload should take about seven seconds. Once the image of the map has uploaded, the FMS displays a message confirming that it has uploaded the new file.
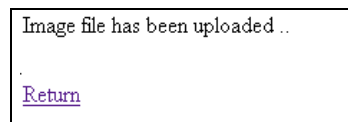
Figure 7.3 Map Image Upload Message

If you receive the following error message, the file did not upload:

Error: File type is not supported.

Hit the back button or click here to return.
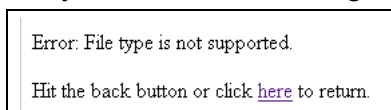
Figure 7.4 Map Image Upload Error Message

Verify your file's size and type, and repeat the upload process.

6 Once the file has uploaded, click **Return** to exit to the Map File Configuration Menu.

7 Return to the FMS home page. Click the **Floor Map** link at the bottom of the page to view your uploaded map image and ensure it has uploaded correctly.

7.3.   Map Inputs

Once the map image has been uploaded, you're ready to designate inputs on the map.

Throughout the mapping process, you will use a set of crosshairs to designate the location of your mapped inputs. The FMS firmware interprets the area in the lower right quadrant of the crosshairs as your input insertion point. Therefore, the point you're mapping appears on the map wherever that lower right quadrant is located when you click the mouse to designate the object's location.
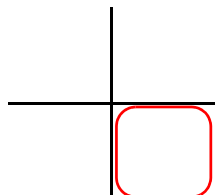
Figure 7.5 FMS Mapping Crosshairs - Insertion Point

When mapped, inputs appear on the map as follows:

Input	Map Display
Analog	Value on a colored background
73 Deg F	Green - OK
73 Deg F	Yellow - Stage 1 alarm
73 Deg F	Red - Stage 2 alarm
Digital	Colored square
	Red or green, represents the on/off value
Modbus/SNMP slave	Colored circle
	Green - OK
	Yellow - High 1 / Low 1 analog alarm
	Red- Stage 2 analog alarm or digital alarm change of state
	Orange - Loss of communications
FMS Home Link	Colored circle with F in the center
	Green - OK
	Red - A point on the system is in alarm

Figure 7.6 FMS Map Key

7.3.1 Map Analog and Digital Input Points

1 From the FMS home page, go to Configuration>Inputs and Relays. All of your previously configured FMS inputs will display.

Figure 7.7 FMS Input/Output Configuration Menu

2 Click the **link** to take you to the Configuration screen for the first input.

3 At the very bottom of the Configuration Input screen you'll see a field labeled Map Coordinate: X, Y and a Graphical Mapping link. Click the **Graphical Mapping** link.

Figure 7.8 FMS Input Configuration Menu

4 The Graphical Mapping link takes you to a view of your map image. This is where you'll designate the physical location of Input #1. As you drag your mouse over the image, note that crosshairs appear. Use these crosshairs to pinpoint the location of the Input.
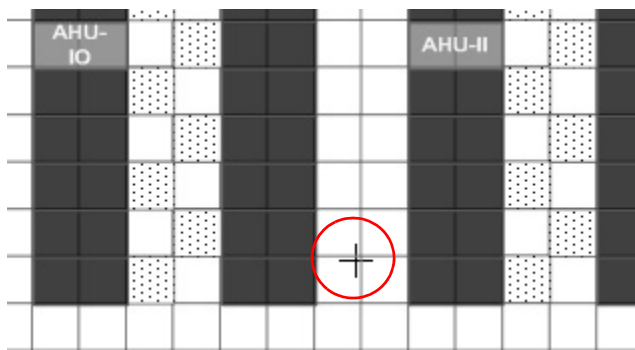
Figure 7.9 FMS Mapping Crosshairs - Insertion Point

5 Click once to designate the location of the input. You'll see a brief *System Updating* message, and then be redirected back to the Configuration Input page. You'll then notice that the X and Y coordinate boxes at the bottom of the page have been filled in with the location you selected when you clicked the crosshairs on the map. You can accept these coordinates as they are, or if you feel a need to fine tune the location, you can edit the coordinates directly.

6 You will also see Map Box Size fields. These fields allow you to adjust the size of the input as it appears on the map. Analog inputs appear on the map as a value, highlighted by a red, yellow, or green box. Changing the numbers in the Map Box Size fields adjusts the size of the highlighted area. You can expand the box to fill a predetermined area on your map, or leave it the same size as the displayed analog value.

NOTE Unlike configuring the inputs themselves, you do not need to click the Submit Changes button on each Configuration Input page to save the map coordinates. The FMS saves the coordinates before it populates them in the X,Y coordinate boxes. If, however, you choose to manually adjust the values in the coordinate boxes, you will need to click the Submit Changes button to save those adjusted values.

7 Click the **Next Input**>> link at the top of the page to map the next input.

NOTE The map you see through the Configuration screens is ONLY a view of the input you're mapping - not a comprehensive view of all the points mapped on the FMS. Through this view, the FMS is simply accepting data for ONE mapped point at a time, not showing you the map in its entirety. To view the entire map, go to the FMS home page and click the Floor Map link on the bottom left corner. This will show you all inputs mapped to date.

7.3.2 Map Modbus and SMNP Slave Units

Modbus and SNMP Slave Units are mapped just like analog and digital inputs.

1 From the FMS home page, go to Configuration>Modbus/SNMP Slave Units. All of your previously configured points will display.

Figure 7.10 Modbus/SNMP (Slave) Unit Configuration Screen

2 Click on the number of the unit you wish to map. This will take you to the Configuration page for that device.

Figure 7.11 Mapping Point Insertion

3 Near the middle of the Configuration screen, you'll see the same Map Coordinate: X, Y fields and Graphical Mapping link you saw on the analog and digital input configuration screen. Click the **Graphical Mapping** link and use the crosshairs to pinpoint the location of the Modbus device or SNMP slave unit.

4 Click the mouse once to designate the location. You'll see a brief *System Updating* message, and then be returned to the Modbus/SNMP Slave Configuration page. The X and Y coordinate boxes will be populated with the coordinates you designated. If you would

like to fine tune the location by adjusting the coordinates or alter the map box size, please remember to click the **Submit Changes** button once your adjustments are complete.

5 Click the **Next >>** link at the top of the page to map the next device.

NOTE When you map a Modbus or SNMP slave unit device, you are mapping its physical location. The circle that appears at the map location is a clickable link that takes you to a table that details the status of the points monitored by the device. Click the **Floor Map** link at the bottom of that page to return to the floor map.

LD2100			
Leak Detected	Leak Distance 0	Cable Length 699	Resistance/Ft 2788
Cable Break	Units 1=Ft; 0=Meters 1	Loop1 Resistance 1947	
Cable Contamination	Leakage Current on Cable 0	Loop2 Resistance 1951	

Floor Map

Figure 7.12 Modbus / SNMP Slave Unit Detailed View

7.3.3 Add a Link to the FMS Home Page

You can also add FMS home page link to the map. The link will appear as a round circle with the letter **F** in the middle. Clicking on this image on the map will take you to the FMS home page.

1 From the MFS home page, go to Configuration>System. At the bottom of the System Configuration page, you'll see the Map Coordinate: X, Y fields and the Graphical Mapping link. Click the **Graphical Mapping** link.

2 Use the crosshairs to designate the location of the link. Once you click the mouse, the link's location will be saved and you'll be returned to the System Configuration page.

3 If necessary, fine-tune the map coordinates in the X and Y boxes. If you manually adjust the coordinates, you must click the **Submit Changes** button to save the adjusted data.

7.4. Back Up the Map Data

Once you've finished mapping all your devices, return to the FMS home page and click the **Floor Map** link. Verify the accuracy of your map. If your map is complete and accurate, it's time to back up the data.

1 From the FMS home page, go to Configuration>Flash Program

2 Click the link that says **Download FCF Configuration File (.xfg - 128k)**

3 If you're using Internet Explorer, a File Download pop-up will appear. Click the **Save** button. Navigate to the location where you'd like to save the file. You can use any file name, but the file name MAY NOT contain spaces, and must be a .xfg file format.

4 If you're using Mozilla Firefox, a pop-up window will appear. Select Save File and click the **OK** button. The file will save into the Downloads folder on your computer, typically located in Documents and Settings>My Documents. After the download is complete, you can navigate to it and rename it as you'd wish. Again, you can use any file name, but the file name MAY NOT contain spaces, and must be a .xfg file format.

FMS User Guide

8

EIA-232 INTERFACE

The FMS EIA-232 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 EIA-232 port. If the FMS is not yet connected to a PC, connect the FMS EIA-232 COM2 port as follows:

1 Connect the EIA-232 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, then press **?** 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.

8.1.   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 five 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 then 20 seconds, there is a fault with the unit and service is required, contact RLE Tech support for more information.

8.2. 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 `10.0.0.188`. 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 Table 8.1.

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

8.3. Main Menu

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

Table 8.1 EIA-232 Main Menu

Command	Description	Function
netcfg	Network Configuration	`netcfg` displays the current MAC address, IP address, subnet mask, default gateway. Users can set the MAC address, IP address, Subnet mask, default gateway, ping, network debug, network statistics, arp table, mail trace1, mail trace2 and test email.
time	Display Date/ Time	`time` displays the FMS current time and date. To enter the time manually, type time one space then the current time in 24 hour format, including the seconds; e.g., hh:mm:ss
date	Display Date/ Time	`date` displays the FMS current time and date. To enter the date manually, type date one space then the current time date; e.g., mm/dd/yy.
reset	bootloader Menu	`reset` displays the FMS bootloader menu. The options are mac, ip, nm, dg, nd, ns, arp, ping, time, date, reset, id, blank, erase prgm, load prgm xmodem, erase saX, run, diag and rlyx.
id	Firmware Identification	`id` displays the FMS unit name, firmware file name and file size.

8.3.1 Network Configuration – netcfg

Typing `netcfg` at the command prompt on the Main Menu displays the **Network 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; see Table 8.2 for the Main Configuration Menu Options.

Table 8.2   Main Configuration Menu Options (SC)

Command	Description	Function
mac	Media Access Control	`MAC` will display the current MAC address for the FMS. The MAC address should never be changed on the FMS, if it needs to be changed, contact RLE Technologies.
ip	Internet Protocol	`IP` is the network address that is part of the TCP/IP protocol suite for the FMS to communicate over the network.
nm	Subnet Mask	`nm` allows users to configure the subnet mask address for the network.
dg	Default Gateway	`dg` allows the user to configure the default gateways/router address for the network.
ping	ICMP Ping	`ping` allows users to send a communication request to other network device top check for network conductivity.
nd	Network Debug	`nd` allows users to troubleshoot the network devices seen by the FMS.
ns	Network Statistics	`ns` allows users to view the network activity seen by the FMS.
arp	Address Resolution Protocol	`arp` allows users to view the arp table entries by the FMS.
mt1	Mail Trace 1	`mt1` allows users a simple view of the communications between the mail server and FMS while trying to sending an email.
mt2	Mail Trace 2	`Mt2` allows users a detailed view of the communications between the mail server and FMS while sending an email.
tm	Test Mail	`tm` allows users to generate a test email from the FMS to the mail server. Users can view the communication between the FMS and mail server. The email page must be configured for this test feature to work.

8.3.1.1   Bootloader Menu

The **bootloader menu** is accessed by typing `reset` at the command prompt. 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 8.3   IP Configuration Menu

Command	Description	Function
mac	Media Access Control	MAC will display the current MAC address for the FMS. The MAC address should never be changed on the FMS, if it needs to be changed, contact RLE Technologies.
ip	Internet Protocol	IP is the network address that is part of the TCP/IP protocol suite for the FMS to communicate over the network.
nm	Subnet Mask	nm allows users to configure the subnet mask address for the network.
dg	Default Gateway	dg allows the user to configure the default gateways/router address for the network.
ping	ICMP	ping allows users to send a communication request to other network device top check for network conductivity.
time	Time	time displays the FMS current time and date. To enter manually, type time one space then the current time in 24 hour format, including the seconds. example: hh:mm:ss.
date	Date	date displays the FMS current time and date. To enter manually, type date one space then the current time date. example: mm/dd/yy.
reset	Bootloader	reset allows the user to return to the bootloader menu
id	Firmware Identification	id displays the current firmware file name and file size.
blank	Firmware fileCheck	blank displays what firmware files are present in the FMS memory.
erase prgm	Erase Firmware	erase prgm allows users to erase the back up firmware file in the FMS.
Load prgm xmodem	Load firmware file via the EIA-232	Load prgm xmodem allows users to upload firmware files via the EIA-232 using a serial packet transfer with a terminal emulation program.
erase saX	Erase sectors of memory	erase saX allows users to erase the specific sections of memory from the FMS.
run	Start Application	run allows users to erase the back up firmware file in the FMS.
diag	Diagnostics	diag allows users to run the current firmware file for the FMS to run its application.

REMOTE ACCESS

9.1. 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 displays on the screen. Leave the username field blank. Type the password and press **Enter**. The session begins.

Note The factory default password is `rletech` (case-sensitive).

Type a question mark (**?**) to view the **Help 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 2.3.1, "Set the FMS IP Address" on page 32. There is, however, a limited command set for remote access. The available commands are shown in the following screen shot:

```
FCF Modem Help Menu
id - display program info
ca - print current alarms
ka - kill all alarms notifications
aa - alarm acknowlege by code (xxxx)
ip   XXX.XXX.XXX.XXX   - enter an IP address
nm   XXX.XXX.XXX.XXX   - enter a net mask
dg   XXX.XXX.XXX.XXX   - enter a default gateway
mss (1436/536) tcp max seq size
FCF>
```

Figure 9.1   FMS Dial-Up Menu

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.

10

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.

10.1. 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

10.2.   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 Internet Service Provider (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** 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.

11

LOADING FIRMWARE AND CONFIGURATION DATA

11.1.   Loading FMS Firmware

You can download current and some past versions of firmware from RLE's web site at www.rletech.com. It is important to confirm the correct version of firmware before downloading and installing 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 with bootloader 7.x.x support firmware version 7.x only.

♦ FMS-X/FMS-XXXX With Bootloader 2.x.x supports firmware version 8.3.x only.

♦ FMS-X/FMS-XXXX With Bootloader 3.x.x supports firmware version 8.4.x only.

WARNING

DO NOT ATTEMPT TO LOAD THE WRONG FIRMWARE ONTO THE FMS. If you have any questions regarding firmware compatibility, visit our FMS web page at www.rletech.com or call us directly.
The firmware load procedure involves using the MIME (multipurpose Internet mail extensions) standard from the FMS web interface. To load firmware to the FMS:

1 Go to the RLE website Resources page at http://www.rletech.com/resources/.

2 Scroll down to the Falcon section and locate the firmware (a .bin file) for the FMS. *Using the same filename*, save it to a local disk.

IMPORTANT Do not change the name of the firmware file when you save it. Otherwise, the FMS will not recognize the file.

3 On the FMS interface, go to Configuration>Flash Program.
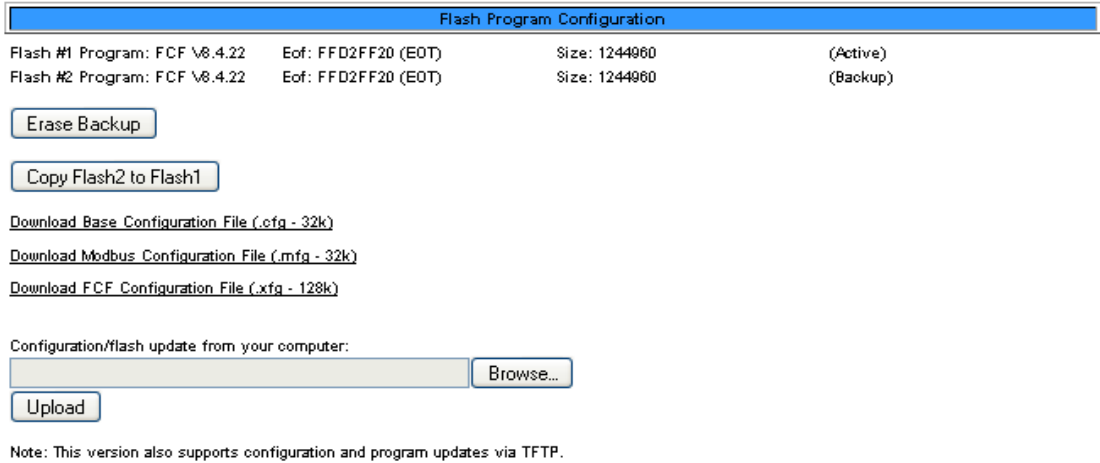
Figure 11.1 Flash Program Configuration Page

4 Click the Browse button.

5 Locate and choose the firmware file (.bin) that you saved from the RLE website.

The path and name of the firmware file (.bin) displays in the field to the left of the Browse button.
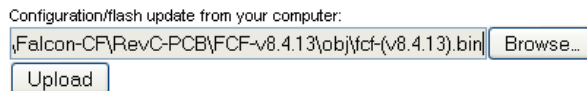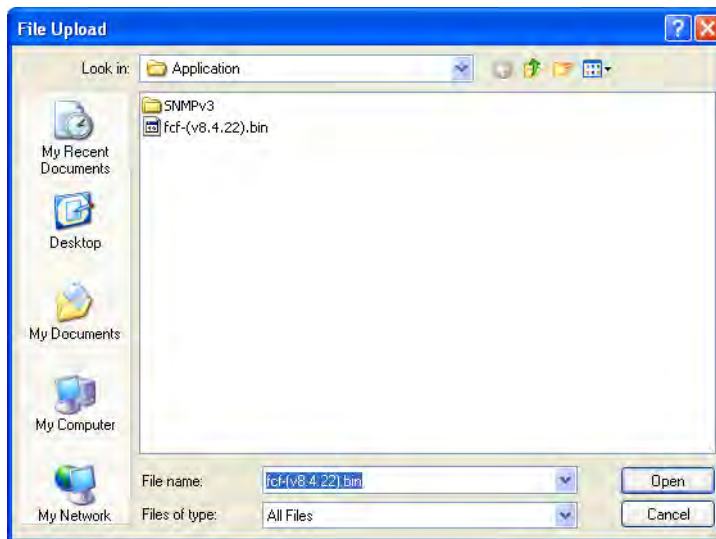
Figure 11.2 Choosing a Firmware File

6 Click the Upload button.

The firmware is loaded while the FMS displays a message confirming that it is loading the new file.

File has been uploaded and bin file verified

File will now be copied to flash #2, this will take about 60 seconds

Then verify the file is contained in flash #2 and then press the Copy Flash2 to Flash1 button

If your browser does not automatically redirect you, please click here after waiting.

Figure 11.3 Firmware Load Messages

The file is loaded to the Flash #2 Program area, which is also called the Backup area. The Flash #1 Program area (also called the Active area) contains the current flash firmware that is in use.

7 To copy the firmware you just uploaded from Flash #2 Program to Flash #1 Program, click the Copy Flash2 to Flash1 button. The following prompt displays:

The page at http://63.253.110.243 says:

Are you sure? - This will erase Flash #1 and Copy Flash #2 to #1

OK   Cancel
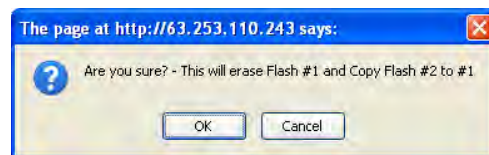
8 Click OK to start the erase and copy process.

During this process, the following messages display:

RLE-CF FCF

The system is erasing flash #1, copying flash #2 to #1 and re-booting, this will take a 60 seconds

If your browser does not automatically redirect you, please click here.

9 If the system does not reboot on its own, click the here link to display the FMS Home page.

10 You can verify which firmware version is loaded by going to Configuration>Flash Program and viewing the information under the blue bar.

Flash Program Configuration			
Flash #1 Program: FCF V8.4.13	**Eof:** FFD27530 (EOT)	**Size:** 1209648	(Active)
Flash #2 Program: FCF V8.4.13	**Eof:** FFD27530 (EOT)	**Size:** 1209648	(Backup)

Figure 11.4 Current Firmware Version As Shown in FMS Interface

11.1.1 Loading Firmware Using TFTP Client

This is an alternate method for loading firmware. Note that 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 the PC and the FMS are on the same subnetwork (LAN).

3 Open the TFTP client. Configure the client as follows.

    a **Host** = Falcon IP Address

    b **Port** = 69

    c **Block** Size = 64, 128, 256, 512, or 1024

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.

11.1.2 Updating FMS Firmware via the EIA-232 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:

♦ Pressing any key after power-up when a 10 second window provides an opportunity to abort the Flash Main Program, or

♦ Typing **RESET** 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 FCF Boot Prompt, erase the back up Flash program (the one with the lowest serial number) by typing **ERASE PRGM** followed by Enter. After a few seconds, the screen will update with an ok and **FCFBoot>**.

6 From the FCF 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 takes 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 FCF 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 FCF Main Menu and repeat the steps above to erase and download to the other Flash program chip.

Once the firmware upgrade is complete, disconnect the serial cable and close HyperTerminal.

11.2. Loading and Saving FMS Configuration Data

You can save FMS configuration data for backup purposes and to load the same configuration 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. The configuration settings are saved to a binary file, which cannot currently be edited off line.

11.2.1 Saving Configuration Data

1 On the FMS interface, go to Configuration>Flash Program.

The Flash Program Configuration page displays.

Flash Program Configuration			
Flash #1 Program: FCF V8.4.22	Eof: FFD2FF20 (EOT)	Size: 1244960	(Active)
Flash #2 Program: FCF V8.4.22	Eof: FFD2FF20 (EOT)	Size: 1244960	(Backup)

[Erase Backup]

[Copy Flash2 to Flash1]

Download Base Configuration File (.cfg - 32k)

Download Modbus Configuration File (.mfg - 32k)

Download FCF Configuration File (.xfg - 128k)

Configuration/flash update from your computer:

[   ] [Browse...]
[Upload]

Note: This version also supports configuration and program updates via TFTP.

Figure 11.5 Save Configuration File (Flash Program Configuration Page)

You can save three different types of configuration files:

♦ Base configuration (.cfg) — Information about physical points other than Modbus points.

♦ Modbus configuration (.mfg) — Information about Modbus points.

♦ FCF configuration (.xfg) — Information about all points, a combination of the .cfg and .mfg files.

2 To save a configuration file, click the link for the type of file you want to save.

A popup prompts you to open or save the file.

3 Select the Save File radio button and click OK.

The file is saved to your web browser's download area, or you are prompted to choose a location for the file.

4 Use Windows Explorer to verify that the files exist on the PC's hard drive. Copy the files to the desired file backup location.

IMPORTANT Do not change the three-letter extension (.cfg, .mfg, or .xfg) of the file name, or the FMS will not recognize the file if you try to load it. You can change the base file name if desired.

11.2.2 Loading Configuration Data

1 On the FMS interface, go to Configuration>Flash Program.

The Flash Program Configuration page displays.
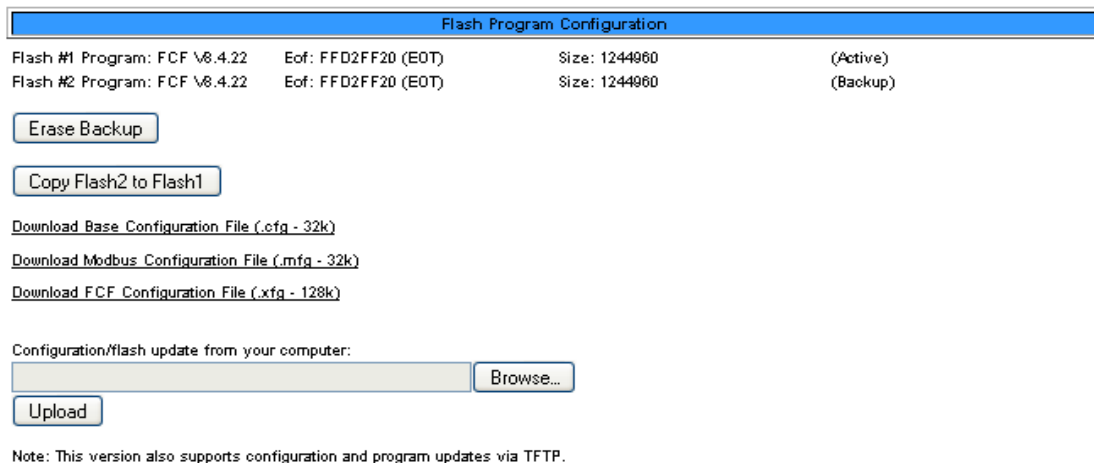
Figure 11.6 Load Configuration File (Flash Program Configuration Page)

2 Click the Browse button to navigate to the location of the configuration file you want to load.

IMPORTANT Make sure you have not changed the three-letter extension (.cfg, .mfg, or .xfg) of the configuration file, or the FMS will not recognize it.

3 Once you have selected the file, click the Upload button.

The configuration file is uploaded while the following messages display:

File has been uploaded and bin file verified

File will now be copied to flash #2, this will take about 60 seconds

Then verify the file is contained in flash #2 and then press the Copy Flash2 to Flash1 button

If your browser does not automatically redirect you, please click here after waiting.

Once the configuration file is uploaded, the FMS reboots itself.

A

FMS EXPANSION CARDS

A.1.   K-1 Expansion Card Descriptions

Four different expansion cards can populate the FMS expansion slots. Currently, Expansion Card A and Expansion Card C are available.

Note Expansion Card B and Expansion Card M are no longer available. Expansion Card M is 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
C	24 Digital Inputs (DI)	EXP-C-24 (24VDC) EXP-C-48 (48VDC)

A.2. Expansion Card Installation

Expansion cards can be installed at the factory at the time of the initial product order, or they can be ordered at a later date and installed by the customer. If customers order 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 2U 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.
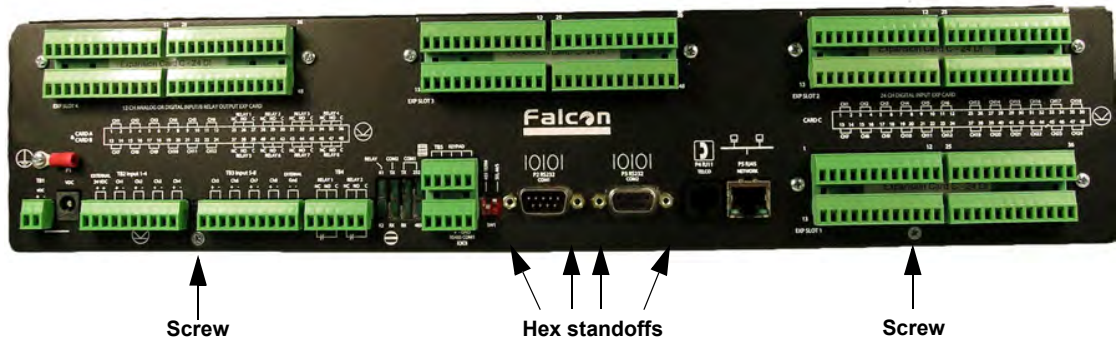
Figure A.1 Back of 2U FMS Showing Hex Standoffs and Screws to Remove

2 Remove the two top screws that attach the side plate (rack ears) to the unit from both sides.

Figure A.2 Side Plate ("Ear") with Two Mounting Screws Removed

3 Slide the base and cover apart as shown.

Figure A.3 Sliding the Base and Cover Apart

4 Gently lift and hinge the top lid to the side and lay it next to the base (bottom chassis).
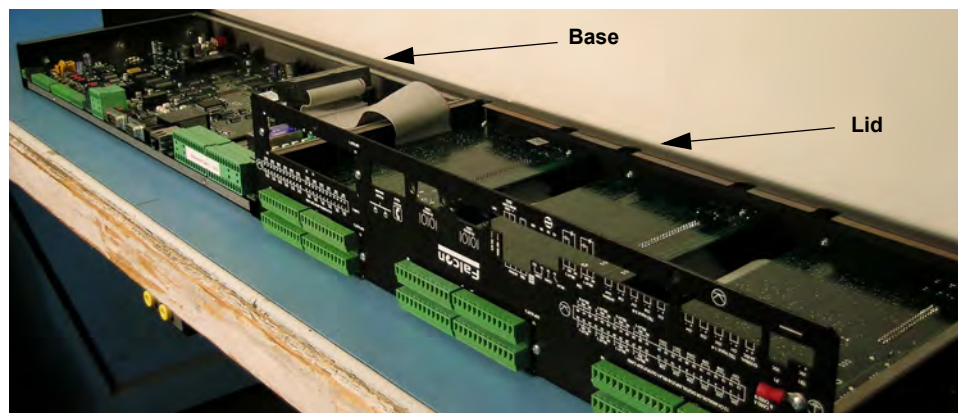
Figure A.4 Two-Rack Unit Opened

5 On the expansion card, set the card slot address (SW2 DIP switches) to the slot number where the card will reside (1 through 4). Table A.2 lists the position of the switches based on the slot number.

Table A.2 SW2 DIP Switch Settings for Expansion Card Slots

Slot	DIP Switch 1	DIP Switch 2	DIP Switch 3	DIP Switch 4
1	On	Off	Off	Off
2	Off	On	Off	Off
3	Off	Off	On	Off
4	Off	Off	Off	On

Figure A.5 shows the location of the DIP switches.
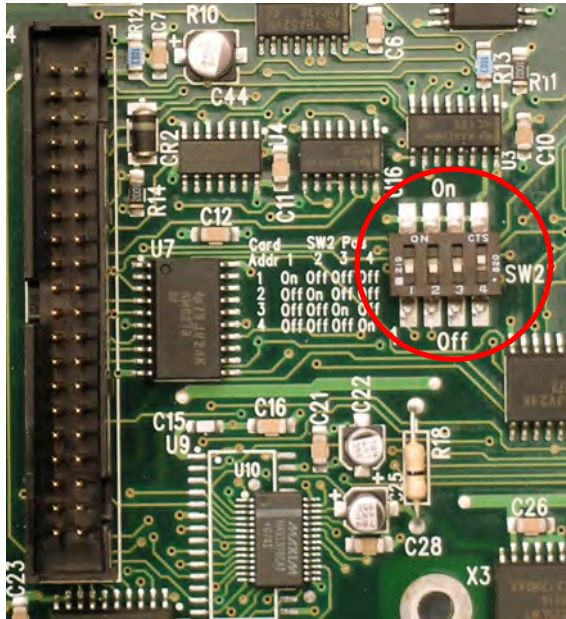
Figure A.5 SW2 DIP Switches

Mounting an Expansion Card in the Base (Slot 1)

If the expansion card is to be mounted in the base (Slot 1):

6 Attach the ribbon cable to the card.

7 Secure the provided screw into the remaining hole.

Note   Do not overlook installation of the screw. This screw grounds the expansion card and is critical to the FMS performance.

If you are finished installing expansion cards:

1 Hinge the lid back in place over the base.

2 Reattach the side brackets using the two mounting screws on the back plate and the hex posts for COM1 and COM2.

If you have more cards to install, go to "Mounting an Expansion Card in the Lid (Slots 2 through 4)" on page 155.

Mounting an Expansion Card in the Lid (Slots 2 through 4)

If the expansion card is to be mounted in the lid (Slots 2, 3, and 4), mount the card as follows:

1 Attach the ribbon cable to the expansion card, making sure that the correct connector is attached.

Note 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.
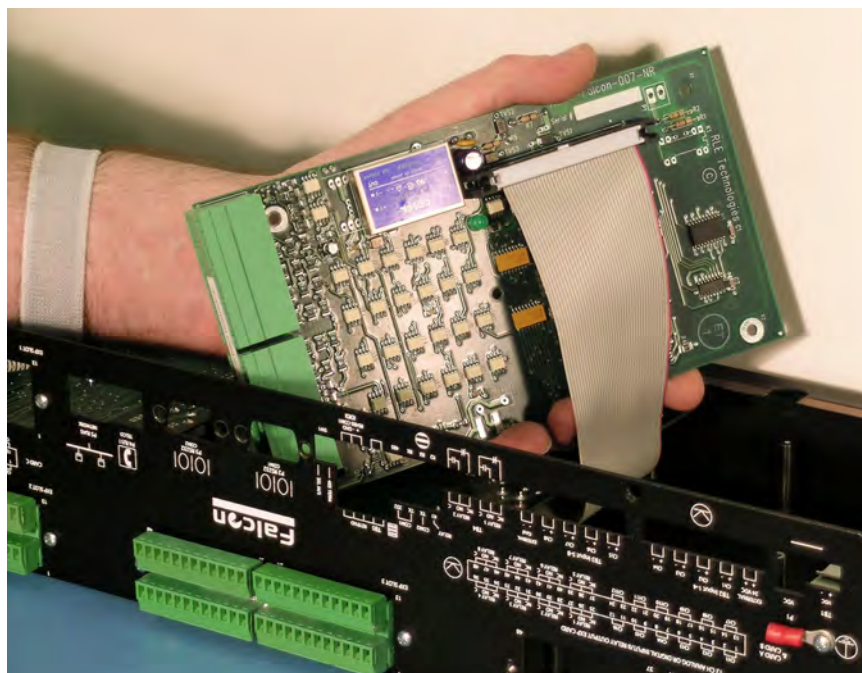
Figure A.6 Expansion Card with Ribbon Cable Attached

2 Angle the card toward the front of the FMS as you slide it into place with the bottom of the card facing out and the terminal blocks positioned in the rear opening. Align the screw holes on the card with the posts.
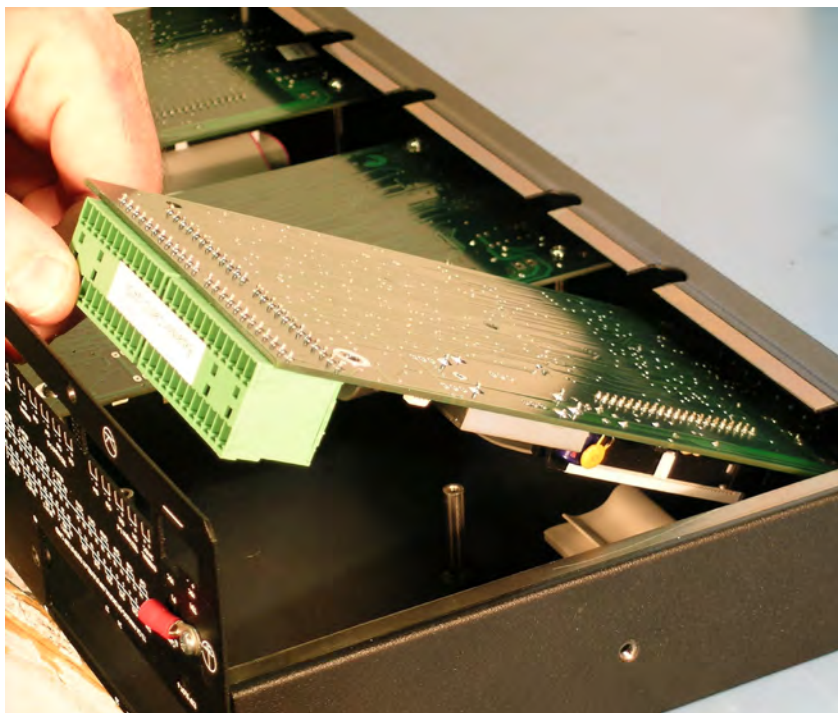
Figure A.7   Expansion Card Mounting in a Two-Rack Unit

3 Secure the card to the lid using the five mounting screws supplied.
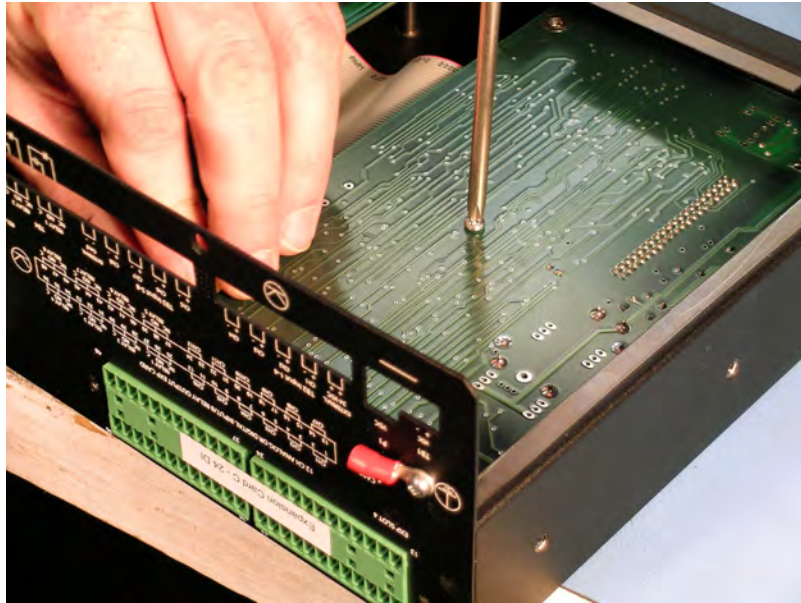
Figure A.8 Expansion Card Final Placement in a Two-Rack Unit

4 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.

A.2.2 Installing an Expansion Card into a 1U 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 hex standoffs on the two COM1 ports (for the location of the hex standoffs, see Figure A.1 on page 152).

2   Remove the terminal blocks.

3   Remove the cover plate labeled Expansion Card from the back of the lid.

4   On the expansion card, set the card slot address (SW2 DIP switches) to address 1 (for a location of the DIP switches, see Figure A.5 on page 154). Switch 1 should be On, and switches 2 through 4 should be Off.

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.

6   Snap the card onto the four posts and secure the provided screw into the remaining hole.

You will know the card is in place if it is very difficult to remove.

WARNING

Do not overlook installation of the screw. This screw grounds the expansion card and is critical to the FMS performance.

---

7   Connect the ribbon cable between the main FMS board and the expansion card.

Note   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 four screws in the lid and the four hex standoffs.

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.
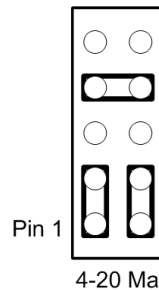
Figure A.9 Expansion Card Current Channel (4-20mA) Configuration

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

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.
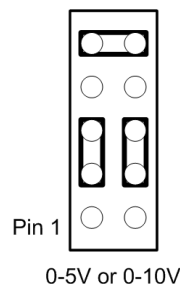
Figure A.10 Expansion Card Voltage Channel (0-5V or 0-10V) Configuration

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 EIA-232 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.

<u>70, 70, 70, 71, 71</u>, 72, 72, 73, 73, 74, 74
     Average = 70, High Value = 70, Low Value = 70

70, <u>70, 70, 71, 71, 72</u>, 72, 73, 73, 74, 74
     Average = 70, High Value = 70, Low Value = 70

70, 70, <u>70, 71, 71, 72, 72</u>, 73, 73, 74, 74
     Average = 71, High Value = 71, Low Value = 70

70, 70, 70, <u>71, 71, 72, 72, 73</u>, 73, 74, 74
     Average = 71, High Value = 71, Low Value = 70

70, 70, 70, 71, <u>71, 72, 72, 73, 73</u>, 74, 74
     Average = 72, High Value = 72, Low Value = 70

70, 70, 70, 71, 71, <u>72, 72, 73, 73, 74</u>, 74
     Average = 72, High Value = 72, Low Value = 70

70, 70, 70, 71, 71, 72, <u>72, 73, 73, 74, 74</u>
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.

ANALOG INPUT 4-20MA REFERENCE CHART

Analog 4-20Ma Gain/Offset Conversion Formula:

Gain = Sensor Range (High Value - Low Value) / 4
Offset = Sensor Low Value - Gain

Example: TH140 Humidity
Gain = (High Value (100) -Low Value (0)) / 4 = 25
Offset = (Sensor Low Value (0) - 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)	32°F - 120°F	22	10
	Temperature (Display in Deg C)	0°C - 48.8°C	12.2	-12.2
	Humidity	0% - 100% RH	25	-25
T120	Temperature (Display in Deg F)	32°F - 122°F	22	10
	Temperature (Display in Deg C)	0°C - 48.8°C	12.2	-12.2
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

Table C.1   Analog Input 4-20mA Reference Chart (continued)

RLE Product #	Transducer Type	Range	Gain	Offset
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

D

FMS ACCESSORIES WIRING

The following figures show the typical wiring between the FMS monitoring system and other products offered by RLE Technologies.
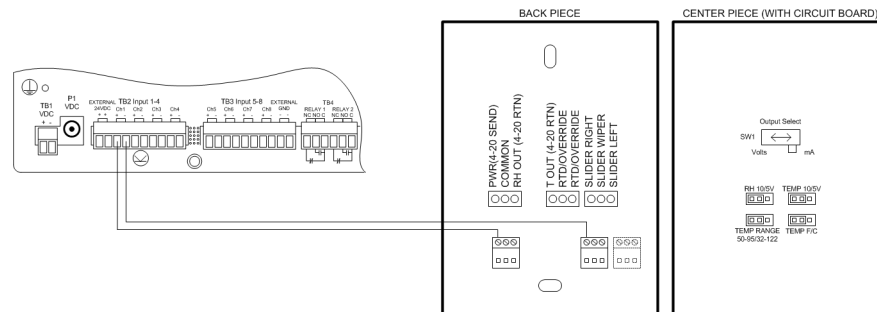
Figure D.1 T120 and T120D Temperature Sensors
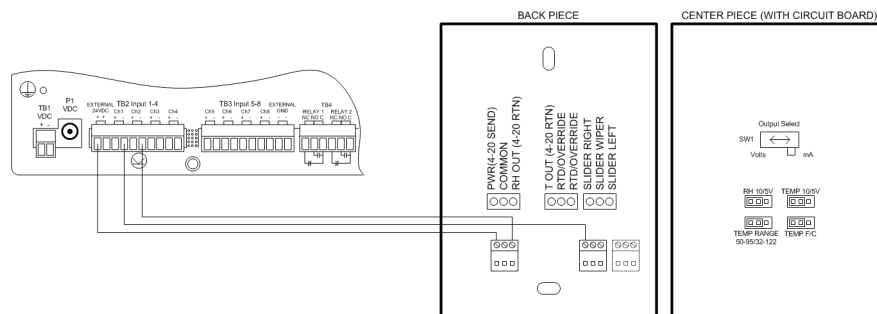
Figure D.2 TH140 and TH140D Temperature/Humidity Sensors
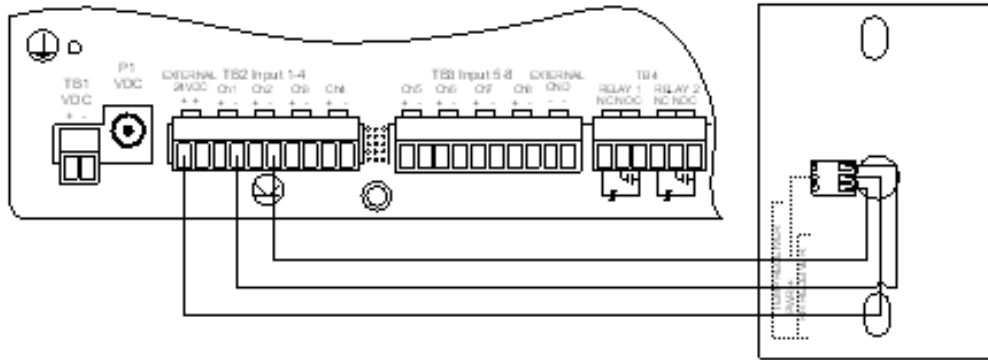
Figure D.3 Dwyer Temperature/Humidity Sensor
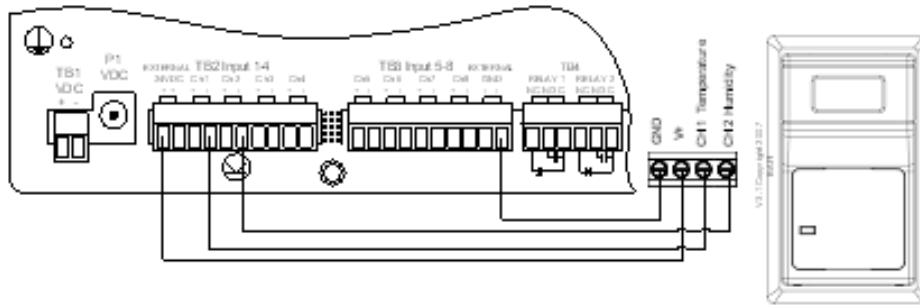
Figure D.4 BAPI Temperature/Humidity Sensor
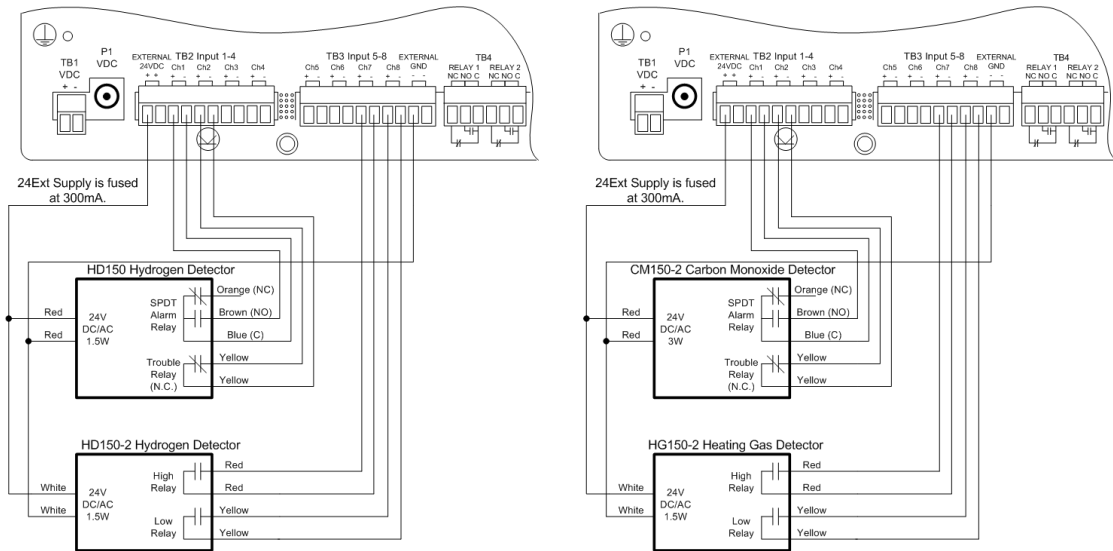
Figure D.5 HD150, HD150-2, CM150-2, and HG150-2 Gas Sensors
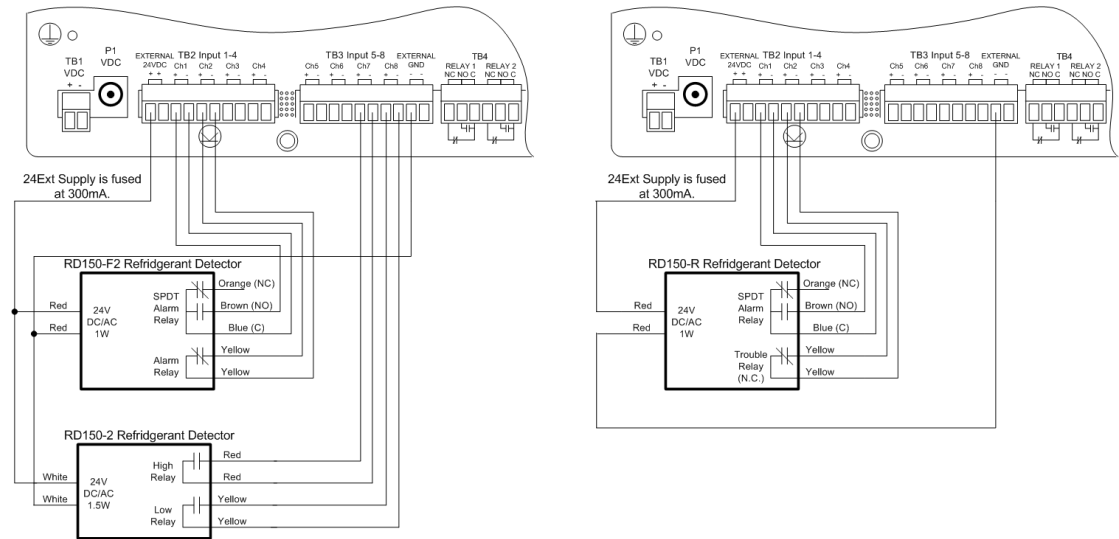
Figure D.6 RD150-F2, RD150-2 & RD150-R Refrigerant Detectors
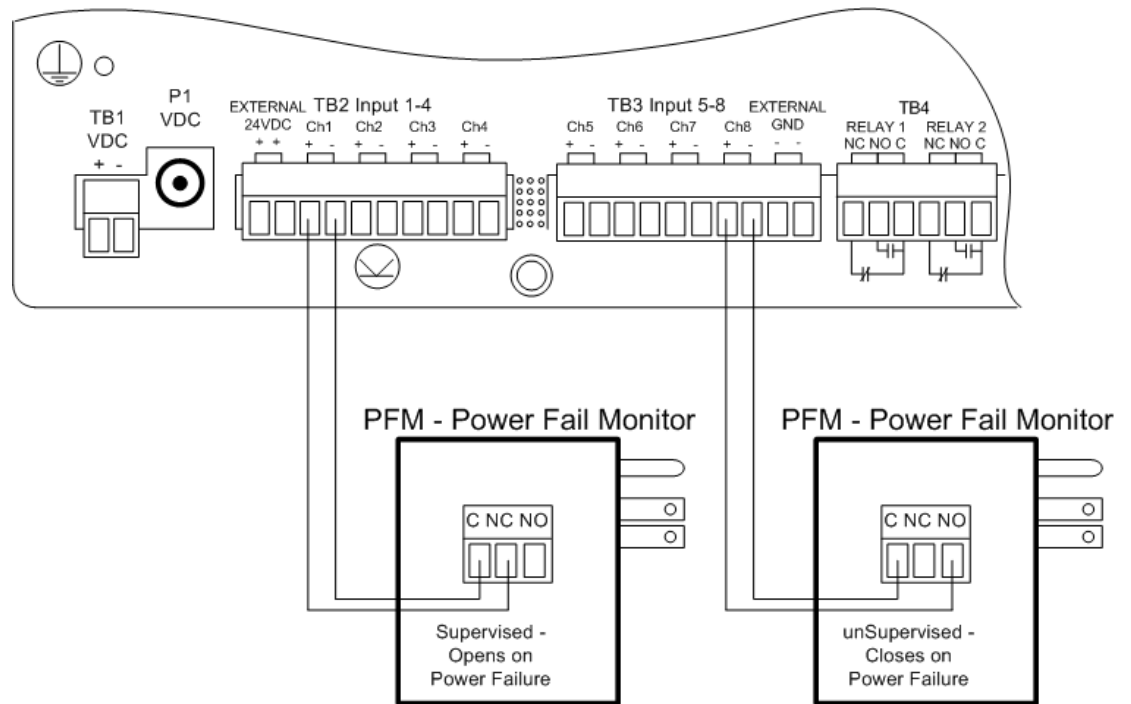
Figure D.7 PFM Power Fail Monitor
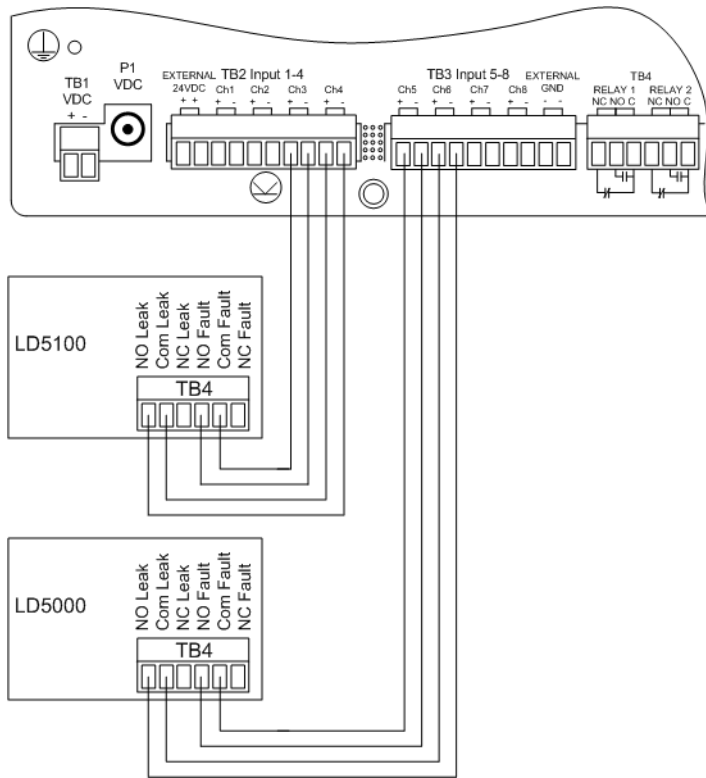
Figure D.8 SeaHawk LD5100 Distance Read Leak Detection System (Dry Contact)

D.1. 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).
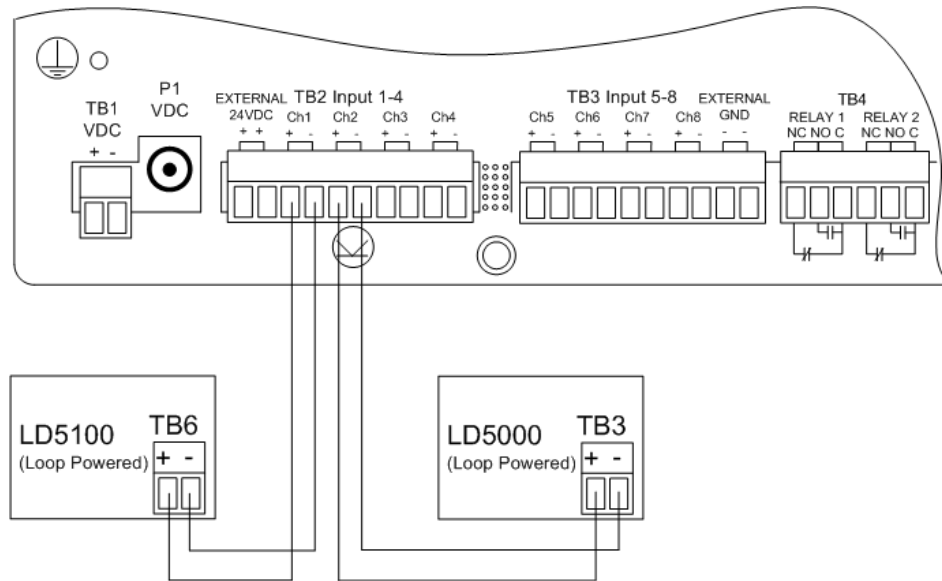
Figure D.9 SeaHawk LD5100 Distance Read Leak Detection System (4-20mA)
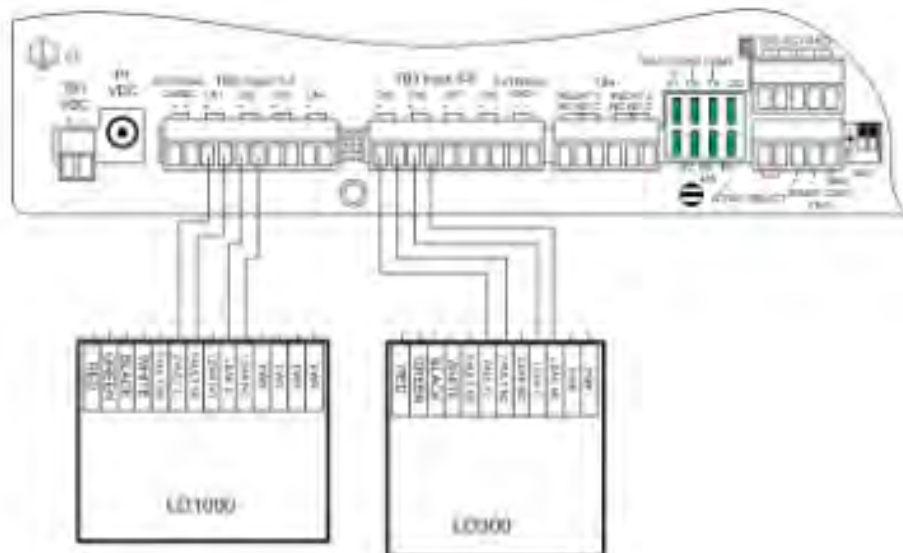
Figure D.10 SeaHawk LD1000, LD300 Leak Detection Systems
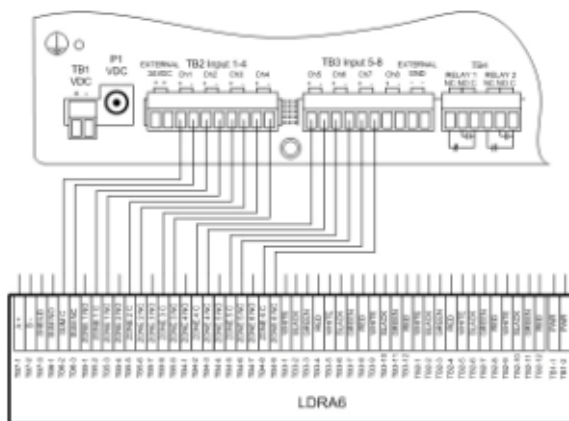
Figure D.11 SeaHawk LD1000, LD300, and LDRA6 Zone Leak Detection Systems

D.2. Wiring for Other Falcon FMS Accessories

For assistance wiring the following Falcon FMS Accessories also offered by RLE, 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

ALARM ID REFERENCE TABLES

E.1. Analog Tables

Table E.1 Analog Alarm ID Reference Table – Inputs 1 through 8

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

Table E.2   Analog Alarm Reference Table – Input Slots 1 and 2

Analog Input Slot 1				Analog Input Slot 2			
Slot Chan	Number	Condition	ID	Slot 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
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

Table E.2 Analog Alarm Reference Table – Input Slots 1 and 2 (continued)

Analog Input Slot 1				Analog Input Slot 2			
Slot Chan	Number	Condition	ID	Slot Chan	Number	Condition	ID
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

Table E.3 Analog Alarm Reference Table – Input Slots 3 and 4

Analog Input Slot 3				Analog Input Slot 4			
Slot Chan	Number	Condition	ID	Slot 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
4	60	Low Limit 1	3042	4	84	Low Limit 1	4042

Table E.3   Analog Alarm Reference Table – Input Slots 3 and 4 (continued)

Analog Input Slot 3				Analog Input Slot 4			
Slot Chan	Number	Condition	ID	Slot Chan	Number	Condition	ID
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

Table E.3 Analog Alarm Reference Table – Input Slots 3 and 4 (continued)

Analog Input Slot 3				Analog Input Slot 4			
Slot Chan	Number	Condition	ID	Slot Chan	Number	Condition	ID
12	68	Low Limit 2	3124	12	92	Low Limit 2	4124

E.2. Digital Tables

Table E.4 Digital Alarm ID Reference Table – 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

Table E.5 Digital Alarm ID Reference Table – Digital Input Slots 1 and 2

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

Table E.6   Digital Alarm ID Reference Table – Digital Input Slots 3 and 4

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	3	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

F

FMS SLOT DESIGNATIONS

F.1. Input Slot Designation Table

Alarm ID format:

♦ XYYZ - 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 – Slot 0

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	

Table F.1 Input Slot Designation Table – Slot 0 (continued)

Slot0	#	Port/CH	CH ID	Analog Alarm ID	Digital Alarm ID
IntHumidSensor	5.2			5021-5024	
LowBatteryAlarm				6010	
PagerAlarm				6020	

Table F.2 Input Slot Designation Table – Slot 1

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

Table F.3 Input Slot Designation Table – Slot 2

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

Table F.4 Input Slot Designation Table – Slot 3

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

Table F.5 Input Slot Designation Table – Slot 4

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.6 Output (Relays) Slot Designation Table – Slots 0 and 1

#	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

Table F.7 Output (Relays) Slot Designation Table – Slots 2 and 3

#	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

Table F.8 Output (Relays) Slot Designation Table – Slot 4

#	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

G

RELAY CONTROL LOGIC

G.1. Falcon-EM Relay Logic

contains the FMS relay control logic diagram described in the following sections.

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.
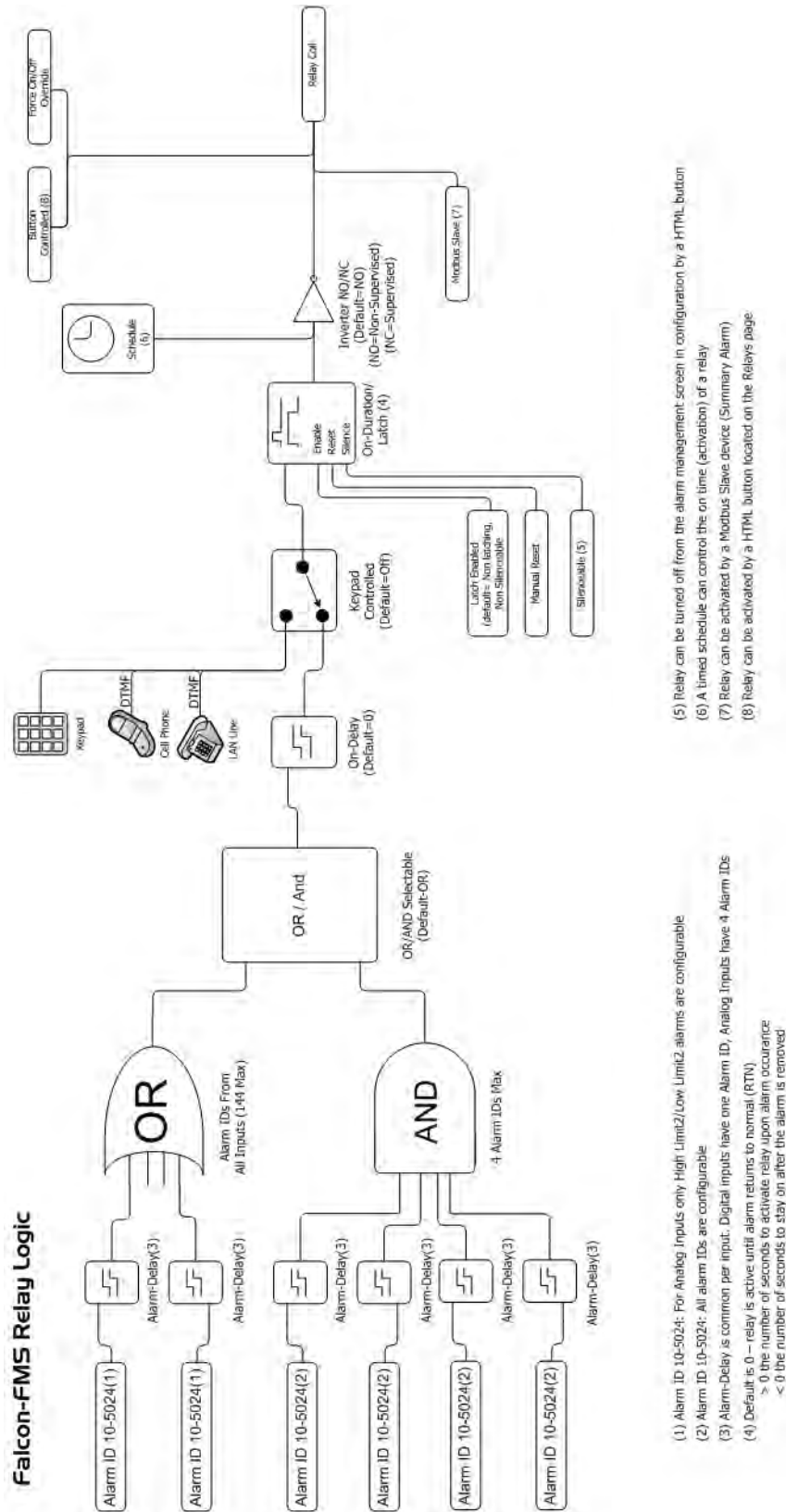
Figure G.1 FMS Relay Control Logic Diagram

H

SNMP v3

When the Falcon FMS has the optional SNMP v3 software installed, it can communicate with SNMP servers running version 3. To configure the FMS for SNMP v3, follow the steps in this appendix.

1 From the top bar of the FMS Web interface, select the Configuration Menu, then select the SNMP/Syslog link from the menu.

The following page displays:

Figure H.1 SNMP/Syslog Configuration Page

2 In the MIB-2 section, enter the basic system information, such as System Name, System Contact, and System Location.

3 In the Traps section, specify the SNMP trap settings as described in Table H.1.

Table H.1SNMP v3 Trap Settings

Field	Description
Select SNMP Trap Type	Select from the following: V1-Trap V2C-Trap V2C-Informs. V3-Traps V3-Informs
Max Inform Retries	Set from 0-999 (minutes). The default is 0, which allows the retries to be unlimited.
Persistent Trap/Inform Intervals	Set from 1-999 (minutes). The default is 0, which allows the FMS to send traps and informs once.
Analog Trap Varbinds	Select either a trap containing the Value, Unit of Measure and Label (default), or just the Label.
Trap Type	Select the method by which the trap is sent from the FMS. Choices are either Alarm Entry Added (default) or Falcon Port Traps.
Configuration Changed Trap Community	Select which trap destination to notify that the FMS has had a configuration change.
Input Trap Delivery	Select if trap notification is to be sent by LAN or PPP connection.

4 In the Trap Destinations section, enter up to four profiles for SNMPv3 communication. The selections are described in Table H.2.

Table H.2 Trap Destination Settings

Field	Description
IP Address	The IP address of the server to the trap information to.
TrapEnable	Check this box to indicate that trap information should be sent to the specified server.
Syslog Message	Check this box to indicate that syslog messages should be sent to the specified server.

5 In the SNMPv3 section, create up to four profiles for SNMPv3 communication. The settings for this section are described in Table H.3.

Table H.3 SNMP v3 Profile Settings

Field	Description
Engine ID	
Context Name	(Optional.) An alphanumeric name used for the SNMP v3 interface. //length limit?//
V3 Trap User (1-4)	Enter the number of the user you are creating or modifying.
User Name	Enter an alphanumeric string of up to //how many?// characters.
Access Mode	Choose from the following: No Authentication Authentication - MD5 Privacy Authentication - MD5 A user name is need for No Authentication, and a user name and password are required for Authentication and Privacy Authentication access.
Auth-Password	An alphanumeric string of 8 to 24 characters in length.
Priv-Password	An alphanumeric string of 8 to 24 characters in length.

I

TECHNICAL SPECIFICATIONS

Table I.1 Technical Specifications

Power		
	1U FMS	24VDC Model: 24VDC (±10%), 1A max. (power supply included); 48VDC Model: 36-72VDC, 0.5A max
	2U FMS	24VDC Model: 24VDC (±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	±0.5ºF (@ 25ºC), ±4ºF (@ -40º to 185ºF); ±3%RH (@ 20% to 80%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 (±10%) @ 300mA max. (power for external sensors and/or devices)

Table I.1   Technical Specifications (continued)

Expansion Cards

	EXP-A-24 or EXP-A-48	1U accommodates 1 expansion card; 2U accommodates up to 4 expansion cards
		24V Falcon requires EXP-x-24 option cards; 48V Falcon requires EXP-x-48 option cards
		12 analog inputs (jumper selectable for 4-20mA, 0-5VDC or 0-10VDC) and digital inputs (non-isolated, individual ground only); 8 Form C Relay Outputs, 1A @ 24VDC, 0.5A resistive @ 120VAC
	EXP-C-24 or EXP-C-48	24 Digital Inputs, 3000VAC RMS optically isolated (common ground or individual ground)

Communications Ports

	Ethernet	10/100BaseT, RJ45 connector; 500VAC RMS isolation
	EIA-232	DB9 female connector; 9600 baud; 3000VAC RMS optically isolated; 15kV ESD protection
	EIA-485 (selectable as EIA-232)	Two-wire half duplex; terminal block (selecting EIA-232 switches to DB9 male connector); 1200, 2400, or 9600 baud configurable; 3000VAC RMS optically isolated
	Modem (RJ11 Telco) – Optional	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, SNPP, 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; V2c: Traps or Informs
	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
	Modus/IP	Modbus Slave; TCP/IP transmission protocol
	BACnet/IP	Reads up to 106 instances and converts to SNMP and Modbus
	Terminal Emulation	VT100 compatible
	TAP (Pager)	Telocator Alphanumeric Protocol Ver1.8

Table I.1 Technical Specifications (continued)

Alarm Notification

	Pager (Modem)	15 Text, numeric, or alphanumeric pager numbers; each digital and analog alarm (HighLimit and LowLimit) 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)	V1, V2c: 8 Community Strings; V3 (optional): 4 users, 4 Trap Destinations
	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 | Self resetting; captured in Event Log

Internal Hardware

	Real Time Clock	Battery backed; ±1.53 min/month accuracy
	Memory	16 MB RAM; 128K NVRAM; 16MB 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
	Extended Trending of Analog Inputs	3,840 entries over 32 inputs either physical or Modbus; logging every 1 minute, 5 minute, 15 minute, 1 hour, 2 hour, 4 hour, 6 hour and 8 hour intervals.

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)	1 Administrator (password for Modem access)

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)

Table I.1   Technical Specifications (continued)

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		-40º to 185ºF (-40º to 85ºC)
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