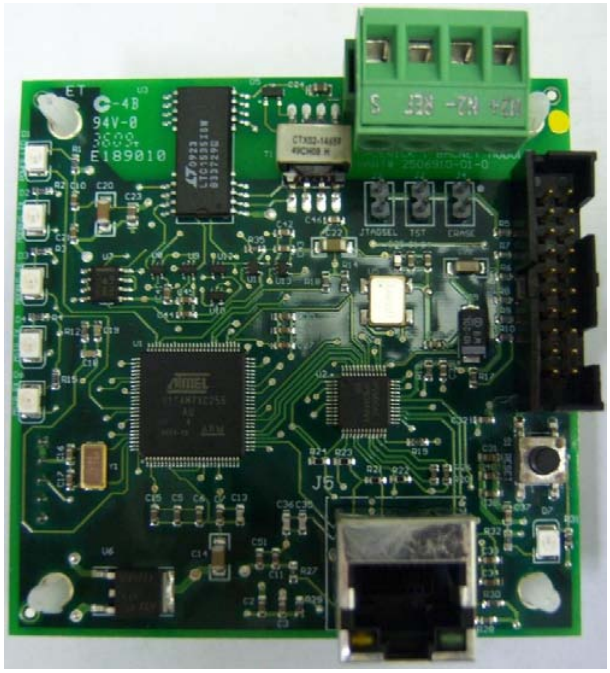
INSTALLATION INSTRUCTIONS

BACnet Communication Card
RXRX-AY01



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED, LICENSED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

DO NOT DESTROY THIS MANUAL

PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN

[ ] INDICATES METRIC CONVERSIONS

8.3 BACnet and Communication Module (RXRX-AY01)

NOTICE

Use this manual to physically install the BACnet communication module into the RTU-C unit controller and connect the unit controller to your network. Use the appropriate Protocol Information document, to integrate the unit into your network. The Protocol Information document contains addressing details, BACnet® protocol information, and a list of the data points available to the network. See section 9 “BAS Protocol Information (POINTS LIST)” and section 10 ”Protocol Implementation Conformance Statement (PICS)” of the RTU-C I&O manual.

8.3.1 Reference Documents

Number	Company	Title	Source
ANSI/ASHRAE 135-2001	American Society of Heating, Refrigerating and Air-Conditioning Engineers	BACnet® A Data Communication Protocol for Building Automation and Control Networks	www.ashrae.org

NOTICE

This equipment generates, uses, and can radiate radio frequency energy and; if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

8.3.2 General Information

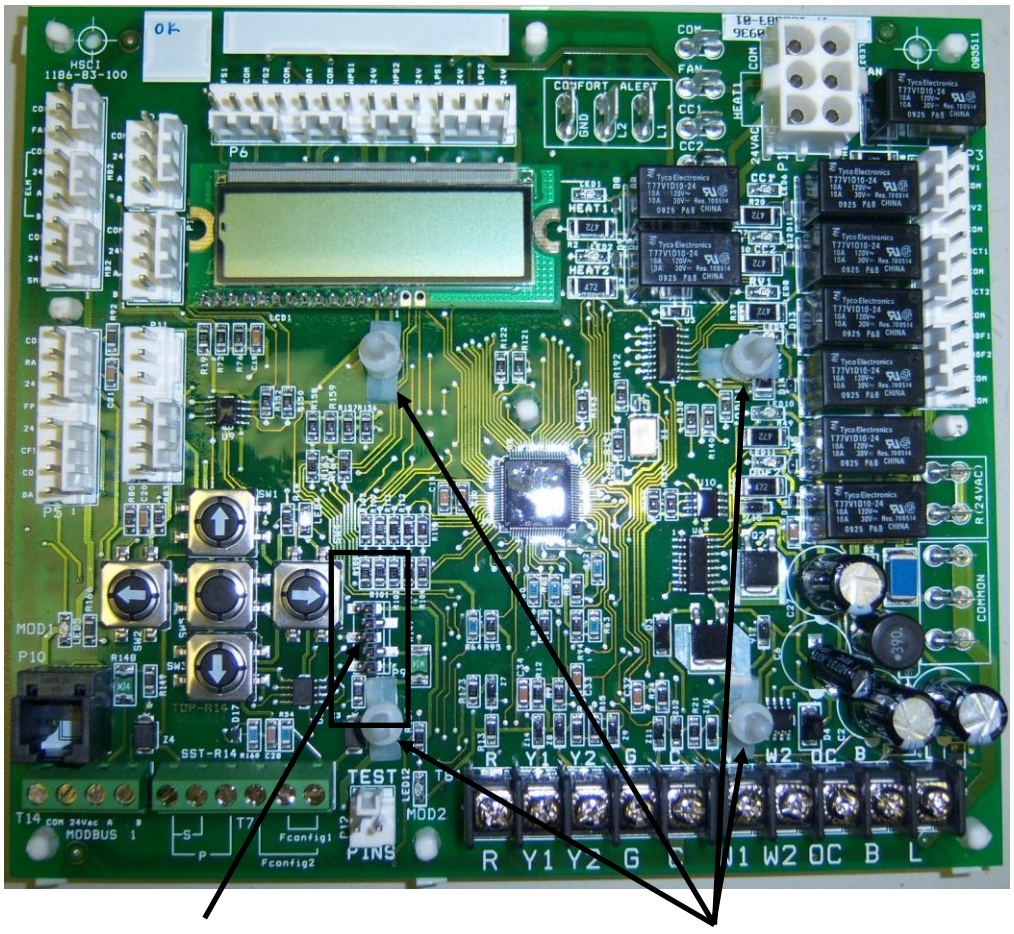
This manual contains the information you need to install the BACnet® Communication Module (RXRX-AY01) on a RTU-C Rooftop Unit Controller, incorporate it into the BACnet network, and maintain it.

8.3.2.1 Description

The BACnet Communication Module (RXRX-AY01) incorporates a RTU-C Unit Rooftop Unit into a BACnet local area network (LAN). It supports the BACnet MS/TP (EIA 485) data link layer (physical layer), BACnet over Ethernet (10Base-T), or BACnet/IP data link layers (physical layer).

The BACnet Communication Module is a printed circuit board that mounts directly on five pins on the top side of the RTU-C Rooftop Unit Controller (see Figure 8-1).

Figure 8-1. RTU-C Rooftop Unit Controller



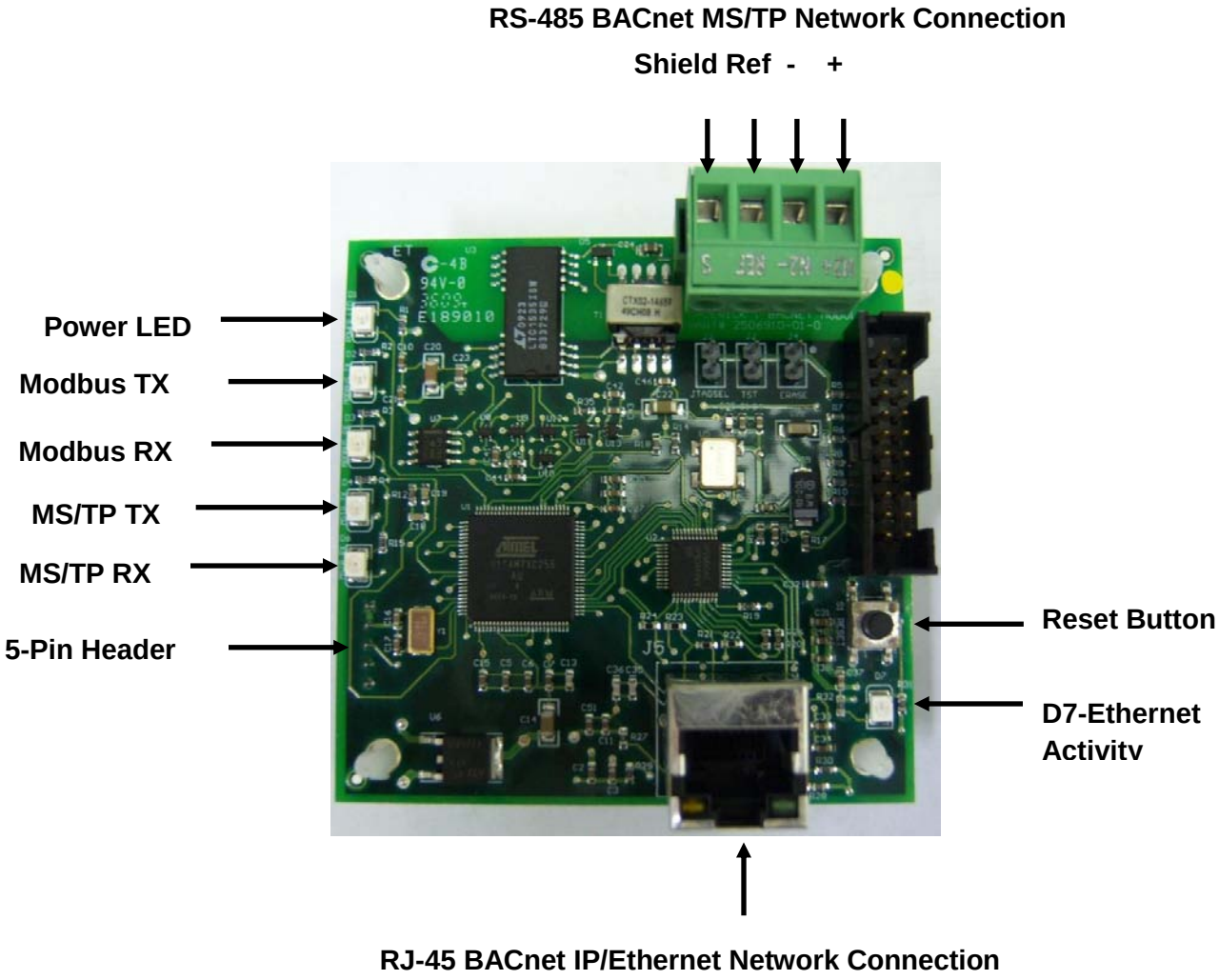
8.3.2.2 Application

The BACnet Communication Module connects the RTU-C Unit Rooftop Unit Controller to a building automation system (BAS) on a BACnet local area network. It is the interface for the exchange of BACnet objects between the network and the unit controller.

8.3.2.3 Component Data

Figure 8-2 shows the location of the major components of the BACnet Communication Module.

Figure 8-2. BACnet Communication Module Major Components



8.3.2.3.1 Reset Button

The reset button is used to reset BACnet addressing and configuration parameters. It is important to note that pressing the Reset button causes all BACnet data to revert to factory default values. For more information, see the Resetting the BACnet Communication Module section of this document.

8.3.2.3.2 Light Emitting Diodes (LEDs)

Six LEDs indicate communication activity and status of the BACnet Communications Module. These indicators are visible when the communication module is connected to the RTU-C Unit Rooftop Unit Controller and the unit is powered on (see Table 8-1 for descriptions of LED activity and Figure 8-2 for LED locations).

Table 8-1. LED Description of Activity

LED Title	LED Color	Meaning
Modbus TX	Green	LED flashes when data is being transmitted from the BACnet Communication Module to the unit controller
Modbus RX	Yellow	LED flashes when data is being sent to the BACnet Communication from the unit controller
MS/TP TX	Green	LED flashes when data is being transmitted via the MS/TP network
MS/TP RX	Yellow	LED flashes when data is received via the MS/TP network
Power	Green	This LED remains on when power is applied to the BACnet Communication Module
D7	Green	Ethernet activity LED

8.3.2.4 BACnet Connections

The RTU-C BACnet Communication Module supports BACnet MS/TP (Master Slave Token Passing), BACnet IP, or BACnet Ethernet network communication. All BACnet protocols are available on a single BACnet Communication Module.

8.3.2.5 BACnet IP/Ethernet Network Connection

An RJ-45 connector connects the BACnet Communication Module to the IP/Ethernet Network (see Figure 8-2).

8.3.2.6 BACnet MS/TP Network Connection

An RS-485 connector connects the BACnet Communication Module to the MS/TP network and has four pins: + , -, Ref, and Shield (see Figure 8-2).

8.3.3 *Installation*

The following section describes how to field install a new BACnet Communication Module or replace an existing BACnet Communication Module on the RTU-C Rooftop Unit Controller so that it can be incorporated into the BACnet network. The BACnet Communication Module is available for field installation only (see Specification Sheet for ordering information).

Recognize this symbol as an indication of Important Safety Information!

CAUTION

Electrostatic discharge hazard.

Can cause equipment damage.

This equipment contains sensitive electronic components that may be damaged by electrostatic discharge from your hands. Before you handle a communications module, you need to touch a grounded object, such as the metal enclosure, in order to discharge the electrostatic potential in your body.

WARNING

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Only personnel knowledgeable in the operation of the equipment being controlled must perform connections and service to the RTU-C Rooftop Unit Controller.

WARNING

BEFORE BEGINNING ANY MODIFICATION, BE SURE MAIN DISCONNECT SWITCH IS IN THE "OFF" POSITION. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. TAG DISCONNECT WITH A SUITABLE WARNING LABEL.

8.3.3.1 *Contents of the BACnet Communication Module Kit (RXRX-AY01)*

The following is the list of items included in the field-installed kit:

The BACnet Communication Module
Four plastic stand-offs
4-pin RS-485 network connector (MS/TP)
Installation Manual

8.3.3.2 Installing a new BACnet Communication Module

The BACnet Communication Module is mounted directly to the unit controller via the four stand-offs and 5-pin header. Follow the steps below to install a new BACnet Communication Module on the RTU-C Rooftop Unit Controller.

8.3.3.3 To install a new BACnet Communication Module

1. Remove power from the unit controller.
2. Connect the BACnet Communication Module to the unit controller's 5-pin header and then further secure the module to the four plastic support stand-offs (see Figure 8-1 and Figure 8-2).
3. Connect the BACnet Communication Module to the BACnet MS/TP or BACnet IP/Ethernet network.
   a. For BACnet MS/TP, insert the proper network cable into the BACnet Communication Module's 4-pin RS-485 network connector (see Figure 8-2 and Figure 8-3).
   b. For BACnet IP or Ethernet, insert the proper network cable into the BACnet Communication Module's RJ-45 network connector (see Figure 8-2 and Figure 8-3).
4. Apply power to the unit controller.

8.3.3.4 Replacing an Existing BACnet Communication Module

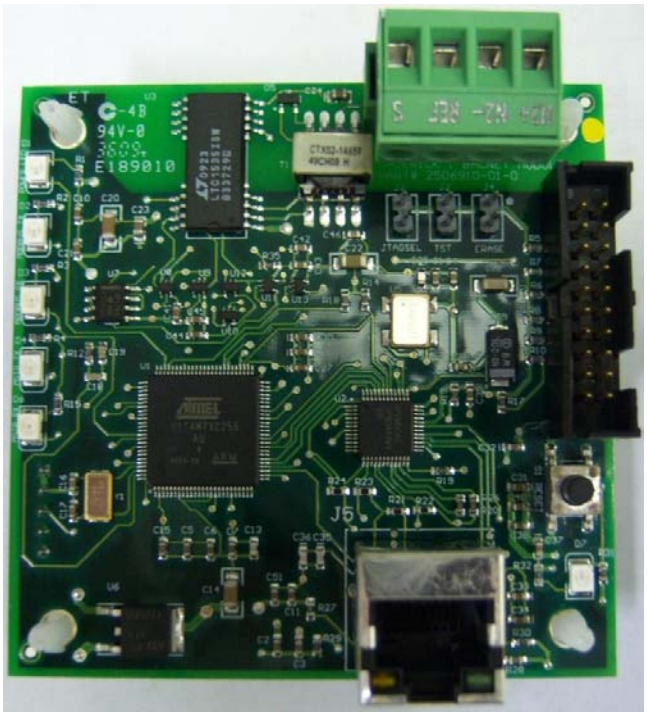
Follow these steps to remove an existing BACnet Communication Module from the unit controller and replace it with a new BACnet Communication Module.

8.3.3.5 To Replace a BACnet Communication Module

1. Remove power from the unit controller.
2. Pull the network cable connector from the BACnet Communication Module (see Figure 8-3).
3. Grasp the BACnet Communication Module and carefully pull it from unit controller. It may be necessary to also remove the plastic stand-offs if they have been installed (see Figure 8-1 and Figure 8-2).
4. Connect the BACnet Communication Module to the unit controller's 5-pin header and then further secure the module to the four plastic support stand offs (see Figure 8-1).
5. Connect the BACnet Communication Module to the BACnet MS/TP or BACnet IP/Ethernet network.
   a. For BACnet MS/TP, insert the proper network cable into the BACnet Communication Module's 4-pin RS-485 network connector (see Figure 8-3).
   b. For BACnet IP or Ethernet, insert the proper network cable into the BACnet Communication Module's RJ-45 network connector (see Figure 8-3).
6. Apply power to the unit controller.

Figure 8-3. BACnet Communication Module Network Connections

RS-485 BACnet MS/TP Network Connector



RJ-45 BACnet IP/Ethernet Network Connector

8.3.4 Integration

Once the BACnet Communication Module has been properly installed on the unit controller, it is then necessary to adjust the communication interface settings to match your Building Automation System (BAS) requirements. Once that is complete, you can then integrate the unit controller into the BAS via a BACnet MS/TP or BACnet IP/Ethernet network.

The BACnet configuration process is described in the following section. Additional information about network parameters can be found in Table 8-2 as well as the BACnet Addressing section.

8.3.4.1 Configuring the BACnet Communication Module

The BACnet Communication Module may be configured and addressed using the BACnet Communication Module's browser-based user interface (further referred to as the BCM Configuration Tool). The BCM Configuration Tool is used for setting and adjusting network parameters for BACnet MS/TP, BACnet IP, or BACnet Ethernet networks.

The following sections describe how to open the BCM Configuration Tool, customize user settings, modify, test, and reset BACnet network parameters.

8.3.4.2 Required Tools

You need the following tools to configure the BACnet Communication Module for network operation:

- PC with Ethernet card and TCP/IP protocol (required for BACnet IP or BACnet Ethernet)
- Internet Explorer® version 6.0 or later
- Ethernet Cable (either an Ethernet crossover cable or a standard Ethernet cable may be used)

8.3.4.3 Connecting to the BCM Configuration Tool

The BACnet Communication Module is configured using the BCM Configuration Tool's web-based user interface. Follow these steps to connect to the BCM Configuration Tool and adjust user name and password.

1. Verify that your PC is on the same subnet mask and similar (but not identical) IP address as the BACnet Communication Module.
2. Confirm that the network cable is connected from the BACnet Communication Module to the PC
3. Open Internet Explorer and type in the IP address of the BCM Configuration Tool.

Note: The BACnet Communication Module ships with a default IP subnet mask (255.255.0.0) and IP address (172.16.5.8). It may be necessary to change the IP address and subnet mask of your PC to access the BCM Configuration Tool's user interface.

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4. Once the BCM Configuration Tool's initial Login screen appears, you can then change the user name and password, if desired (see Figure 8-4). ***Note: If the Login screen does not appear, cycle main power to the unit to reset communication between the RTU-C and the communication card***.
   a. Type the default user name, which is "Administrator."
   b. Type the default password, which is "Admin."
   c. Click on the Submit button.

d. After a user name and password have been entered, the Main Menu screen appears (see Figure 8-5). The Main Menu provides the option to select either Administrator Settings or Communication Settings. The Administrator Settings screen allows alternation of the user name and password (see Figure 8-6). The Communication Interface Settings screen allows configuration of network parameters (see Figure 8-7 and following section titled Configuration using the BCM Configuration Tool).

e. To change the user name and/or password, press the Administrator Settings button.

f. Modify user name and password as desired.

Note: Both the user name and password are case sensitive and must be 4-15 characters in length. They may be changed at any time in the Administrator Settings section of the user interface.

g. Once changes have been made to the Administrator Settings screen, a message appears to confirm that the changes have been accepted (see Figure 8-8).

Figure 8-4. BCM Configuration Tool Login Screen

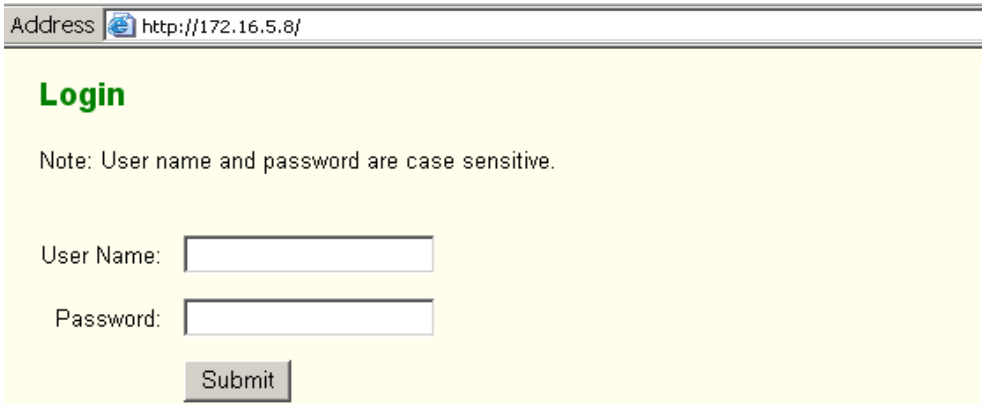


Figure 8-5. BCM Configuration Tool Main Menu

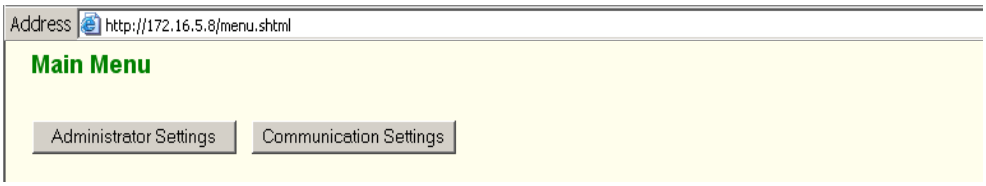
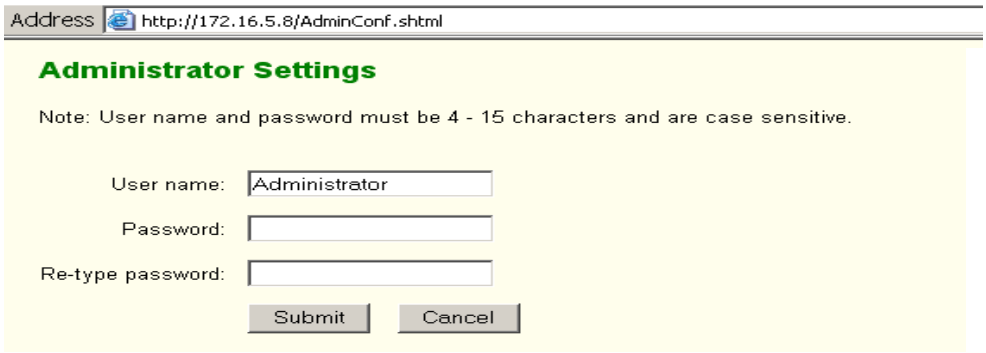


Figure 8-6. BCM Configuration Tool Administrator Settings Screen



8.3.4.4 Configuration using the BCM Configuration Tool

Once the user name and password have been set, the BCM Configuration Tool can be used to view and adjust network parameters for the BACnet Communication Module. The following section describes how to change parameters necessary for BACnet addressing and initial network connection. These parameters are discussed in greater detail in Table 8-2.

1. After login, select the Communication Interface Settings option from the Main Menu screen (see Figure 8-5 and Figure 8-7).
2. Under the Device section, change the following values to meet the installation requirements:
   a. Device Name
   b. Device Instance
   c. Select the Communication Type (BACnet IP, BACnet Ethernet, or BACnet MS/P).
3. Modify other parameters under the BACnet IP or BACnet MS/TP section as required for your network.
4. Click on the Submit button.
5. Once changes have been made to the BACnet Communications Interface Settings screen, a message appears to confirm that the changes have been accepted (see Figure 8-8).

Figure 8-7. BCM Configuration Tool Communications Interface Settings Screen

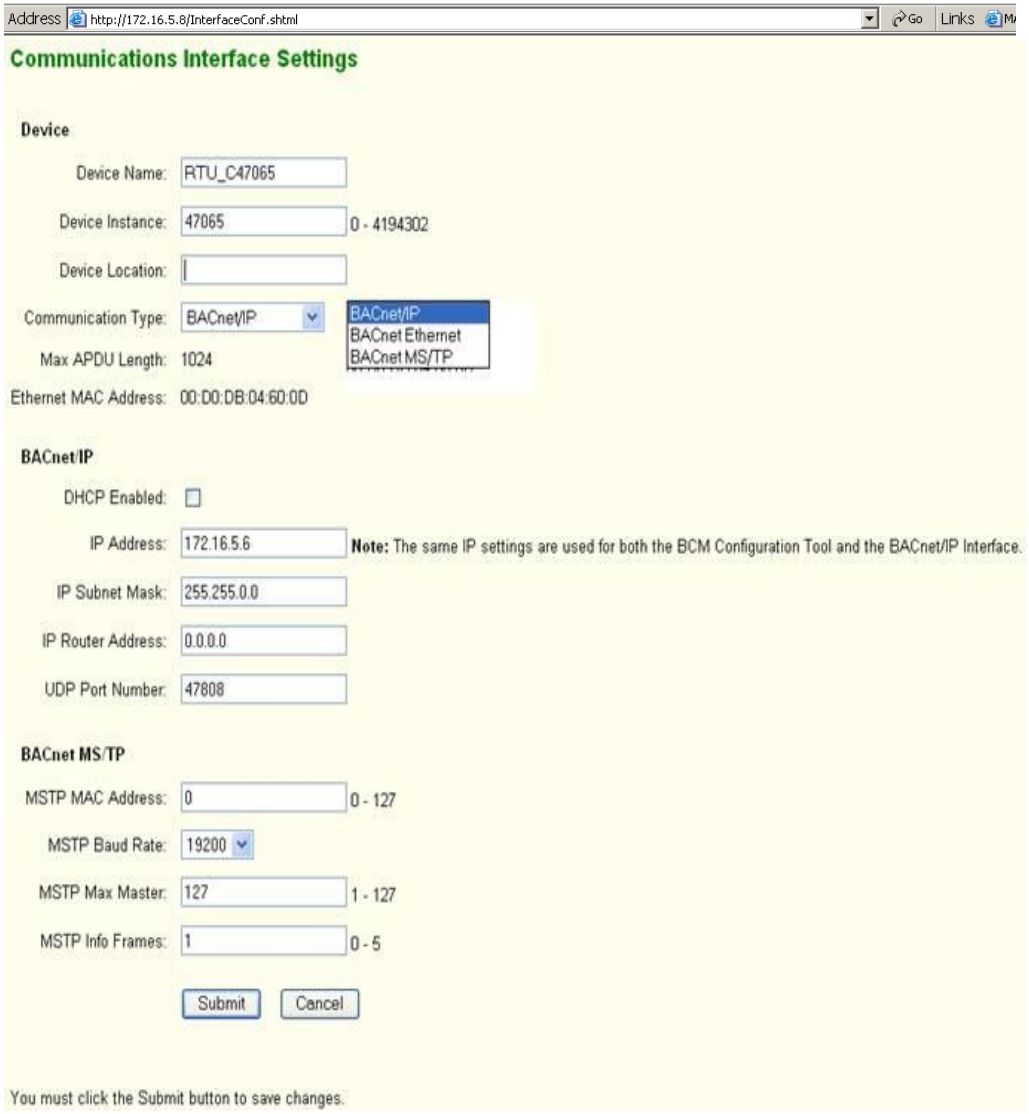


Figure 8-8. BCM Configuration Tool Settings Change Confirmation Screen

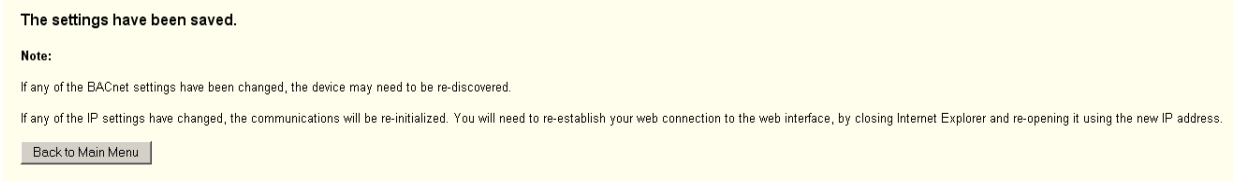


Table 8-2. Network Configuration Parameters

Parameter	Value (Range)/Definition	Initial Value/Note
Device Name	12 – 20 character Device Object Name. Change this value as needed to match installation parameters	RTU_C######### Where ######### is the Device Instance Number
Device Instance	0-4194302/Device Instance of the BACnet Communication Module	47065 for IP and Ethernet 3002 for BACnet MS/TP[1] Must be unique throughout the entire network
Device Location	0 – 31 characters. An optional BACnet property intended to indicate the physical location of the unit controller	Initial values is NULL or blank
Communication Type	1 – BACnet/IP 2 – BACnet/Ethernet 3 – BACnet MS/TP	1 – BACnet/IP
DHCP Enabled	Off-On/Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP Address	Default = disabled
IP Address	IP Address of the BACnet Communication Module	172.16.5.8
IP Subnet Mask	Subnet Mask of the BACnet Communication Module	255.255.0.0
IP Router Address	Internet Protocol Router Address	0.0.0.0
UDP Port Number	0 – 65535, (User Datagram Protocol) Identifies the application process in the destination unit	47808
MSTP MAC Address	0-127/ The MS/TP address of the BACnet Communication Module	0/ Each device on the BACnet network must have a unique MS/TP address
MSTP Baud Rate	9600-19200-38400-76800/ Data transfer speed	19200 bps
MSTP Max Master	0-127/ This variable specifies the highest possible address for master node and shall be less than or equal to 127	127
MSTP Info Frames	0-5/ This variable specifies the maximum number of information frames the BACnet Communication Module may send before it must pass the token	1

[1] The default device instance for BACnet MSTP is 3002 + the MAC address.

8.3.4.5 BACnet Addressing

The following section describes the common BACnet configuration parameters used to establish network communication between the unit controller and the BAS.

8.3.4.6 BACnet MS/TP

Common settings required for BACnet MS/TP configuration are: MS/TP MAC address, Device Instance, and Baud Rate.

The BACnet MS/TP Media Access Control (MAC) address is a one-octet address that must be set during the BACnet Communication Module configuration. The MAC address must be unique to the MS/TP network and have a valid range of 0-127. It is shipped set to a default value of 0.

8.3.4.7 BACnet IP

Common settings required for BACnet IP configuration are: IP Address, Subnet Mask, and Device Instance. The BACnet Communication Module is assigned a factory default IP address and Subnet Mask.

These are only temporary but are required so that the user knows what address to access the BACnet Communication Module in order to change network parameters. See your system administrator for the correct IP Address and Subnet Mask required for your network.

The BACnet/IP (B/IP) address of the RTU-C unit controller consists of the four-octet IP address followed by the two-octet UDP (User Datagram Protocol) port number. The BACnet/IP Address is a six-octet value analogous to a MAC (Media Access Control) address. The IP Address portion of the BACnet/IP address must be unique in the BACnet network segment. The default UDP port number in the unit controller is 47808 (BAC0 in hexadecimal).

8.3.4.7.1 Dynamic Host Configuration Protocol

The BACnet Communication Module supports Dynamic Host Configuration Protocol (DHCP) IP Addressing for BACnet IP networks.

By default, this feature is disabled. To configure the BACnet Communication Module to use the DHCP feature, select "DHCP Enabled" check box in the BACnet IP section of the Communications Interface Settings page (see Figure 8-7). In a DHCP-based network, the BACnet Communication Module automatically receives the required parameters from the DHCP server. Consult with your network administrator for the information on your network setting.

8.3.4.8 BACnet Ethernet

BACnet Ethernet requires configuration of the Device Instance.

The Ethernet MAC address of the BACnet Communication Module is a six-octet address assigned when it was manufactured. It is fixed and cannot be changed. Use this address to access the BACnet Communication Module on a BACnet over Ethernet network.

8.3.4.9 Testing Network Communication

You can determine whether your PC is properly configured to access the BACnet Communication Module. To test whether your computer is properly addressed to communicate with the BACnet Communication Module, follow these steps:

1. Make sure the PC has Subnet Mask 255.255.0.0 and similar (but not identical) IP Address as the BACnet Communication Module.
2. Open a DOS window (go to Start button\Programs\Accessories\Command Prompt.)
3. Type "ping 172.16.5.8" at the DOS prompt.
4. Press Enter.
5. Observe response. See Figure 8-9 for a successful response.

Figure 8-9. Successful Ping and Response

```
C:\>ping 172.16.5.8

Pinging 172.16.5.8 with 32 bytes of data:

Reply from 172.16.5.8: bytes=32 time=93ms TTL=63
Reply from 172.16.5.8: bytes=32 time=5ms TTL=63
Reply from 172.16.5.8: bytes=32 time=70ms TTL=63
Reply from 172.16.5.8: bytes=32 time=16ms TTL=63

Ping statistics for 172.16.5.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum =  93ms, Average =  46ms

C:\>
```

8.3.4.10 Resetting the BACnet Communication Module

All settings that can be changed with the BCM Configuration Tool may be reset to factory defaults with the Reset Button (see Figure 8-2 for location of the Reset Button on the BACnet Communication Module). If the IP Address or the MAC Address has been lost or forgotten, the BACnet Communication Module can be reset to the default IP Address and Subnet Mask.

All settings from Administrator Settings and/or Communications Interface Settings screens are reset to factory defaults.

To activate the reset function, push the Reset Button while the BACnet Communication Module is attached to unit controller and while power is applied to both.

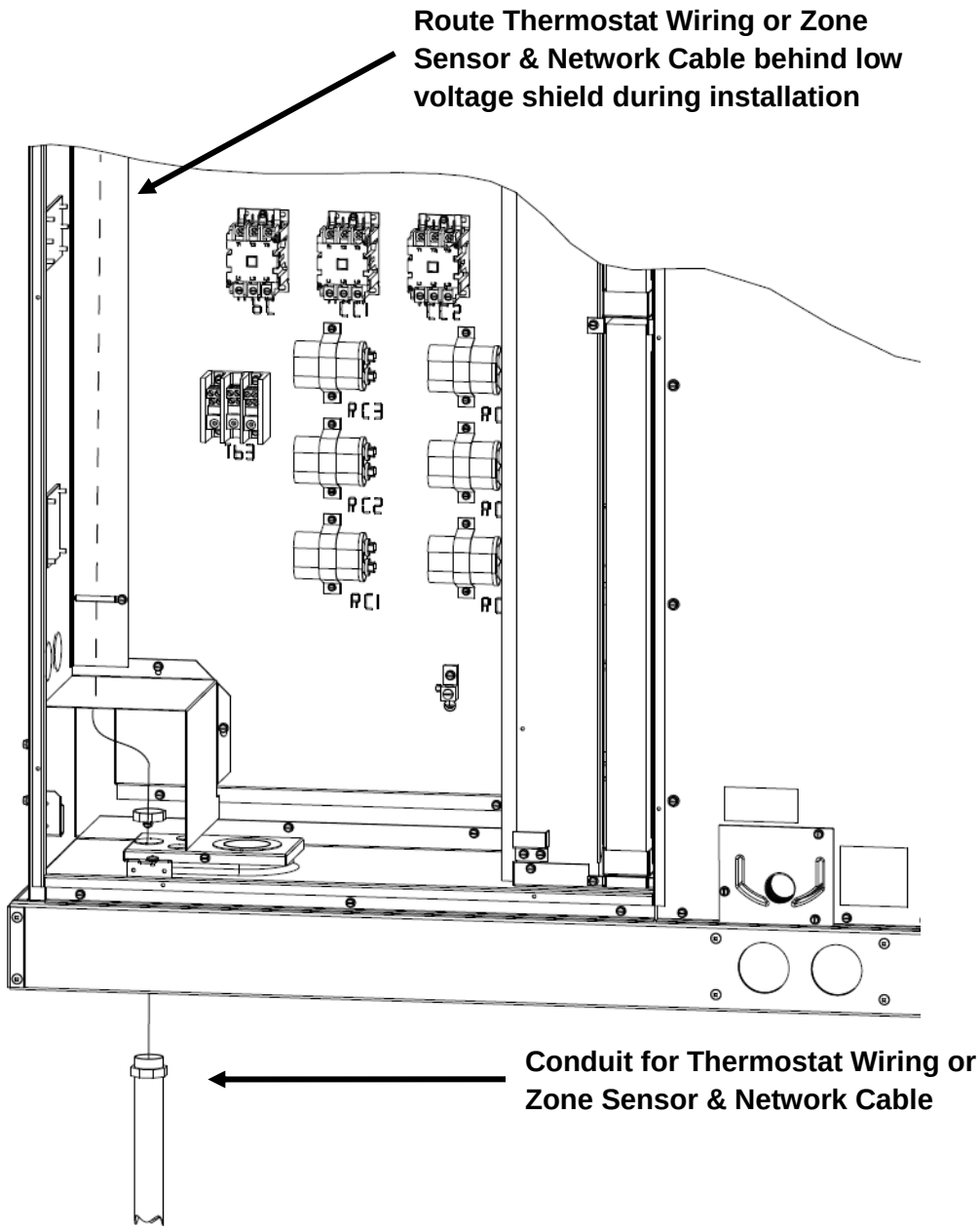
Note: The Power, Modbus TX, and Modbus RX LEDs all blink during regular operation. After the Reset Button is pushed, the Power LED will be solid green for a few seconds and the Modbus TX and Modbus RX LEDs will be blank for a few seconds.

8.3.5 Test Procedures

If attempts to communicate with the RXRX-AY01 card through the Ethernet port are unsuccessful, cycle the unit main power once to reset communication between the RTU-C and the RXRX-AY01.

If you can control the unit from the unit controller but you are not able to communicate with unit via the network, follows these steps:

- Check the network wiring
- Check the network parameters and verify that they are correct and that there are no duplicate devices on the network
- Check communications


Route Thermostat Wiring or Zone Sensor & Network Cable behind low voltage shield during installation
RC3
RC2
RC1
Conduit for Thermostat Wiring or Zone Sensor & Network Cable