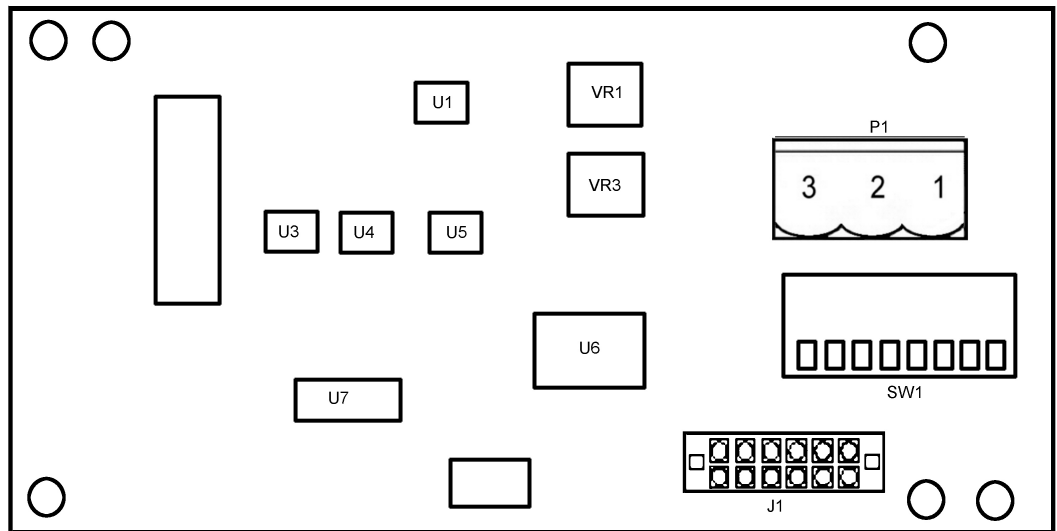


MicroTech II™ AAF®HermanNelson® Unit Ventilator Controller

N2 Open Communication Modules



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Limited Warranty

Consult your local McQuay Representative for warranty details. Refer to Form 933-43285Y. To find your local McQuay Representative, go to www.mcquay.com.

Revision History

IM 732 August 1, 2002 Initial Release

Reference Documents

Number	Source	Title
OM748	www.McQuay.com	Air Source Heat Pump with Electric Heat (Software Model 00)
OM749	www.McQuay.com	Water Source Heat Pump with Electric Heat (Software Model 02) Water Source Heat Pump without Electric Heat (Software Model 03)
OM750	www.McQuay.com	DX Cooling with Electric Heat (Software Model 04)
OM751	www.McQuay.com	DX Cooling Only (Software Model 05)
OM752	www.McQuay.com	Electric Heat Only (Software Model 06)
OM753	www.McQuay.com	DX Cooling with Wet Heat - Valve Control (Software Model 07) DX Cooling with Wet Heat - F&BP Damper Control (Software Model 08)
OM754	www.McQuay.com	2-pipe Wet Heat Only - Valve Control (Software Model 09) 2-pipe Wet Heat Only - F&BP Damper Control (Software Model 10)
OM755	www.McQuay.com	2-pipe Heat/Cool - Valve Control (Software Model 11) 2-pipe Heat/Cool - F&BP Damper Control (Software Model 12)
OM756	www.McQuay.com	4-pipe Heat/Cool - Valve Control (Software Model 13) 4-pipe Heat/Cool - F&BP Damper Control (Software Model 14)
OM757	www.McQuay.com	2-pipe Cooling Only - Valve Control (Software Model 15) 2-pipe Cooling Only - F&BP Damper Control (Software Model 16)
OM758	www.McQuay.com	2-pipe Cooling with Electric Heat - Valve Control (Software Model 17) 2-pipe Cooling with Electric Heat - F&BP Damper Control (Software Model 18)
ED 15069	www.McQuay.com	MicroTech II™ Unit Ventilator Unit Controller Protocol Implementation Conformance Statement
ED 15065	www.McQuay.com	MicroTech II™ AAF®-HermanNelson® Unit Ventilator Unit Controller Protocol Information
IM731	www.McQuay.com	MicroTech II™ AAF®HermanNelson® Unit Ventilator Controller BACnet® Communication modules
IM747	www.McQuay.com	MicroTech II™ Unit Ventilator Unit Controls Installation Manual
	www.johnsoncontrols.com/Metasys/n2open.htm	N2 -- A Data Communication Protocol for Building Automation and Control Networks

Notice

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General Information

Use this manual to physically install the communication module onto the Unit Ventilator Unit Controller board and to make the wiring connections to your network. You also need the appropriate McQuay Engineering Data Sheet known as the Protocol Information to integrate the unit into your network. The Protocol Information contains addressing details, N2 Open protocol information, and a list of the data points available to the network. See the Reference Documents section of this document for part numbers of Protocol Information manuals. These documents are available from your local McQuay International representative and for downloading at the McQuay International web site: www.mcquay.com.

WARNING

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

This equipment must be properly grounded. Only personnel that are knowledgeable in the operation of the equipment being controlled must perform connections and service to the MicroTech II control panel.

CAUTION

Static sensitive components. Can cause equipment damage.

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

NOTICE

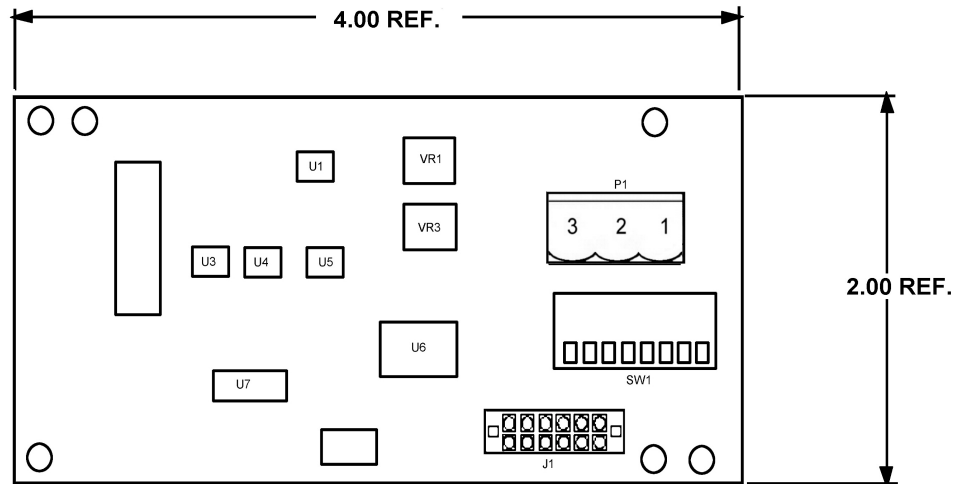
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of 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 his or her own expense. **McQuay International disclaims any liability resulting from any interference or for the correction thereof.**

Description

A MicroTech II N2 Open communication module incorporates a MicroTech II Unit Controller into an N2 Open Local Area Network (LAN). This combination provides an interface to the building-automation network.

The MicroTech II N2 communication module is a printed-circuit board that plugs onto the MicroTech II Unit Controller board. Figure 1 shows an outline drawing of the N2 communication module with reference dimensions.

Figure 1: N2 communication module



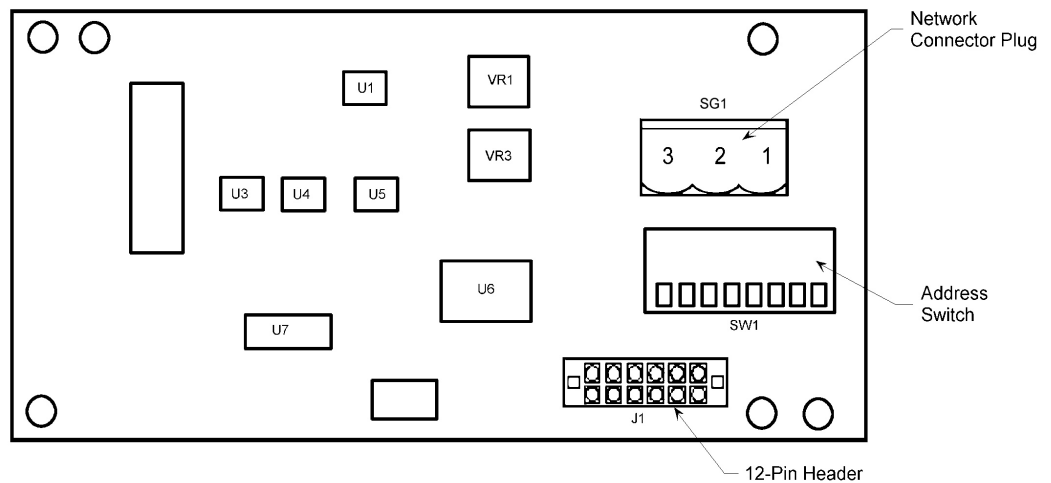
Application

The MicroTech II N2 communication module connects the MicroTech II Unit Controller to the Building Automation System (BAS) on a N2 Local Area Network. It is the interface for the exchange of N2 points between the network and the Unit Controller.

Component Data

Figure 2 shows the major components of the communication module.

Figure 2. MicroTech II N2 communication module major components



N2 Network Connection

N2 network wiring connections are made to SG1 (Network Connector Plug). This connector is physically made in two parts, a board-mounted (3-terminal) male plug and a (3-terminal) female plug with screw-type wiring connections.

The two portions come plugged together and look like a single part. However, they can be separated at the middle by gently pulling them apart. Connect the wiring (that has been stripped of insulation by about 1/3-inch) to the SG1 female plug portion. Insert the wires into the proper screw-terminals and tighten the connections with a small flat-blade screwdriver (see

Figure 9). Make sure that the wiring connections aren't shorted and that they are tight.

Address Switch

The Address Switch (S1) must be field-configured on each MicroTech II N2 communication module to a unique address, so that it can be located and addressed when wired into the network. The system integrator usually pre-assigns an address to each module. The available range of possible addresses using the binary switches is 1 through 253.

Figure 3. Address switch (S1)



Dip switch settings and how they work

When a switch is in the up (open) position, its value is 0. So when all the switches are in the up there is no module address. When switches are set in the down (closed) position, their individual values are shown in Figure 4 below.

Figure 4. Dip switch values (when closed)

Switch #	Value	Number when closed
1	2 to the zero power	1
2	2 to the 1 st power	2
3	2 to the 2 nd power	4
4	2 to the 3 rd power	8
5	2 to the 4 th power	16
6	2 to the 5 th power	32
7	2 to the 6 th power	64
8	2 to the 7 th power	128

Figure 5 shows an example of a typical address setting. The digital switch positions as read from left to right are 00110010. This provides an address of 76 as illustrated below.

Figure 5. Address switch (S1) set to example



$$(0 + 0 + 4 + 8 + 0 + 0 + 64 + 0 = 76)$$

12-Pin Header

The 12-pin header, J1, connects the unit-controller Unit Controller board to the MicroTech II N2 Open communication module through the bottom side of the printed-circuit board.

Integration

Configuring the Unit Controller

Each MicroTech II Unit Controller board and N2 communication module is preprogrammed and configured at the factory to be a single Unit Controller, whether the boards are assembled together at the factory or field assembled. Each unit is also ready to operate using the default values. These default values may be changed via the unit's keypad, using ServiceTools™, or via the network. See the appropriate operation manual for default values and keypad operating instructions, and refer to the appropriate MicroTech II Protocol Information for descriptions of the network variables. See Reference Documents for part numbers.

Network Connection

N2 Open Addressing

The N2 Open device address of the MicroTech II controller in a Local Area Network (LAN) is set by using the eight-position DIP switch on the N2 communication module (see the heading: **Address Switch**). The address is physically set using the binary switches. An open switch (switch up) is a 0, and the value of a closed switch (switch down) is shown in Figure 4. The address naming starts with switch 1. Each address must be unique and set during installation. After setting the address with the switches, you must cycle power to the controller (turn the controller off and then on again) for the new address to take effect.

The data transmission rate is 9600-bps (baud)..

N2 Bus Information

The N2 communication Bus is a local network that links controllers and point interfaces to the Network Control module (NCM). The N2 Bus uses a master/slave protocol in which the master device (the NCM) initiates all communication with the N2 Bus devices. These N2 Bus devices include the Digital Control modules (DCMs), Point Multiplex modules (XBN, XRE, XRL, XRM), and all Application Specific Controllers (ASCs).

The N2 Bus is wired in a daisy-chain fashion and the devices are connected in series. The N2 Bus can use solid or stranded wire, or optical fiber when special fiber modems are used. So the choices include:

- 3-wire twisted cable
- 2-wire twisted-pair telephone cable
- 2-wire twisted-pair cable with a shield
- Duplex optical fiber (requires a pair of fiber modems).

Selecting the Right Cable

For most N2 Bus installations, the most practical choice is solid, 2-wire twisted-pair, unshielded, telephone cables. If you have existing stranded cable, you can use it, but you may find that the strands become a nuisance when wiring the cable.

For N2 Bus installations where there is a lot of electrical noise (e.g., gas ignition systems, radar or magnetic-resonance imaging equipment, on a factory floor, or outdoors), shielded wire or optical fiber is the best choice. Of the two, fiber is by far the better option, but it is more expensive. It offers extended N2 distances and excellent immunity to electrical noise, lightning, and various other building noises. It can also be buried underground between two buildings so that the N2 Bus can be extended in a campus-type installation.

N2 Bus Rules

Figure 6 summarizes the rules and maximums allowed for installing the N2 Bus. You may wish to print this table and keep it handy.

Figure 6. N2 Bus Rules

Category	Rules/Maximums Allowed
General	One or two N2 Bus per NCM
	Only daisy-chained devices
Number of Devices	100 devices per NCM (60 to 200 TC-9100s)
	50 devices per repeater
	Two repeaters cascaded
Line Length and Type	1524 m (5000 ft) between NCM to farthest N2 device before repeater is needed
	4572 m (15,000 ft) from NCM to farthest N2 device (three segments of 1524 m [5000 ft] each)
	2012 m (6600 ft) between two fiber modems
Cable	26 AWG twisted pair or larger (solid or stranded 22 AWG or heavier recommended)
Terminations	Two switched EOL per segment (preferred)
	One switched EOL per segment (required)

Number of Devices

- Currently, up to 100 devices can be connected to an NCM, including repeaters. The actual number of devices is dependent on the features and point count used in the NCM.

Note: The number of devices varies because both the number of software objects and JC-BASIC processes influence the Network Controller's (NC's) performance (*see Guidelines for Efficient Operation Technical Bulletin [LIT-636341]*).

- Up to 50 daisy-chained devices are allowed before a repeater is needed. Add a repeater to the bus when you reach 49 devices. Count each repeater as one device.
- Any path from the NCM to an N2 device cannot go through more than two repeaters or two pairs of fiber modems (i.e., cascaded repeaters/modems). This is because the repeater/modem delays the N2 Bus signal between Sides A and B. The N2 Bus can compensate for only two of these delays; therefore, up to two repeaters or two pairs of fiber modems can be cascaded in series. Note that the signal from the NCM only passes through two repeaters or two pairs of modems to any N2 device.
- For additional information on the maximum number of devices and priority assignments, be sure to read *Guidelines for Efficient Operation Technical Bulletin (LIT-636341)*.

Line Length and Type

- A repeater is required for every 1524 m (5000 ft) of daisy-chained cable.
- The maximum distance between an NCM and the farthest device (even through repeaters) is 4572 m (15,000 ft).
- You may use 18 through 26 AWG twisted pair wire; however, Johnson Controls recommends 22 AWG or heavier, because lighter wire breaks easily when stripped and installed.
- The maximum distance between two fiber modems is 2,012 m (6,600 ft). If your application requires lengths beyond that, contact S.I. Tech for information about their "high power" option.

You may also use optical fiber on the N2 Bus (a pair of fiber modems is required for conversion). Duplex optical fiber is needed, either 50 (3.0 dB/km), 62.5 (4.0 dB/km), or 100 (5.0 dB/km) micrometers. The 62.5 size is preferred.

Installation

The MicroTech II N2 Open communication module may either be installed in the factory or field installed. The module mounts on connector pins and is held in place with three plastic locking standoffs. The N2 Open network connects to the MicroTech II N2 Open communication module at the network connector plug (SG1).

The MicroTech II N2 Open communication module is included in a kit (part number 107293125). You need to know the N2 address that is assigned to the communication module. The network administrator can supply this information.

To mount a new MicroTech II N2 communication module onto the Unit Controller board, follow these steps:

1. Disconnect power from the Unit Controller board.
2. Unplug the unwired network cable connector from the terminal block SG1 (see Figure 2).
3. Install the three standoffs on the Unit Controller board at the locations shown in Figure 7. Simply press the locking standoffs into the holes on the board. Then locate the empty connector for the MicroTech II N2 communication module on the Unit Controller board (see Figure 8).
4. Orient the communication module printed-circuit board so that the component side faces outward and the connector pins can penetrate the 12-pin header on the communication module.
5. Push the communication module onto the connector pins and standoffs until you hear the faint click of the locking standoffs securing the board in place.
6. Connect the network wiring to the network cable connector and plug it into the terminal block, SG1, on the MicroTech II communication module (see Figure 9).
7. Set the N2 address (supplied by the network administrator) using the Address Switch (SW1). The valid range is 1 to 253 (see Figure 4).
8. Reapply power to the MicroTech II Unit Controller board.

Note: You must maintain the polarity of the signal throughout the network. Always connect + to + and – to –. Also, the network cable shield or third-wire connection must be continuous throughout the network and must be connected to earth ground at **one** (and only one) point.

To replace a MicroTech II N2 communication module on a MicroTech II Unit Controller board, follow these steps:

1. Disconnect power from the Unit Controller board.
2. Record the N2 address on the Address Switch (SW1).
3. Remove the network cable plug-in connector from the SG1 terminal block (see Figure 2).
4. Locate the three standoffs for the MicroTech II N2 communication module on the Unit Controller board (Figure 7 and Figure 8).
5. Using a pliers or screwdriver to depress the barb on one standoff, gently pull the corner of the communication module over the barb. Be careful to not bend the communication module or misalign the connector pins.
6. Proceeding to the other two corners, remove the communication module from each standoff, and pull the module over the standoffs.
7. Gently lift the MicroTech II N2 communication module from the Unit Controller board.
8. Locate the empty connector pins and three standoffs for the MicroTech II N2 communication module on the Unit Controller board.
9. Orient the communication module printed-circuit board so that the component side faces outward and the connector pins can penetrate the 12-pin header on the communication module.
10. Push the communication module onto the connector pins and standoffs until you hear the faint click of the locking standoffs securing the board in place.

11. Connect the communication module to the network by reinserting the network-cable plug into SG1 (see Figure 9).
12. Set the N2 Address in Address Switch SW1 (see Figure 4).
13. Reapply power to the MicroTech II Unit Controller board.

Figure 7. Communication module mounted on the Unit Controller board

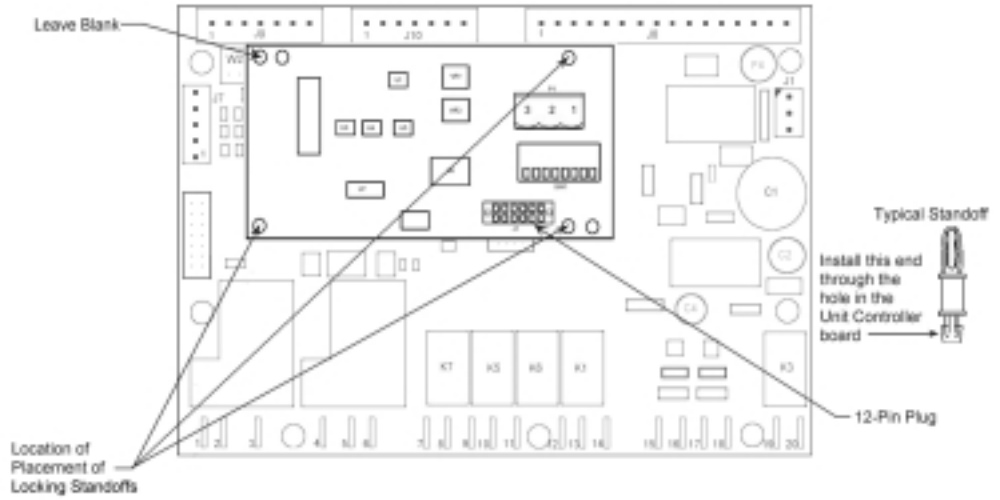


Figure 8. Communication module mounting detail

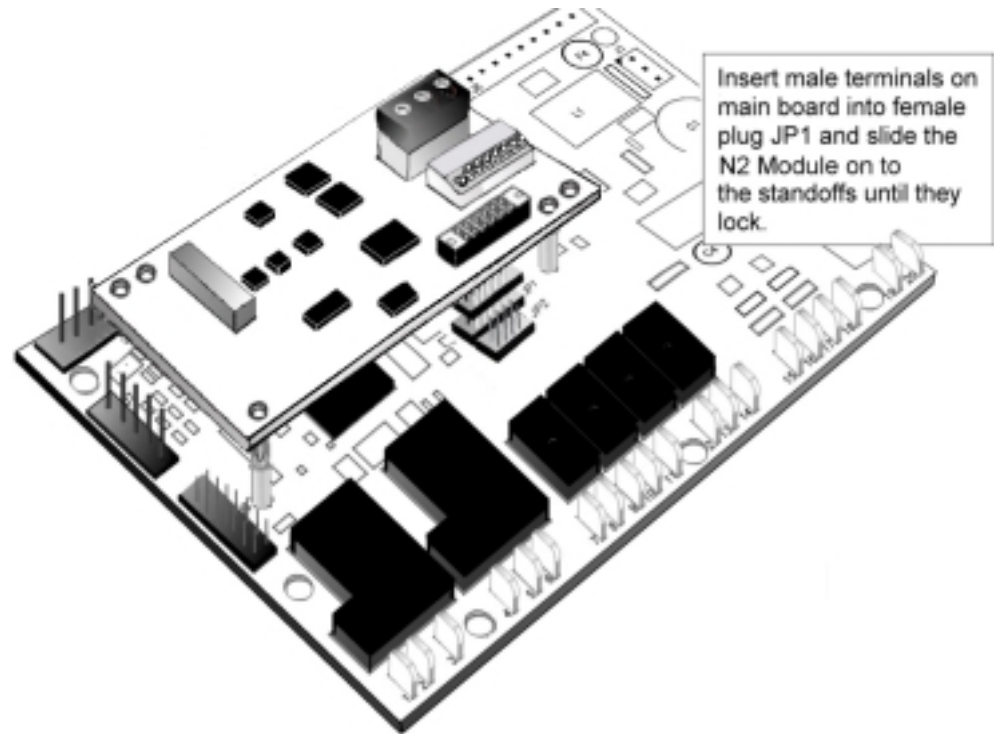
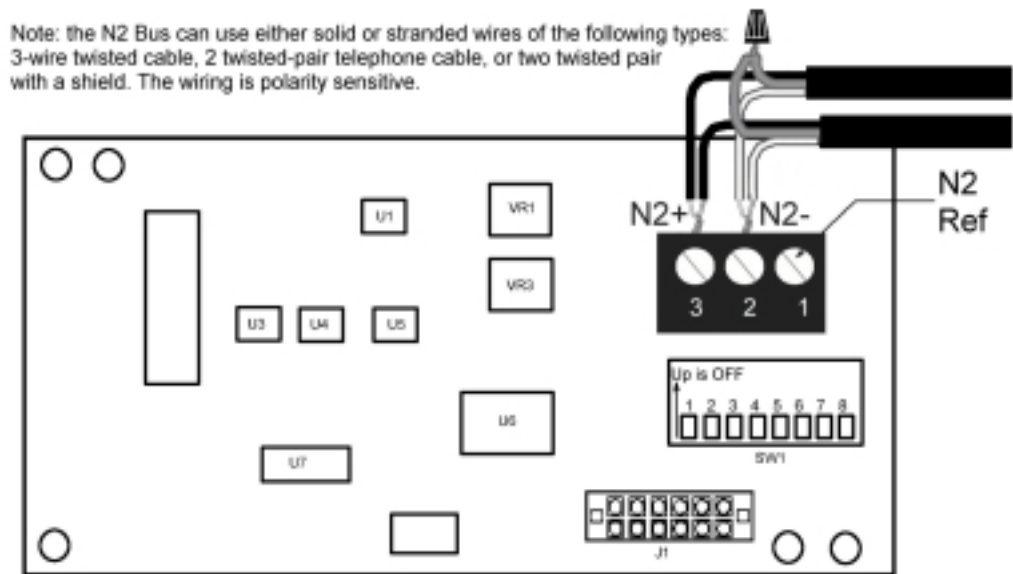


Figure 9. N2 module typical wiring



Service Information

Test Procedures

If you can control the unit from the keypad but are unable to communicate with it via the network, try the following:

- Verify the network (bus) wiring
- Check the integrity of the cable harness to the network terminals
- Verify that the N2 address (SW1) is set to a unique binary number between 1 and 253.

If the MicroTech II N2 Open communication module still doesn't respond, replace the communication module.

List of Replaceable Parts

Network Connection Plug

Generic Replacement Parts

The three-contact network connector plug has custom markings, but if you lose this terminal block you can replace it with a standard block without the markings from a manufacturer. The list below contains manufacturers part numbers for equivalent parts without the custom markings.

Manufacturer	Telephone	Order Number
Phoenix Contact	(800) 888-7388	17 57 02 2
Altech Corp	(908) 806-9400	37.003

Direct Replacement Parts

You can order direct replacement parts for these connector plugs from McQuay International (1-800-37-PARTS).

Part Number	Description
AS-TBKIT-0	5 terminal blocks marked REF, N2- and N2+

Kit

Component	Description	Part No.
Kit	N2 communication module for unit ventilators with standoffs	107293125

