ICP PANEL-TEC

MICROBRIDGE+ INSTALLATION AND OPERATION GUIDE

MODBUS/ MODBUS PLUS PORT EXPANDER (PEX+) APPLICATION

REVISION HISTORY

Revision	Date	Author	Comments
000	28 Sep 2009	David Walker	Initial release.
001	29 Sep 2009	David Walker	Added routing diagrams.
002	5 Apr 2010	David Walker	Added dimensions/drawing

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INTRODUCTION

The Modbus/Modbus Plus Port Expander (PEX+) is a 3-port device that allows a Modbus Master and one or more Modbus Slaves to communicate with each other and with one or more Modbus Plus devices. It is most commonly used to allow Modbus Plus devices to communicate with Modbus Slave devices, or for a Modbus Master to communicate with Modbus Plus Slave devices. Each port on the PEX+ is individually configured, and the Modbus ports support both the Modbus RTU and Modbus ASCII protocols. When passing messages from a Modbus Master to a Modbus Slave, it will convert between RTU and ASCII as necessary.

The PEX+ is based on the MicroBridge+ module. The MicroBridge+ is a light-weight DIN Rail mountable unit with 2 serial ports and a Modbus Plus port, and 5 LED indicators to communicate device status. It is powered with a DC supply providing any voltage between 7 and 28 volts.

The PEX+ has a built-in configuration utility. The configuration screens are accessed through any terminal communication program such as HyperTerminal.

Serial Port Overview

The MicroBridge+ has two DB9 serial ports, which can be used in either RS232 mode or 2-wire RS485 mode. The RS485 signals are located on the same pins on both serial ports. They are placed on pins that are not generally used for RS232 communications, so off-the-shelf RS232 cables may be used when operating in RS232 mode. Both of the serial ports will operate at any standard baud rate from 1200 to 115,200 bps.

One of the serial ports uses a DB9 female connector, and is referred to as the Local (LCL) Master port. It is used to connect the PEX+ to a local Modbus Master device. The RS232 signals on the Local Master port us a DCE configuration. An LED indicator is used to reflect transmit/receive activity on this port.

The other serial port uses a DB9 male connector, and is referred to as the Slave (SLV) port. It is used to connect the PEX+ to one or more Modbus Slave devices. The RS232 signals on the Slave port us a DTE configuration. An LED indicator is used to reflect transmit/receive activity on this port.

Either serial port may be used to configure the PEX+ using the built-in configuration utility. Configuration must be performed in RS232 mode. When configuring the PEX+ over the Slave port from a standard PC serial port, a null-modem cable is required.

Modbus Plus Port Overview

The MicroBridge+ also has a single DB9 female Modbus Plus port. This port is designed to mate with any standard DB9 Male Modbus Plus cable. An LED indicator is used to reflect the status of this port.

Ordering Information

The MicroBridge+ is sold with several different software applications. To ensure that the correct version of the MicroBridge+ is procured, please include the correct part number when ordering. Part numbers for the PEX+, power supply, and optional cables are as follows.

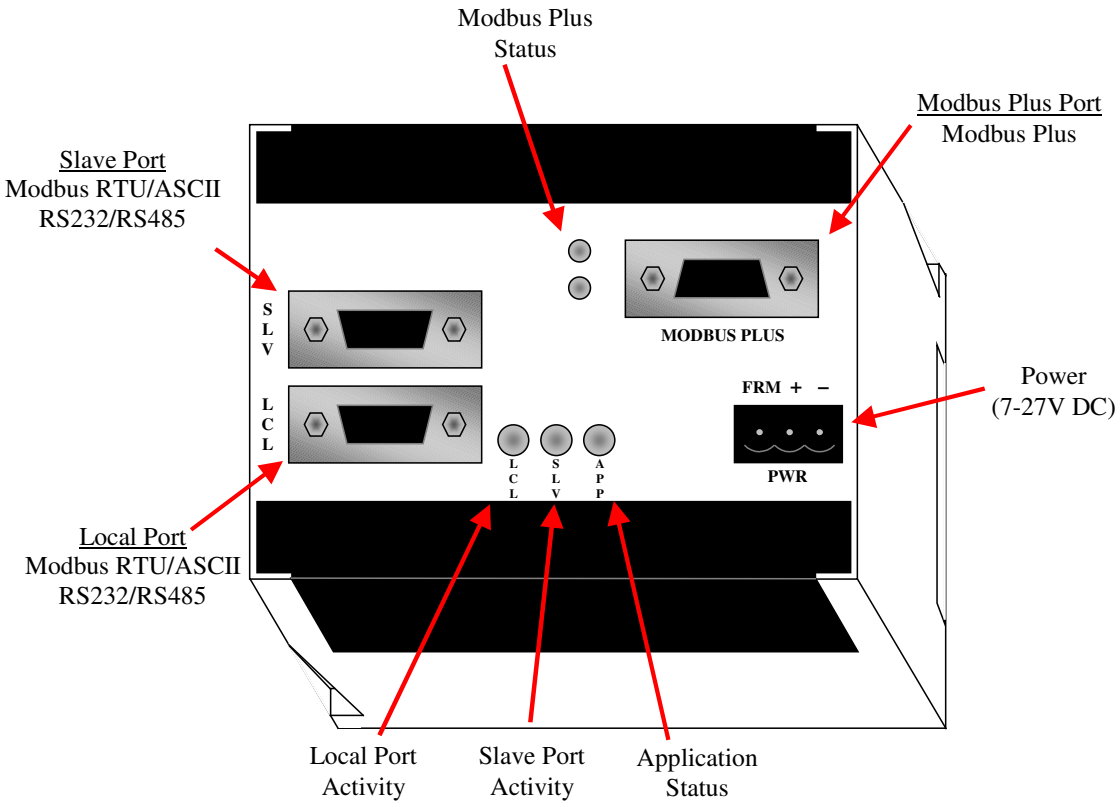
Table 1 - Part Numbers

Part Number	Description
6006-402-100	MicroBridge+ with PEX+ application
4000-0205	MicroBridge Power Supply
6000-RS232	MicroBridge Configuration Cable, Modbus RS232 Device Cable for any port (Straight-Through DB9F to DB9M RS232 Cable)
6000-RS232N	MicroBridge Configuration Cable, Modbus RS232 Device Cable for any port (Null-Modem DB9F to DB9F RS232 Cable)
6000-0003	Modbus RS485 Device Cable for Local Master Port (DB9M to Stripped Wires, 2-Wire RS485 Cable)
6000-0006	Modbus RS485 Device Cable for Slave Port (DB9F to Stripped Wires, 2-Wire RS485 Cable)
6000-0008	Modbus RS232 Device Cable for Local Master Port (DB9M to Stripped Wires, RS232 Cable)
6000-0009	Modbus RS232 Device Cable for Slave Port (DB9F to Stripped Wires, RS232 Cable)

HARDWARE

Dimensions

The MicroBridge is packaged in a 10cm x 7.5cm x 11cm plastic box, with a din-rail mounting on the bottom. The serial and Modbus Plus ports, leds, and power connector are on the top of the unit.



Power Supply

The MicroBridge+ requires a 500 mA DC power supply with any voltage from 7 – 27 Volts DC. A pluggable terminal block is used to connect the power supply to the MicroBridge+. The format of the terminal socket on the MicroBridge+ is shown in the following figure.

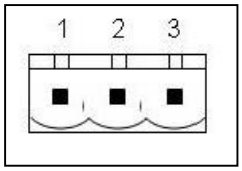


Figure 1 - Power Supply Connector

Wall Mount Power Supply

The following figure shows how to connect a wall-mount power supply to the MicroBridge+.

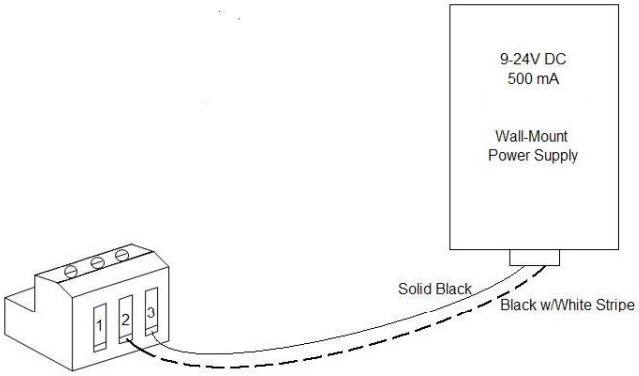


Figure 2 - Connecting a Wall-Mount Power Supply

External Power Supply

The following figure shows how to connect an external power supply to the MicroBridge+. The V- and V+ connections are mandatory but the Earth Ground Reference is optional.

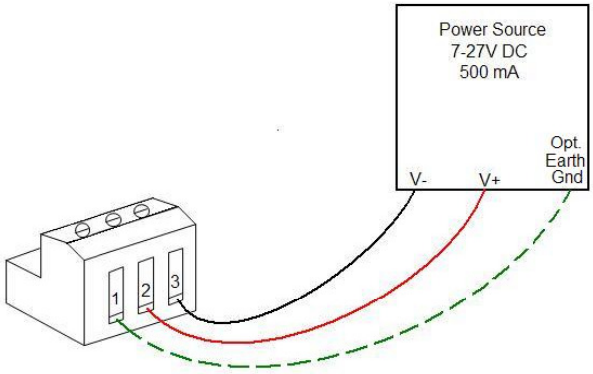


Figure 3 - Connecting an External Power Supply

Serial Port Pinouts

The pin configuration for the two DB9 serial ports are shown in the table below.

Table 2 - Serial Port Pinouts

Local: DB9-Female		
Pin	**Label**	**Description**
1	485+	RS485 D+
2	TXD	RS232 TxD
3	RXD	RS232 RxD
4	DTR	RS232 DTR
5	GND	Reference Ground
6	485-	RS485 D-
7	RTS	RS232 RTS
8	CTS	RS232 CTS
9	VCC	+5VDC Input

Slave: DB9-Male		
Pin	**Label**	**Description**
1	485+	RS485 D+
2	RXD	RS232 RxD
3	TXD	RS232 TxD
4	-	No Connect
5	GND	Reference Ground
6	485-	RS485 D-
7	CTS	RS232 CTS
8	RTS	RS232 RTS
9	-	No Connect

Modbus Plus Port Pinout

The pin configuration for the DB9 Modbus Plus port is shown in the table below.

Table 3 - Modbus Plus Port Pinout

Modbus Plus Port: DB9-Female		
Pin	**Label**	**Description**
1	GND	Chassis Ground
2	A	Receive/Transmit A
3	B	Receive/Transmit B
4	-	No Connect
5	-	No Connect
6	-	No Connect
7	-	No Connect
8	-	No Connect
9	-	No Connect

Serial Cables

232 Communications

When a serial port is configured for RS232 communications, an off-the-shelf straight-through or null-modem is generally used to connect to other Modbus devices. The type of cable required and optional cable that can be purchased from ICP -Panel-Tec are shown in the following table.

Table 4 - RS232 Cables

PEX+ Port	Modbus Device Type	Recommended Cable
Local Master	RS232 DTE with DB9 connector	6000-RS232 (Straight-Through DB9/DB9)
Local Master	RS232 DCE with DB9 connector	6000-RS232N (Null-Modem DB9/DB9)
Local Master	RS232 DTE/DCE with terminal block	6000-0008 (DB9M to Stripped Wires)
Slave	RS232 DTE with DB9 connector	6000-RS232N (Null-Modem DB9/DB9)
Slave	RS232 DCE with DB9 connector	6000-RS232 (Straight-Through DB9/DB9)
Slave	RS232 DTE/DCE with terminal block	6000-0009 (DB9F to Stripped Wires)

485 Communications

When a serial port is configured for RS485 communications, the connector on the Modbus device(s) being connected to the PEX+ can vary significantly. Because of this, all optional RS485 cables offered by ICP Panel-Tec end in stripped wires to provide maximum flexibility. The cables available for both master ports and the slave port are shown in the following table.

Table 5 - RS485 Cables

PEX+ Port	Modbus Device Type	Recommended Cable
Local Master	2-Wire RS485 with any connector	6000-0003 (DB9 Male to Stripped Wires)
Slave	2-Wire RS485 with any connector	6000-0006 (DB9 Female to Stripped Wires)

LED Indicators

There are a total of 3 Bi-color LED indicators and 2 single-color LED indicators on the MicroBridge+. The APP LED displays the overall status of the PEX+. The LCL LED displays communications activity on the Local Master port. The SLV LED displays communications activity on the Slave port. The MBP LED displays the status of the Modbus Plus interface. The remaining LED is for internal use only, and displays the internal communications activity between the host application and the Modbus Plus peer processor.

Table 6 - PEX+ General Status LED (APP)

For this state:	LED is:	To indicate:
No Power	Off	There is no power applied to the device.
Startup	Solid Green	The PEX+ is checking the ports for a valid configuration startup sequence prior to initializing the Modbus Plus peer processor.
Initialization	Flashing Yellow (250ms On, 250ms Off)	The PEX+ is initializing the Modbus Plus peer processor. PEX+ communications are not yet active.
Run Mode	Flashing Green (250ms On, 250ms Off)	The Modbus Plus peer processor is active, and the PEX+ is operating normally in RUN Mode.
Crashed	Flashing Red (250ms On, 250ms Off)	The Modbus Plus peer processor has crashed and is being reset. All PEX+ communications are suspended.
Configuration Mode	Flashing Green (1.5 sec On, 1.5 sec Off)	The PEX+ is in Configuration Mode.

Table 7 - Local Master Port Communications Activity LED (LCL)

For this state:	LED is:	To indicate:
Receive Data	Red	The PEX+ is receiving data from the Local Modbus Master.
Transmit Data	Green	The PEX+ is transmitting data to the Local Modbus Master.

Table 8 - Slave Port Communications Activity LED (SLV)

For this state:	LED is:	To indicate:
Receive Data	Red	The PEX3000 is receiving data from a Modbus Slave.
Transmit Data	Green	The PEX3000 is transmitting data to a Modbus Slave

Table 9 - Modbus Plus Port Status (MBP)

For this state:	LED is:	To indicate:
Not Active	Off	There is no power applied to the device, or the Modbus Plus peer processor has not been initialized (or is being reset).
Offline	1 Flash/second	The Modbus Plus peer processor is offline. In this state, the node monitors the network and builds a table of active nodes. It remains in this state for 5-8 seconds, then attempts to go to its normal operating mode.
Normal	6 Flashes/second	The Modbus Plus peer processor is operating normally, and is exchanging the token with other nodes on the Modbus Plus network.
No Token	2 Flashes, then Off for 2 seconds	The PEX+ node is hearing the token being passed among other nodes, but is never receiving the token. Check the network link for an open or short circuit, or defective termination.
No Other Nodes	3 Flashes, then Off for 1.7 seconds	The PEX+ node is not hearing any other nodes. It is claiming the token, but finding no other node to which to pass it. Check the network link for an open or short circuit, or defective termination.
Duplicate Node Address	4 Flashes, then Off for 1.4 seconds	The PEX+ node has heard a valid message from another node that is using the same address as this node. The PEX+ node remains in this state as long as it continues to hear the duplicate address. If the duplicate address is not heard for 5 seconds, the node goes Offline and attempts to rejoin the network.

CONFIGURATION

Configuration Cable

Either of the serial ports on the PEX+ may be used for configuration via the RS-232 signals on the port. A straight-through DB9 cable (Order Number 6000-RS232) can be used to connect the LCL port on the PEX300 II to a serial port on a PC for configuration. A null modem cable (Order Number 6000-RS232N) is necessary to configure the PEX+ via the SLV port. The minimum pin connections for the standard configuration cable are shown in the following figure.

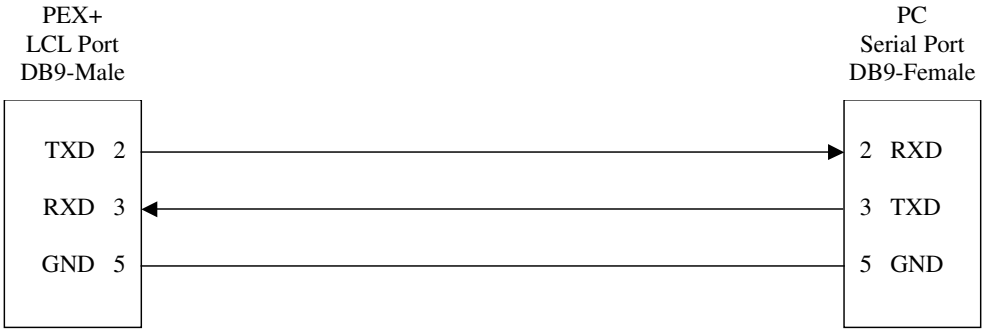


Figure 4 - Minimum Configuration Cable Pinout for LCL port

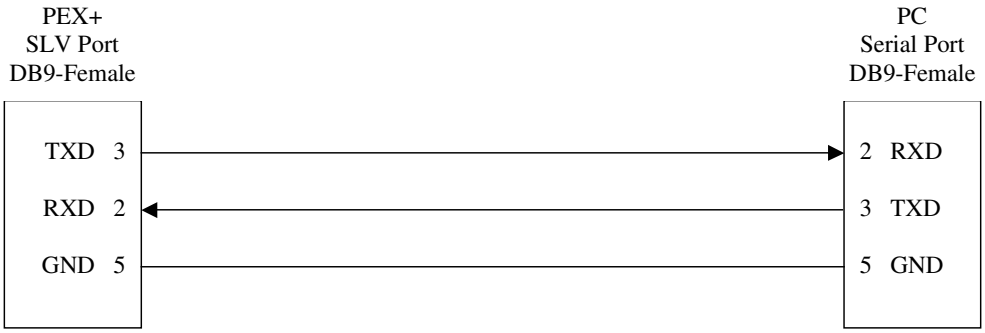


Figure 5 - Minimum Configuration Cable Pinout for SLV port

Changing the Configuration

The configuration stored in the PEX+ may be changed from the default configuration by entering Configuration Mode.

1. Power off the PEX+.
2. Attach a configuration cable between any serial port on the PEX+ and a serial port on a PC.
3. Start a terminal program, such as HyperTerminal on the PC, and connect using the following settings:
   - Baud = 19200 bps
   - Data bits = 8
   - Parity = None
   - Stop Bits = 1
   - Flow Control = None
4. Apply power to the PEX+, and send the configuration start sequence ("**+++**") by pressing the **plus** key three times within 5 seconds of startup.

Once the PEX+ is in Configuration Mode, it will send its current configuration information to the terminal program, as follows:

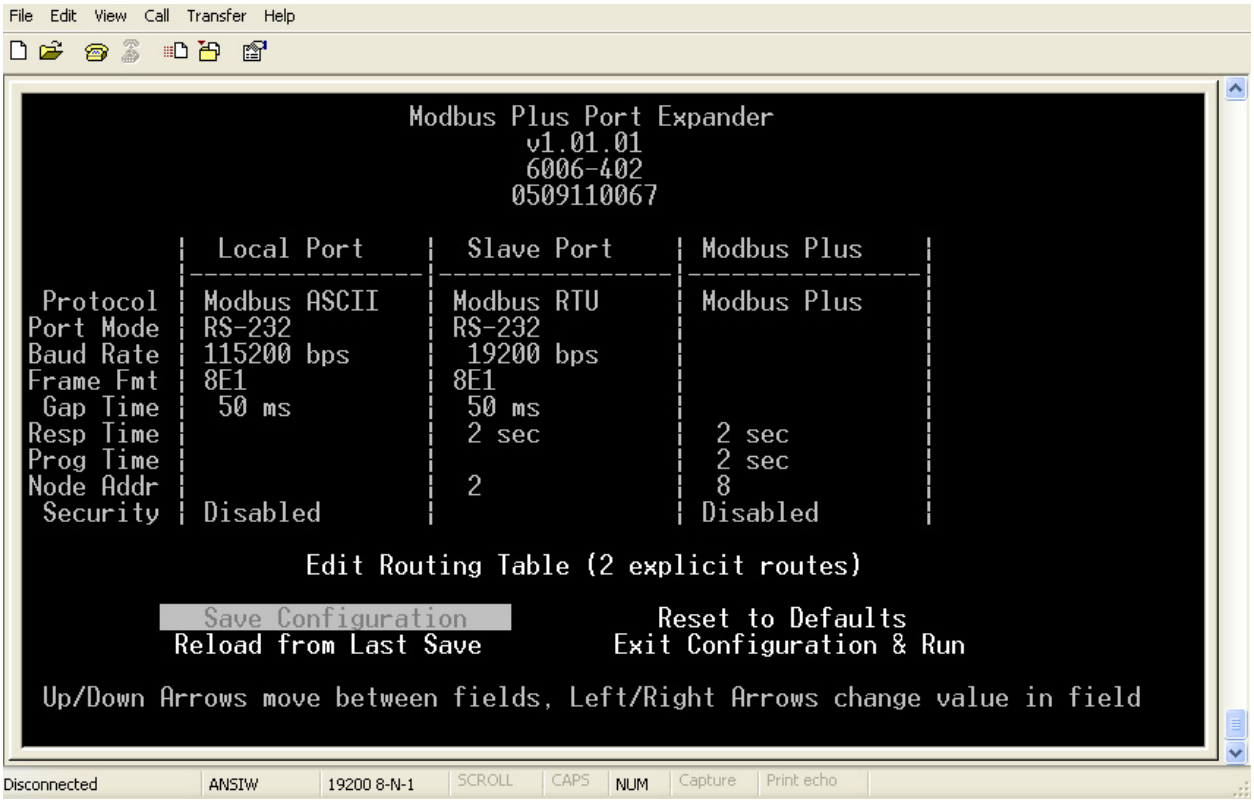


Figure 6 - PEX+ Configuration Display

Use the **up** and **down** arrows on your keyboard to navigate to the field you want to change, then use the **left** and **right** arrows to change the value in that field. When you are finished, navigate to "Save Configuration" and press the **Enter** key to save the configuration information to the PEX+. If the configuration is invalid, a message will be displayed indicating the reason. If the configuration was successfully saved, a "Configuration Saved" message will be displayed.

Once the configuration has been saved, remove power from the PEX+ and remove the configuration cable.

Local Master Port Configuration Settings

The Local Master port, labeled "LCL" on the front panel of the PEX+, may be connected to a local Modbus master device. Any device that will initiate Modbus requests is considered to be a Modbus master device.

The following configuration settings may be changed for the Local Master port:

Table 10 - Local Master Port Configuration Settings

Setting	Values	Default
Protocol	Modbus RTU Modbus ASCII	Modbus RTU
Port Mode	RS-232 RS-485	RS-232
Baud Rate	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	9600 bps
Frame Format	7E1* 7O1* 7N2* 8N1 8E1 8O1 8N2	8E1
Maximum Gap Time	5 ms – 500 ms	50 ms
Security	Disabled Read-only	Disabled

*7 data bits not supported for Modbus RTU

Frame Format

Frame Format is listed by data bits (7 or 8), parity (Even, Odd or None), and stop bits (1 or 2) - i.e. 8E1 indicates 8 data bits, even parity, and 1 stop bit.

Note: Because Modbus RTU is encoded as 8-bit binary data, frame formats utilizing 7 data bits are not supported for Modbus RTU.

Maximum Gap Time

Maximum Gap Time is the maximum time allowed between received characters in a Modbus RTU message before "giving up" on that message. It is there to handle sudden loss of communications (power loss, cable unplugged or severed, etc.) smoothly. The default value of 50ms should be sufficient for most networks.

Note: Maximum Gap Time does not apply to Modbus ASCII messages, since those messages have defined start and end characters.

Security

Read-only security may be enabled on the Local Master port, which will cause exception responses to be generated in response to write commands (specifically Modbus function codes 5, 6, 15, and 16) received from a Modbus master device.

Slave Port Configuration Settings

The Slave port, labeled "SLV" on the front panel of the PEX+, may be connected to a Modbus slave device. Any device that will only respond to Modbus requests addressed to itself is considered to be a Modbus slave device.

The following configuration settings may be changed for the Slave port:

Table 11 - Slave Port Configuration Settings

Setting	Values	Default
Protocol	Modbus RTU Modbus ASCII	Modbus RTU
Port Mode	RS-232 RS-485	RS-232
Baud Rate	9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	9600 bps
Frame Format	7E1* 7O1* 7N2* 8N1 8E1 8O1 8N2	8E1
Maximum Gap Time	5 ms – 500 ms	50 ms
Response Timeout	250 ms – 10 sec	2 sec
Default Slave Node Address	1-255	2

*7 data bits not supported for Modbus RTU

Frame Format

Frame Format is listed by data bits (7 or 8), parity (Even, Odd or None), and stop bits (1 or 2) - i.e. 8E1 indicates 8 data bits, even parity, and 1 stop bit.

Note: Because Modbus RTU is encoded as 8-bit binary data, frame formats utilizing 7 data bits are not supported for Modbus RTU.

Maximum Gap Time

Maximum Gap Time is the maximum time allowed between received characters in a Modbus RTU message before "giving up" on that message. It is there to handle sudden loss of communications (power loss, cable unplugged or severed, etc.) smoothly. The default value of 50ms should be sufficient for most networks.

Note: Maximum Gap Time does not apply to Modbus ASCII messages, since those messages have defined start and end characters.

Response Timeout

Response Timeout is the maximum time that the Slave port will listen for the start of a response from a Modbus slave device. For proper timeout handling, Modbus and Modbus Plus master devices should be programmed with a timeout of at least twice this value.

Default Slave Node Address

There are times when a message will be routed to the Slave port without a destination node address attached (see the section on routing). In those cases, the Slave port will send the message using the Default Slave Node Address.

Modbus Plus Port Configuration Settings

The Modbus Plus port, labeled "MBP" on the front panel of the PEX+, may be connected to Modbus Plus device. The following configuration settings may be changed for the Modbus Plus port:

Table 12 - Modbus Plus Port Configuration Settings

Setting	Values	Default
Response Timeout	250 ms – 10 sec	2 sec
Programming Timeout	250 ms – 10 sec	2 sec
Modbus Plus Node Address	1-64	4
Security	Disabled Read-only	Disabled

Response Timeout

Response Timeout is the maximum time that the PEX+ will wait for a response from a Modbus Plus slave device.

Programming Timeout

Programming Timeout is the maximum time that the PEX+ will remain in programming mode after forwarding a programming request from the Local Master port to a Modbus Plus slave device.

Modbus Plus Node Address

The Modbus Plus Node Address is the node address of the PEX+ on a Modbus Plus network.

Security

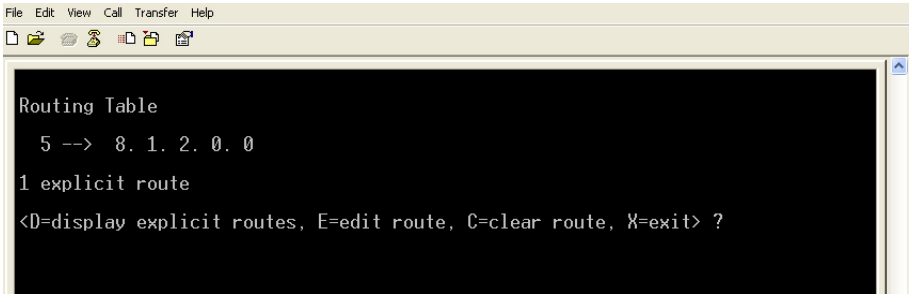
Read-only security may be enabled on the Modbus Plus port, which will cause exception responses to be generated in response to write commands (specifically Modbus function codes 5, 6, 15, and 16) received from a Modbus Plus master device.

Routing Table

The PEX+ normally routes messages received from a local Modbus master device based on a fixed set of rules based on the Modbus node address of the received Modbus message (see the sections on *Routing*). However, it is sometimes necessary to override those rules to explicitly map Modbus Plus routing paths to Modbus node addresses. This accomplished through the use of a Routing Table.

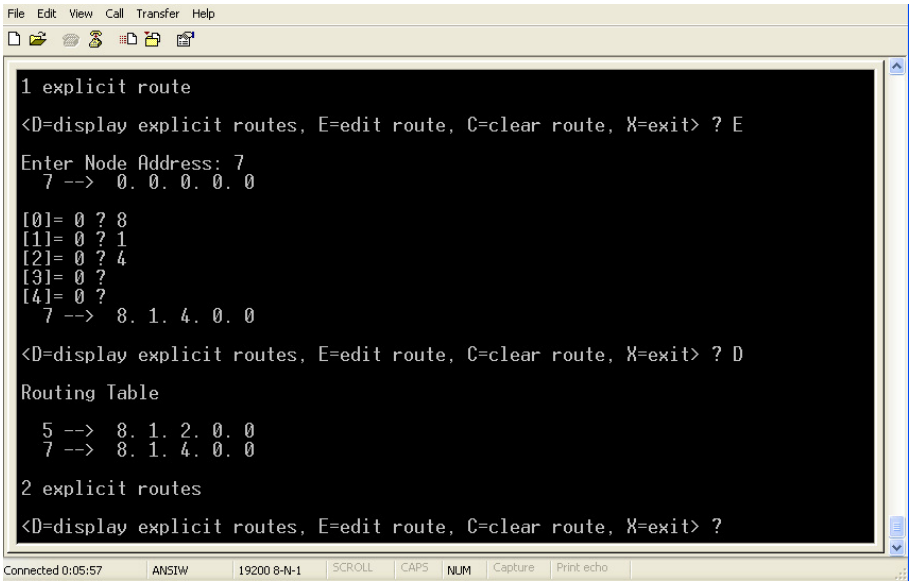
By default, all entries in the routing table are disabled (set to <0.0.0.0.0>), indicating that normal rules should apply for those node addresses. To override the normal rules for a specific Modbus node address, the routing path associated with that node address in the Routing Table must be changed.

To edit the Routing Table, use the arrow keys to navigate to the "Edit Routing Table" option on the configuration screen, then press the **Enter** key. Any existing explicit entries in the Routing Table will be displayed.



Edit a Routing Table Entry

To edit a Routing Table entry, press 'E' at the command prompt, then type the node address of the entry to be changed and press the **Enter** key. The current routing path associated with that node address in the Routing Table will be displayed, followed by a prompt to modify the first byte (index [0]) in the routing path. Type the new value for the first byte of the routing path, then press the **Enter** key (pressing the **Enter** key without typing a value will leave that byte of the routing path unchanged). After each byte in the routing table is entered, a new prompt will be displayed for the next byte. Once the last byte in the routing path has been entered, the new routing path will be displayed, followed by the command prompt.



Clear a Routing Table Entry

To clear a Routing Table entry (reset it back to <0.0.0.0.0>), press 'C' at the command prompt, then type the node address of the entry to be cleared and press the **Enter** key. All bytes of the routing path asscociated with that node address will be reset to 0, and the new routing path will be displayed, followed by the command prompt.

Display the Routing Table

To redisplay the Routing Table, press 'D' at the command prompt. A list of all explicit entries in the Routing Table will be displayed on the screen.

Exit to Configuration Screen

When all changes have been made to the Routing Table, press 'X' at the command prompt to return to the main configuration screen.

Note: Changes made to the Routing Table are not saved until the 'Save Configuration' option is selected on the configuration screen.

PEX+ OPERATION

Routing Messages from a Modbus Plus Master

When the PEX+ receives a message from a Modbus Plus master device on the Modbus Plus port, it checks the routing path of the incoming message. The first byte of the routing path will always be the Modbus Plus node address of the PEX+. The second byte of the routing path must be a '1', indicating that the message should be routed to serial port 1 (the Slave port). If the third byte of the routing path is non-zero, that value will be used as the node address of the Modbus slave. If the third byte contains a '0', the Default Slave Node Address of the Slave port will be used as the node address of the Modbus slave. The remaining bytes in the routing path will be ignored, and should be set to '0'. For example, if the Modbus Plus routing path is <4.1.0.0.0>, it would be sent to a Modbus slave device using the Default Slave Node Address of the Slave port. If the Modbus Plus routing path is <4.1.24.0.0>, it would be sent to a Modbus slave device using Modbus node address 24.

Routing to the Slave Port

If the routing path of the received message is invalid, or if the data does not contain a valid Modbus message, an exception response will be generated to the originating Modbus Plus master device. Otherwise, the message will be queued up for the Slave port.

When the Slave port is free to process another message, it will retrieve the message from the queue, format it according to its configured protocol, and send it to a Modbus slave device. It will then start a response timer and listen for a response from the Modbus slave device.

If a response is received on the Slave port, the PEX+ will extract the response message from the received response and return the response to the Modbus Plus port. The Modbus Plus port will then send the response back to the originating Modbus Plus master device.

If no response is received before the response timer expires, or if an invalid or partial response is received, an exception response will be returned to the Modbus Plus port. The Modbus Plus port will then send the exception response back to the originating Modbus Plus master device.

The Modbus Plus port supports 8 slave data channels and 8 slave programming channels. Messages received on any of those channels are subject to the same validation procedures, and queued up for the Slave port in the same way.

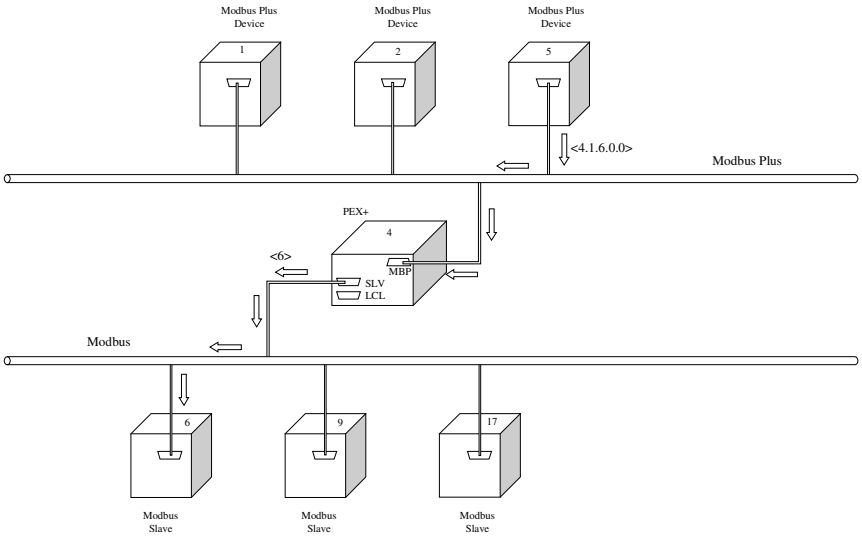


Figure 7 - Routing Message from Modbus Plus to Modbus Slave

Routing Messages from a Modbus Master

Modbus messages use a 1-byte value (1-247) to specify the destination of a message. Modbus Plus messages, on the other hand, use a 5-byte routing path to specify the destination of a message. In order to forward messages from a Modbus master device to a Modbus Plus slave device, a predefined set of rules must be used to convert a 1-byte Modbus node address into a 5-byte Modbus Plus routing path.

The PEX+ defines rules for four types of routing paths - Direct Attach Addresses, MUX Attach Addresses, Implicit Attach addresses, and Explicit Attach addresses.

Direct Attach Addresses

If the Modbus node address is in the range 1-64 (Direct Attach Address), the message is routed to the specific node address 1-64 on the Modbus Plus network. The first byte of the routing path contains the value of the node address, and the remaining four bytes of the routing path contain '0'. For example, if the Modbus node address is 7, the resulting Modbus Plus routing path would be <7.0.0.0.0>.

MUX Attach Addresses

If the Modbus node address is 71 (MUX Attach Address), the message is routed to a Modbus Slave device on the Slave port, using the Default Slave Node Address as the node address of the message.

Implicit Attach Addresses

If the Modbus node address is in the range 80-255 (Implicit Attach Address), the value will be divided by 10. The quotient and remainder will then become the first two bytes of the five-byte routing path (the other three bytes will contain '0'). For example, if the Modbus node address is 94, the resulting Modbus Plus routing path would be <9.4.0.0.0>.

Explicit Attach Address

If there is an explicit entry in the Routing Table for the Modbus node address (the routing path is non-zero), the routing path in the Routing Table is used, overriding any other addressing rules that would apply to that Modbus node address.

If the first byte in the routing path is non-zero, the message is forwarded to a Modbus Plus slave device using that routing path. For example, a routing path targeting Modbus Plus node address 7 on the local Modbus Plus network would be <7.0.0.0.0>. A routing path targeting Modbus Plus node address 9 via a Bridge Plus device (with node address 3) would be <3.9.0.0.0>.

If the first byte in the routing path is '0', and the second byte in the routing path is '1', the message is forwarded to a Modbus slave device via the Slave port. If the third byte of the routing path is non-zero, that value will be used as the node address of the Modbus slave. If the third byte contains a '0', the Default Slave Node Address of the Slave port will be used as the node address of the Modbus slave. The remaining bytes in the routing path will be ignored, and should be set to '0'. For example, a routing path targeting the default Modbus Slave device on the Slave port would be <0.1.0.0.0>. A routing path targeting a specific Modbus Slave device at node address 38 on the Slave port would be <0.1.38.0.0>.

Routing to the Modbus Plus Port

When the destination of a Modbus message received on the Local Master port is a Modbus Plus slave device, the message is queued up for the next available Modbus Plus master data or programming channel (depending on the function code of the message). When the channel is free, it will get the message from the queue and forward it out the Modbus Plus port, and set a response timer.

When a response is received from the Modbus Plus slave device, the response will be returned to the Local Master port to be sent to the originating Modbus master device. If an exception response is received from the Modbus Plus

slave device, an exception response will be returned to the Local Master port to be sent to the originating Modbus master device.

If the response timer expires before a response is received from the Modbus Plus slave device, the message is aborted and no response is returned to the Modbus master device.

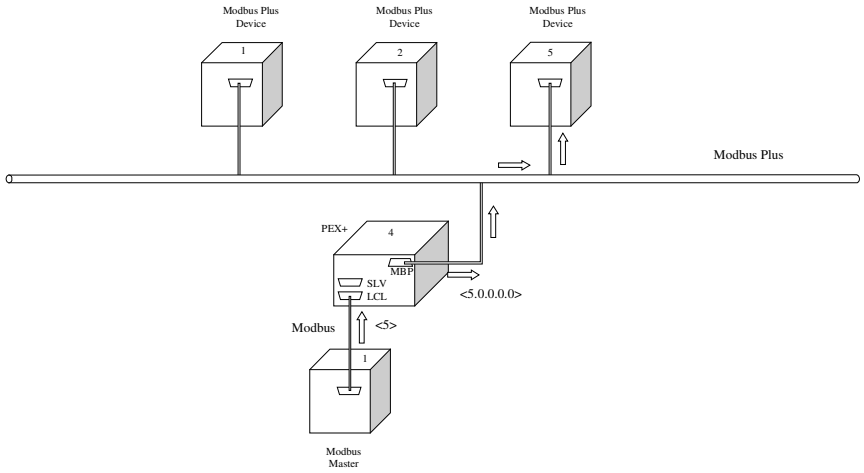


Figure 8 - Routing Message from Modbus Master to Modbus Plus Device (Direct Attach)

Routing to the Slave Port

When the destination of a Modbus message received on the Local Master port is a Modbus slave device on the Slave port, the message is queued up for the Slave port..

When the Slave port is free to process another message, it will retrieve the message from the queue, format it according to its configured protocol, and send it to a Modbus slave device. It will then start a response timer and listen for a response from the Modbus slave device.

If a response is received on the Slave port, the PEX+ will extract the response message from the received response and return the response to the Local Master port. The Local Master port will then send the response back to the originating Modbus master device.

If no response is received before the response timer expires, the message is aborted and no response is returned to the Modbus master device.

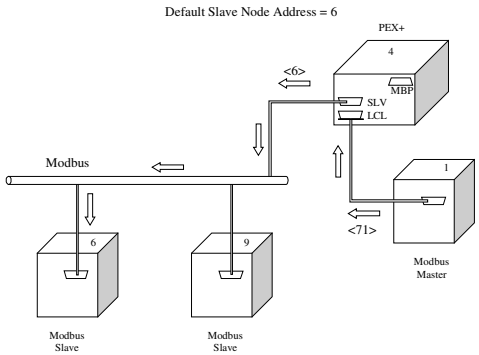


Figure 9 - Routing Message from Modbus Master to Modbus Slave (MUX Attach)