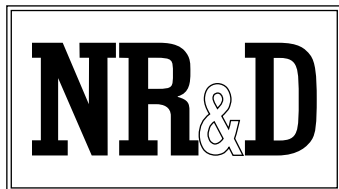


PMN

Installation and Programming Manual

This Manual describes the PMN PowerLogic® Modbus Plus Network module, its uses and set up.

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Introduction

The Niobrara PMN (PowerLogic® Modbus Plus NIM) is a network module that interfaces PowerLogic Circuit Monitors (CM), other PNIM (and RNIM) Slave devices, and Modbus RTU Slave devices to a Modbus Plus (MB+) network. The PMN mounts directly onto the back of a Series 2000 Circuit Monitor. Power for the PMN is provided by an external 90-276Vac at 47-63Hz or 125-350Vdc connector and is normally connected to the control power of the CM. A stand-alone version with a steel mounting plate is available as the PMN-SA.

The PMN includes the standard Modbus Plus chipset from Modicon. The MB+ address is selected by a pair of rotary switches on the front panel of the PMN.

The PMN will support up to 8 slaves (any mix of PNIM or Modbus RTU) through its RS-485 port. A short color coded pigtail with spade lugs is provided to allow easy connection to the Circuit Monitor. The PMN-SA has a 9-pin RS-485 serial port on its front panel. Each of the Slave devices must have a unique network address within the range of 1 through 8 inclusive. All Slaves must be set to the same baud rate and parity. The PMN will configure its RS-485 port to match the baud rate and parity of the first slave it can communicate with. Upon power-up, the PMN will attempt to read register 8188 within slave #1 with the PNIM protocol and Modbus RTU protocol. If it is unable to communicate with slave 1 it will try slave 2 through 8 at the same baud rate and parity. It will attempt each of the possible CM baud rates and parity combinations until communication is established. The PMN will also automatically determine if the network is 4-wire RS-485 or 2-wire RS-485 and tristate its transmitter when necessary.

Incoming MB+ messages require the next to the last non-zero drop in the route to match the address of the PMN as set by the rotary switches. The final non-zero drop in the route determines the Slave accessed; this drop must be within the range of 1 through 8.

Incoming MB+ Holding Register READs and WRITEs are directly mapped to the SY/MAX registers with no offset. An access of Holding Register 1000 (PLC equivalent 41000 or 401000) will operate on the SY/MAX register 1000.

Specifications

Mounting Requirements

One PowerLogic Circuit Monitor Series 2000 with the I/O expansion port free.
The unit may also be mounted as stand-alone.

Power Supply Input Range

90-276 Vac 47-63Hz or 125-350Vdc
6 Watts nominal

Operating Temperature

0 to 60 degrees C operating. -40 to 80 degrees C storage.

Humidity Rating

up to 90% noncondensing

Pressure Altitude

-200 to +10,000 feet MSL

MB+ Communication Port

9 pin female D-connector, transformer isolated. 1Mb data rate. Modbus Plus Protocol.

RS-485 Communication Port

4 inch pigtail with spade lugs for connecting to the screw terminals on a CM. PMN-SA includes a 9-pin SY/MAX pinout RS-485 port. Self adjusting PNIM Master and Modbus RTU protocols. Self adjusting baud rate and parity to match the slaves. Possible values are 1200, 2400, 9600, and 19200 baud and EVEN or NONE parity. Self detecting of 4-wire or 2-wire RS-485 networks.

Indicator lights

7 LEDs: Red MB+ Error, Green MB+ Active, Yellow Serial TX, Yellow Serial RX, Green Active, Red Error, Green Power.

Physical Dimensions

IOM-4411 footprint.
Wt.: 2.5 lb.
W: 6.2 in.
H: 1.5 in.
D: 9.1 in.

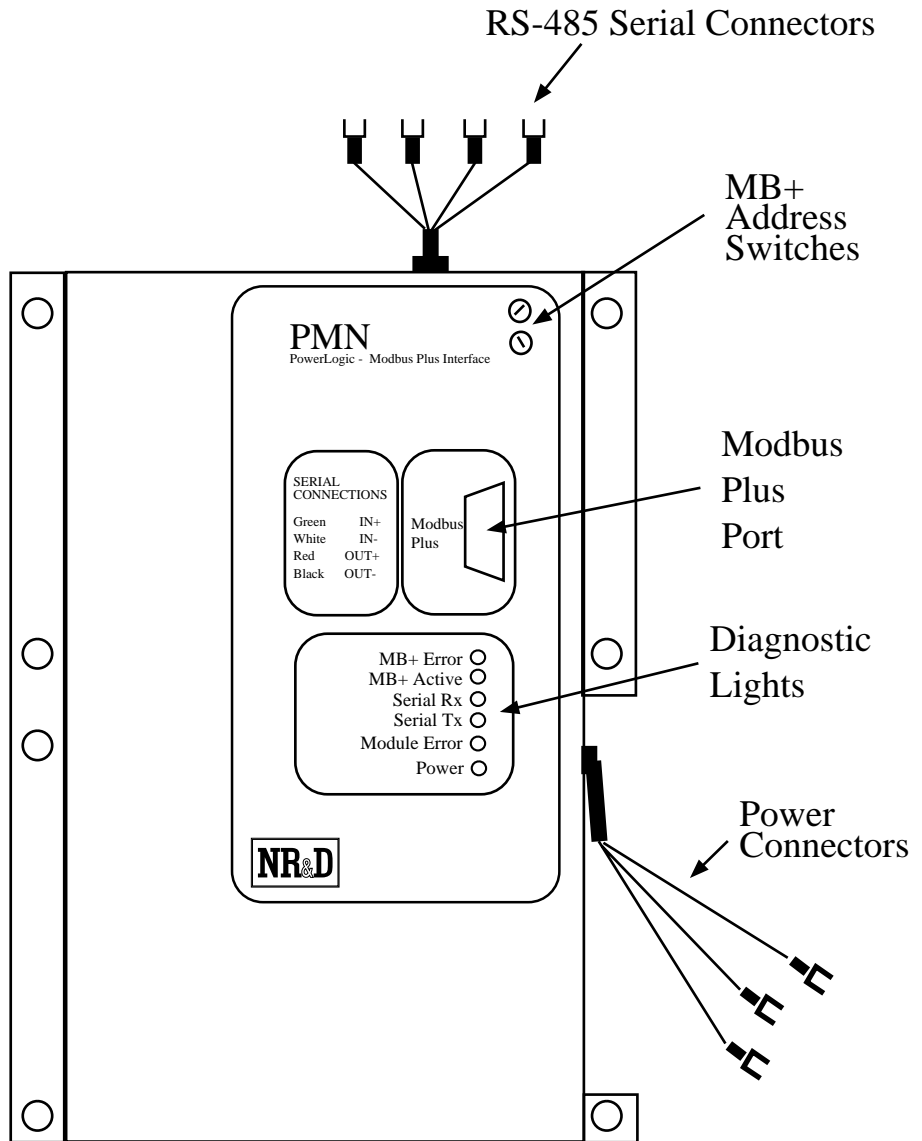


Figure 1-1 PMN Front Panel

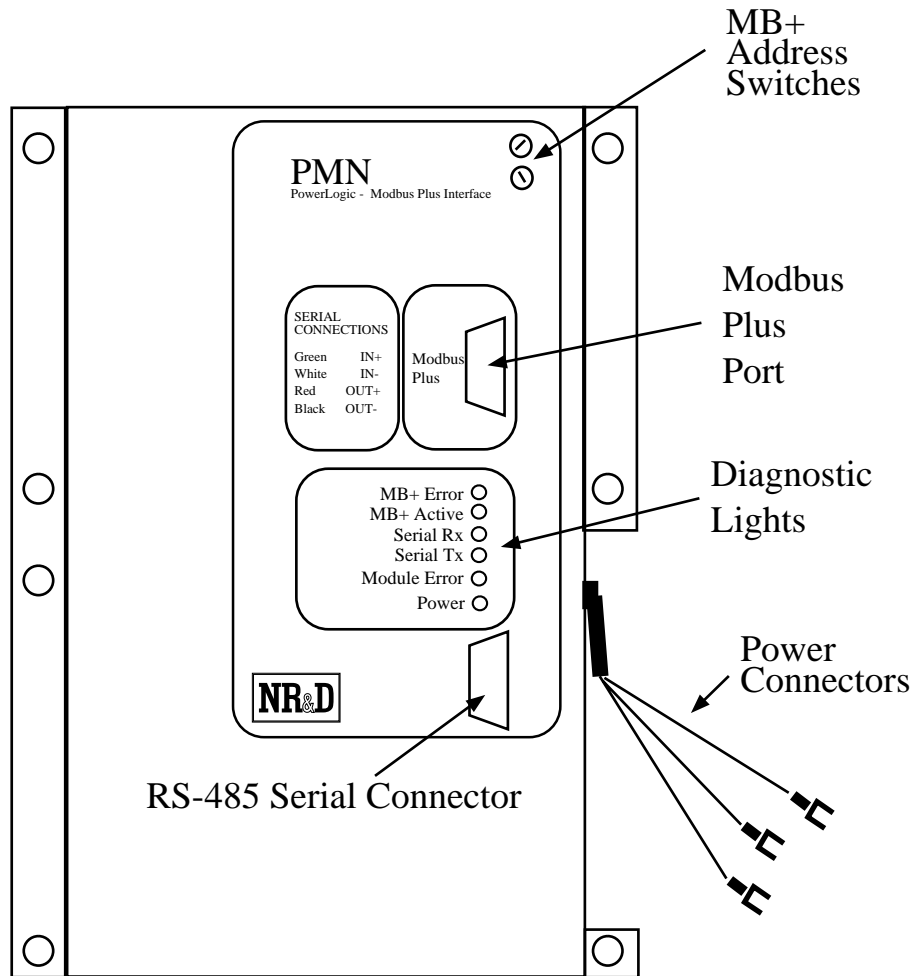


Figure 1-2 PMN-SA Front Panel

Warning

Installing a PMN onto a live MB+ network may result in a duplicate address conflict with another MB+ device. Configure the PMN to an address known not to exist on the network before connecting the PMN to the network.

PMN Installation

- 1 Remove power from the Circuit Monitor.
- 2 Guide the PMN's mounting holes onto the seven studs of the Circuit Monitor. Secure the PMN to the CM with the seven #6-23 nuts supplied with the PMN. Tighten to 6-9 lb.-in (0.68 - 1.01 N-M) of torque.

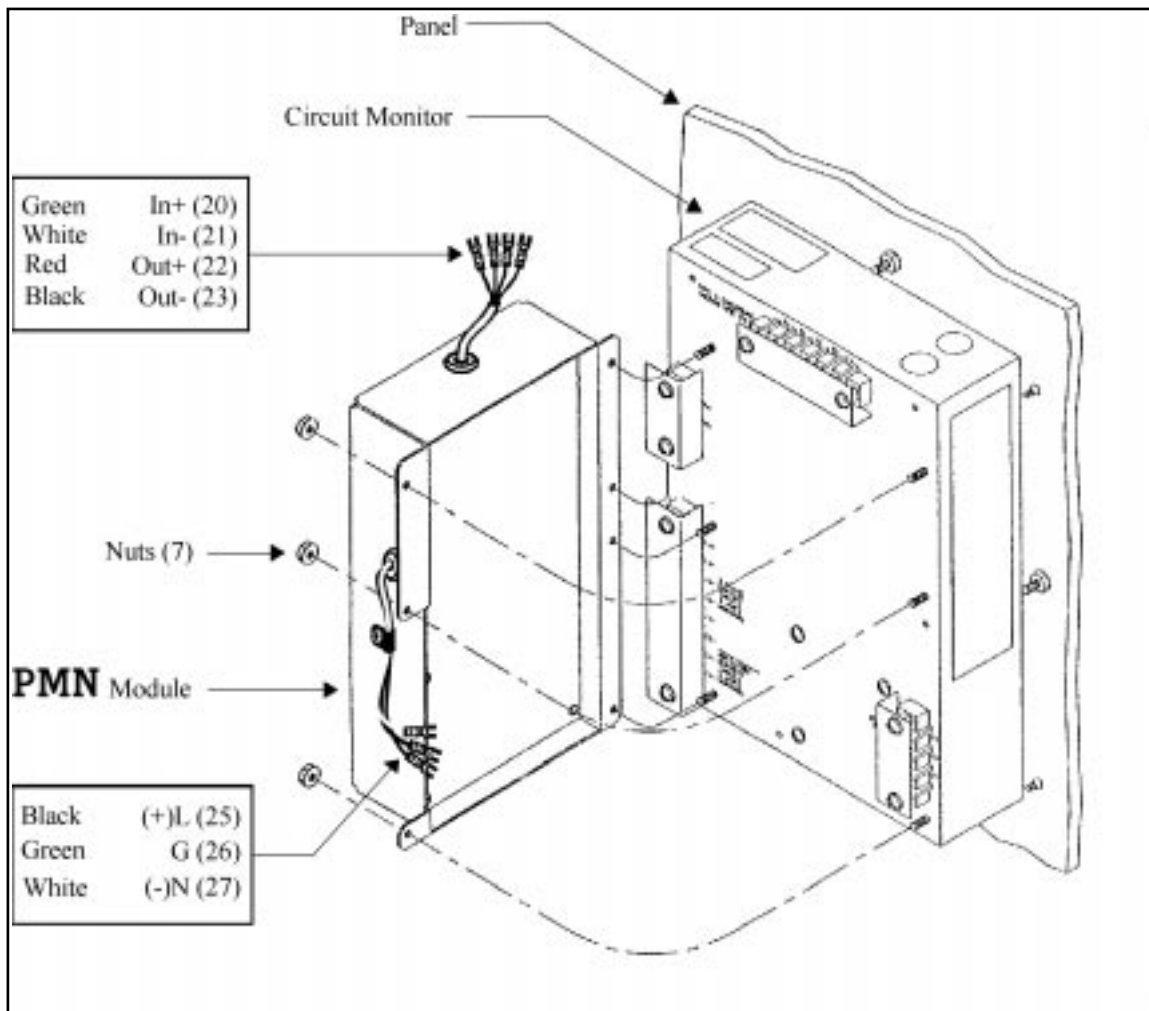


Figure 2-1 PMN Installation

Serial Communications Wiring

The PMN is the PNIM and Modbus RTU protocol master for a multidrop RS-485 communication network. Up to eight (8) PNIM and/or Modbus RTU slave devices may be attached to the PMN with the following restrictions:

- The network Address of each slave devices must be unique and fall within the range of 01 through 08 inclusive.
- All slave devices must be set for the same baud rate and parity. The default values are 9600 baud and EVEN parity. The PMN will operate at 1200, 2400, 4800, 9600, and 19200 baud at EVEN and NONE parity. The PMN automatically determines the baud rate and parity for the network based upon the first slave it is able to communicate with.
- The maximum recommended distance for the RS-485 network is 4000 ft. (1220m).
- The last unit on the multidrop network must be terminated with the PowerLogic MCT-485 terminator or equivalent. Terminate only the LAST device (furthest from the PMN). If a link has only one device, terminate that device.

- The PMN provides internal biasing of the multidrop network. NO external biasing device is required or allowed.

PMN to CM Wiring

The PMN provides a short pigtail cable with spade connectors for connection to the RS-485 port of the CM to which it is attached. Table 2-1 provides the color code for connecting to the Circuit Monitor.

Table 2-1 PMN RS-485 Wiring Code

PMN Wire	CM Connector	CM Terminal
Green	IN +	20
White	IN -	21
Red	OUT +	22
Black	OUT -	23

The PMN-SA provides a 9-pin female D connector for connection to the RS-485 port . Table 2-1 provides the color code for connecting to the Circuit Monitor.

Table 2-2 PMN-SA RS-485 Wiring Code

PMN-SA Pin	Color	CM Connector	CM Terminal
2	Green	IN +	20
1	White	IN -	21
4	Red	OUT +	22
3	Black	OUT -	23

PMN Daisy-Chaining PowerLogic Devices

To daisy-chain additional devices from the PMN, wire the RS-485 terminals from each device to the matching terminal on the next device. In other words, simply connect all of the IN+ connections together on one wire, all of the IN- connections together on another, all of the OUT+ connections together, all of the OUT- connections together and all of the shields together. See Table 2-3 for an example of connecting 4 CMs to a PMN.

Belden 8723 cable (or equivalent) is recommended for the RS-485 network wiring.

Table 2-3 Daisy-Chaining Wiring Example

PMN	CM #1	CM #2	CM #3	CM #8
Green	IN +	IN +	IN +	IN +
White	IN -	IN -	IN -	IN -
Red	OUT +	OUT +	OUT +	OUT +
Black	OUT -	OUT -	OUT -	OUT -
	Shield	Shield	Shield	Shield

NOTE: When connecting multiple devices to the PMN, make sure that each device is configured for a unique network address between 1 and 8 inclusive. Also make sure that all devices are configured for the same baud rate and parity.

Shielding the RS-485 Network

It is recommended that the Shield cable of the RS-485 link be grounded at one, and only one, point on the multidrop network.

Terminating the RS-485 Network

To ensure reliable communication between the PMN and the devices on the network it is important to provide the proper termination at each end of the network. The PMN provides this termination at its end but an external terminator is needed at the other end. The PowerLogic Class 3090 Type MCT-485 Multipoint Communications Terminator provides an easy solution for connections involving Circuit Monitors. Simply slide the terminator's four spade connectors under the IN+, IN-, OUT+, and OUT- terminals on the CM's RS-485 block.

Biasing the RS-485 Network

The PMN automatically provides full biasing of the network. NO external biasing equipment is required or allowed. Do not use a POWERLOGIC MCA-485 adaptor on a PMN-SA.

Configuring the PMN

NOTICE: It is important to configure the PMN MB+ Address before placing the unit on the MB+ network. If the PMN has the same MB+ address as another device, one device will drop into a duplicate address error state. This is noted by the green MB+ Active light flashing at a rate of 4 flashes per second. This type of situation may result in unpredictable behavior of equipment and may lead to personal and property damage and should be avoided.

For normal Modbus Plus operation, only the PMN's MB+ address is required for configuration. Simply set the two rotary switches to the chosen MB+ address. The valid range is 1 through 64 inclusive. The switch labeled 0...6 controls the 10's digit while the switch labeled 0...9 controls the 1's digit. It is recommended that address 1 not be used in order to avoid possible conflicts with new PLC units being placed online.

MB+ Network Connection

Warning

Installing a PMN onto a live MB+ network may result in a duplicate address conflict with another MB+ device. Configure the PMN to an address known not to exist on the network before connecting the PMN to the network.

Simply connect a standard Modbus Plus drop connector onto the 9 pin MB+ port on the PMN.

For a complete reference on Modbus Plus network planning and installation see the *Modbus Plus Network Planning and Installation Guide*. Modicon Inc. Modicon part number GM-MBPL-001.

Control Power Connection

The PMN requires an external control power connection for operation. Typically this will be the same control power that the Circuit Monitor uses; 120 or 240 Vac or Vdc.

DANGER!

Only qualified electrical workers should install and wire this equipment. Such work should be performed only after reading this complete set of instructions. Follow proper safety procedures regarding control power wiring.

Failure to observe this precaution will result in severe personal injury or death!

Table 2-4 displays the control power cable color code and appropriate Circuit Monitor terminal for connection.

Table 2-4 Control Power Connections

Wire Color	Description	CM Connector #
BLACK	Line (DC +)	25
GREEN	Ground	26
WHITE	Neutral (DC -)	27

The PMN provides support for the Modbus Plus local network. The MB+ protocol topology allows for up to 64 devices on a network segment. Each device on a network segment must be assigned a unique network address within the range 01 through 64 inclusive. Multiple network segments may be bridged together to form large systems. Messages are passed from one device to another by the appropriate use of a route within the message. The route will include the network address of the network address of the target device, and any inter-network addresses required. The route field of a message may be up to 5 layers deep, is terminated with the value 00, and all unused drops are also set to 00.

The PMN will have its own MB+ network address as set by its rotary switches. If the next to last non-zero drop in the route is that of the PMN then the PMN will try to route the message to the network of slaves attached to it. In this case, the last non-zero drop in the route must be within the range of 01 through 08 inclusive.

Simple Quantum PLC Example

Figure 3-1. This is a simple MB+ network with a Modicon Quantum PLC and a PMN with three CMs attached. The PMN has a MB+ address of 05 while the Quantum MB+ address is 06. Each CM is uniquely addressed with values of 01, 02, and 03.

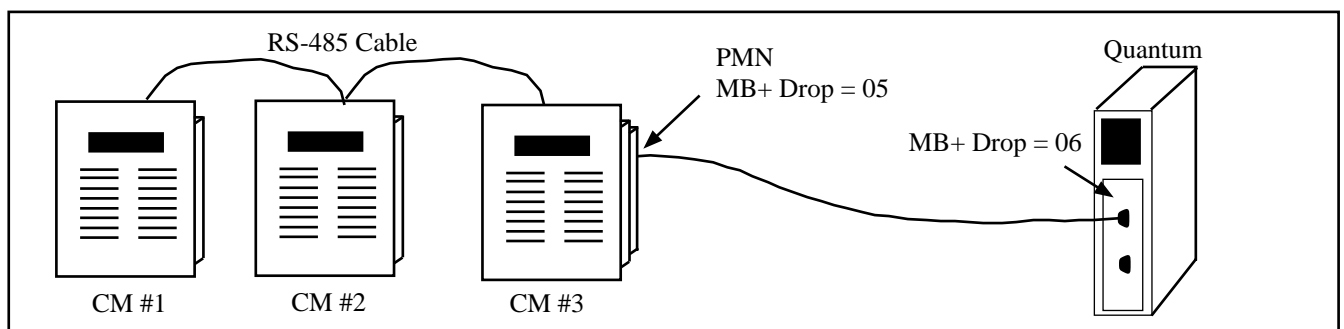


Figure 3-1 MB+ Routing Example

Communication messages in the Quantum could be set to target each of the Circuit Monitors. Table 3-1 lists the possible routes for each destination.

Table 3-1 Example routing

Source	Target	Route
Quantum	CM #1	05.01.00.00.00
Quantum	CM #2	05.02.00.00.00
Quantum	CM #3	05.03.00.00.00

MEB Example

Figure 3-2 displays a MB+ network with a Niobrara PMN with one CM and a Modicon Micro PLC (connected to the 4-wire RS-485 via a Niobrara DDC2I convert), a PMN with three CMs, and a Niobrara MEB, a Quantum PLC, and a personal computer running SMS. The PMN with the single CM has a MB+ address of 27. The other PMN has a MB+ address of 23. The Quantum PLC has a MB+ address of 07. The MEB has a MB+ address of 21. The personal computer running PowerLogic System Manager Software (SMS3000) is connected to the Ethernet port of the MEB using an Modbus/TCP protocol.

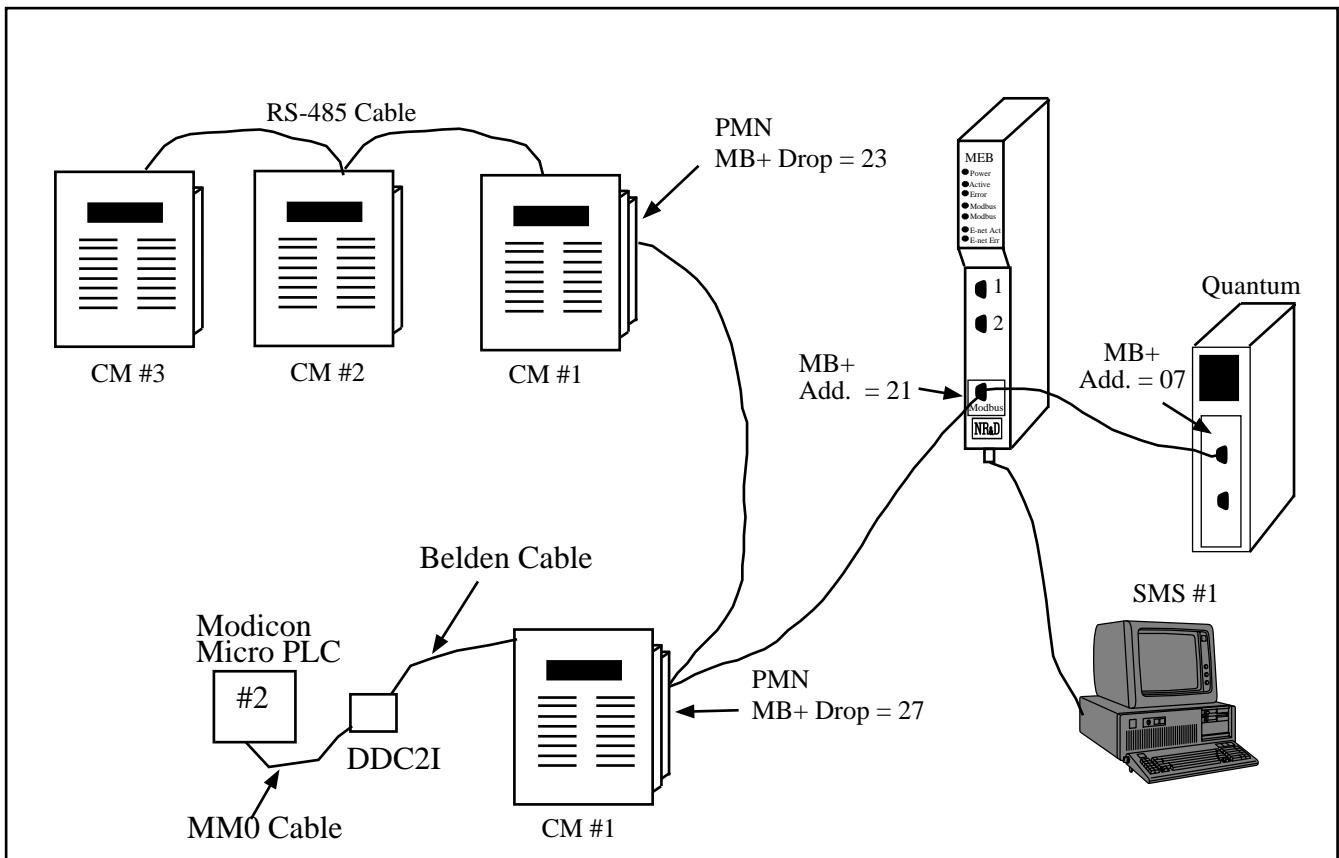


Figure 3-2 MEB Routing Example

Table 3-2 MEB Example routing

Source	Target	Route
SMS	PMN 27, CM #1	21, 27, 01
SMS	PMN 27, PLC #2	21, 27, 02
SMS	PMN 23, CM #1	21, 23, 01
SMS	PMN 23, CM #2	21, 23, 02
SMS	PMN 23, CM #3	21, 23, 03
Quantum PLC	PMN 27, CM #1	27.01.00.00.00
Quantum PLC	PMN 27, PLC #2	27.02.00.00.00
Quantum PLC	PMN 23, CM #1	23.01.00.00.00
Quantum PLC	PMN 23, CM #2	23.02.00.00.00
Quantum PLC	PMN 23, CM #3	23.03.00.00.00

The Modicon Micro PLC uses Modbus RTU for its serial protocol and the PMN automatically selects that protocol when communicating with it. and PNIM protocol when communicating with the CM.

Connector Pinouts

MB+ port on PMN (DE9S with jack screw posts)

- 1 Shield
- 2 Data A
- 3 Data B
- 4 ... 9 No Connection

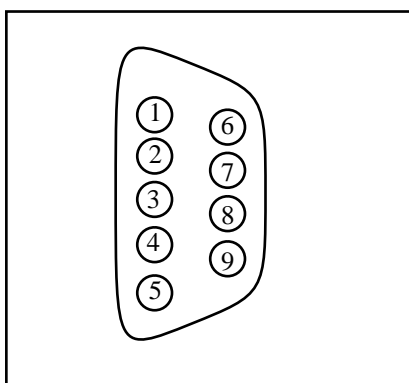


Figure 4-1 MB+ Connector Pinout

RS-485 Pigtail Cable Color Code

- GREEN - transmit data (noninverted) from PMN. Connect to IN+ on the CM.
- WHITE - transmit data (inverted) from PMN. Connect to IN- on the CM.
- RED - receive data (noninverted) to PMN. Connect to OUT+ on the CM.
- BLACK - receive data (inverted) to PMN. Connect to OUT- on the CM.

RS-485 port on PMN-SA (DE9S with slide lock posts)

- 1 - transmit data (inverted) from PMN. Connect to IN- on the CM.
- 2 - transmit data (noninverted) from PMN. Connect to IN+ on the CM.
- 3 - receive data (inverted) to PMN. Connect to OUT- on the CM.
- 4 - receive data (noninverted) to PMN. Connect to OUT+ on the CM.
- 5- CTS (-)
- 6 - RTS (-)
- 7 - CTS (+)
- 8 - RTS (+)

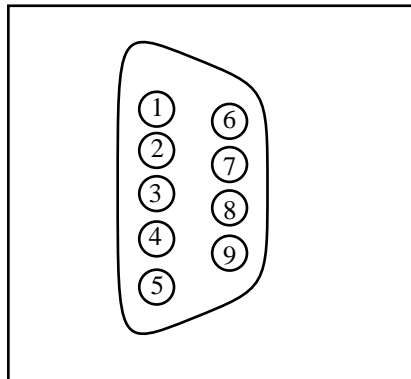


Figure 4-2 PMN-SA RS-485 Connector Pinout

Control Power Cable Color Code

- BLACK - AC Line or DC Positive (+)
- GREEN - Ground
- White - AC Neutral or DC Negative (-)

Recommended Cabling

PNIM Network Cabling

The PMN provides a short pigtail cable with spade connectors for connection to the RS-485 port of the CM to which it is attached. Table 5-1 provides the color code for connecting to the Circuit Monitor.

Table 5-1 PMN RS-485 Wiring Code

PMN Wire	CM Connector	CM Terminal
Green	IN +	20
White	IN -	21
Red	OUT +	22
Black	OUT -	23

The PMN-SA provides a 9-pin female D connector for connection to the RS-485 port . Table 2-1 provides the color code for connecting to the Circuit Monitor.

Table 5-2 PMN-SA RS-485 Wiring Code

PMN-SA Pin	Color	CM Connector	CM Terminal
2	Green	IN +	20
1	White	IN -	21
4	Red	OUT +	22
3	Black	OUT -	23
5			
6			
7			
8			

Daisy-Chaining PowerLogic Devices

To daisy-chain additional PowerLogic devices from the PMN, wire the RS-485 terminals from each device to the matching terminal on the next device. In other words, simply connect all of the IN+ connections together on one wire, all of the IN- connections together on another, all of the OUT+ connections together, all of the OUT- connections together and all of the shields together. See Table 5-3 for an example of connecting 4 CMs to a PMN.

Belden 8723 cable (or equivalent) is recommended for the RS-485 network wiring.

Table 5-3 Daisy-Chaining Wiring Example

PMN	CM #1	CM #2	CM #3	CM #8
Green	IN +	IN +	IN +	IN +
White	IN -	IN -	IN -	IN -
Red	OUT +	OUT +	OUT +	OUT +
Black	OUT -	OUT -	OUT -	OUT -
	Shield	Shield	Shield	Shield

NOTE: When connecting multiple devices to the PMN, make sure that each device is configured for a unique network address between 1 and 8. Also make sure that all devices are configured for the same baud rate and parity.

Shielding the RS-485 Network

It is recommended that the Shield cable of the RS-485 link be grounded at one, and only one, point on the multidrop network.

Terminating the RS-485 Network

To ensure reliable communication between the PMN and the devices on the network it is important to provide the proper termination at each end of the network. The PMN provides this termination at its end but an external terminator is needed at the other end. The PowerLogic Class 3090 Type MCT-485 Multipoint Communications Terminator provides an easy solution for connections involving Circuit Monitors. Simply slide the terminator's four spade connectors under the IN+, IN-, OUT+, and OUT- terminals on the CM's RS-485 block.

Biasing the RS-485 Network

The PMN automatically provides full biasing of the network. NO external biasing equipment is required or allowed.

2-Wire Operation on PMN-SA

Simply jumper the TX+ to the RX+ (pins 2-4) to form the (+) connection and jumper the TX- to the RX- (pins 1-3) to form the (-) connection. Also jumper RTS+ to CTS+ (pins 8-7) as well as RTS- to CTS- (pins 6-5).

MB+ Wiring

The Modbus Plus network is a 3-wire (one pair and a shield) twisted pair cable with the nodes connected in a daisy-changed configuration. There is no polarity requirement at the node's transceiver, so the data cable pair may be connected either way at a node. A 220 ohm terminator is required at each end of the network cable. There are limits upon the maximum number of nodes per segment, the number of repeaters, and the lengths of cable segments on the Modbus Plus network.

For specific information refer to the Modicon Document GM-MBPL-001 *Modbus Plus Network Planning and Installation Guide*. Modicon Inc.

Troubleshooting

Reaching NR&D Technical Support

Technical support at Niobrara may be reached by:

Voice	(800) 235-6723
Voice	(417) 624-8918
Fax	(417) 624-8920
E-mail	techsupport@niobrara.com

Troubleshooting the PMN

The first step in troubleshooting the PMN is to inspect the lights on the PMN itself.

Booting

When the PMN is first powered up, the BUSY, and ERROR lights will flash on and off four times quickly. If the PMN is displaying this sequence repeatedly, it may be due to the internal watchdog resetting the unit. Causes may include low ac (or dc) power or an internal hardware problem in the PMN itself. The unit may need to be returned to the factory for inspection and service. Call NR&D for a Return Material Authorization number (RMA) before sending the unit in.

Troubleshooting the RS-485 network

Attempting to communicate with CM#1

After booting, the PMN waits for about 5 seconds for the Circuit Monitor to finish booting before it attempts to communicate with it. The PMN first attempts with the baud rate and parity settings stored in its memory from the last time it communicated with the CM. If it is unable to talk to the CM, it adjusts its baud rate and parity to try all possible combinations used by the CM. The yellow Serial TX light will periodically flash as the PMN sends messages to slave #1. If Slave #1 is able to hear and understand the message from the PMN, it will reply and the yellow RX light will flash on the PMN.

The PMN will poll on a two second interval while it is attempting to communicate with CM#1 and hasn't yet established communication. Once communication is established the PMN will poll CM#1 to read register 8188 every five seconds if there is no Ethernet traffic routed to the RS-485 network, or every 50 seconds if it is busy.

Serial TX and RX Lights

The yellow TX light flashes as data is being transmitted from the PMN's RS-485 port. Observing the duration of the TX flashes can give a visual indication of the baud rate being used; 19200 baud flashes quickly while 2400 baud blinks slowly.

The yellow RX light flashes when the PMN is receiving data on the RS-485 port. This light will only flash when the PowerLogic RS-485 slave responds to a command from the PMN. A number of problems may prevent the slave from replying to the PMN:

- **Incorrect RS-485 Cable Connection.** Check that the PMN's RS-485 pigtail is connected to the CM with the GREEN wire to the IN+, the WHITE wire to the IN-, the RED wire to the OUT+, and the BLACK wire to the OUT-. Check all other connected devices to be sure that all of the IN+s are connected to the other IN+s, IN-s, to the other IN-s, OUT+ to OUT+, and OUT- to OUT-. There should be a terminator on only the last CM on the network. The Shield should be grounded at only one location of the RS-485 network. Initial troubleshooting may be easier if only CM#1 is connected to the PMN; then adding additional units after communication is established with CM#1.
- **Incorrect addressing of slaves.** All slave devices on the RS-485 network must be uniquely addressed. These addresses must be within the range of 1 through 8 inclusive. There must be one slave with the Address = 1. The PMN reads register 8188 in slave #1 to determine the serial port parameters. Make certain that all CMs have their own address and that one is set for 1.
- **OCI-2000 adapter is connected to the CM.** The optical communications interface disables the RS-485 network on a Circuit Monitor while it is attached and turned on. Power down or remove the OCI-2000 unit to restore communication through the RS-485 network to the CM.
- **RS-485 driver failed on PMN.** The RS-485 driver may be tested with a good high impedance voltmeter. Place the meter in the DC Voltage range. Place the RED probe on the Green wire (CM IN+) and the BLACK probe on the White wire (CM IN-). While the PMN is not transmitting (TX light off), there should be approximately +4.1 VDC across these wires. When the PMN is transmitting, the voltage will oscillate through +-4VDC. It may be difficult to see the deflection at the higher baud rates and an oscilloscope is suggested for advanced troubleshooting. The minimum voltage obtained during a full 1200 baud to 19200 baud sweep will be around -1.6 VDC. If the voltage is fixed at around +4, 0, or -4 volts, and doesn't oscillate as the TX light blinks, then the transmitter is probably damaged and must be returned to the factory for repair.
- **RS-422 Receiver failed on CM.** The CM-2000 units have a variety of statistical registers that may be monitored from the Diagnostics monitor on the front panel of the Circuit Monitor.

- Register 2100 - **Number of good messages sent to this Unit.** This register will increment each time the CM receives a good message from either the RS-485 network or the Optical port on the front. If this register increments when the PMN transmits at the proper baud rate then the CM's receiver is functioning.
- Register 2101 - **Number of good messages sent to other units.** This register will increment each time the CM receives a good message targeted to another slave on the network. If this register increments when the PMN transmits at the proper baud rate then the CM's receiver is functioning.
- Register 2102 - **Number of messages with Invalid Address.** This register will increment each time a message is sent from the Master (PMN) targeted to a non-responding slave. If this register increments when the PMN transmits at the proper baud rate then the CM's receiver is functioning.
- Register 2103 - **Number of messages with bad checksum.** This register is incremented each time a message is sent to this CM that has a bad checksum.
- Register 2104 - **Number of bad messages received at this CM.** This register is incremented each time a bad message is received. This register will increment as the PMN tries different baud rates and parity combinations.
- Register 2105 - **Number of messages received at this CM with illegal opcode.**
- Register 2106 - **Number of messages received at this CM with illegal registers.**
- Register 2107 - **Number of messages received at this CM with illegal counts.**
- Register 2108 - **Number of messages received at this CM with bad frames.**
- **RS-485 receiver failed on PMN.** If the PMN is transmitting to CM1, the CM is indicating a good reception by reading register 6100 in the CM from the front panel and observing this counter incrementing, and a slight voltage deflection is observed on the OUT pairs of the CM, then the receiver in the PMN may be malfunctioning. If the RX light on the PMN flashes as the CM transmits, then the RS-485 receiver is good. If the RX light flashes when the PMN polls at the CM's baud rate but the CM continues to poll at other baud rates then either the PMN is broken or most likely, the polarity is reversed between the OUT of the CM and the PMN. Reverse the OUT- and OUT+ wires at the CM.

MB+ Troubleshooting

The Modbus Plus network is a 3-wire (one pair and a shield) twisted pair cable with the nodes connected in a daisy-changed configuration. There is no polarity requirement at the node's transceiver, so the data cable pair may be connected either way at a node. A 220 ohm terminator is required at each end of the network cable. There are limits upon the maximum number of nodes per segment, the number of repeaters, and the lengths of cable segments on the Modbus Plus network. For more information, refer to the **Modicon Modbus Plus Network Planning and Installation Guide (GM-MBPL-001)**.

The user should configure the node address of the Modbus Plus port on the PMN before connecting the PMN to the network. This should avoid possible duplicate address problems with other units on the network.

The connection to the MB+ network is made just like with any MB+ device. The Modbus Active LED on the PMN is controlled by the MB+ microprocessor and may be used to diagnose the network.

Modbus Active LED

The green Modbus Act LED on the PMN flashes repetitive patterns to display node status.

Table 6-1 Modbus Active LED

Blinking Pattern	Description
flash every 160ms	Normal Operation. This node is successfully receiving and passing the token. All nodes should blink at this rate under when working properly.
flash every 1 sec	This node is in the MONITOR_OFFLINE state. It must remain in this state for 5 seconds and is not allowed to transmit messages onto the network. While in this state, the node is listening to all other nodes and building a table of the known nodes.
2 flashes, off 2 sec.	This node is in the MAC_IDLE state. It is hearing other nodes get the token but it is never receiving the token itself. This node may have a bad transmitter.
3 flashes, off 1.7 sec.	This node is not hearing any other nodes. and it is periodically claiming the token and finds no other nodes to pass it to. This node may be the only active node on the network or it may have a bad receiver.
4 flashes, off 1.4 sec	This node has heard a duplicate address packet. There is another node on the network with the same address as this node. This node is now in the DUPLICATE_OFFLINE state where it will passively monitor the link until it does not hear the duplicate node for 5 seconds.

Appendix A

NR&D Internet Access

Niobrara Research & Development is currently offering an Internet Web Page for its customers. This valuable customer service tool makes it easy to bring the user up to date on software revisions, firmware changes, product support news, and more. Our Internet home page is at **<http://www.niobrara.com>** so check us out.

Customer support questions may be set by E-mail to **techsupport@niobrara.com**.