NOTIFIER®
by Honeywell

Modbus Gateway

Installation and Operation Manual

Fire Alarm System Limitations

While a fire alarm system may lower insurance rates, it is not a substitute for fire insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. These documents can be found at http://www.systemsensor.com/html/applicat.html.

A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, or chimneys may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photo-electronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, crippling its ability to report a fire.

Audible warning devices such as bells may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol or medication. Please note that:

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A fire alarm system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. The control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until this manual is read and understood.

CAUTION - System Reacceptance Test after Software Changes. To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0°C to 49°C (32°F to 120°F) and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and all peripherals be installed in an environment with a nominal room temperature of 15-27° C/60-80° F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices this system may operate erratically or can be damaged when subjected to lightning-induced transients. Although no system is completely immune from lightning transients and interferences, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, and printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

Though designed to last many years, system components can fail at any time. This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static-suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation by authorized personnel.

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing device pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his own expense.

Canadian Requirements: This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Le present appareil numerique n'emet pas de bruits radio-electriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada. Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Manual page number
- Your comment

Send email messages to:

FireSystems.TechPubs@honeywell.com

Please note this email address is for documentation feedback only. If you have any technical issues, please contact Technical Services.

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Section 1 Modbus Gateway Features

1.1 Product Description

The Modbus Gateway provides a communication link between networks that use the Modbus/TCP communication protocol and Fire Alarm Control Panels (FACPs) resident on an NFN network. The NFN network communicates with the Modbus Gateway through an HS-NCM-W/SF/MF or NCM-W/F network control module that is on that NFN network. The Modbus communication protocol is consistent with Modbus Application Protocol Specification V1.1b.

The Modbus Gateway configuration web page, a programming utility included with the Modbus Gateway assembly, is used to configure the Modbus Gateway. The Modbus Gateway is designed to need very little configuration. In most applications you will only need to enter the TCP/IP settings for your network and the nodes you would like to monitor. The gateway will automatically map all the configured points and supply you with a user friendly comma separated value report that defines the mapping. Refer to Section 3, "Modbus Gateway Configuration", on page 33.

1.1.1 Modbus Gateway Features

The Modbus Gateway has the ability to:

- Monitor four compatible NFN or HS-NFN nodes not including the Modbus Gateway node itself.
- Provide data such as event type, active/inactive, enabled/disabled, acknowledged/ unacknowledged, device type, analog value (4–20ma modules only) and system troubles.
- Support reads of up to 100 registers at a time. Analog values can be read 10 registers at a time.
- Receive configuration data from the Modbus Gateway configuration web page.
- Log diagnostic information.
- Send standard Modbus Exception Responses.
- Reduce configuration time by self configuring all points of monitored nodes.
- Support standard Command Functions (See Section 5.2.1, "Modbus Commands" on page 43).

📄 **NOTE:** This manual is written with the understanding that its user is trained in Modbus operations and services. The information provided here is solely for the configuration of the Modbus Gateway to communicate event information to an existing Modbus network.

1.1.2 Modbus Masters

Modbus Masters Compatibility

- The Modbus Gateway was designed to be compatible with standard Modbus/TCP masters.
- Support one-byte Unit IDs.
- Have configurable polling times.
- Support Modbus Exception responses including 0x0A and 0x0B.
- The Modbus Gateway supports one Modbus Master.

1.2 System Architecture

1.2.1 IP Requirements

An Internet or Intranet IP network connection is required to configure the Modbus Gateway, and to connect it with Modbus clients. The Internet or Intranet IP network connection must meet the following requirements.

Table 1.1 IP Requirements

Parameter	Requirements
Ethernet Network Configuration	Private or Business LAN
TCP/IP Requirements	Static IP address required
Peer-to-Peer/Domain Support	Peer-to-Peer
Ethernet Connection	Standard 100Base-T Connection
Bandwidth Requirements	Based on client polling rates
Firewall Configurations/Required Port(s)	502
DNS Support	No

1.2.2 Bandwidth Calculation

Use this information to calculate the network bandwidth your Modbus Gateway usage will require, and how it will impact your network.

Table 1.2 Modbus TCP Request

Description	Bytes
Ethernet header	14
IP Header	20
TCP Header	20
MBAP Header	7
Message—5 bytes Function code (1) **+** Start Address (2) **+** Quantity of Registers (2)	5
Total Bytes	*66*

Table 1.3 Modbus TCP Response

Description	Bytes
Ethernet header	14
IP Header	20
TCP Header	20
MBAP Header	7
Message—Function code (1) + Byte Count (1) + Max 100 registers of each 2 Bytes (200)	202
Total Bytes	***263***

Calculating Bandwidth Requirement

- One request and response pair requires 329 Bytes (66 + 263).
- If a client is polling at one second intervals, then request and response are both possible in one second.
- A request and response pair creates network traffic of 329 Bytes per second (329 **x** 1).
- In other words, a request and response pair creates network traffic of 2632 bits per second (329 **x** 8).
- Therefore, the network must be able to accommodate at least 0.0027 Mbps data flow.
- Once every five seconds, an analog request adds a small amount of network traffic.
- Formula for Modbus Gateway network bandwidth requirement based on polling rate:

Bandwidth requirement = (329 **x** (1000/**polling rate in milliseconds**) **x** 8) / (10^6) **Mbps**

1.2.3 Modbus Gateway Architecture

These illustrations show possible configurations for Modbus Gateway architecture.

Modbus Client

Modbus Gateway
configuration web
page

IP Network

Modbus Gateway

NUP

HS-NCM-W/SF/MF
OR
NCM-W/F

NFN Network

FACP

FACP

FACP
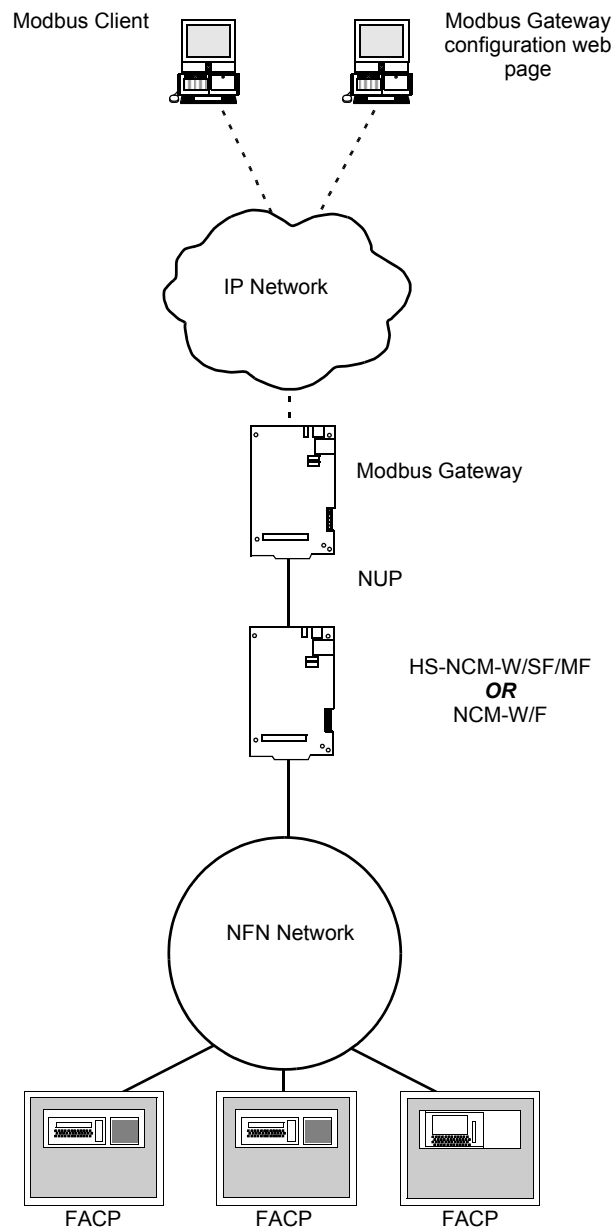
Figure 1.1 Example System: Modbus Gateway on NFN Network

Modbus Client

Modbus Gateway
configuration web
page

IP Network

Modbus Gateway

NUP

FACP
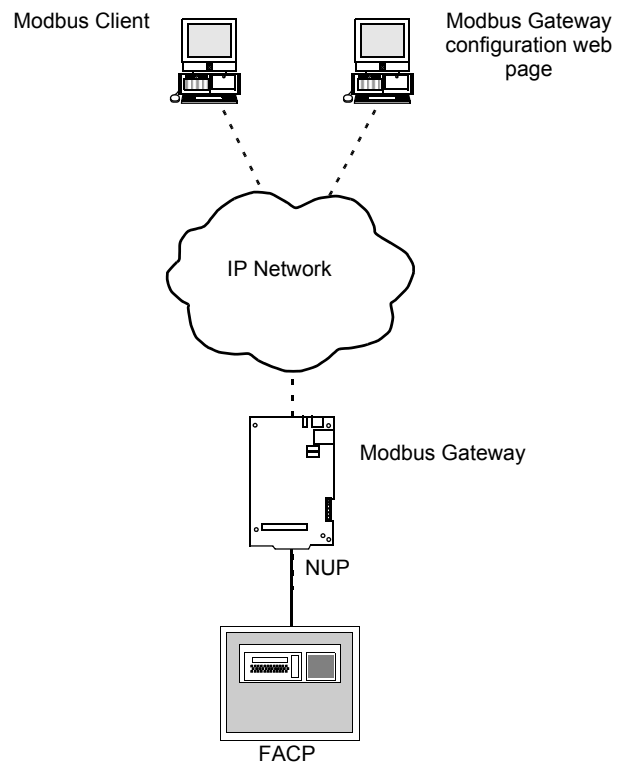
Figure 1.2 Example System: Modbus Gateway Direct to Fire Alarm Control Panel

1.2.4 Redundancy

The Modbus Gateway supports redundancy. To implement a redundant gateway, simply set up another Modbus Gateway to monitor the same nodes as the first. The second gateway will need to have a separate and unique IP address from the first gateway. The Modbus client can get the same information from either gateway.
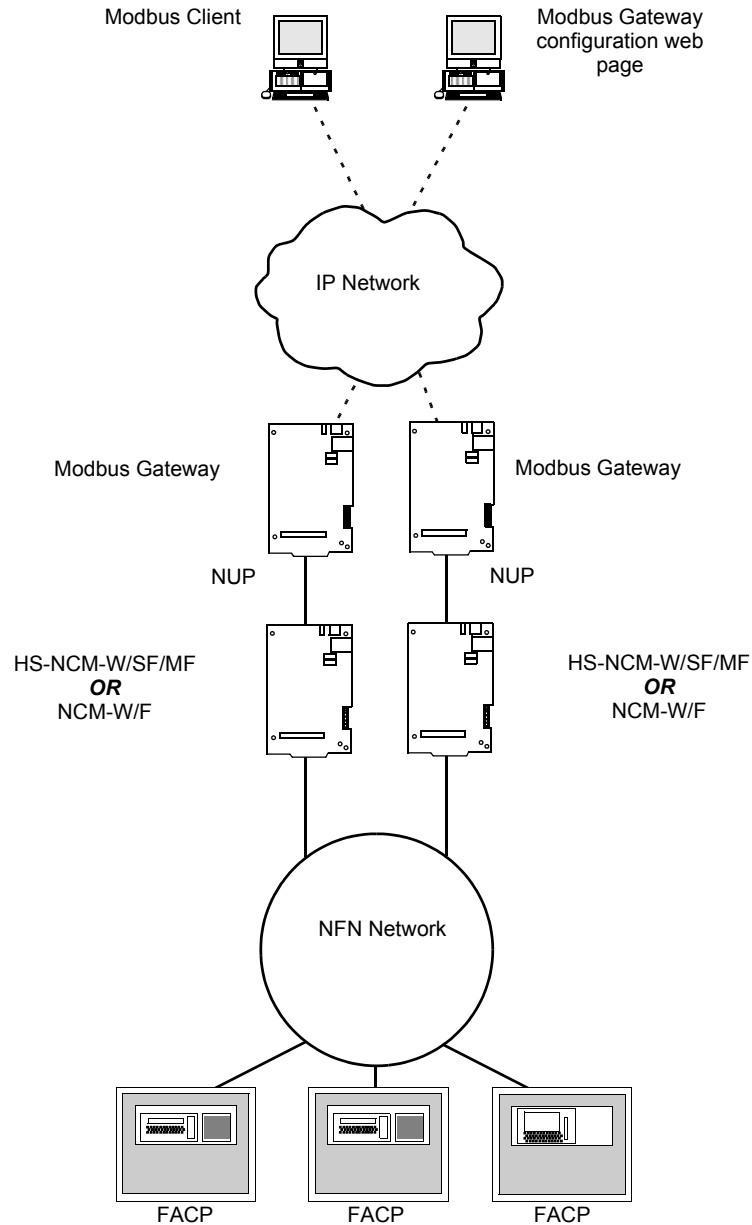
Figure 1.3 Redundant Modbus Gateways

1.3 Related Documentation

Below is a list of documentation that relates to the use of the Modbus Gateway.

Table 1.4 Related Documentation

For information on	Refer to	Part No.
Cabinets & Chassis	CAB-3/CAB-4 Series Installation Document	15330
Panels and Annunciators	NFS-320 Installation/Operation/Programming Manual NFS-640 Installation/Operation/Programming Manual NFS2-640 Installation/Operation/Programming Manual NFS-3030 Installation/Operation/Programming Manual NFS2-3030 Installation/Operation/Programming Manual	52745/52746/52747 52544/52545/52546 52741/52742/52743 51330/51344/51345 52544/52546/52545

1.4 Agency Listings

NOTE: The Modbus Gateway is recognized by UL as a supplementary reporting device.

NOTE: UL 864, 9th Edition—This system works with products that have been UL 864, 9th Edition listed as well as products that have not received UL 864, 9th Edition certification. Operation of systems that are comprised of equipment that is UL 864, 9th Edition listed together with products that are not UL 864, 9th Edition listed requires the approval of the local Authority Having Jurisdiction (AHJ).
CAN/ULC-S559-04, 1st Edition—This system works with products that have been CAN/ULC-S559-04, 1st Edition listed as well as products that have not received CAN/ULC-S559-04, 1st Edition certification. Operation of systems that are comprised of equipment that is CAN/ULC-S559-04, 1st Edition listed together with products that are not CAN/ULC-S559-04, 1st Edition listed requires the approval of the local Authority Having Jurisdiction (AHJ).

1.4.1 Compliance

This product has been investigated to, and found to be in compliance with the following standards.

National Fire Protection Association

*   **NFPA 72**—National Fire Alarm Code

Underwriters Laboratories

*   **UL-864**—Control Units for Fire Alarm Systems, Ninth Edition
*   **UL-2017**—General-Purpose Signaling Devices and Systems, First Edition

Underwriters Laboratories Canada

*   **CAN/ULC-S527-99**—Standard for Control Units for Fire Alarm Systems, Second Edition
*   **CAN/ULC-S559-04**—Equipment for Fire Signal Receiving Centres and Systems, First Edition

1.4.2 Installation

This product is intended to be installed in accordance with the following regulatory agencies.

Local

• **AHJ**—Authority Having Jurisdiction

National Fire Protection Association

• **NFPA 70**—National Electrical Code
• **NFPA 72**—National Fire Alarm Code
• **NFPA 101**—Life Safety Code

Underwriters Laboratories

• **UL-1076**—In certified applications, the unit shall be installed in accordance with Proprietary Burglar Alarm Units and Systems, Fifth Edition

Underwriters Laboratories Canada

• **CAN/ULC-S524-06**—Standard for the Installation of Fire Alarm Systems, Fifth Edition
• **CAN/ULC-S561-03**—Installation and Services for Fire Signal Receiving Centres and Systems, First Edition

Canada

• **CSA C22.1**—Canadian Electrical Code, Part I, Safety Standard for Electrical Installations

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⚠ **WARNING: Installation**
Improper installation, maintenance, and lack of routine testing could result in system malfunction.

1.5 Environmental Requirements

This product must be installed in the following environmental conditions:

• Temperature range of 0°C to 49°C (32°F - 120°F).
• 93% humidity non-condensing at 30°C (86°F).

The contents of this manual are important and must be kept in close proximity of the hardware. If building ownership is changed, this manual and all other testing and maintenance information must also be passed to the current owner of the facility. A copy of this manual was shipped with the equipment and is also available from the manufacturer.

1.5.1 Wiring Restrictions

📄 **NOTE:** All wiring connections are supervised and power limited.

📄 **NOTE:** USB and NUP wiring connections must be located within 20 feet and encased in conduit within the same room, or the connection must be within a common enclosure.

📄 **NOTE:** In Canada, if the gateway is installed in a separate cabinet, the cabinet must be connected to the Fire Alarm Control Panel (FACP) with a close nipple fitting.

RS232 (NUP)

• Line Impedance 5k ohm
• Max Distance 50 feet

Ethernet

• Line Impedance 100 ohm

- Max Distance 100 meters

1.6 Compatibility

1.6.1 Compatible Panels

Table 1.5 High Speed NFN Compatibility Table

NFN Node Type	High Speed Network Boards Supported	
NFS-320	HS-NCM-W/SF/MF	NCM-W/F
NFS-640	HS-NCM-W/SF/MF	NCM-W/F
NFS2-640	HS-NCM-W/SF/MF	NCM-W/F
NFS-3030	HS-NCM-W/SF/MF	NCM-W/F
NFS2-3030	HS-NCM-W/SF/MF	NCM-W/F
AFP-2800*	HS-NCM-W/SF/MF	NCM-W/F

*When interfacing with AFP-2800 FACPs, Modbus Gateway only supports objects that are in line with Notifier USA panels, such as loop devices and zones. Rings and virtual points are not supported. For more information, please contact technical support.
Note: The NFS(2)-3030 can not be in receive mode.

1.6.2 Compatible NFN Products

The products listed below cannot be monitored by a Modbus Gateway, however they may reside on the same NFN network as a Modbus Gateway without causing any interference.

- DVC
- NCA
- NCA-2
- NWS
- BACnet Gateway
- NFN Gateway
- ONYXWorks products
- FirstVision
- Classic panels (AM-2020, AFP-1010, AFP-200, AFP-300/400)

Section 2 Modbus Gateway Embedded Installation

2.1 Required Equipment

The Modbus Gateway requires the following:

Modbus Gateway Assembly

The following are shipped with the Modbus Gateway:

- Modbus Gateway printed circuit board
- PNET-1 surge suppressor (P/N PNET-1)
- RJ45 to RJ45 standard Ethernet network cable (P/N 75585)—used to connect the Modbus Gateway to PNET-1 surge suppressor
- NUP to NUP Cable (P/N 75556)—used to connect the Modbus Gateway to an NCM-W/F or HS-NCM-W/SF/MF and supported panel
- Wire leads to NUP Network Communications Module power cable (P/N 75583)

Network Components

- RJ45 to RJ45 standard Ethernet network cable—customer's internet or intranet connection to Modbus Gateway
- NFN network—version 5.0 or above (sold separately)
- High Speed Network Communication Module: HS-NCM-W/SF/MF board—used to facilitate network communication between the Modbus Gateway and a High Speed NFN network. *OR*
- Network Communication Module: NCM-W/F board—used to facilitate network communication between the Modbus Gateway and an NFN network.

Cabinet and Hardware (sold separately)

- CAB-3/CAB-4 series cabinet
- CHS-4L chassis

2.2 Modbus Gateway Installation Overview

⚠ **CAUTION: Multiple Modbus Gateway Installations**
Modbus Gateways must be installed and configured one at a time because all Modbus Gateways start with the same factory defined IP address and node number.

2.2.1 Gateway Installation Process Overview Flow Diagram

```
              ┌─────────────┐
              │    Start    │
              └─────────────┘
                     │
                     ▼
         ┌───────────────────────┐
         │ "Installing a CAB3/CAB4│
         │   Cabinet" on page 22 │
         └───────────────────────┘
                     │
                     ▼
         ┌───────────────────────┐
         │  "Installing a CHS-4L │
         │   Chassis" on page 23 │
         └───────────────────────┘
                     │
                     ▼
         ┌───────────────────────┐
         │ "Installing the Modbus│
         │ Gateway Printed Circuit│
         │   Board" on page 24   │
         └───────────────────────┘
                     │
                     ▼
         ┌───────────────────────┐
         │ To Section 3.1, "Modbus│
         │ Gateway Configuration",│
         │     on page 33        │
         └───────────────────────┘
```
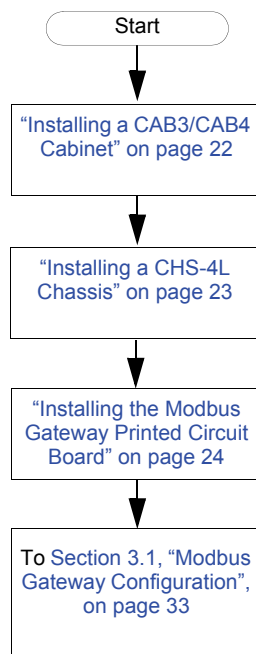
Figure 2.1 Gateway Installation Process Flow Diagram

2.2.2 Modbus Gateway Printed Circuit Board Layout
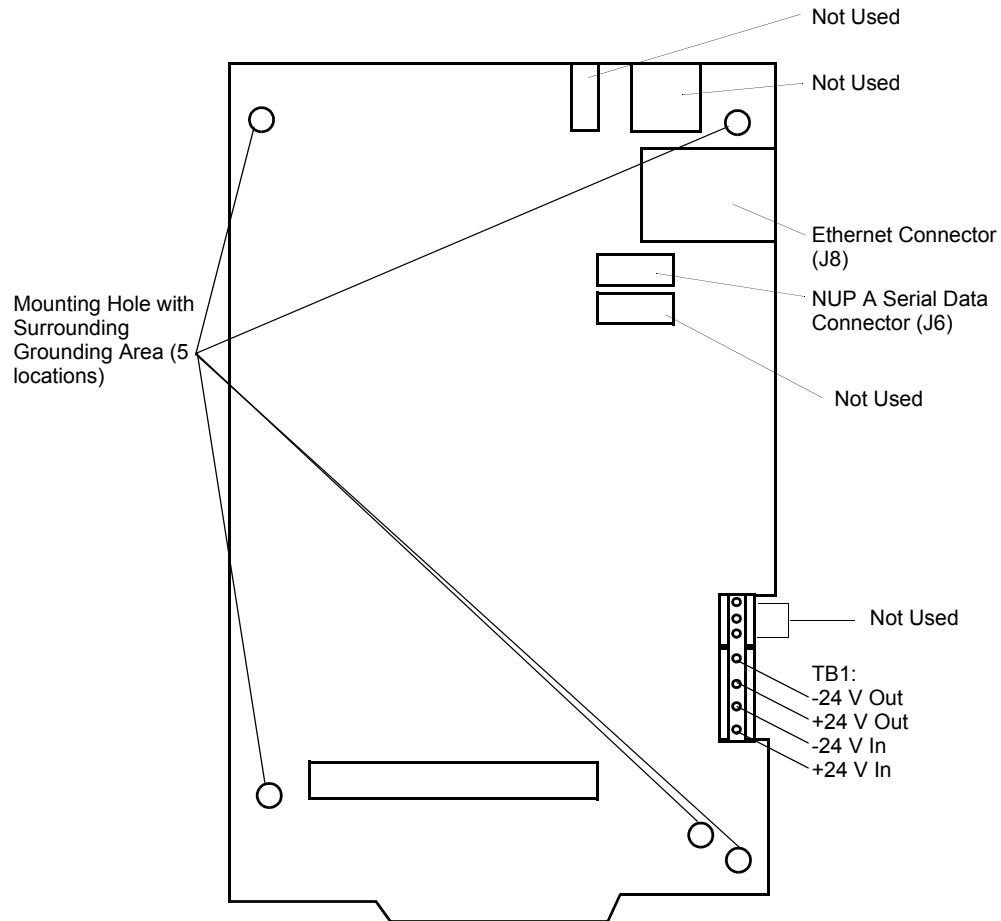
Figure 2.2 Modbus Gateway Printed Circuit Board

2.3 Installing a CAB3/CAB4 Cabinet

Install a new CAB-3/CAB-4 series cabinet according to the requirements of the local authority having jurisdiction or prepare an existing CAB-3/CAB-4 series cabinet that houses a supported NOTIFIER® panel or annunciator. Refer to Section 1.6, "Compatibility" on page 17 for list of compatible panels and annunciators.

NOTE: The CAB3/CAB4 cabinet is ordered separately. For installation details, refer to the CAB-3/CAB-4 Series Installation Document, 15330 and or the panel's or annunciator's documentation.

NOTE: Knockouts are provided on the unit so that the field wiring may be run in conduit if required by the local authority having jurisdiction. All field wiring connections are intended to be made at the installation wiring terminals provided as part of the unit.
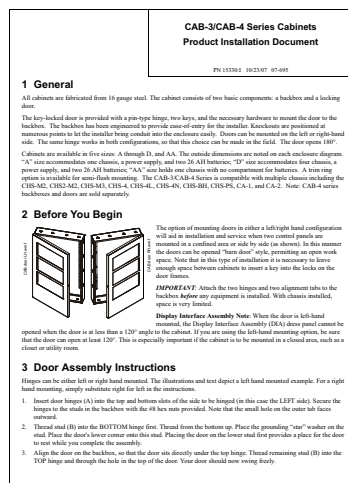
Figure 2.3 CAB-3/CAB-4 Series Installation Document, 15330

2.4 Installing a CHS-4L Chassis

A chassis holds the gateway within a CAB-3/CAB-4 series cabinet. A CHS-4L chassis fits into any CAB-3/CAB-4 series cabinet row except for the bottom row, which provides battery housing and does not have PEM studs for mounting. Follow these instructions to install a CHS-4L chassis in a CAB-3/CAB-4 series cabinet.

Step 1.   Position the chassis so the PEM cabinet studs are aligned with the chassis mounting holes, and mount the chassis onto the cabinet.

Step 2.   Secure the chassis to the PEM studs with the two hex nuts (PN 36047) provided with the chassis.

PEM Studs

Hex Nuts
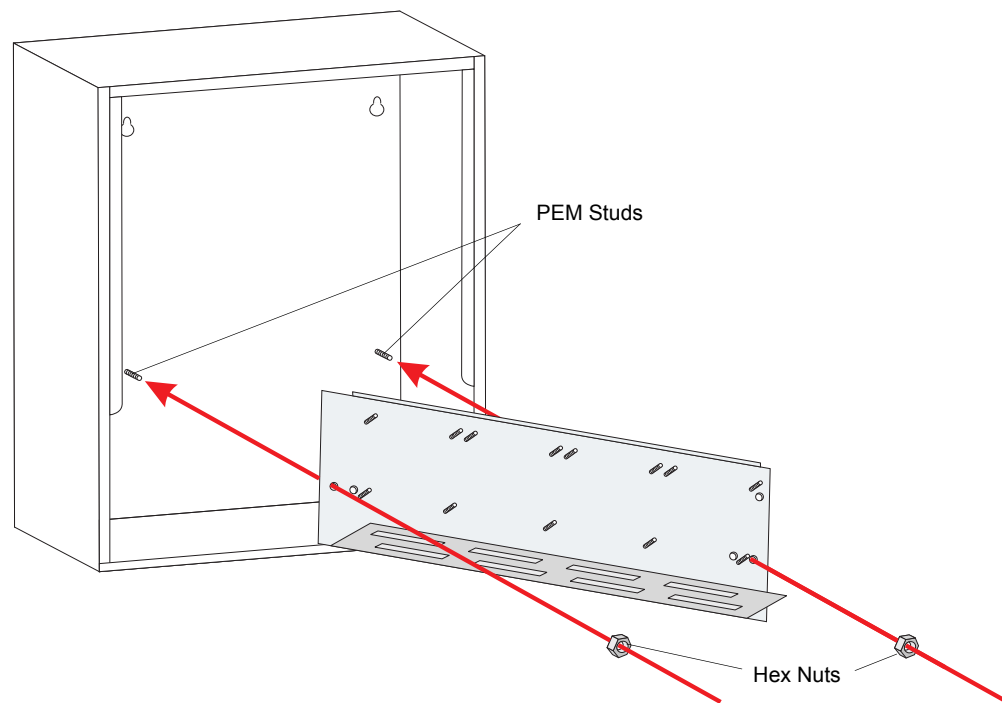
Figure 2.4 Installing a CHS-4LChassis

2.5 Installing the Modbus Gateway Printed Circuit Board

Install the Modbus Gateway printed circuit board onto the mounting studs on the CHS-4L chassis, making sure to use only the mounting holes bordered by grounding area.

Grounding area
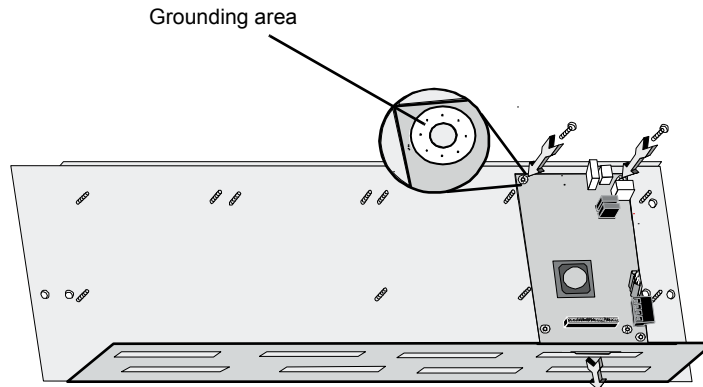
Figure 2.5 Install Modbus Gateway Printed Circuit Board onto Chassis

NOTE: There must be enough clearance on the right side of the printed circuit board to allow an Ethernet cable to be connected to the Ethernet port.

2.5.1 Connect the Power Supply

It is important that the Modbus Gateway be correctly connected to a power source meeting applicable requirements. For more information, refer to Section 3.0.1, "Modbus Gateway Power Supply Connection" on page 25.

Section 3 Power and Data Connections

3.0.1 Modbus Gateway Power Supply Connection

Table 3.1 Power Supply Specifications

	NOMINAL
Input Voltage	+24VDC
Input Current @ +24VDC	400 mA

The Modbus Gateway requires +24VDC @400mA nominal and supervised battery backup in accordance with local code requirements. Outside Canada, the Modbus Gateway can be powered by any regulated, UL 1481 listed, power limited, battery backed, +24VDC power supply. For Canadian installation, The Modbus Gateway must be powered by a ULC listed Fire Alarm Control Unit or a ULC listed power supply for fire application. Conform to UL or ULC standards as applicable in your area
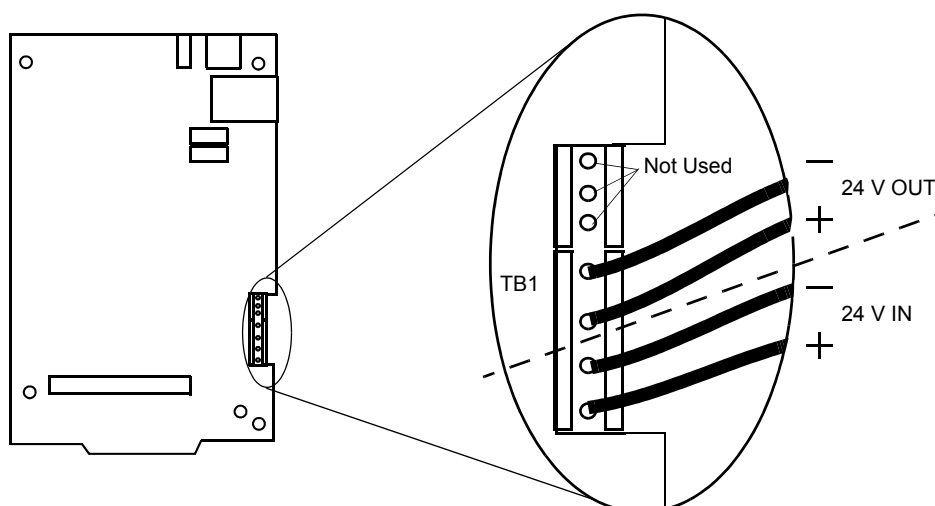
Figure 3.1 Modbus Gateway Power Connection

📄 **NOTE:** All wiring from the power supply is power limited, and a separation of at least ¼" (6.35 mm) must be maintained between power limited and non-power limited wiring.

⚠️ **CAUTION: Power Sources**
Different sources of power are used in conjunction with the Modbus Gateway product. Disconnect all sources of power before servicing. This device and associated equipment may be damaged by removing and/or inserting cards, modules or interconnecting cables while this unit is powered. This damage may adversely affect the operation of this unit, but its effect may not be readily apparent.

3.1 Connecting a Modbus Gateway to a High Speed NCM

- Use an HS-NCM-W for a twisted pair wire connection.
- Use an HS-NCM-SF for a single mode fiber-optic cable connection.
- Use an HS-NCM-MF for a multimode fiber-optic cable connection.

Connecting the Modbus Gateway to an HS-NCM-W/SF/MF allows the gateway to communicate with devices on a high speed NFN network. Refer to Section 1.6.1, "Compatible Panels" on page 17 and Section 1.6.2, "Compatible NFN Products" on page 17 for information about compatible devices. Connect Modbus Gateway to a High Speed Network Control Module using these methods:

■ NUP to NUP Cable Connection

A NUP to NUP cable is used to connect between the gateway and the NFN network. Connect the cable between to the Modbus Gateway circuit board NUP "A" connector and an HS-NCM-W/SF/MF board NUP "A" connector.
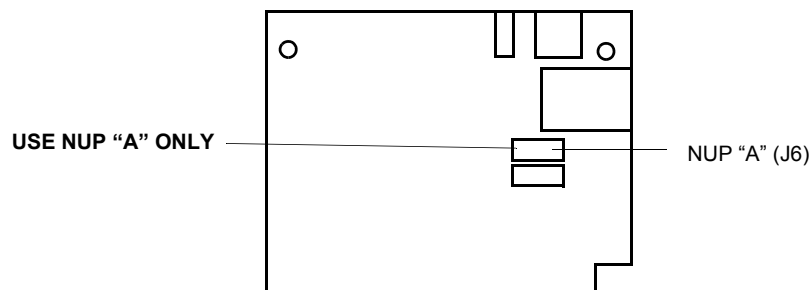
Figure 3.2 NUP Connector

■ Routing Power to an HS-NCM with NUP Data Connection

To route power from a Modbus Gateway to a High Speed NCM (HS-NCM) with a NUP data connection, follow this procedure: Use a properly insulated wire to connect the 24V Out (+) and (-) terminals on the Modbus Gateway power connector to the 24V In (+) and (-) terminals on the HS-NCM power connector.
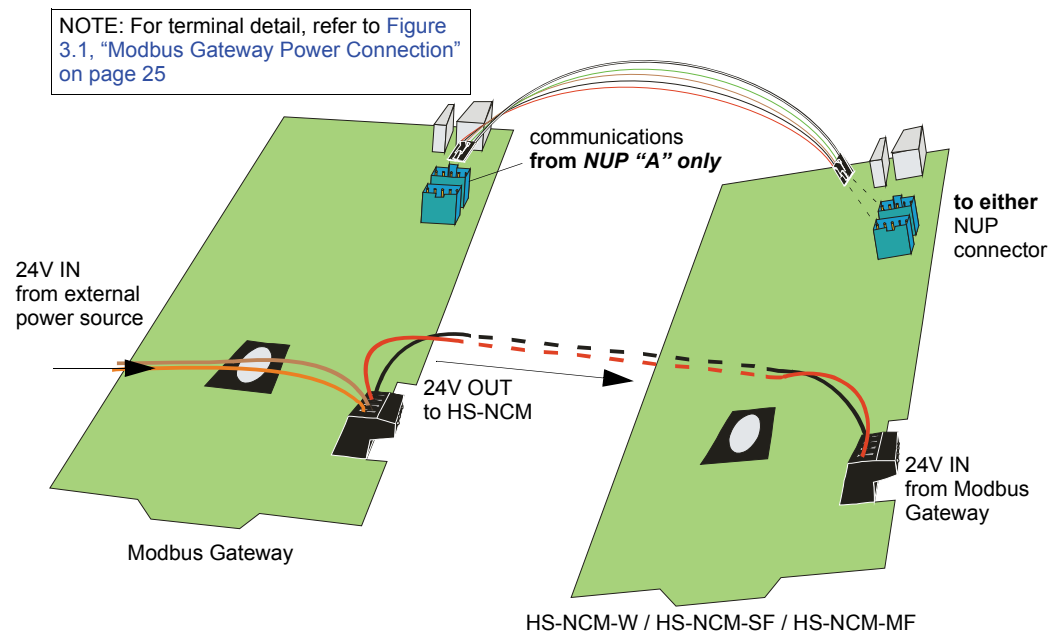
Figure 3.3 Powering an HS-NCM from a Modbus Gateway with NUP Data Connection

3.2 Connecting a Modbus Gateway to an NCM

- Use an NCM-W for a twisted pair wire connection.
- Use an NCM-F for a fiber-optic cable connection.

■NUP to NUP Cable Connection

Connecting the Modbus Gateway to an NCM-W/F allows the gateway to communicate with devices on an NFN network. Refer to Section 1.6.1, "Compatible Panels" on page 17 and Section 1.6.2, "Compatible NFN Products" on page 17 for information about compatible devices. A NUP to NUP cable is used to connect between the gateway and the NFN network. Connect the cable between the Modbus Gateway board NUP "A" connector and either NUP connector on an NCM W/F board.
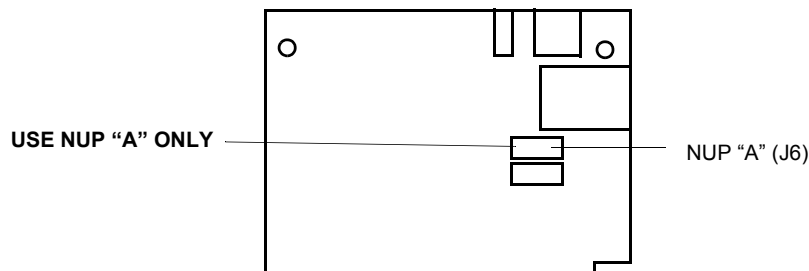
Figure 3.4 NUP Connector

Routing Power to a Standard NCM

To route power from a Modbus Gateway to a Network Communication Module (NCM), follow these steps:

Step 1. Connect the black (negative) wire end of the NCM power cable (P/N 75583) to the 24V Out (-) terminal on the Modbus Gateway power connector.

Step 2. Connect the red (positive) wire end of the NCM power cable (P/N 75583) to the 24V Out (+) terminal on the Modbus Gateway power connector.

Step 3. Connect the NUP end of the NCM power cable (P/N 75583) to either NUP connector on the NCM.
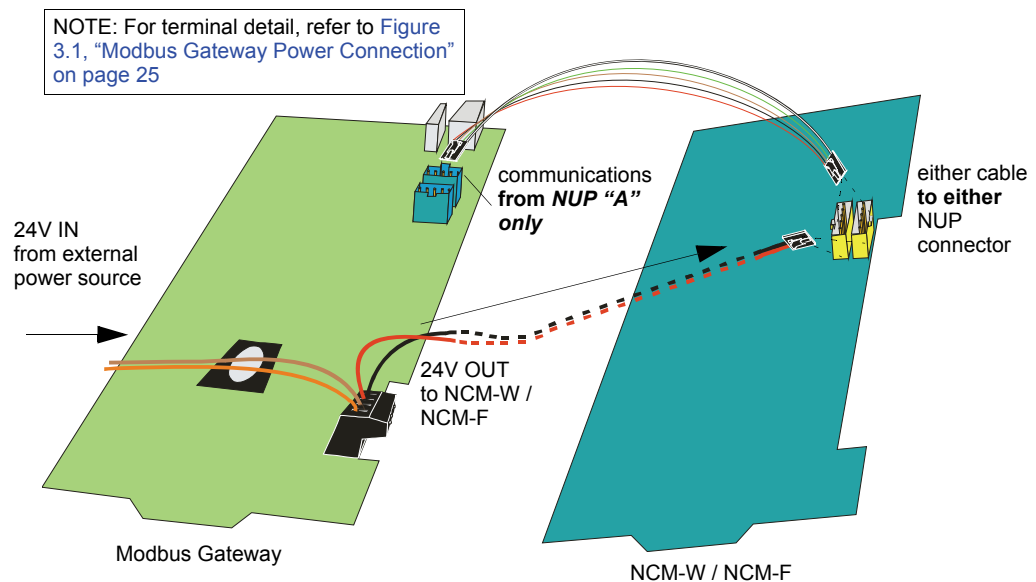
Figure 3.5 Powering an NCM-W / NCM-F from a Modbus Gateway

3.3 Connecting a Modbus Gateway to a Fire Alarm Control Panel (FACP)

■ **NUP to NUP Cable Connection**

The Modbus Gateway can connect to and communicate directly with an FACP. Refer to for information about compatible FACPs. A NUP to NUP cable is used to connect between the gateway and the FACP. Connect the cable between the Modbus Gateway board NUP "A" connector and any available NUP connector on an FACP.

NUP to NUP cable

NUP "A" (J6)

use NUP "A" only

Connect to FACP

NOTE: The Modbus Gateway is powered by the FACP. Do not supply the Modbus Gateway with an additional 24V power supply.
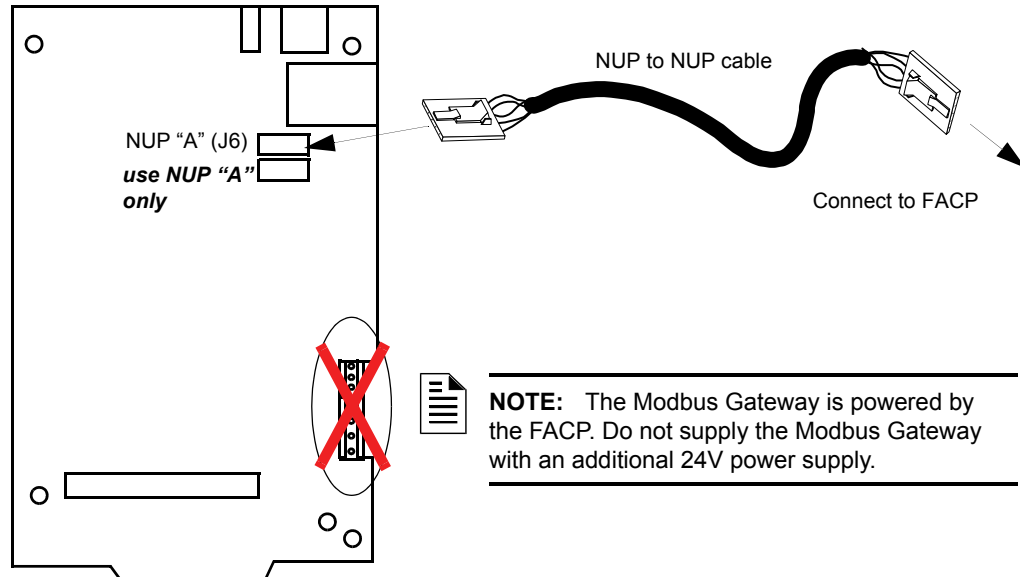
Figure 3.6 NUP to NUP Connection—FACP

3.4 Connect the Modbus Gateway to the PNET-1 Surge Suppressor

This ensures the Modbus Gateway is properly protected from power surges before it is connected to your IP network.

Step 1. Plug the PNET-1 surge suppressor into the Modbus Gateway board.

Step 2. Plug the RJ45 cable into the PNET-1.

Step 3. Plug the RJ45 cable into your IP network.
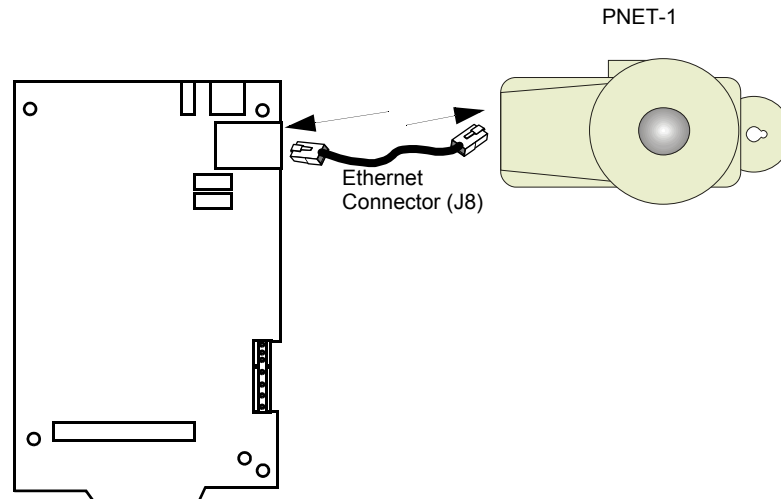
Figure 3.7 PNET-1 Connection

Section 4 Modbus Gateway Configuration

4.1 Modbus Gateway Configuration Web Page

Modbus Gateway is configured through a dedicated web page running on the embedded gateway itself. Access the configuration web page from a computer in the same IP subnet as the Modbus Gateway, with Microsoft Internet Explorer 6 or higher installed. The latest version of JAVA must also be installed and enabled.

4.1.1 Connect the Configuration Computer to the Modbus Gateway

If your configuration computer is on the same IP network you connected the Modbus Gateway to in the step, "Cable Connections" on page 18, then your configuration computer is already connected to the Modbus Gateway.

Otherwise, refer to Appendix E, "Modbus Gateway Local Configuration", on page 115.

4.1.2 Prepare the Configuration Computer to Communicate with Modbus Gateway

Configure your configuration computer to communicate with the default Modbus Gateway IP address of 192.168.1.2.:

Step 1. From the Windows taskbar, click **Start** ⇨ **Connect To** ⇨ **Show All Connections**.

Step 2. Right-click your LAN connection, and then click **Properties** in the menu that appears.
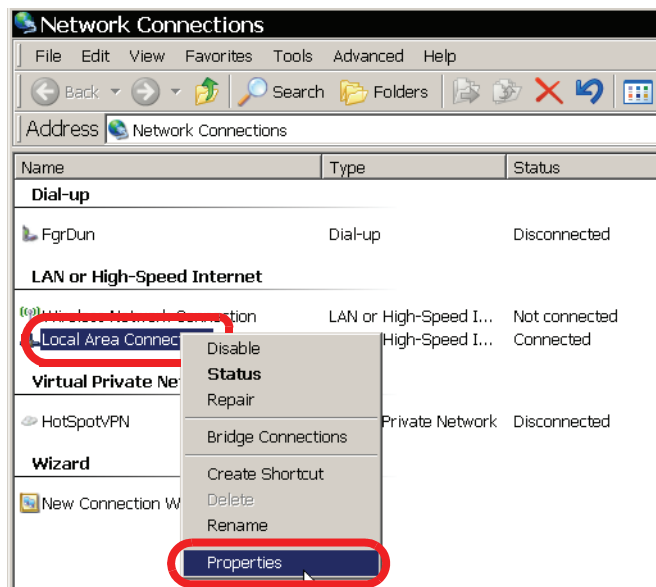
Step 3.   Select **Internet Protocol (TCP/IP)**, and then click **Properties**.
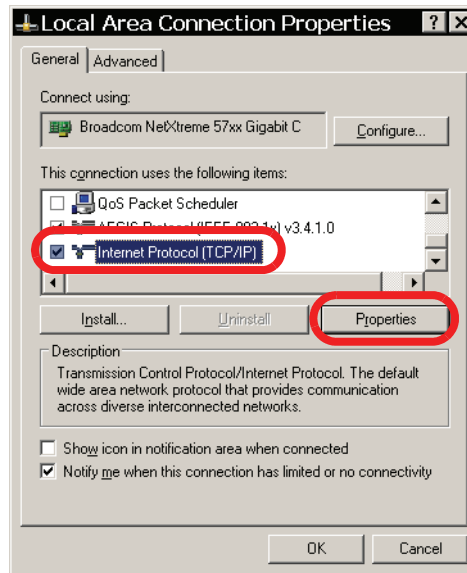
Step 4.   Record your current Internet Protocol (TCP/IP) property settings so you can restore them later.

Step 5.   Click **Use the following IP address**, and then type *192.168.1.X* into the **IP address** field.
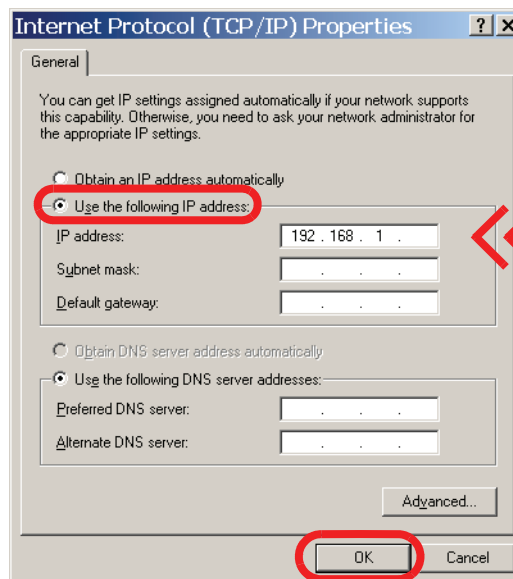
📑 **NOTE:**   *X* can be any number between 0 and 255 except for 2 (since the Modbus Gateway default IP address is 192.168.1.*2*).

Step 6.   Click **OK**, and then close all remaining open windows.

4.1.3 Configure the Modbus Gateway

Log into the Web Page

Log into the Modbus Gateway configuration web page using the following steps:

Step 1.   Start Microsoft Internet Explorer.

Step 2.　Browse to the address **http://192.168.1.2**

> **NOTE:**　**192.168.1.2** is the factory default Modbus Gateway IP address. If the Modbus Gateway has been configured previously, you will need to enter the IP which was assigned to the Modbus Gateway during configuration, *rather than* **192.168.1.2**.

> **NOTE:**　Depending on the version of Java installed on the configuration computer, a security prompt may appear. Click **NO** to proceed to the configuration web page.

Step 3.　If prompted, click **Run** to enable the applet.

Step 4.　When the Please Log In dialogue opens, type **00000000** (eight zeros) and then click **Login**.
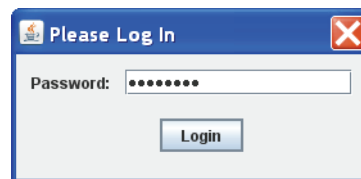
Configure the Modbus Gateway IP Address

Step 1.　On the configuration Web page, double-click the **Additional Properties** folder.
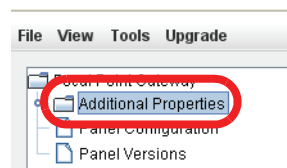
Step 2.　Click the **Internet IP Address Settings** subfolder.
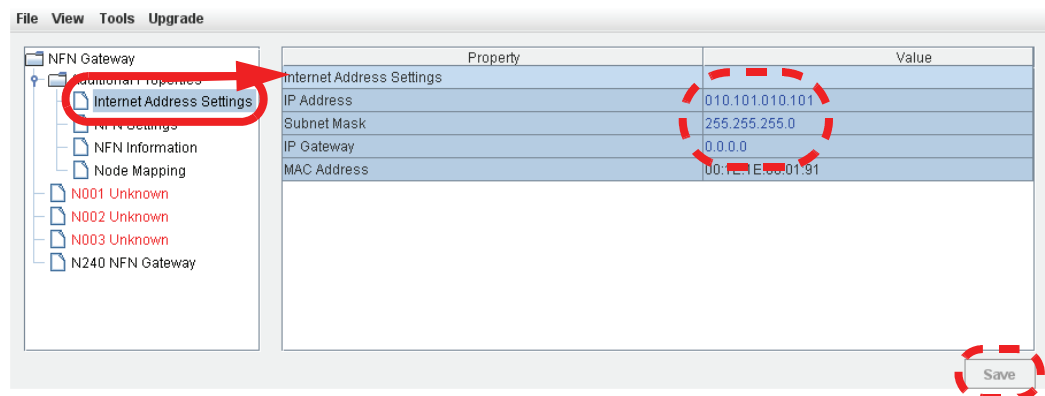
Step 3.   Change the default Modbus Gateway IP address so it will be added to your IP network.

The gateway default IP values are:

- **IP Address**: 192.168.1.2—Change this IP address so the gateway will be added to your IP network.
- **Subnet Mask**: 255.255.255.0—Change this to the subnet address of the Modbus Gateway.
- **Gateway**: 0.0.0.0—If the Modbus Gateway is connected to an Ethernet network with an IP Gateway, or IP Router, enter the IP address of the appropriate IP Gateway.
- (**MAC Address**—The MAC address of the gateway is read only and cannot be configured.)

Step 4.   Click **Save**.

The Modbus Gateway reboots.

Step 5.   Enter the new IP Address in your browser address bar to log into the Modbus Gateway at its new address.
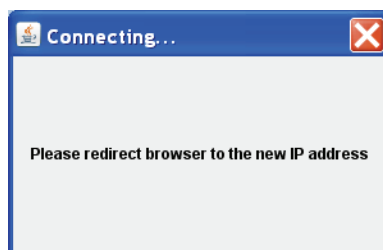
Restore Your Standard Internet Protocol (TCP/IP) Settings

Step 1.   From the Windows taskbar, click **Start ➪ Connect To ➪ Show All Connections**.

Step 2.   Right-click your LAN connection, and then click **Properties** in the menu that appears.
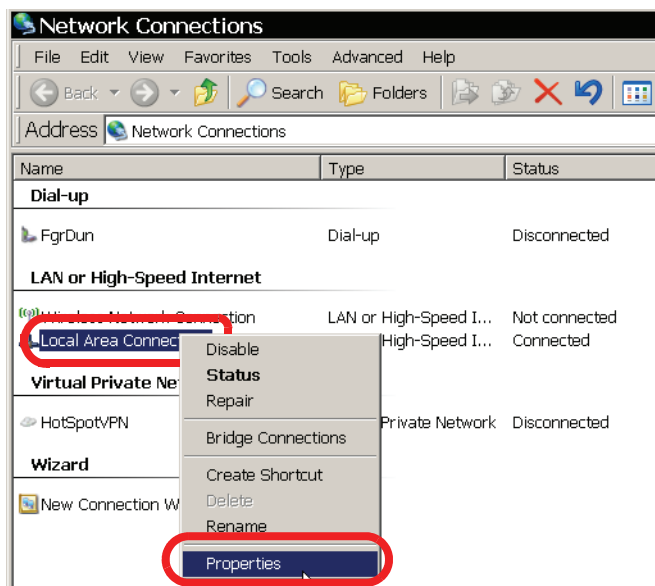
Step 3.   Select **Internet Protocol (TCP/IP)**, and then click **Properties**.
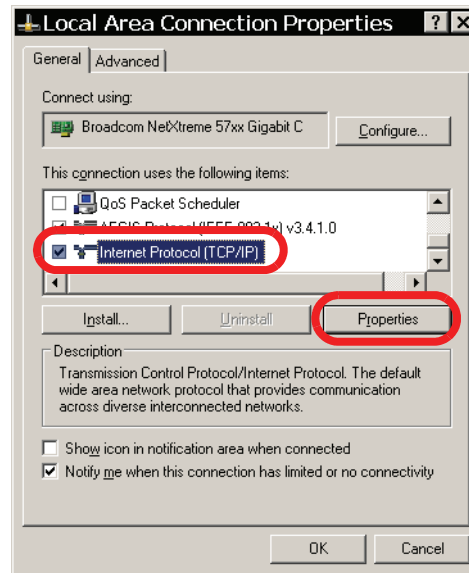
Step 4.   Enter the settings you recorded earlier into the Internet Protocol (TCP/IP) Properties dialogue, and then click **OK** to return your configuration computer to your IP network.

Configure NFN Settings

Click **NFN Settings** under the **Additional Properties** folder in the navigation pane to configure NFN settings.
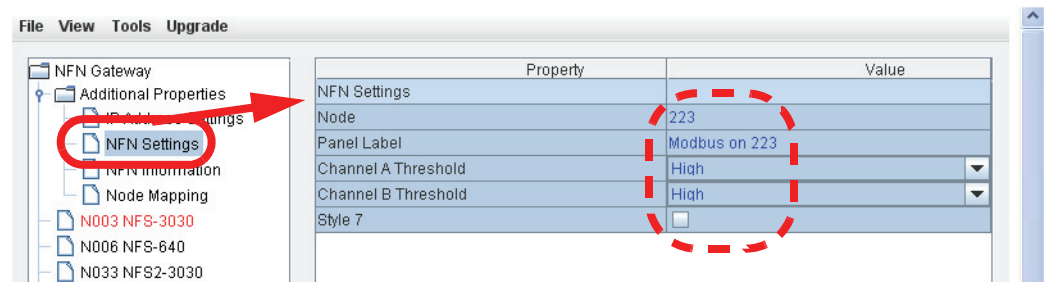
Node—This property assigns the NFN network address of the Modbus Gateway.

Panel Label—This can be set to anything.

Channel A and **B Threshold**—Set these thresholds based on the amount of noise present in the NFN network on the respective channels. Select High for high-noise networks, low for low-noise networks.

Style 7—Check this box for NFN networks with Style 7 SLC (signaling line circuit) configuration; clear this box for NFN networks with Style 4 SLC configuration.

NFN Information

Click **NFN Information** under the **Additional Properties** folder in the navigation pane to view NFN information.
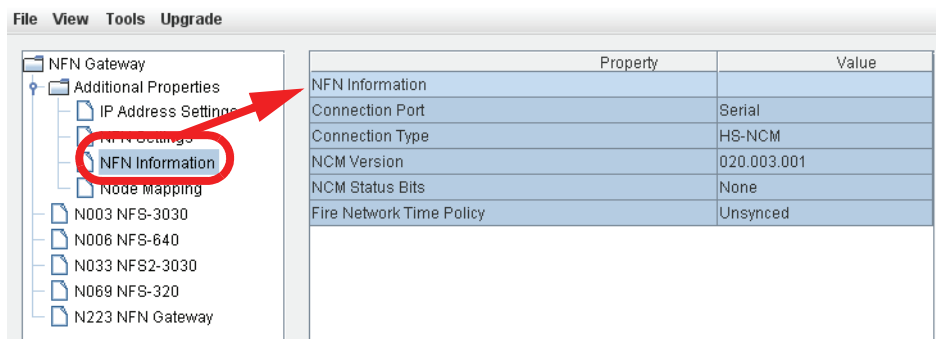
The information provided under the NFN Information heading cannot be changed using the Modbus Gateway configuration web page.

Connection Port—Modbus Gateway always connects through the serial port.

> **NOTE:** The Connection Port value appears as "Serial" even if the Connection Type is "disconnected."

Connection Type—Displays the connection type, which can be: HS-NCM, NCM-2, NCM, Direct Connect or Disconnected.

NCM Version—The NCM version number.

> **NOTE:** The NCM Version table row does not appear if the Connection Type is "disconnected."

NCM Status Bits—Reports the NCM status, which can be: Piezo, UPS Failure, Network Fail Port A, Network Fail Port B, High Speed Audio, NCM Sniffer Mode Active, Local Connection Limit Exceeded, None

> **NOTE:** The NCM Status Bits table row does not appear if the Connection Type is "disconnected".

Fire Network Time Policy—Always appears as "Unsynced," since Modbus Gateway does not synchronize time with the network.

■ Node Mapping

Click **Node Mapping** under the **Additional Properties** folder in the navigation pane to view and configure monitoring of nodes on the NFN network.
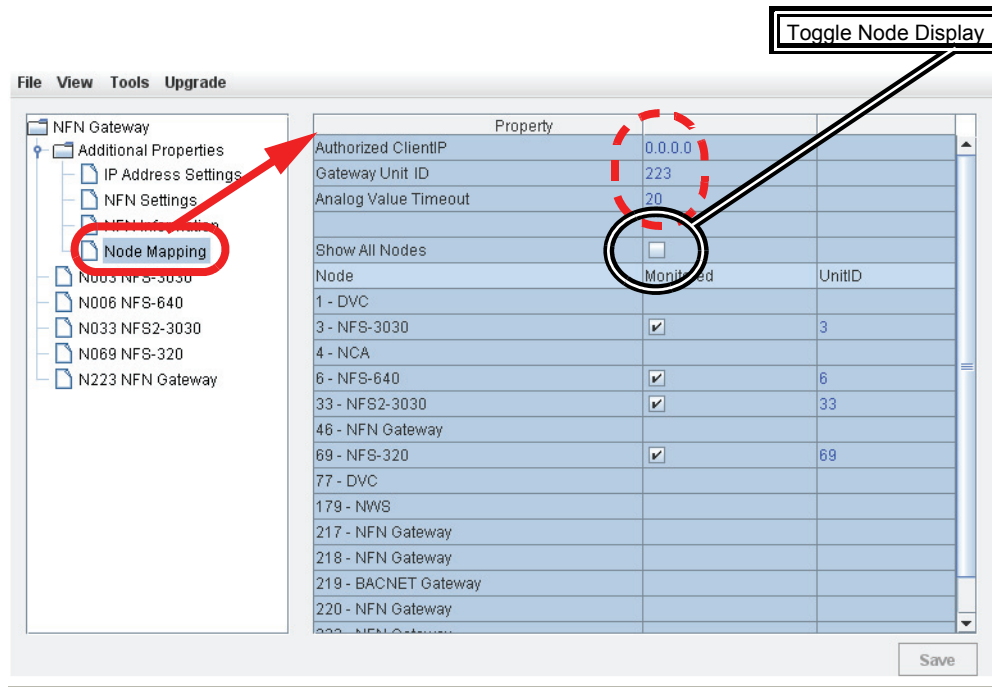
NOTE: Click **Save** after making any changes. The Modbus Gateway reboots after any changes are made to this page.

■ Properties

Three configurable properties are displayed at the top of the Node Mapping information pane. These are:

Authorized Modbus Client IP Address—This is an optional security feature. By default (that is, with an Authorized Modbus Client IP Address of **0.0.0.0**) the gateway allows any client to request data. If you enter an IP address of anything other than **0.0.0.0** into the **Authorized Modbus Client IP Address** field, then the gateway only responds to requests from a single client at that IP—*no other Modbus clients may communicate with the gateway.* (However, any computer running a browser in the local network will still be able to access the Modbus Gateway configuration web page as normal.)

NOTE: Even with Authorized Modbus Client IP Address set to 0.0.0.0, Modbus Gateway **only communicates with one client at a time**. Once Modbus Gateway accepts a client's request to connect, it will not accept any other request to connect until the original client has disconnected.

Gateway Unit ID—This property assigns the Modbus Unit ID which the Modbus Gateway will use in the Modbus network. This is a configurable property of the nodes. By default the Modbus Unit ID for a monitored node is set to be the same as the NFN Node ID. If for any reason the Unit ID needs to be changed, click the value and type the new Unit ID number. Since each Unit ID in the Modbus Network needs to be unique, change this number only if there is a conflict in the Unit IDs in the Modbus network.

Analog Value Polling Time Out—Analog Value Polling Time Out is the minimum frequency at which the Modbus Gateway expects to receive continuing polls from clients seeking analog values from 4-20mA devices. When a client that had been polling a set of analog values fails to re-poll the

values within the Analog Value Polling Time Out period, the Modbus Gateway stops polling the points in question. Once the Analog Value Polling Time Out period expires without the Modbus Gateway receiving a repeated poll, any further poll received will be treated as a new poll, and the first read will be considered an initialization read (for more information, refer to "Analog Values and Trending" on page 44). By default the Analog Value Polling Time Out is 20 seconds.

■ Node List

Below the configurable properties listed above, the Node Mapping information pane displays a list of nodes on the NFN network. Check the box above the field labeled "Monitoring" to toggle between displaying all nodes defined on the NFN network (even nodes that are unknown and/or off line) and displaying only monitored and on line nodes.

A box appears beside the name of nodes which Modbus Gateway can monitor, and also beside every unknown node. Check the box to monitor the node.

> **NOTE:**   Please note the following details regarding monitoring nodes:
> —Modbus Gateway can monitor up to four (4) nodes.
> —If an "unknown" node comes on line and is found to be of the wrong type for Modbus Gateway to monitor, its box is automatically unchecked.
> —Click **Save** once you have selected all the nodes for Modbus Gateway to monitor (up to four). After clicking **Save**, wait while the gateway reboots automatically. You will be asked to log into the configuration web page again.

> **NOTE:**   **Redundancy**—It is possible for two Modbus Gateways to monitor the same nodes on an NFN network.

Also listed for each node is its Modbus **Unit ID**. This is a configurable property of the nodes. By default the Modbus Unit ID for a monitored node is set to be the same as the NFN Node ID. If for any reason the Unit ID needs to be changed, click the value and type the new Unit ID number. Since each Unit ID in the Modbus Network needs to be unique, change this number only if there is a conflict in the Unit IDs in the Modbus network. Once the Unit ID for a node is changed, click **Save** at the bottom of the page. The Modbus Gateway automatically reboots.

> **NOTE:**   Each of the 240 possible nodes on the NFN network (except for gateways, web servers and DVCs) is automatically assigned a Modbus Unit ID. When you enter a new Unit ID number for a node, the old Unit ID number is reassigned to whichever node previously used the new Unit ID number you entered. *However, the* Modbus Gateway *configuration web page will not accept a new Unit ID number that is currently being used by a monitored node*. In order to reassign a Unit ID number used by a monitored node, first assign a new Unit ID number for the monitored node.

■ Node Properties

In the navigation (left) pane, the Modbus Configuration web page displays the nodes it is monitoring on the NFN network. The name of each on line monitored node appears in black text. The name of each off line monitored node appears in red text. Click the name of an on line network node to view information about that node.

There are three categories of information listed for each monitored node:

Node number

> The first property listed is the NFN network node number of the monitored node. The NFN network node number is read-only; it cannot be changed using the Modbus Configuration web page.

Version information

> Hardware and software version information about the monitored node and the devices used to connect it to the NFN network are listed under the light blue Version heading row.

Mapped **Register Information**

The register information for detectors and/or modules attached to the monitored node is displayed according to the scheme selected in the **Register Type** list box:

• Analog—Shows the analog values from 4–20ma modules, if any, connected to the node.

• Device Type—Shows a map of the registers storing device type information for points attached to the node.

• Status—Shows a map of the registers storing status information for points attached to the node.

For more information about registers, refer to "Node Mapping" on page 37.

📄 **NOTE:**   Since the Modbus Gateway monitors itself, it also appears as a monitored node in the navigation pane of the Modbus Gateway configuration web page. Note however, the Modbus Gateway may be listed as an NFN Gateway in the navigation pane. The Modbus Gateway displays general register mapping information only, since unlike FACPs it does not connect directly to network points.
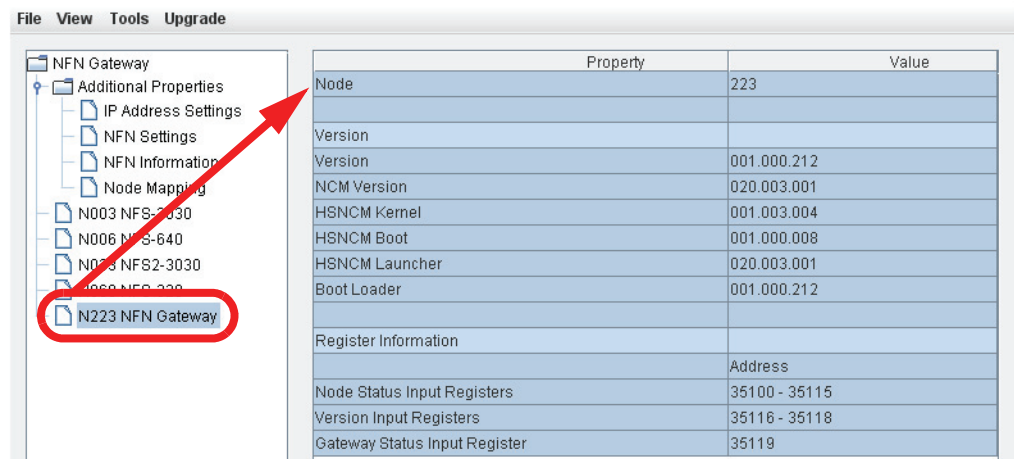
Login Password Settings

The first time the gateway is started the factory default password is used (00000000 - eight zeros), after the initial configuration it is highly recommended that you change the password.

Step 1.   Click **Tools ⇨ Set Password**.
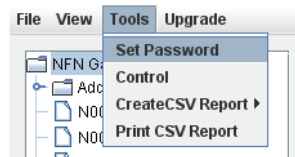
The Gateway Login (change password) window opens.

Figure 4.1 Gateway Login - Change Password Window

Step 2.   Type the previous password in the Previous Password field.

Step 3.   Type a new password in the New Password field:

- Passwords are case-sensitive.
- Alpha and numeric characters are supported.
- 1 character minimum and 8 character maximum.

Step 4.   Type the new password in the Confirm Password field.

Step 5. Click **Change Password**.

📄 **NOTE:**   If you forget your old password, please contact Technical Support to reset the password.

Register Map Report: Create CSV Report

📄 **NOTE:**   To ensure the CSV report is created correctly, make sure all monitored nodes are on line.

The Modbus Gateway configuration web page can be used to generate a register map report in standard Comma Separated Value (CSV) file format. This register map file serves as a reporting tool for Modbus Master configuration. A register map report contains the following information:

*   **Gateway IP Address**—Gateways configured IP address
*   **Gateway Node Number**—NFN node number of the Modbus Gateway
*   **Gateway Version**—Modbus Gateway Firmware version
*   **Gateway Unit ID**—Modbus Unit ID. It is recommended this be the same as the Gateway Node Number.
*   **Gateway Node Type**—Modbus Gateway
*   **Authorized Modbus Client IP Address**—This is a security feature. This the IP address of the client that is allowed to connect to the Modbus Gateway. If it is set to **0.0.0.0** then any client can connect.
*   **Node Mapping** for All Four Monitored Nodes—Modbus mapping of NFN nodes
*   Two types of register map report can be created:
    *   *With Actual Points*—(Recommended) Shows a map of the points that are configured and mapped.
    *   *With All Points*—Shows a map of all possible points on all configured panels.
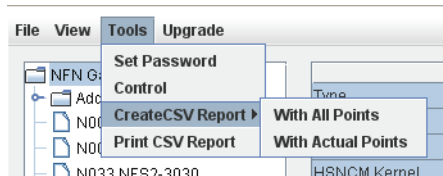
Register Map Report: Print CSV Report

Clicking **Tools** ⇨ **Print CSV Report** prints the most recently generated register map report from a printer you select.
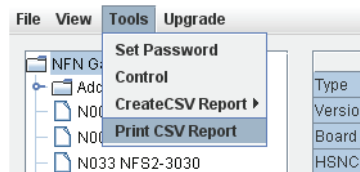
📄 **NOTE:**   We recommend generating a register map report immediately before printing, to guarantee current data.

Upgrading The Modbus Gateway Firmware

Follow these steps to upgrade the Modbus Gateway firmware:

Step 1. From the Modbus Gateway configuration web page main menu, click **Upgrade** ⇨ **Firmware**.

Step 2. Browse to the folder **Embedded Files** in the CD root directory, or to where you saved the gateway firmware upgrade file. Click the file name that begins, "**#MGNU**" and has the extension **.AR**, and then click **Open**.
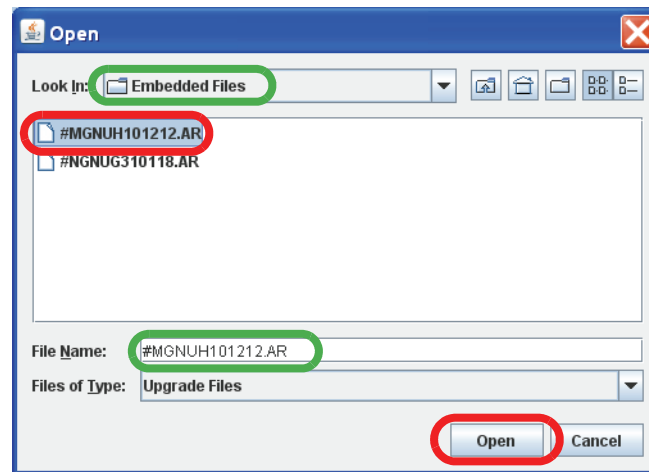
Section 5 Modbus Gateway Operation

5.1 Time Synchronization Functionality

The Modbus Gateway itself is not a time master. It does not accept time synchronization messages broadcast either from the NFN network, or from its clients.

5.1.1 Panel and Gateway Synchronization

When making programming changes to a panel, it is important that you verify that the Modbus Gateway has synchronized with these changes. This assures that you will not get unreliable data from the gateway. There are several ways in which a Modbus Gateway synchronizes with a panel

- Every 24 hours the gateway will attempt to compare its database with the panel database. If there is a difference then the gateway will synchronize.
- If the gateway receives a message from the panel that it has been reprogrammed through a programming tool or from the front panel, then the gateway will attempt to resynchronize.
- If the gateway is reset, the power is cycled or the panel connectivity is lost and reapplied.

Resynchronization does several things. First, the gateway updates all of its device type registers to match the panels. Second, the gateway updates the device status registers to assure the gateway will provide accurate state data.   If the panel and panel network are not completely stable while the gateway is resynchronizing, then the gateway aborts resynchronization.

5.2 Modbus Command Support

5.2.1 Modbus Commands

The Modbus Gateway supports the following Modbus commands:

- Read Input Registers (0x04)
- Read Holding Registers (0x03)
- Write Single register (0x06)
- Read Device Identification supported 43 / 14 (0x2B / 0x0E)

5.2.2 Exception Responses

Modbus Gateway sends exception responses to its Modbus clients as appropriate (e.g. Invalid Command, invalid data etc.). For more information, refer to Appendix A, "Exception Responses", on page 59.

5.3 Modbus Addressing

The Modbus Gateway uses Modbus Addressing within the following guidelines:

- The Modbus Gateway operates similarly to a Modbus Bridge. Each Modbus Gateway can support up to four panels on an NFN network. Each fire panel being addressed by the Modbus master on the NFN network is identified by the Unit ID.
- The Unit ID used in the Modbus Gateway must be in the range 1 through 247. This is a Modbus range limitation. The Unit ID should match the node number of the NFN node you are addressing. For example, a unit ID of 127 addresses NFN node 127.

• The Modbus Gateway communicates on standard Modbus IP port 502.

> **NOTE:**   This is not configurable and is a Modbus norm.

• Standard register types and reference ranges are:
    – 0x Coil 00001–09999
       1x Discrete Input 10001–19999
       3x Input Register 30001–39999
       4x Holding Register 40001–49999

For more information on Modbus addressing, refer to Section 6, "Register Mapping", on page 47.

5.4 Analog Values and Trending

Trending of analog values is supported on all of the panels/networks 4–20ma modules. The only limitation is that the gateway will only actively read analog values for up to 10 analog modules at a time. You can read all the analog values on all the modules as long as you send a separate poll for these points in groups of up to 10 points at a time, following the rules outlined below. Please reference the use cases for clarity on this issue.

• Accept a poll for up to any 10 analog (4–20ma) points per gateway.
    – Requests for more points than this are rejected with an exception code.
    – If any of the points in the request are not 4–20 ma modules then the gateway rejects the request with an exception code.
• The first poll for analog values is an initialization poll. This initialization poll informs the gateway to start acquiring analog values for these points at 5 second intervals.
    – Points are only polled on the NFN if the 4–20ma module is in at least the first level of alarm status. If the point is normal then the gateway returns a value of zero.

> **NOTE:**   The first response to an analog point poll is zero. This response is an initialization confirmation from the gateway.

• Upon receiving the initialization confirmation, the client can begin polling the analog points. The client should wait 5 seconds after the initialization request to insure that the Modbus Gateway has had enough time to get the analog values and load the registers. Thereafter the Modbus Gateway continues to poll the points. The analog value in the Modbus Gateway are updated no faster than once every 5 seconds.
    – Points are polled if the device is in at least the first level of alarm status. Zero is returned for devices not in alarm status.
    – When a point being polled enters normal status, polling for that point on the NFN is terminated and the analog value register for that point is filled with zeros.
• The Modbus Gateway ceases polling the analog points when:
    – The client does not make a request for these exact same points over a period defined in the Modbus Configuration Tool as "Analog Value Time Out". The default is 20 seconds.
    – The gateway makes a request for a point (or points) that is not *exactly the same as the initial request*. The Modbus Gateway first sends an initial confirmation for the new set of analog points, and then begins polling those points at 5 second intervals.

Analog Value Use Cases

Use Case 1: A client requests analog values from the points L1M1 through L1M10 every 10 seconds.

> **Result:** The Modbus Gateway sends back zeros in response to the first request for analog values from the points L1M1 through L1M10. The Modbus Gateway sends back actual values

on the second request from the client 5 seconds later. The Modbus Gateway continues to poll these devices as long as the client continues to send analog value requests for points L1M1 through L1M10 at a rate faster than the Analog Value Time Out.

Use Case 2: A client requests analog values from the points L1M1 through L1M10. After 10 minutes of polling on a 10 second interval the client stops requesting analog values for these points.

> **Result:** The Modbus Gateway sends back zeros in response to the first request for analog values from the points L1M1 through L1M10. The Modbus Gateway sends back actual values on the second request from the client 10 seconds later. The Modbus Gateway continues to poll these devices as long as the client continues to send analog value requests for points L1M1 through L1M10. When the client stops polling at 10 minutes, the Modbus Gateway will stop polling the NFN after the Analog Value Time Out expire**s.**

Use Case 3: A client requests analog values from the points L1M1 through L1M10. After 10 minutes of polling on a 10 second interval the client requests analog values from the points L1M20 to L1M22.

> **Result:** The Modbus Gateway sends back zeros in response to the first request for analog values from the points L1M1 through L1M10. The Modbus Gateway sends back actual values on the second request from the client 10 seconds later. The Gateway continues to poll these devices as long as the client continues to send analog value requests for the points L1M1 through L1M10. When the client sends a request for analog values from the points L1M20 through L1M22, the Modbus Gateway immediately sends back zeros in response to the first analog value request from these points, and starts polling L1M20 through L1M22. The Modbus Gateway only polls the points specifically requested.

Use Case 4: A client requests analog values from the points L1M1 through L1M10. After 10 minutes of polling on a 10 second interval, the client requests analog values from the points L1M5 through L1M12.

> **Result:** The Modbus Gateway sends back zeros in response to the first request for analog values from the points L1M1 through L1M10. The Modbus Gateway sends back actual values in response to the second request from the client 10 seconds later. The Modbus Gateway continues to poll these devices as long as the client continues to send analog value requests for the points L1M1 through L1M10. When the client sends a request for analog values from the points L1M5 through L1M12, the gateway immediately sends back zeros in response to the first analog value request from points L1M11 and L1M12 (since these are newly requested points) and it sends back actual values in response to the continuing analog value requests for points L1M5 through L1M10 (since it already has been polling these points). The gateway stops polling points L1M1 through L1M4 and starts polling points L1M5 through L1M12.

Use Case 5: A client requests analog values from the points L1M1 through L1M15.

> **Result:** The Modbus Gateway sends back an exception response, because it can only process requests for up to 10 analog values at a time. The client should request and receive values for L1M1 through L1M10, and then send a request for L1M11 through L1M15. Note that the first request for analog values from a valid range of points is considered an initialization request, which returns zeros.

Section 6 Register Mapping

6.1 Register Mapping Overview

- Modbus Gateway uses 16-bit registers.
- One Modbus Input register and one Modbus Holding Register are allocated for each device address.
- These registers represent a contiguous address mapping of all devices and points.

6.2 Point Status Holding Registers

Each of the point status holding registers are divided up into two bytes as defined below:

- **Active Event Type**: This byte communicates the active event type as defined in Appendix B, "Active Event Types", on page 61. An active state is defined in this gateway as any Fire, Security, Critical Process, Medical or Supervisory alarm state. This byte will be all 0's if the device is not in an active state (see **Active** bit description in the bulleted list below). Inactive states include any state not shown in Appendix B. These states include, normal, troubles, disables, prealarms, etc. This byte will be all 1's if the point is not present in the panel.
- **Ack Fire Alarm**: If this bit is set to 1 then the fire alarm on this point is acknowledged.
- **Disable**: If this bit is set to 1 then the point is disabled.
- **Enable**: If this bit is set to 1 then the point is enabled.
- **Active**: If this bit is set to 1 then the point is Active and there will be an active event type in the lower byte.
- **InActive**: If this bit is set to 1 then the point is not active.
- **Trouble**: If this bit is set to 1 then the point is in a trouble state.
- **Prealarm**: If this bit is set to 1 then the point is in a prealarm state.
- **Ack Block**: If this bit is set to 1 then all events on this point, other than fire alarm, are acknowledged.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ack Block	Prealarm	Trouble	InActive	Active	Enable	Disable	Ack Fire Alarm	Active Event Type							

Table 6.1 Device/Module Holding Register Addresses

Start Address	End Address	Device Address
40001	40200	L1D1–L1D159
40201	40400	L1M1–L1M159
40401	40600	L2D1–L2D159
40601	40800	L2M1–L2M159
40801	41000	L3D1–L3D159
41001	41200	L3M1–L3M159

Table 6.1 Device/Module Holding Register Addresses

Start Address	End Address	Device Address
41201	41400	L4D1–L4D159
41401	41600	L4M1–L4M159
41601	41800	L5D1–L5D159
41801	42000	L5M1–L5M159
42001	42200	L6D1–L6D159
42201	42400	L6M1–L6M159
42401	42600	L7D1–L7D159
42601	42800	L7M1–L7M159
42801	43000	L8D1–L8D159
43001	43200	L8M1–L8M159
43201	43400	L9D1–L9D159
43401	43600	L9M1–L9M159
43601	43800	L10D1–L10D159
43801	44000	L10M1–L10M159

NOTE: There are unused registers on every loop in order to make the register addresses easier to remember and allow for future expansion (e.g. registers 40159 through 40200 are not used).

NOTE: Note: On the AFP-2800, output point activation status is not reported to the Modbus Gateway and therefore the bits and event type will always indicate a non active state. AFP-2800 activations from the Modbus client is not supported.

6.3 Point Device Type Holding Registers

- Consists of 2000 holding registers.
- Each register represents the device or module type for two points as defined below.
- The upper byte has the even number points; the lower byte has the odd number points.
- See Appendix C, "Device Types", on page 63 for device type definition.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Device Type								Device Type							

Table 6.2 Device And Module Addresses

Start Address	End Address	Devices In Upper Byte	Devices In Lower Byte
44001	44100	Loop 1 Detector 2,4,6,8,10...158	Loop 1 Detector 1,3,5,9,11...159
44101	44200	Loop 1 Module 2,4,6,8,10...158	Loop 1 Module 1,3,5,9,11...159
44201	44300	Loop 2 Detector 2,4,6,8,10...158	Loop 2 Detector 1,3,5,9,11...159
44301	44400	Loop 2 Module 2,4,6,8,10...158	Loop 2 Module 1,3,5,9,11...159
44401	44500	Loop 3 Detector 2,4,6,8,10...158	Loop 3 Detector 1,3,5,9,11...159
44501	44600	Loop 3 Module 2,4,6,8,10...158	Loop 3 Module 1,3,5,9,11...159
44601	44700	Loop 4 Detector 2,4,6,8,10...158	Loop 4 Detector 1,3,5,9,11...159
44701	44800	Loop 4 Module 2,4,6,8,10...158	Loop 4 Module 1,3,5,9,11...159
44801	44900	Loop 5 Detector 2,4,6,8,10...158	Loop 5 Detector 1,3,5,9,11...159
44901	45000	Loop 5 Module 2,4,6,8,10...158	Loop 5 Module 1,3,5,9,11...159
45001	45100	Loop 6 Detector 2,4,6,8,10...158	Loop 6 Detector 1,3,5,9,11...159
45101	45200	Loop 6 Module 2,4,6,8,10...158	Loop 6 Module 1,3,5,9,11...159
45201	45300	Loop 7 Detector 2,4,6,8,10...158	Loop 7 Detector 1,3,5,9,11...159
45301	45400	Loop 7 Module 2,4,6,8,10...158	Loop 7 Module 1,3,5,9,11...159
45401	45500	Loop 8 Detector 2,4,6,8,10...158	Loop 8 Detector 1,3,5,9,11...159
45501	45600	Loop 8 Module 2,4,6,8,10...158	Loop 8 Module 1,3,5,9,11...159
45601	45700	Loop 9 Detector 2,4,6,8,10...158	Loop 9 Detector 1,3,5,9,11...159
45701	45800	Loop 9 Module 2,4,6,8,10...158	Loop 9 Module 1,3,5,9,11...159
45801	45900	Loop 10 Detector 2,4,6,8,10...158	Loop 10 Detector 1,3,5,9,11...159
45901	46000	Loop 10 Module 2,4,6,8,10...158	Loop 10 Module 1,3,5,9,11...159

6.4 Zones/Panel Circuits Status Holding Registers

Each of the zones/panel circuits holding registers are divided up into two bytes as defined below:

- **Active Event Type**: This byte communicates the active event type as defined in Appendix B, "Active Event Types", on page 61. An active state is defined in this gateway as any Fire, Security, Critical Process, Medical or Supervisory alarm state. This byte will be all 0's if the zone/panel circuit is not in an active state (see **Active** bit description in the bulleted list below). Inactive states include any state not shown in Appendix B. These states include, normal, troubles, disables, prealarms, etc. This byte will be all 1's if the zone/panel circuit is not present in the panel.

- **Ack Fire Alarm**: If this bit is set to 1 then the fire alarm on the zone/panel circuit is acknowledged.

- **Disable**: If this bit is set to 1 then the zone/panel circuit is disabled.

- **Enable**: If this bit is set to 1 then the zone/panel circuit is enabled.
- **Active**: If this bit is set to 1 then the zone/panel circuit is Active and there will be an active event type in the lower byte.
- **InActive**: If this bit is set to 1 then the zone/panel circuit is not active.
- **Trouble**: If this bit is set to 1 then the zone/panel circuit is in a trouble state.
- **Prealarm**: If this bit is set to 1 then the zone/panel circuit is in a prealarm state.
- **Ack Block**: If this bit is set to 1 then all events on the zone/panel circuit, other than fire alarm, are acknowledged.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ack Block	Prealarm	Trouble	InActive	Active	Enable	Disable	Ack Fire Alarm	Active Event Type							

■ General Zones

Register Address	Zone Address
46001–47000	Z 1,2,3,4,5,6,7,8,...1000

■ Logic Zones

Register Address	Zone Address
47001–49000	Z 1,2,3,4,5,6,7,8,...2000

■ Trouble Zones

Register Address	Zone Address
49001–49100	Z 1,2,3,4,5,6,7,8,...100

■ Releasing Zones

Register Address	Zone Address
49101–49110	Z 1,2,3,4,5,6,7,8,9,10

■ Panel Circuits

Register Address	Panel Circuits
• 49111–49118	• P1.1–P1.8
• 49119–49126	• P2.1–P2.8
• 49127–49134	• P3.1–P3.8
• 49135–49142	• P4.1–P4.8
• 49143–49150	• P5.1–P5.8
• 49151–49158	• P6.1–P6.8
• 49159–49166	• P7.1–P7.8
• 49167–49174	• P8.1–P8.8
• 49175–49182	• P9.1–P9.8
• 49183–49190	• P10.1–P10.8
• 49191–49198	• P11.1–P11.8
• 49199–49206	• P12.1– P12.8

Table 6.3 Supported Circuits by Panel

Panel	Max Panel Circuits Points
NFS-640	8
NFS2-320	Not Supported
NFS2-640	Not Supported
NFS-3030	12
NFS2-3030	Not Supported

6.5 Bell Circuits Status Holding Registers

■ **NFS2-640 and NFS-320 Only**

Each of the bell circuits status holding registers are divided up into two bytes as defined below:

- **Active Event Type**: This byte communicates the active event type as defined in Appendix B, "Active Event Types", on page 61. An active state is defined in this gateway as any Fire, Security, Critical Process, Medical or Supervisory alarm state. This byte will be all 0's if the bell circuit is not in an active state (see **Active** bit description in the bulleted list below). Inactive states include any state not shown in Appendix B. These states include, normal, troubles, disables, prealarms, etc. This byte will be all 1's if the bell circuit is not present in the panel.
- **Ack Fire Alarm**: If this bit is set to 1 then the fire alarm on the bell circuit is acknowledged.
- **Disable**: If this bit is set to 1 then the bell circuit is disabled.
- **Enable**: If this bit is set to 1 then the bell circuit is enabled.
- **Active**: If this bit is set to 1 then the bell circuit is Active and there will be an active event type in the lower byte.
- **InActive**: If this bit is set to 1 then the bell circuit is not active.
- **Trouble**: If this bit is set to 1 then the bell circuit is in a trouble state.
- **Prealarm**: If this bit is set to 1 then the bell circuit is in a prealarm state.
- **Ack Block**: If this bit is set to 1 then all events on the bell circuit, other than fire alarm, are acknowledged.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ack Block	Prealarm	Trouble	InActive	Active	Enable	Disable	Ack Fire Alarm	Active Event Type							

Table 6.4 Bell Circuit Holding Register Addresses

Start Address	End Address	Device Address
49400	49400	Bell Circuit 1
49401	49401	Bell Circuit 2
49402	49402	Bell Circuit 3

Table 6.4 Bell Circuit Holding Register Addresses

Start Address	End Address	Device Address
49403	49403	Bell Circuit 4

6.6 Bell Circuits Device Type Holding Registers

Each register represents the device type for two points as defined below.

- Each register represents two bell circuits as defined below.
- See Appendix C, "Device Types", on page 63 for device type definition.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Device Type								Device Type							

Table 6.5 Bell Circuit Type Code Holding Register Addresses

Start Address	End Address	Device Address	Device Address
49410	49410	Bell Circuit 2	Bell Circuit 1
49411	49411	Bell Circuit 4	Bell Circuit 3

6.7 Panel Status Holding Register

Start Address	End Address	Description
49500	49500	Panel Status Holding Register

The holding register is divided up into bit fields as defined below:

- **Reset**: Not used.
- **Silence**: The fire alarm control panel is silenced when this bit is set to 1.

Upper Byte								Lower Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Not used														Silence	Reset

6.8 Analog Values Input Registers

Analog Values

Analog Values are only available for 4–20ma modules.

NOTE: For all modules that are not 4–20ma, the Analog Value field is filled with zeros.

Table 6.6 Input Register Analog Values

Start Address	End Address	Analog Value (16 bits)
30001	30200	L1M1–L1M159
30201	30400	L2M1–L2M159
30401	30600	L3M1–L3M159
30601	30800	L4M1–L4M159
30801	31000	L5M1–L5M159
31001	31200	L6M1–L6M159
31201	31400	L7M1–L7M159
31401	31600	L8M1–L8M159
31601	31800	L9M1–L9M159
31801	32000	L10M1–L10M159

6.9 Panel & System Troubles Input Registers

Sixty-Four 16 bit registers are reserved for panel troubles.

One register is assigned as an overall panel trouble indicator.

Start Address	End Address	Description
35000	35000	Panel Trouble Summary (Total number of Trouble bits set for the node)
35001	35064	Panel Troubles

A single bit is reserved for each trouble in the system. The assignment of bits to trouble codes are shown in Appendix D, "System Troubles", on page 67.

6.10 Gateway Information Input Registers

📄 **NOTE:**   Information/debug values are used by the Modbus Gateway Unit ID only. All other nodes reject reads in this address range.

The Modbus Gateway records some status and configuration information for debugging and technical support purposes. This information is stored in some reserved gateway registers as outlined below.

• Gateway Modbus address

• Gateway IP address

• Gateway Version Number

• Gateway status

Table 6.7 Information/Debug Value Holding Register Addresses

Start Address	End Address	Description
35100	35500	Information/Debug info
35100	35115	Node Status • 1 = On Line • 0 = Off Line The Modbus Gateway tracks the node status of all nodes on the NFN network.
35116	35116	Gateway major version number
35117	35117	Gateway minor version number
35118	35118	Gateway build
35119	35119	Gateway Status • 1 = On Line • 0 = Off Line

Node Status Details

Each nodes status is represented by a bit in a register. If the bit is set then the node is on line. Below is an example of how this is represented in a register

Bit#	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
35100	N16	N15	N14	N13	N12	N11	N10	N9	N8	N7	N6	N5	N4	N3	N2	N1
35101	N32	N31	N30	N29	N28	N27	N26	N25	N24	N23	N22	N21	N20	N19	N18	N17

Table 6.8 Node Status Example

Read Device Identification (0x2B/0x0E)

This function code allows reading the identification and additional information

Table 6.9 43 / 14 (0x2B / 0x0E) READ DEVICE IDENTIFICATION

Object ID	Object Name / Description	Value
0x00	VendorName	Notifier
0x01	ProductCode	1
0x02	MajorMinorRevision	V1.0
0x03	VendorUrl	www.honeywelllifesafety.com
0x04	ProductName	Modbus Gateway
0x05	ModelName	Modbus Gateway
0x06	UserApplicationName	Modbus Gateway

Section 7 Troubleshooting

7.1 What are some basic guidelines I should use when installing a Modbus Gateway?

- Polling should be done slowly to start.
- Use Modscan® to debug the system rather than a more complicated client. Make sure you can see registers being updated as events happen on the NFN network/panel.
- Make sure you can ping the gateway from the same computer on which you are installing the client application.
- Check and double check your power supplies as well as all cabling.
- Make sure the client supports Unit IDs.
- Stop the client from sending a subsequent request until after it receives a response from the gateway.
- Make sure the client accepts all exception responses. Including 0xA and 0xB.
- Use Wireshark to debug IP traffic.
- Be sure only one client is polling the gateway.
- Check the Modbus Gateway configuration tool and be sure that the Authorized Client IP address is set to **0.0.0.0**. If you are using the Authorized Client IP security feature then confirm that the address in the gateway matches the address in your Modbus client.

7.2 How fast can the Modbus client poll the gateway?

The polling rate is a function of several variables. Some issues that will determine the maximum poll rate are:

- The size of the NFN network that you are monitoring.
- The number of points on the panels.
- The event activity on the NFN network/panel (i.e. VeriFire downloads).
- Requests for analog values are much slower than other requests
- If you see only a partial response form the gateway in your Modbus client then try increasing the "response time out" value in the client to a larger value. If you set it to 5 seconds or more then this should be adequate. The exact response time out will depend on your IP network delays and routing. On a small IP network the gateway responds to a read of 100 register in less than 1 second.

The gateway also has some processing overhead in order to do such things as maintain the registers.

7.3 How can I tell if the gateway is running?

- Ping the gateway from the computer on which you are running your Modbus client.
- Use Wireshark® to analyze the data on the IP network.
- Modscan was one tool that was used during development to test the gateway. It is designed primarily as a testing device for verification of correct protocol operation in new or existing systems.

7.4 How do I recover a lost password from the gateway?

If the password for the gateway is lost then you will not be able to make programming changes. Technical support can provide you with a procedure for resetting the password. This password reset will also reset the entire configuration back to factory default and thus require you to reconfigure the gateway. Go through this procedure only if it is absolutely necessary and you have documented all of the gateway settings that will need to be reprogrammed.

7.5 What is an "initialization read" for analog values?

This is the first read of up to 10 analog values from a 4–20ma module. This first read tells the gateway that it should begin a polling routine for the analog values in this request. The first response from the initialization will usually be all zeros. Subsequent responses will have the actual values.

7.6 How many analog values can I read at a time?

Ten analog values can be read at a time. Remember that you must do an initialization read.

7.7 Why do I get an exception code when trying to read an analog value?

There are several reasons you may receive an exception code when requesting an analog value.

- The point you are requesting an analog value from is not a 4–20ma Analog Input Module.
- At least one of the points in the group of points you are requesting an analog value from is not a 4–20ma Analog Input Module.
- You requested more than 10 analog values in a single request.

7.8 Why do I get all zeros when I read an analog value?

There are several reasons you will receive a zero reading from an FMM-4–20 Analog Input Module.

- The first read for an analog value from the gateway initializes the polling routine in the gateway to retrieve analog values from the NFN network. The first response will usually be all zeros. This is normal. The subsequent polls of an analog value for the same point or group of points will return actual values. As long as you continue to poll the same points at a rate faster than the Analog Poll Time Out then the gateway will continue to poll the same points.
- The gateway will not actually take an analog value reading unless the module has reached the first threshold and therefore it will return a zero reading.
- If the client polls the gateway too quickly after the initialization poll then the gateway may still return zeros.
- If the client polls the analog values slower than the Analog Poll Time Out, then the gateway may return all zeros.

7.9 What is the "Analog Value Polling Time Out"?

This is how long a gateway will continue to poll analog points after the last client read request of the points. As long as the client makes analog reads of the same points faster than the Analog Value Polling Time then the gateway will continue to poll these points. If the client polls slower than the Analog Value Polling Time then the gateway may return readings of zero because this will be considered an initialization read.

7.10 System Trouble

For information about system trouble information stored in holding registers, please refer to "Panel & System Troubles Input Registers" on page 53.

Appendix A: Exception Responses

If a Modbus master device sends an invalid command or attempts to read an invalid holding register, an exception response is generated. The exception response follows the standard packet format. The high order bit of the function code in an exception response is 1. The data field of an exception response contains the exception error code. The list below describes the exception codes supported and the possible causes.

Table A.1

Exception Code	Conditions	Exception Name
0x01	• Protocol Identifier in Modbus packet does not match Modbus protocol. Protocol Identifier in Modbus should always be "0". • Function code sent by the client is not supported by the Modbus Gateway or the FACP. • A Control command was sent to the gateway. Please contact customer service.	Illegal function
0x02	• Register address range specified by the client is not supported by the FACP. • Register address range requested is valid but the device (e.g. Detector, Module, Zone, etc.) is not present in the specified FACP. • Analog Value is requested from a register which is not associated with a 4–20 mA device.	Illegal data address
0x03	• Number of registers requested exceeds the maximum allowed limit. The maximum number of registers that a client can read at one time is 100. The exception to this is for analog values where the maximum number of registers a client can read at one time is 10. • Invalid Data written to the register when sending commands.	Illegal data value
0x0A	Unit ID specified in the request packet is not configured for monitoring.	Gateway path failed
0x0B	FACP is off line or there is a communication problem on your panel and/or NFN.	Gateway target failed

Appendix B: Active Event Types

Categories

All NFN events are mapped into Modbus event categories which are stored in the Modbus register. Events are mapped as shown in Table B.1, "Event Type Categories".

Table B.1 Event Type Categories

Event	Modbus Register Value
No Active Status (see note)	00H
Fire Alarm	10H
Security Alarm (Life)	11H
Critical Process Alarm (Life)	12H
Medical Emergency (Life)	13H
Security Alarm (Property)	20H
Critical Process (Property)	21H
Supervisory Signal (Guard's Tour)	30H
Supervisory Signal (Equipment)	40H
Disabled Alarm	52H
Disabled Active	55H
Non-Fire Activation	71H
Non-Fire Activation (no acknowledgment required)	72H
Device Not Present	0xFFH

NOTE: Multiple states are possible for a device. For example, a device connected to a Fire Alarm Control Panel may be both Active and Disabled. Also, a device may be in the Trouble and Fire Alarm states at one time.

NOTE: "No Active Status" does not indicate the point/device is in a normal state. The holding register for the point or device contains more detail. For more information, refer to Section 6, "Register Mapping", on page 47.

Appendix C: Device Types

Table C.1, "Device Type Values" shows the values used for devices types. These values reflect the following device categories:

- Detectors (1–50)
- Monitor Modules (51–150)
- Control Module (151–250)

Table C.1 Device Type Values

DEVICE TYPE	Value
Heat Detector	1
Ion Detector	2
Photo Detector	3
Laser Detector	4
Omni Detector	5
Photo Detector	6
Monitor Module	51
HEAT DETECT	52
MONITOR	53
PULL STATION	54
RF MON MODUL	55
RF PULL STA	56
SMOKE CONVEN	57
SMOKE DETECT	58
WATERFLOW	59
WATERFLOW S	60
ACCESS MONTR	61
AREA MONITOR	62
AUDIO SYSTEM	63
EQUIP MONITR	64
HOLD UP	65
RF SUPERVSRY	66
SECURITY L	67
LATCH SUPERV	68

Table C.1 Device Type Values

DEVICE TYPE	Value
TRACK SUPERV	69
SPRINKLR SYS	70
SYS MONITOR	71
TAMPER	72
ACK SWITCH	73
ALLCALL PAGE	74
DRILL SWITCH	75
EVACUATE SW	76
FIRE CONTROL	77
HAZARD ALERT	78
MEDIC ALERT	79
NON FIRE	80
PAS INHIBIT	81
POWER MONITR	82
PROCESS MON	83
PROCESS AUTO	84
RESET SWITCH	85
SIL SWITCH	86
TELE PAGE	87
TORNADO ALRT	88
TROUBLE MON	89
ABORT SWITCH	90
MAN RELEASE	91
MANREL DELAY	92
SECOND SHOT	93
SECURITY T	94
NC MONITOR	95
NC SUP T	96
NC SUP L	97

Table C.1 Device Type Values

DEVICE TYPE	Value
NC NON FIRE	98
SECURE/ACCESS	99
DISABLE MON	100
FMM 4-20	101
CONTROL	151
RELAY	152
BELL CIRCUIT	153
STROBE CKT	154
HORN CIRCUIT	155
AUDIBLE CKT	156
SPEAKER	157
REL END BELL	158
(blank)	159
RELEASE CKT	160
REL CKT ULC	161
RELEA.FORM C	162
REL AUDIBLE	163
NONRESET CTL	164
TELEPHONE	165
REL CODE BELL	166
INSTANT RELE	167
ALARMS PEND	168
CONTROL NAC	169
GEN ALARM	170
GEN SUPERVIS	171
GEN TROUBLE	172
GENERAL PEND	173
TROUBLE PEND	174
FORM C RESET	175

Table C.1 Device Type Values

DEVICE TYPE	Value
ISOLATED SPK	176
ISOLATED NAC	177
RELAY FDBACK	178
REL FORM C FB	179

Appendix D: System Troubles

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35001	0	GROUND FAULT
	1	AC FAIL
	2	BATTERY
	3	STYLE 6 POS. LOOP 1
	4	STYLE 6 POS. LOOP 2
	5	CORRUPT LOGIC EQUAT
	6	LCD80 SUPERVISORY
	7	EPROM ERROR
	8	INTERNAL RAM ERROR
	9	EXTERNAL RAM ERROR
	10	PROGRAM CORRUPTED
	11	NO DEV. INST ON L1
	12	PANEL DOOR OPEN
	13	AUXILIARY TROUBLE
	14	TERM. SUPERVISORY
	15	ANNUN. 1 TROUBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35002	0	ANNUN. 1 NO ANSWER
	1	ANNUN. 2 TROUBLE
	2	ANNUN. 2 NO ANSWER
	3	ANNUN. 3 TROUBLE
	4	ANNUN. 3 NO ANSWER
	5	ANNUN. 4 TROUBLE
	6	ANNUN. 4 NO ANSWER
	7	ANNUN. 5 TROUBLE
	8	ANNUN. 5 NO ANSWER
	9	ANNUN. 6 TROUBLE
	10	ANNUN. 6 NO ANSWER
	11	ANNUN. 7 TROUBLE
	12	ANNUN. 7 NO ANSWER
	13	ANNUN. 8 TROUBLE
	14	ANNUN. 8 NO ANSWER
	15	ANNUN. 9 TROUBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35003	0	ANNUN. 9 NO ANSWER
	1	ANNUN.10 TROUBLE
	2	ANNUN.10 NO ANSWER
	3	ANNUN.11 TROUBLE
	4	ANNUN.11 NO ANSWER
	5	ANNUN.12 TROUBLE
	6	ANNUN.12 NO ANSWER
	7	ANNUN.13 TROUBLE
	8	ANNUN.13 NO ANSWER
	9	ANNUN.14 TROUBLE
	10	ANNUN.14 NO ANSWER
	11	ANNUN.15 TROUBLE
	12	ANNUN.15 NO ANSWER
	13	ANNUN.16 TROUBLE
	14	ANNUN.16 NO ANSWER
	15	ANNUN.17 TROUBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35004	0	ANNUN.17 NO ANSWER
	1	ANNUN.18 TROUBLE
	2	ANNUN.18 NO ANSWER
	3	ANNUN.19 TROUBLE
	4	ANNUN.19 NO ANSWER
	5	ANNUN.20 TROUBLE
	6	ANNUN.20 NO ANSWER
	7	ANNUN.21 TROUBLE
	8	ANNUN.21 NO ANSWER
	9	ANNUN.22 TROUBLE
	10	ANNUN.22 NO ANSWER
	11	ANNUN.23 TROUBLE
	12	ANNUN.23 NO ANSWER
	13	ANNUN.24 TROUBLE
	14	ANNUN.24 NO ANSWER
	15	ANNUN.25 TROUBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35005	0	ANNUN.25 NO ANSWER
	1	ANNUN.26 TROUBLE
	2	ANNUN.26 NO ANSWER
	3	ANNUN.27 TROUBLE
	4	ANNUN.27 NO ANSWER
	5	ANNUN.28 TROUBLE
	6	ANNUN.28 NO ANSWER
	7	ANNUN.29 TROUBLE
	8	ANNUN.29 NO ANSWER
	9	ANNUN.30 TROUBLE
	10	ANNUN.30 NO ANSWER
	11	ANNUN.31 TROUBLE
	12	ANNUN.31 NO ANSWER
	13	ANNUN.32 TROUBLE
	14	ANNUN.32 NO ANSWER
	15	NETWORK FAIL PORT A

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35006	0	NETWORK FAIL PORT B
	1	NETWORK FAILURE
	2	ADV WALK TEST
	3	CHARGER FAIL
	4	GROUND FAULT LOOP 2
	5	STYLE 6 NEG. LOOP 1
	6	STYLE 6 NEG. LOOP 2
	7	GROUND FAULT LOOP 1
	8	UDACT TROUBLE
	9	UDACT NO ANSWER
	10	PROG MODE ACTIVATED
	11	LOADING..NO SERVICE
	12	BASIC WALK TEST
	13	NFPA 24HR REMINDER
	14	NVRAM BATT TROUBLE
	15	(reserved)

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35007	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	OPTION MODULE
	9	STYLE 6 ON LOOP 3
	10	AVPS. TROUBLE
	11	NAM CCBE PROG. LOST
	12	MAN. EVAC INITIATED
	13	MAN. EVAC RECEIVED
	14	(reserved)
	15	(reserved)

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35008	0	ANNUN.33 TROUBLE
	1	ANNUN.33 NO ANSWER
	2	ANNUN.34 TROUBLE
	3	ANNUN.34 NO ANSWER
	4	ANNUN.35 TROUBLE
	5	ANNUN.35 NO ANSWER
	6	ANNUN.36 TROUBLE
	7	ANNUN.36 NO ANSWER
	8	ANNUN.37 TROUBLE
	9	ANNUN.37 NO ANSWER
	10	ANNUN.38 TROUBLE
	11	ANNUN.38 NO ANSWER
	12	ANNUN.39 TROUBLE
	13	ANNUN.39 NO ANSWER
	14	ANNUN.40 TROUBLE
	15	ANNUN.40 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35009	0	ANNUN.41 TROUBLE
	1	ANNUN.41 NO ANSWER
	2	ANNUN.42 TROUBLE
	3	ANNUN.42 NO ANSWER
	4	ANNUN.43 TROUBLE
	5	ANNUN.43 NO ANSWER
	6	ANNUN.44 TROUBLE
	7	ANNUN.44 NO ANSWER
	8	ANNUN.45 TROUBLE
	9	ANNUN.45 NO ANSWER
	10	ANNUN.46 TROUBLE
	11	ANNUN.46 NO ANSWER
	12	ANNUN.47 TROUBLE
	13	ANNUN.47 NO ANSWER
	14	ANNUN.48 TROUBLE
	15	ANNUN.48 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35010	0	ANNUN.49 TROUBLE
	1	ANNUN.49 NO ANSWER
	2	ANNUN.50 TROUBLE
	3	ANNUN.50 NO ANSWER
	4	ANNUN.51 TROUBLE
	5	ANNUN.51 NO ANSWER
	6	ANNUN.52 TROUBLE
	7	ANNUN.52 NO ANSWER
	8	ANNUN.53 TROUBLE
	9	ANNUN.53 NO ANSWER
	10	ANNUN.54 TROUBLE
	11	ANNUN.54 NO ANSWER
	12	ANNUN.55 TROUBLE
	13	ANNUN.55 NO ANSWER
	14	ANNUN.56 TROUBLE
	15	ANNUN.56 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35011	0	ANNUN.57 TROUBLE
	1	ANNUN.57 NO ANSWER
	2	ANNUN.58 TROUBLE
	3	ANNUN.58 NO ANSWER
	4	ANNUN.59 TROUBLE
	5	ANNUN.59 NO ANSWER
	6	ANNUN.60 TROUBLE
	7	ANNUN.60 NO ANSWER
	8	ANNUN.61 TROUBLE
	9	ANNUN.61 NO ANSWER
	10	ANNUN.62 TROUBLE
	11	ANNUN.62 NO ANSWER
	12	ANNUN.63 TROUBLE
	13	ANNUN.63 NO ANSWER
	14	ANNUN.64 TROUBLE
	15	ANNUN.64 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
	0	GROUND FAULT LOOP 3
	1	GROUND FAULT LOOP 4
	2	GROUND FAULT LOOP 5
	3	GROUND FAULT LOOP 6
	4	GROUND FAULT LOOP 7
	5	GROUND FAULT LOOP 8
	6	GROUND FAULT LOOP 9
	7	GROUND FAULT LOOP 10
35012	8	STYLE 6 NEG. LOOP 3
	9	STYLE 6 NEG. LOOP 4
	10	STYLE 6 NEG. LOOP 5
	11	STYLE 6 NEG. LOOP 6
	12	STYLE 6 NEG. LOOP 7
	13	STYLE 6 NEG. LOOP 8
	14	STYLE 6 NEG. LOOP 9
	15	STYLE 6 NEG. LOOP 10

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35013	0	STYLE 6 POS. LOOP 3
	1	STYLE 6 POS. LOOP 4
	2	STYLE 6 POS. LOOP 5
	3	STYLE 6 POS. LOOP 6
	4	STYLE 6 POS. LOOP 7
	5	STYLE 6 POS. LOOP 8
	6	STYLE 6 POS. LOOP 9
	7	STYLE 6 POS. LOOP 10
	8	PRINTER SUPERVISORY
	9	BUZZER SUPERVISORY
	10	CRT SUPERVISORY
	11	PRINT QUEUE FULL
	12	MEMORY LOSS
	13	PRINTER COVER OPEN
	14	PRINTER PAPER OUT
	15	PRINTER OFF LINE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
	0	Workstation Fan Failure
	1	UPS Failure
	2	MANUAL MODE ENTERED
	3	NCM COMM LOSS
	4	STYLE 4 SHORT A LOOP 1
	5	STYLE 4 SHORT B LOOP 1
	6	STYLE 4 SHORT A LOOP 2
	7	STYLE 4 SHORT B LOOP 2
35014	8	STYLE 4 SHORT A LOOP 3
	9	STYLE 4 SHORT B LOOP 3
	10	STYLE 4 SHORT A LOOP 4
	11	STYLE 4 SHORT B LOOP 4
	12	STYLE 4 SHORT A LOOP 5
	13	STYLE 4 SHORT B LOOP 5
	14	STYLE 4 SHORT A LOOP 6
	15	STYLE 4 SHORT B LOOP 6

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35015	0	STYLE 4 SHORT A LOOP 7
	1	STYLE 4 SHORT B LOOP 7
	2	STYLE 4 SHORT A LOOP 8
	3	STYLE 4 SHORT B LOOP 8
	4	STYLE 4 SHORT A LOOP 9
	5	STYLE 4 SHORT B LOOP 9
	6	STYLE 4 SHORT A LOOP 10
	7	STYLE 4 SHORT B LOOP 10
	8	GENERAL PS FAULT
	9	STYLE 6 SHORT LOOP 1
	10	STYLE 6 SHORT LOOP 2
	11	STYLE 6 SHORT LOOP 3
	12	STYLE 6 SHORT LOOP 4
	13	STYLE 6 SHORT LOOP 5
	14	STYLE 6 SHORT LOOP 6
	15	STYLE 6 SHORT LOOP 7

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35016	0	STYLE 6 SHORT LOOP 8
	1	STYLE 6 SHORT LOOP 9
	2	STYLE 6 SHORT LOOP 10
	3	NODE xxx COMMUNICATIONS FAILURE
	4	NCM PIEZO BATTERY FAILURE
	5	DVC COMM LOSS
	6	POWER SUPPLY CABLE NOT CONNECTED
	7	TM4 TROUBLE
	8	TM4 NO ANSWER
	9	TM4 DISABLED
	10	SELF TEST FAILED
	11	NETWORK INCOMPATIBILITY
	12	Not Used
	13	Not Used
	14	Not Used
	15	Not Used

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35017	0	ANNUN. 65 TROUBLE
	1	ANNUN. 65 NO ANSWER
	2	ANNUN. 66 TROUBLE
	3	ANNUN. 66 NO ANSWER
	4	ANNUN. 67 TROUBLE
	5	ANNUN. 67 NO ANSWER
	6	ANNUN. 68 TROUBLE
	7	ANNUN. 68 NO ANSWER
	8	ANNUN. 69 TROUBLE
	9	ANNUN. 69 NO ANSWER
	10	ANNUN. 70 TROUBLE
	11	ANNUN. 70 NO ANSWER
	12	ANNUN. 71 TROUBLE
	13	ANNUN. 71 NO ANSWER
	14	ANNUN. 72 TROUBLE
	15	ANNUN. 72 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35018	0	ANNUN. 73 TROUBLE
	1	ANNUN. 73 NO ANSWER
	2	ANNUN. 74 TROUBLE
	3	ANNUN. 74 NO ANSWER
	4	ANNUN. 75 TROUBLE
	5	ANNUN. 75 NO ANSWER
	6	ANNUN. 76 TROUBLE
	7	ANNUN. 76 NO ANSWER
	8	ANNUN. 77 TROUBLE
	9	ANNUN. 77 NO ANSWER
	10	ANNUN. 78 TROUBLE
	11	ANNUN. 78 NO ANSWER
	12	ANNUN. 79 TROUBLE
	13	ANNUN. 79 NO ANSWER
	14	ANNUN. 80 TROUBLE
	15	ANNUN. 80 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35019	0	ANNUN. 81 TROUBLE
	1	ANNUN. 81 NO ANSWER
	2	ANNUN. 82 TROUBLE
	3	ANNUN. 82 NO ANSWER
	4	ANNUN. 83 TROUBLE
	5	ANNUN. 83 NO ANSWER
	6	ANNUN. 84 TROUBLE
	7	ANNUN. 84 NO ANSWER
	8	ANNUN. 85 TROUBLE
	9	ANNUN. 85 NO ANSWER
	10	ANNUN. 86 TROUBLE
	11	ANNUN. 86 NO ANSWER
	12	ANNUN. 87 TROUBLE
	13	ANNUN. 87 NO ANSWER
	14	ANNUN. 88 TROUBLE
	15	ANNUN. 88 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35020	0	ANNUN. 89 TROUBLE
	1	ANNUN. 89 NO ANSWER
	2	ANNUN. 90 TROUBLE
	3	ANNUN. 90 NO ANSWER
	4	ANNUN. 91 TROUBLE
	5	ANNUN. 91 NO ANSWER
	6	ANNUN. 92 TROUBLE
	7	ANNUN. 92 NO ANSWER
	8	ANNUN. 93 TROUBLE
	9	ANNUN. 93 NO ANSWER
	10	ANNUN. 94 TROUBLE
	11	ANNUN. 94 NO ANSWER
	12	ANNUN. 95 TROUBLE
	13	ANNUN. 95 NO ANSWER
	14	ANNUN. 96 TROUBLE
	15	ANNUN. 96 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35021	0	ANNUN. 97 TROUBLE
	1	ANNUN. 97 NO ANSWER
	2	ANNUN. 98 TROUBLE
	3	ANNUN. 98 NO ANSWER
	4	ANNUN. 99 TROUBLE
	5	ANNUN. 99 NO ANSWER
	6	ANNUN. 100 TROUBLE
	7	ANNUN. 100 NO ANSWER
	8	ANNUN. 101 TROUBLE
	9	ANNUN. 101 NO ANSWER
	10	ANNUN. 102 TROUBLE
	11	ANNUN. 102 NO ANSWER
	12	ANNUN. 103 TROUBLE
	13	ANNUN. 103 NO ANSWER
	14	ANNUN. 104 TROUBLE
	15	ANNUN. 104 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35022	0	ANNUN. 105 TROUBLE
	1	ANNUN. 105 NO ANSWER
	2	ANNUN. 106 TROUBLE
	3	ANNUN. 106 NO ANSWER
	4	ANNUN. 107 TROUBLE
	5	ANNUN. 107 NO ANSWER
	6	ANNUN. 108 TROUBLE
	7	ANNUN. 108 NO ANSWER
	8	ANNUN. 109 TROUBLE
	9	ANNUN. 109 NO ANSWER
	10	ANNUN. 110 TROUBLE
	11	ANNUN. 110 NO ANSWER
	12	ANNUN. 111 TROUBLE
	13	ANNUN. 111 NO ANSWER
	14	ANNUN. 112 TROUBLE
	15	ANNUN. 112 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35023	0	ANNUN. 113 TROUBLE
	1	ANNUN. 113 NO ANSWER
	2	ANNUN. 114 TROUBLE
	3	ANNUN. 114 NO ANSWER
	4	ANNUN. 115 TROUBLE
	5	ANNUN. 115 NO ANSWER
	6	ANNUN. 116 TROUBLE
	7	ANNUN. 116 NO ANSWER
	8	ANNUN. 117 TROUBLE
	9	ANNUN. 117 NO ANSWER
	10	ANNUN. 118 TROUBLE
	11	ANNUN. 118 NO ANSWER
	12	ANNUN. 119 TROUBLE
	13	ANNUN. 119 NO ANSWER
	14	ANNUN. 120 TROUBLE
	15	ANNUN. 120 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35024	0	ANNUN. 121 TROUBLE
	1	ANNUN. 121 NO ANSWER
	2	ANNUN. 122 TROUBLE
	3	ANNUN. 122 NO ANSWER
	4	ANNUN. 123 TROUBLE
	5	ANNUN. 123 NO ANSWER
	6	ANNUN. 124 TROUBLE
	7	ANNUN. 124 NO ANSWER
	8	ANNUN. 125 TROUBLE
	9	ANNUN. 125 NO ANSWER
	10	ANNUN. 126 TROUBLE
	11	ANNUN. 126 NO ANSWER
	12	ANNUN. 127 TROUBLE
	13	ANNUN. 127 NO ANSWER
	14	ANNUN. 128 TROUBLE
	15	ANNUN. 128 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35025	0	REMOTE DISPLAY 1 TROUBLE
	1	REMOTE DISPLAY 1 NO ANSWER
	2	REMOTE DISPLAY 2 TROUBLE
	3	REMOTE DISPLAY 2 NO ANSWER
	4	REMOTE DISPLAY 3 TROUBLE
	5	REMOTE DISPLAY 3 NO ANSWER
	6	REMOTE DISPLAY 4 TROUBLE
	7	REMOTE DISPLAY 4 NO ANSWER
	8	REMOTE DISPLAY 5 TROUBLE
	9	REMOTE DISPLAY 5 NO ANSWER
	10	REMOTE DISPLAY 6 TROUBLE
	11	REMOTE DISPLAY 6 NO ANSWER
	12	REMOTE DISPLAY 7 TROUBLE
	13	REMOTE DISPLAY 7 NO ANSWER
	14	REMOTE DISPLAY 8 TROUBLE
	15	REMOTE DISPLAY 8 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35026	0	REMOTE DISPLAY 9 TROUBLE
	1	REMOTE DISPLAY 9 NO ANSWER
	2	REMOTE DISPLAY 10 TROUBLE
	3	REMOTE DISPLAY 10 NO ANSWER
	4	REMOTE DISPLAY 11 TROUBLE
	5	REMOTE DISPLAY 11 NO ANSWER
	6	REMOTE DISPLAY 12 TROUBLE
	7	REMOTE DISPLAY 12 NO ANSWER
	8	REMOTE DISPLAY 13 TROUBLE
	9	REMOTE DISPLAY 13 NO ANSWER
	10	REMOTE DISPLAY 14 TROUBLE
	11	REMOTE DISPLAY 14 NO ANSWER
	12	REMOTE DISPLAY 15 TROUBLE
	13	REMOTE DISPLAY 15 NO ANSWER
	14	REMOTE DISPLAY 16 TROUBLE
	15	REMOTE DISPLAY 16 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35027	0	REMOTE DISPLAY 17 TROUBLE
	1	REMOTE DISPLAY 17 NO ANSWER
	2	REMOTE DISPLAY 18 TROUBLE
	3	REMOTE DISPLAY 18 NO ANSWER
	4	REMOTE DISPLAY 19 TROUBLE
	5	REMOTE DISPLAY 19 NO ANSWER
	6	REMOTE DISPLAY 20 TROUBLE
	7	REMOTE DISPLAY 20 NO ANSWER
	8	REMOTE DISPLAY 21 TROUBLE
	9	REMOTE DISPLAY 21 NO ANSWER
	10	REMOTE DISPLAY 22 TROUBLE
	11	REMOTE DISPLAY 22 NO ANSWER
	12	REMOTE DISPLAY 23 TROUBLE
	13	REMOTE DISPLAY 23 NO ANSWER
	14	REMOTE DISPLAY 24 TROUBLE
	15	REMOTE DISPLAY 24 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35028	0	REMOTE DISPLAY 25 TROUBLE
	1	REMOTE DISPLAY 25 NO ANSWER
	2	REMOTE DISPLAY 26 TROUBLE
	3	REMOTE DISPLAY 26 NO ANSWER
	4	REMOTE DISPLAY 27 TROUBLE
	5	REMOTE DISPLAY 27 NO ANSWER
	6	REMOTE DISPLAY 28 TROUBLE
	7	REMOTE DISPLAY 28 NO ANSWER
	8	REMOTE DISPLAY 29 TROUBLE
	9	REMOTE DISPLAY 29 NO ANSWER
	10	REMOTE DISPLAY 30 TROUBLE
	11	REMOTE DISPLAY 30 NO ANSWER
	12	REMOTE DISPLAY 31 TROUBLE
	13	REMOTE DISPLAY 31 NO ANSWER
	14	REMOTE DISPLAY 32 TROUBLE
	15	REMOTE DISPLAY 32 NO ANSWER

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35029	0	SYSTEM INITIALIZATION
	1	POWER SUPPLY COMM FAILURE
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35030	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35031	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35032	0	Reserved
	1	Reserved
	2	LINK PROTECTOR PRIMARY STATUS
	3	LINK PROTECTOR SECONDARY STATUS
	4	LINK PROTECTOR NOT PRESENT
	5	EVENT BUFFER 80% FULL
	6	EBI STATUS
	7	SOFTWARE MISMATCH
	8	NO POWER SUPPLY INST
	9	LOOP 1-2 COMM FAILURE
	10	LOOP 3-4 COMM FAILURE
	11	LOOP 5-6 COMM FAILURE
	12	LOOP 7-8 COMM FAILURE
	13	LOOP 9-10 COMM FAILURE
	14	TEST PROGRAM UPDATE
	15	HISTORY 80% FULL

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35033	0	LOOP CONTINUITY TEST FAIL LOOP 1
	1	LOOP CONTINUITY TEST FAIL LOOP 2
	2	LOOP CONTINUITY TEST FAIL LOOP 3
	3	LOOP CONTINUITY TEST FAIL LOOP 4
	4	LOOP CONTINUITY TEST FAIL LOOP 5
	5	LOOP CONTINUITY TEST FAIL LOOP 6
	6	LOOP CONTINUITY TEST FAIL LOOP 7
	7	LOOP CONTINUITY TEST FAIL LOOP 8
	8	LOOP CONTINUITY TEST FAIL LOOP 9
	9	LOOP CONTINUITY TEST FAIL LOOP 10
	10	UNPROGRAMMED DEVICE ON LOOP 1
	11	UNPROGRAMMED DEVICE ON LOOP 2
	12	UNPROGRAMMED DEVICE ON LOOP 3
	13	UNPROGRAMMED DEVICE ON LOOP 4
	14	UNPROGRAMMED DEVICE ON LOOP 5
	15	UNPROGRAMMED DEVICE ON LOOP 6

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35034	0	UNPROGRAMMED DEVICE ON LOOP 7
	1	UNPROGRAMMED DEVICE ON LOOP 8
	2	UNPROGRAMMED DEVICE ON LOOP 9
	3	UNPROGRAMMED DEVICE ON LOOP 10
	4	IR ENABLED ON LOOP 1
	5	IR ENABLED ON LOOP 2
	6	IR ENABLED ON LOOP 3
	7	IR ENABLED ON LOOP 4
	8	IR ENABLED ON LOOP 5
	9	IR ENABLED ON LOOP 6
	10	IR ENABLED ON LOOP 7
	11	IR ENABLED ON LOOP 8
	12	IR ENABLED ON LOOP 9
	13	IR ENABLED ON LOOP 10
	14	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 1
	15	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 2

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35035	0	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 3
	1	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 4
	2	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 5
	3	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 6
	4	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 7
	5	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 8
	6	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 9
	7	TRANSMIT/RECIEVE ERROR ABOVE LIMIT ON LOOP 10
	8	TOO MANY DEVICES ON LOOP 1
	9	TOO MANY DEVICES ON LOOP 2
	10	TOO MANY DEVICES ON LOOP 3
	11	TOO MANY DEVICES ON LOOP 4
	12	TOO MANY DEVICES ON LOOP 5
	13	TOO MANY DEVICES ON LOOP 6
	14	TOO MANY DEVICES ON LOOP 7
	15	TOO MANY DEVICES ON LOOP 8

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35036	0	TOO MANY DEVICES ON LOOP 9
	1	TOO MANY DEVICES ON LOOP 10
	2	MISMATCHED LOOP TYPE ON LOOP 1
	3	MISMATCHED LOOP TYPE ON LOOP 2
	4	MISMATCHED LOOP TYPE ON LOOP 3
	5	MISMATCHED LOOP TYPE ON LOOP 4
	6	MISMATCHED LOOP TYPE ON LOOP 5
	7	MISMATCHED LOOP TYPE ON LOOP 6
	8	MISMATCHED LOOP TYPE ON LOOP 7
	9	MISMATCHED LOOP TYPE ON LOOP 8
	10	MISMATCHED LOOP TYPE ON LOOP 9
	11	MISMATCHED LOOP TYPE ON LOOP 10
	12	Ground Fault Port A
	13	Ground Fault Port B
	14	Amplifier Trouble
	15	AUXIN Trouble

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35037	0	DIGIN Trouble
	1	FFT TROUBLE
	2	REMOTE MIC Trouble
	3	DAP Port A Failure
	4	DAP Port B Failure
	5	DAL No Answer
	6	LOCAL MIC TROUBLE
	7	LOCAL PHONE TROUBLE
	8	ANALOG OUTPUT A TROUBLE
	9	ANALOG OUTPUT B TROUBLE
	10	ANALOG OUTPUT C TROUBLE
	11	ANALOG OUTPUT D TROUBLE
	12	FLASH IMAGE ERROR
	13	POWER SUPPLY TROUBLE
	14	AMPLIFIER LIMIT
	15	AMPLIFIER SUPERVISION

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35038	0	DAL ADDRESS CONFLICT
	1	DEVICE SERVICING REQUIRED
	2	MAPPING IN PROGRESS LOOP 1
	3	MAPPING IN PROGRESS LOOP 2
	4	MAPPING IN PROGRESS LOOP 3
	5	MAPPING IN PROGRESS LOOP 4
	6	MAPPING IN PROGRESS LOOP 5
	7	MAPPING IN PROGRESS LOOP 6
	8	MAPPING IN PROGRESS LOOP 7
	9	MAPPING IN PROGRESS LOOP 8
	10	MAPPING IN PROGRESS LOOP 9
	11	MAPPING IN PROGRESS LOOP 10
	12	DATABASE CORRUPTED
	13	AUDIO LIBRARY CORRUPTED
	14	DATABASE INCOMPATIBLE
	15	AUDIO LIBRARY INCOMPATIBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35039	0	DAL DOWNLOAD IN PROGRESS
	1	FIRE VOICE TROUBLE
	2	FIRE VOICE NO ANSWER
	3	PHONE CHANNEL LIMIT EXCEEDED
	4	NCM SMIFFER MODE ACTIVE
	5	LOCAL CONNECTION LIMIT EXCEEDED
	6	HARDWARE MISMATCH
	7	DAL DEVICE NO ANSWER
	8	PRIMARY AMP 1 TROUBLE
	9	PRIMARY AMP 2 TROUBLE
	10	PRIMARY AMP 3 TROUBLE
	11	PRIMARY AMP 4 TROUBLE
	12	BACKUP AMP 1 TROUBLE
	13	BACKUP AMP 2 TROUBLE
	14	BACKUP AMP 3 TROUBLE
	15	BACKUP AMP 4 TROUBLE

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35040	0	DSBUS 1 COMMFAIL
	1	DSBUS 2 COMMFAIL
	2	DSBUS 3 COMMFAIL
	3	DSBUS 4 COMMFAIL
	4	AA TROUBLE BUS FAIL
	5	NFN PAGING CHANNEL LIMIT EXCEEDED
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35041	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35042	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35043	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35044	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35045	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35046	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35047	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Table D.1 System Troubles Register Map

Register	Bit Number	System Trouble Name
35048	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved
	8	Reserved
	9	Reserved
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
	14	Reserved
	15	Reserved

Appendix E: Modbus Gateway Local Configuration

📄 **NOTE:** This procedure is only necessary if you are configuring an Modbus Gateway using a configuration computer that is not already on the same IP network as the Modbus Gateway. Refer to "Connect the Modbus Gateway to the PNET-1 Surge Suppressor" on page 29.

📄 **NOTE:** A direct connection requires that a cross over Ethernet cable be made or purchased by the customer.

E.1 Direct Connection to the Gateway Printed Circuit Board

Step 1. Connect the cross over cable between the PNET-1 Ethernet connector and the configuration computer network card Ethernet connector (refer to "Cross Over Cable Specifications").
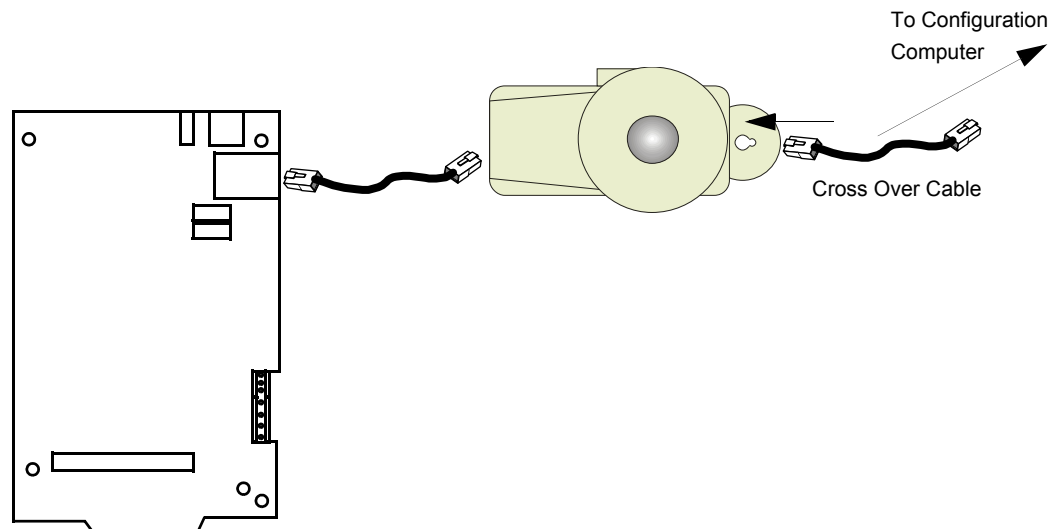
Figure E.1 Configuration Computer Direct Connection

Step 2. The configuration computer is connected. Complete the remaining procedures in Section 3.1.3, "Connect the Configuration Computer to the Modbus Gateway", on page 33.

■ Cross Over Cable Specifications

This cross over cable connects the configuration computer network card and the PNET-1 surge suppressor, which is itself connected to the Modbus Gateway board.

The cross over cable can be purchased or you can make one. Please use the following information for the correct pinout requirements for each end of the cable. EIA/TIA wire color-code standard 568B is applicable.

Table E.1 Cross Over Cable (568B)
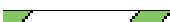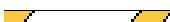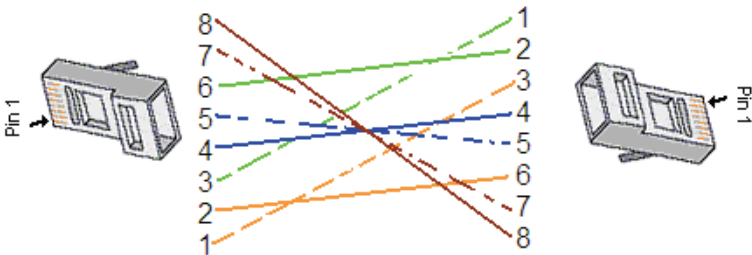
RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	

Table E.1 Cross Over Cable (568B)

2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	Blue	
5	White/Blue		5	White/Blue	
6	Green		6	Orange	
7	White/Brown		7	White/Brown	
8	Brown		8	Brown	

Appendix F: Glossary

F

FTP File Transfer Protocol, used to back up the Modbus Gateway database and download firmware for field upgrades.

H

HS-NCM-W/F High Speed Network Control Module, a network interface enabling the Modbus Gateway to communicate with other NFN devices.

I

IP Address Logical address designating a node on an IP network with the format NNN.NNN.NNN.NNN, where NNN groups can be between 0 and 255.

Modbus Gateway A printed circuit board interface that allows the NFN network to communicate with a Modbus network.

NFN The network of Fire Alarm Control Panels. Ethernet - Local area network protocol.

T

Telnet An Internet protocol that allows you to communicate directly with another computer on the Internet by specifying the host name, port and terminal type.

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