

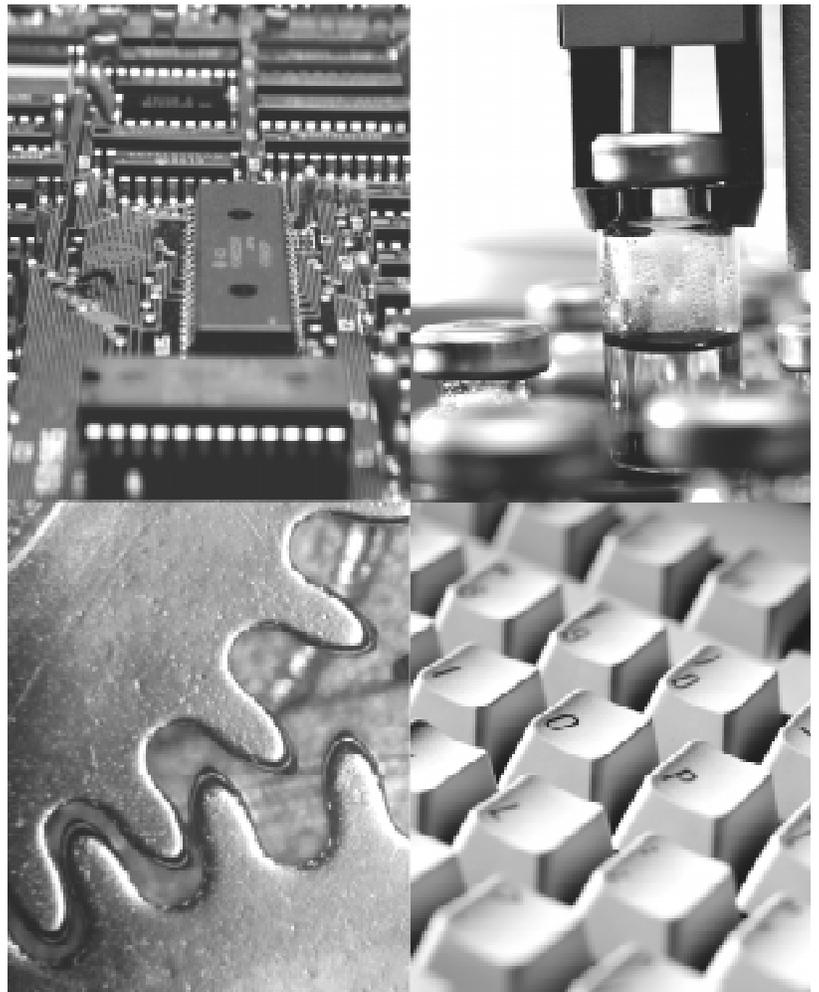
Modicon

Modbus Plus PCI-85 Interface Adapter

890 USE 162 00 Version 1.0

User Guide

Edition January 2001



Schneider
 **Electric**

Data, Illustrations, Alterations

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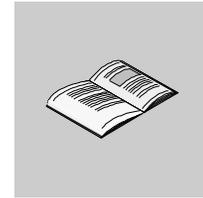
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Modicon
Modbus Plus PCI-85 Interface
Adapter
User Guide

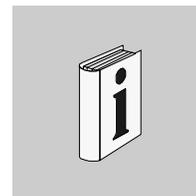
890 USE 162 00 EngVersion 1.0

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About the book



At a Glance

Document Scope This manual describes how to install and configure the PCI-85 Modbus Plus Interface Adapter.
To find out about any changes to the manual after this version was published, consult our web site at www.modicon.com

Terms and Abbreviations Used

Numbers are written according to international practice as well as according to approved SI (System International d'Unites) presentation; each thousand is separated by a space, along with use of the decimal point, e.g., 12 345.67.

Validity Note This documentation applies to the installation and configuration of the PCI Interface Adapter in Windows 95, Windows 98, Windows Me, Windows NT 4.0, and Windows 2000 environments.

Revision History

Rev. No.	Changes
1	Initial version.

Related Documents

Title of Documentation	Reference Number
Modbus Plus System Planning and Installation Guide	890USE10000
IBM Host-based Devices User's Guide	890 USE 102 00
Modbus Plus Network I/O Servicing Guide	840 USE 104 00

**Product Related
Warnings**

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The PCI-85 Adapter and Your Computer

1

At a Glance

Introduction

This chapter provides both general product and configuraton information for the PCI-85 Modbus Plus Interface Adapter.

What's in this Chapter?

This Chapter contains the following Maps:

Topic	Page
Product Overview	10
Configuring the PCI-85 Adapter	11

Product Overview

PCI-85 Modbus Plus Interface Adapter

The PCI-85 Modbus Plus Interface Adapter mounts in a single PCI slot of an IBM PC or a compatible Personal Computer. The PCI-85 Adapter links the computer to a Modbus Plus network allowing computer based applications to exchange data with many Schneider Programmable Logic Controllers (PLCs) and with other devices on the network.

Typical applications for the Modbus Plus network include data acquisition and monitoring, remote PLC programming, program upload/download/archiving support, and interfacing to manufacturing applications operating on plant computer systems.

The PCI-85 Interface Adapter mounts into the PCI backplane of a personal computer and attaches to the network by means of a nine-pin D connector. The Modbus Plus medium is a single, twisted shielded pair cable that supports up to 32 nodes without repeaters, or 64 nodes with repeaters.

Note: Before handling the PCI-85 Interface Adapter, you should be familiar with methods for handling circuit boards, including methods for anti-static protection. If you are unfamiliar with these precautions, contact Schneider Automation for assistance.

Configuring the PCI-85 Adapter

Easy Configuration

The PCI-85 Interface Adapter is supplied with the Modbus Plus Driver Suite CD ROM. On-board support of the Plug and Play standard allows easy configuration and operation in Windows 95, Windows 98, Windows Me, Windows NT 4.0, and Windows 2000 environments.

These drivers support many existing applications including:

- Programming Software such as Concept, Modsoft, and ProWorx
 - Monitor Pro Human-Machine Interface (HMI) Software
 - Modicon MBPSAT program for monitoring Modbus Plus networks
 - Other third-party programming panel software and HMI software
-

Your Hardware Configuration

The node address is set with the driver software. The PCI requires two memory spaces, which are allocated by the PnP manager/BIOS. One memory space is used to access the PCI configuration registers and the second is used to access the 2Kbyte region, which is used as a buffer between the application and the PCI on-board microcomputers.

The board is a PCI PnP component, so no switches need to be set prior to installation. You can install the unit into an available slot in your computer's motherboard and connect the network cable.

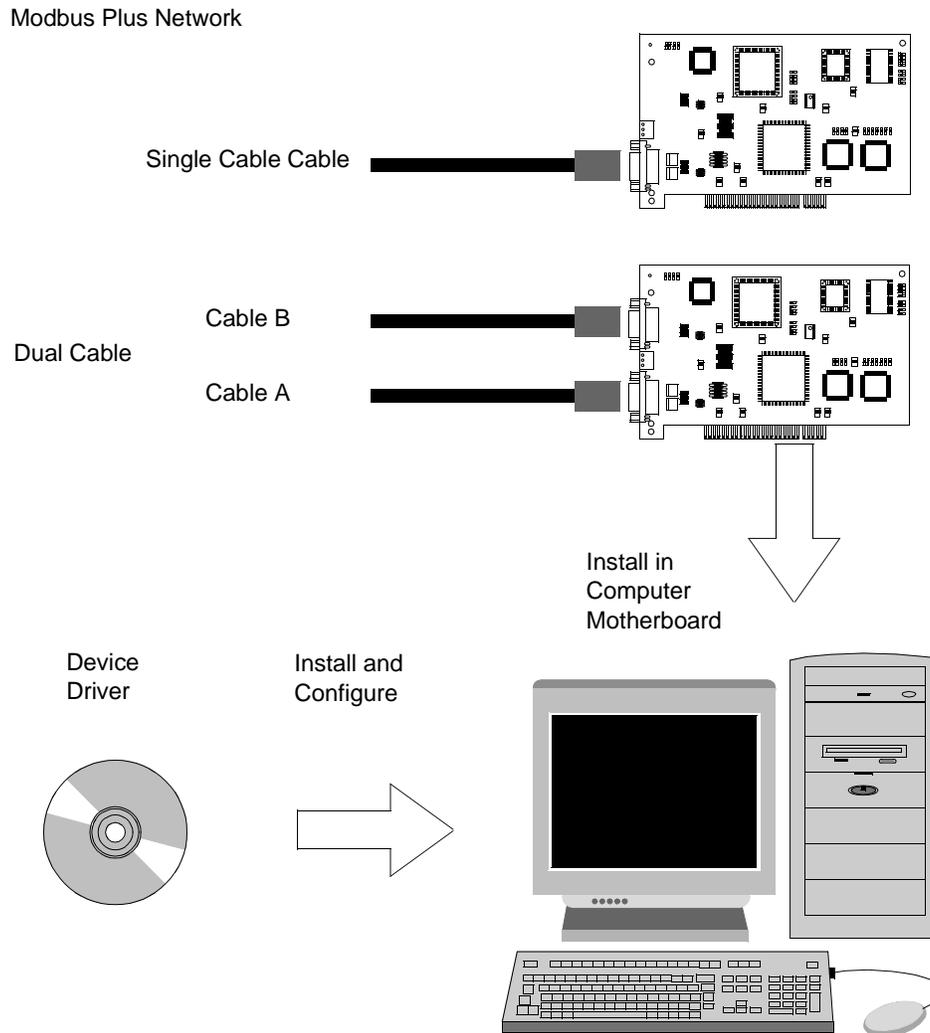
Your Software Configuration

Before using the PCI-85 Interface Adapter in your application, you must install the Modbus Plus device driver software on your hard disk and edit the configuration parameters using the utility provided.

Schneider also offers, as a separate product, a Software Development Kit (SDK) that consists of header files, C libraries, and example programs. You can compile and link these components to your applications program using the C-compiler, Microsoft Visual Studio (4.2 or higher).

Also provided by Schneider are a network diagnostic utility and a set of sample programs that show methods for accessing controller registers and the network global database.

Configuration Overview Figure 1, which follows, summarizes the configuration of the PCI-85 Interface Adapter in your computer.



Note: For further information about planning your Modbus Plus network system, see the *Modbus Plus Network Planning and Installation Guide*. (P/N 890 USE 100 00).

Adding or Deleting Active Nodes

2

Adding or Deleting Active Nodes

Disconnecting a Modbus Plus Node

If you are replacing a node on an active Modbus Plus network, you can disconnect and reconnect that device's local drop cable without powering down the devices connected to other nodes on the network. The network protocol will bypass the removed device and include it when it is reconnected.

If you disconnect a node device from the network, it is not necessary to terminate its local drop connector. The connector should be left open electrically. Cover its pins to prevent damage and contamination.

	CAUTION
	<p>Adding or deleting a node can produce unpredictable results.</p> <p>If your application is dependent upon the presence of this adapter node on the network, adding or deleting it as the active node can produce unpredictable results. Before adding or deleting any node, ensure that you have determined how the application will handle the network configuration.</p> <p>Failure to observe this precaution can result in injury or equipment damage.</p>

Installing the Device Driver Software



3

Installing the PCI-85 Device Driver Software

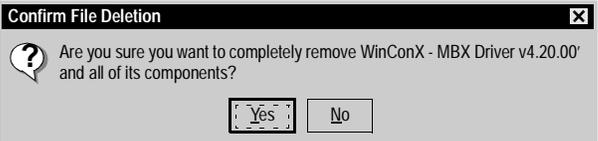
Overview

Use the following procedures as guidelines when you install your device driver software.

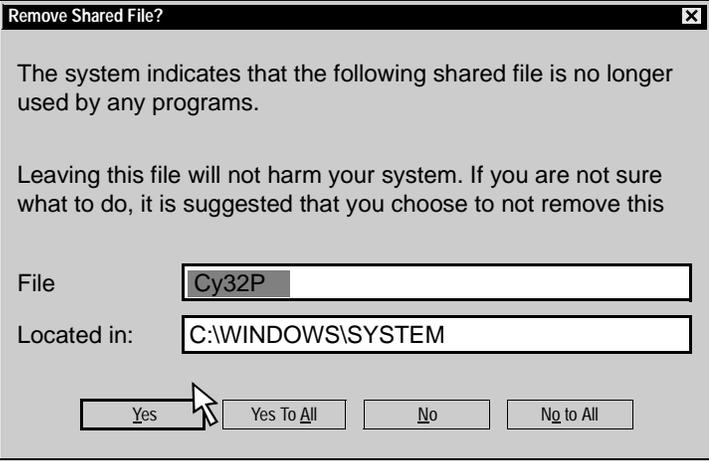
Device Driver Software Setup Procedure

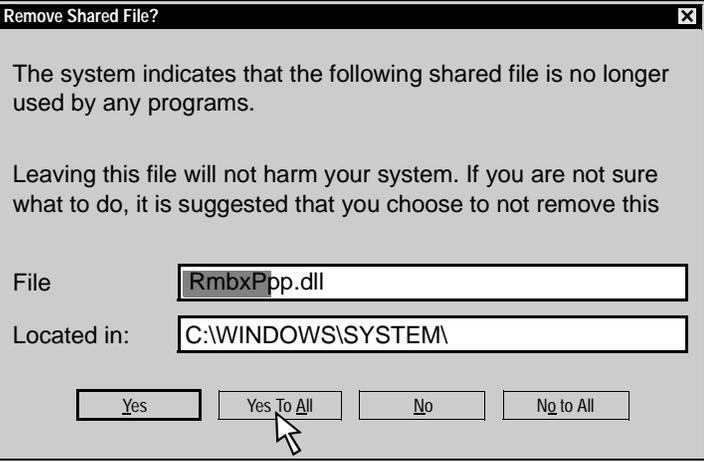
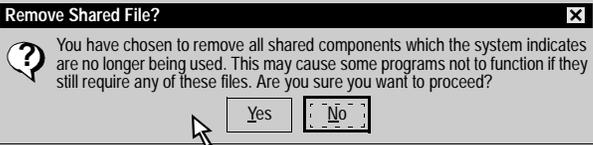
The steps in the following procedure are guidelines that describe how to prepare for installing the device driver software.

Step	Action																				
1	Insert the CD-ROM labeled Modbus Plus Driver Suite into your CD ROM drive. The CD will auto-start. If not, do the following: From the menu bar, select Start > Run > D:/Setup.exe .																				
2	Before installing, all previously installed components must be uninstalled by clicking on Uninstall for each one. Go to the MBX configuration screen (shown in the following figure). Select MBX Driver and Virtual MBX Driver . Then click on Go . <div data-bbox="500 737 1312 1276" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%;">Install</th> <th style="width: 15%;">Uninstall</th> <th style="width: 40%;">Version Found on System</th> </tr> </thead> <tbody> <tr> <td>MBX Driver</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>v4.20.00</td> </tr> <tr> <td>Ethernet MBX Driver</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>v4.20.00</td> </tr> <tr> <td>Remote MBX Driver</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>v4.20.00</td> </tr> <tr> <td>Virtual MBX Driver</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>v4.20.00</td> </tr> </tbody> </table> <p style="font-size: small; text-align: center;">Check the MBX components you wish to install or uninstall. All uninstall operations will take place first.</p> </div>		Install	Uninstall	Version Found on System	MBX Driver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	v4.20.00	Ethernet MBX Driver	<input type="checkbox"/>	<input type="checkbox"/>	v4.20.00	Remote MBX Driver	<input type="checkbox"/>	<input type="checkbox"/>	v4.20.00	Virtual MBX Driver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	v4.20.00
	Install	Uninstall	Version Found on System																		
MBX Driver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	v4.20.00																		
Ethernet MBX Driver	<input type="checkbox"/>	<input type="checkbox"/>	v4.20.00																		
Remote MBX Driver	<input type="checkbox"/>	<input type="checkbox"/>	v4.20.00																		
Virtual MBX Driver	<input checked="" type="checkbox"/>	<input type="checkbox"/>	v4.20.00																		
3	Read the on-screen information, and click on Yes to proceed. <div data-bbox="500 1318 1003 1633" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Information</p> <p> ? If you proceed with the uninstall, your configuration settings will be removed. If you are planning to reinstall the software while you are performing the uninstall, you may be asked if you want to remove shared files. These files are only used by MBX products and can safely be removed. Therefore, it is recommended that you remove these files by selecting "Yes To All" when prompted by Setup. </p> <p>Do you wish to continue?</p> <p> <input checked="" type="button" value="Yes"/> <input type="button" value="No"/> </p> </div>																				

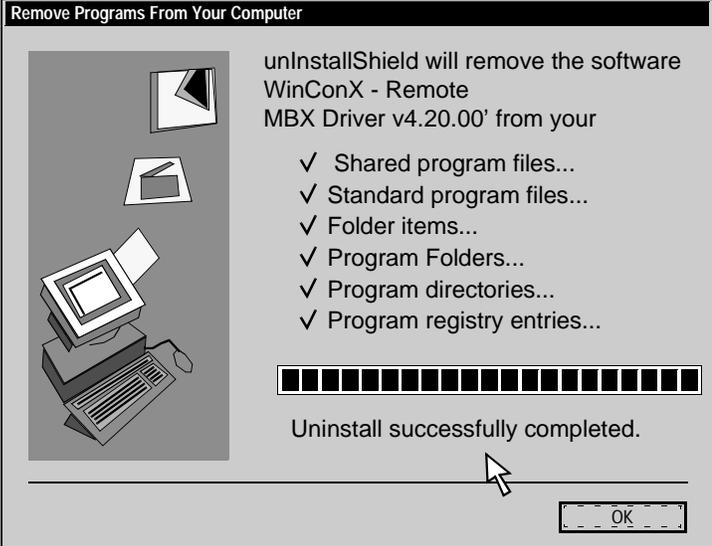
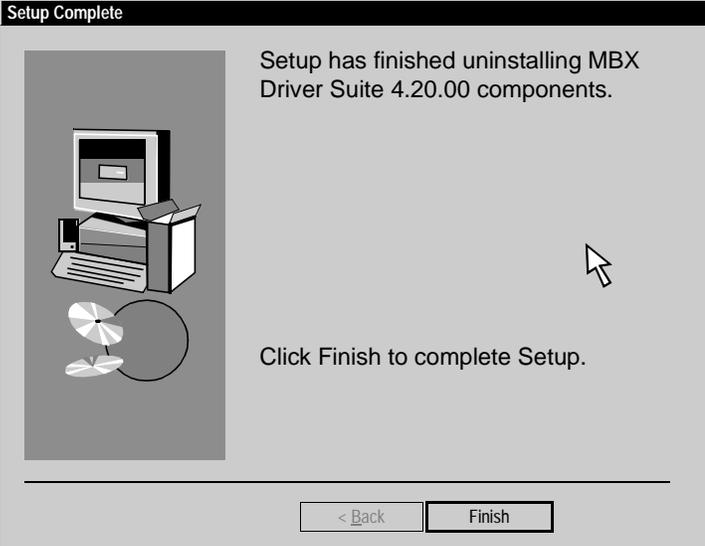
Step	Action
4	<p>Click on Yes to confirm file deletion.</p> 

Completing the Setup Procedure Follow the on-screen instructions for removing shared files and programs, as shown in the following figures.

Step	Action
1	<p>Follow the on-screen instructions for removing shared files. Click on Yes to All.</p> 
2	<p>The specified components will be removed. Click on OK.</p> 

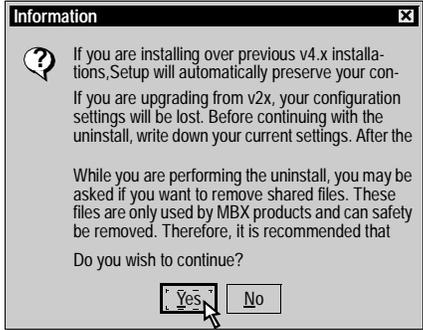
Step	Action
3	<p>Click on Yes to confirm file deletion.</p> 
4	<p>Follow the on-screen instructions for removing shared files.</p> 
5	<p>Click on Yes to confirm removing the files.</p> 

Installing the Device Driver Software

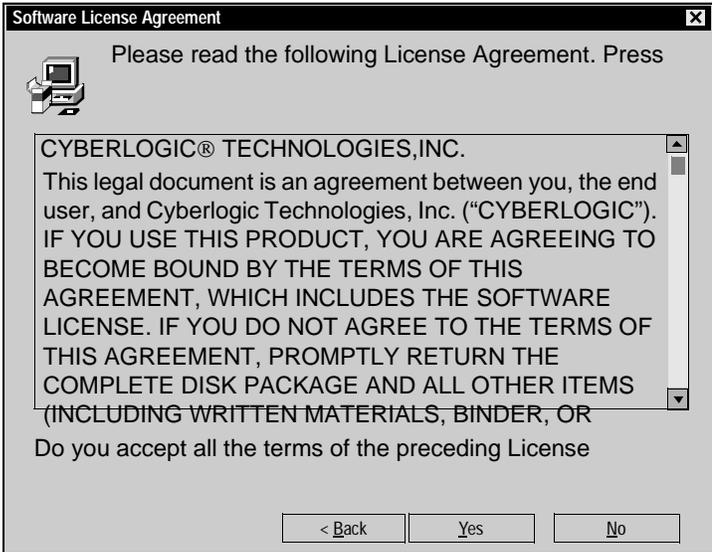
Step	Action
6	<p>The specified components will be removed. Click on OK.</p>  <p>Remove Programs From Your Computer</p> <p>unInstallShield will remove the software WinConX - Remote MBX Driver v4.20.00' from your</p> <ul style="list-style-type: none">✓ Shared program files...✓ Standard program files...✓ Folder items...✓ Program Folders...✓ Program directories...✓ Program registry entries... <p>Uninstall successfully completed.</p> <p>OK</p>
7	<p>Click on Finish to complete Setup.</p>  <p>Setup Complete</p> <p>Setup has finished uninstalling MBX Driver Suite 4.20.00 components.</p> <p>Click Finish to complete Setup.</p> <p>< Back Finish</p>

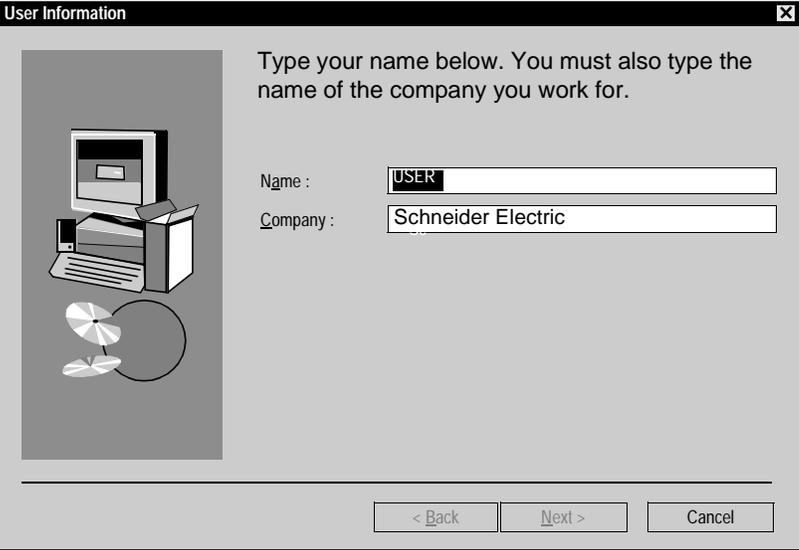
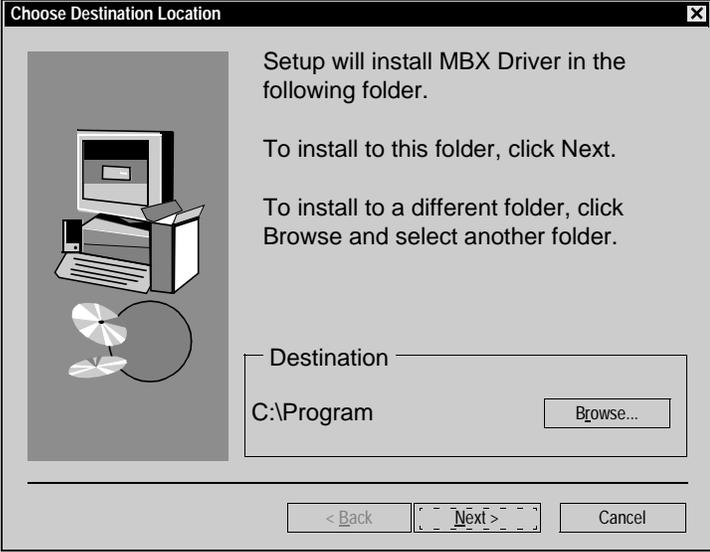
Procedure for Installing the Device Driver Software

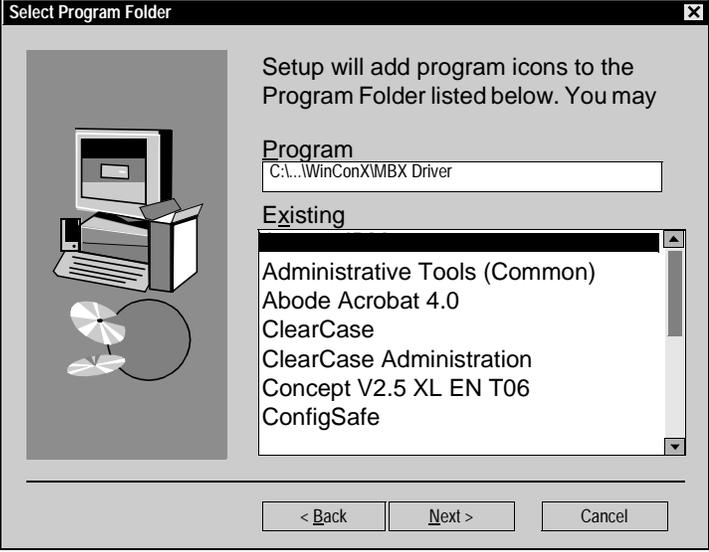
Use the following procedure to install the device driver software. Follow the on-screen instructions.

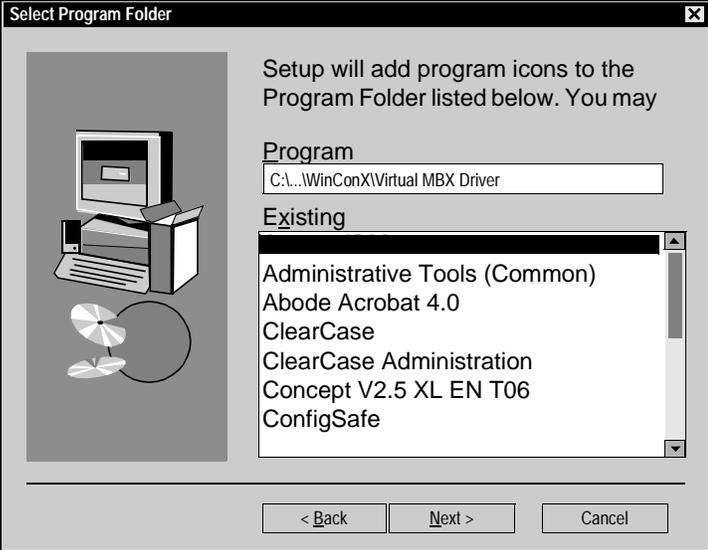
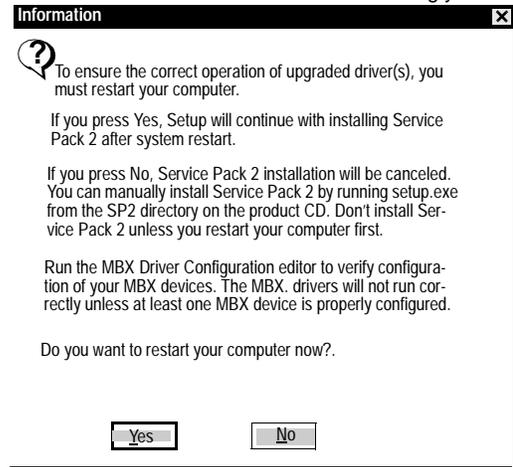
Step	Action
1	<p>Click on Yes to continue.</p> 
2	<p>At the Welcome screen (shown in the following figure), click on Next.</p> 

Installing the Device Driver Software

Step	Action
3	<p data-bbox="506 436 950 464">Read the warning information and click on OK.</p>  <p>The image shows a Windows-style warning dialog box with a black title bar containing the word "Warning" and a close button (X). The main area has a light gray background and contains a warning icon (a triangle with an exclamation mark) on the left. To the right of the icon, the text reads: "This product is licensed to be installed and used on a single computer only! Installing or using this product on more than one computer is a violation of this product's license agreement." At the bottom center of the dialog is a single button labeled "OK".</p>
4	<p data-bbox="506 709 1295 737">Read the Software License Agreement and click on Yes to accept it and to proceed.</p>  <p>The image shows a "Software License Agreement" dialog box with a black title bar and a close button (X). The main area has a light gray background and contains a small computer icon on the left. To the right of the icon, the text reads: "Please read the following License Agreement. Press". Below this is a scrollable text area containing the following text: "CYBERLOGIC® TECHNOLOGIES, INC. This legal document is an agreement between you, the end user, and Cyberlogic Technologies, Inc. ("CYBERLOGIC"). IF YOU USE THIS PRODUCT, YOU ARE AGREEING TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT, WHICH INCLUDES THE SOFTWARE LICENSE. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PROMPTLY RETURN THE COMPLETE DISK PACKAGE AND ALL OTHER ITEMS (INCLUDING WRITTEN MATERIALS, BINDER, OR". Below the scrollable area, the text "Do you accept all the terms of the preceding License" is visible. At the bottom of the dialog are three buttons: "< Back", "Yes", and "No".</p>

Step	Action
5	<p>Complete the user information screen with your information.</p> 
6	<p>Click on Next to accept the default destination location for the MBX Driver, or click on Browse to view and select a different program folder as the destination location.</p> 

Step	Action
7	<p>Follow the on-screen instructions for adding program icons for the MBX Driver.</p>  <p>The screenshot shows a 'Select Program Folder' dialog box. On the left is an icon of a computer with a printer and two CD-ROMs. The main text says: 'Setup will add program icons to the Program Folder listed below. You may'. Below this is a 'Program' text box containing 'C:\...\WinConX\MBX Driver'. Underneath is an 'Existing' list box containing: 'Administrative Tools (Common)', 'Abode Acrobat 4.0', 'ClearCase', 'ClearCase Administration', 'Concept V2.5 XL EN T06', and 'ConfigSafe'. At the bottom are buttons for '< Back', 'Next >', and 'Cancel'.</p>
8	<p>Click on Next to accept the default destination location for the Virtual MBX Driver, or click on Browse to view and select a different program folder as the destination location.</p>  <p>The screenshot shows a 'Choose Destination Location' dialog box. On the left is the same computer icon as in step 7. The main text says: 'Setup will install Virtual MBX Driver in the following folder.' Below this are two paragraphs: 'To install to this folder, click Next.' and 'To install to a different folder, click Browse and select another folder.' At the bottom is a 'Destination' text box containing 'C:\...\WinConX\Virtual' and a 'Browse...' button. At the very bottom are buttons for '< Back', 'Next >', and 'Cancel'.</p>

Step	Action
9	<p>Follow the on-screen instructions for adding program icons for the Virtual MBX Driver.</p> 
10	<p>Follow the on-screen instructions for restarting your computer.</p> 
11	<p>After you restart your computer, proceed with the on-screen instructions (not shown here) for installing Service Pack 2.</p>

Installing the Device Driver Software

Installing the PCI-85 Interface Adapter

4

Installing the PCI-85 Interface Adapter

Procedure for Installing the PCI-85 Adapter

Use the steps in the following procedure as guidelines for installing the PCI-85 Adapter and connecting its cable(s). **Note that when installing the Modbus Plus Device Drive Suite for the first time, the PCI-85 Interface Adapter will be set to the Modbus Plus Node Address #1. Ensure that you do not already have a node located at address #1.**

Step	Action
1	Set the computer power switch to OFF and unplug its power cable from the power source.
2	Remove the computer cover. Retain the screws and other hardware for reassembly.
3	Locate the unused PCI expansion slot on the computer motherboard. Remove the screw securing the blank rear faceplate for this slot position and remove the faceplate. Retain the screws and other hardware for re-assembly.
4	Insert the PCI-85 Interface Adapter into the expansion slot connector. Ensure that the PCI-85 Interface Adapter is firmly seated in the connector.
5	Install the screw to secure the board's rear faceplate to the computer frame. Note that this screw is required for proper grounding of the board.
6	Reinstall the computer cover.
7	Plug the Modbus Plus network cable connector(s) into the board's connector(s). If you have a dual-cable network, your two cables should be labeled A and B. Ensure that you connect the cables into the proper connectors, as follows. <ul style="list-style-type: none">● A is on the bottom● B is on the top
8	Reconnect the computer power cable and power up the computer. Verify normal operation with the board installed.

Installing the PCI-85 Interface Adapter

Interpreting the Network Indicator

5

Interpreting the Network Indicator

Overview

The following information describes the network indicators on both the dual and single cable PCI-85 Adapters.

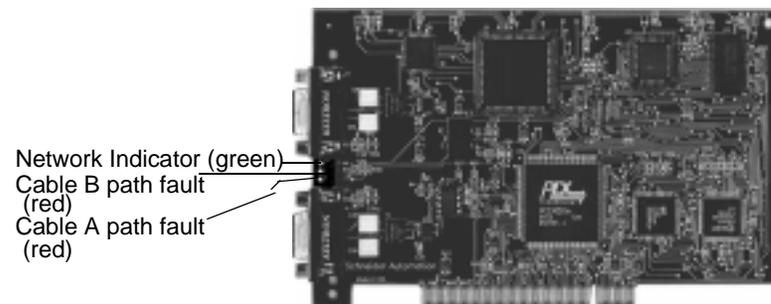
Dual Cable PCI-85 Adapter

The Dual Cable PCI-85 Adapter has three indicators:

- A green indicator shows the overall communication status of the node.
- The two red indicators identify faults on the two cable paths.
The two red indicators should be interpreted as follows:
 - If a red indicator blinks momentarily, it indicates that a message error was detected on the cable path.
 - A steady **ON** state indicates a hard fault either in the cable or in a node device connected to the cable.

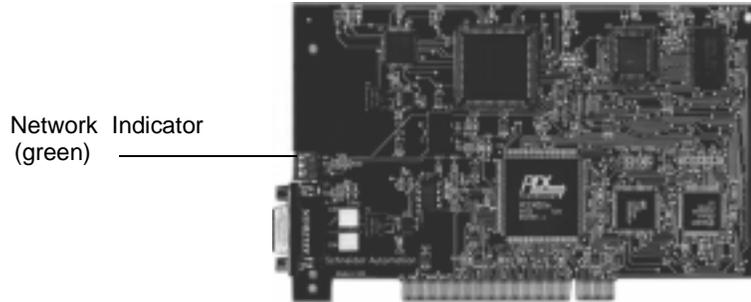
If communication is lost on one cable path, the other continues normally.

The two connectors (shown in the following figure) allow for redundant cabling. If one cable is severed, the other cable allows the continued functionality of the Modbus Plus node.



Single Cable PCI-85 Adapter

The Single Cable PCI Adapter (shown in the following figure) has one indicator that shows the network communication status (green). This board does not feature the redundant cabling option.



PCI-85 Adapter LEDs

The following table describes the LED patterns for both PCI-85 Adapters.

LED Pattern	Description
Six flashes/second	Normal operating state for each node. The node is successfully receiving and passing the token. All nodes on a healthy network flash this pattern.
One flash/second	This node is off-line just after power-up or after exiting four-flashes/second mode. In this state, the node monitors the network and builds a table of active nodes and token holding nodes. After being in this state for 5 seconds, the node attempts to go to its normal operating state (indicated by six flashes/second).
Two flashes; then OFF for two seconds	The node hears the token being passed among the other nodes, but it never receives the token itself. Check the network for an open circuit or defective termination.
Three flashes; then OFF for 1.7 seconds	The node is not hearing token passing among the other nodes. It periodically claims the token but cannot find another node to which to pass it. Check the network for an open circuit or defective termination.
Four flashes; then OFF for 1.4 seconds	The node has heard a valid message from a node using a network address identical to its own address. The node remains in this state for as long as it continues to hear the duplicate address. If the duplicate address is not heard for five seconds, the node changes to one flash/second mode.

MBPSTAT



MBPSTAT

Overview

Rather than viewing your network indicator, you may find it more convenient to use your Network Diagnostic Utility Program, *MBPSTAT.EXE*, to diagnose suspected faults. This utility is supplied on the distribution disk with your controller. A full description of how to run your MBPSTAT program appears in Appendix D of the *Modicon IBM Host Based Device's User's Guide*.

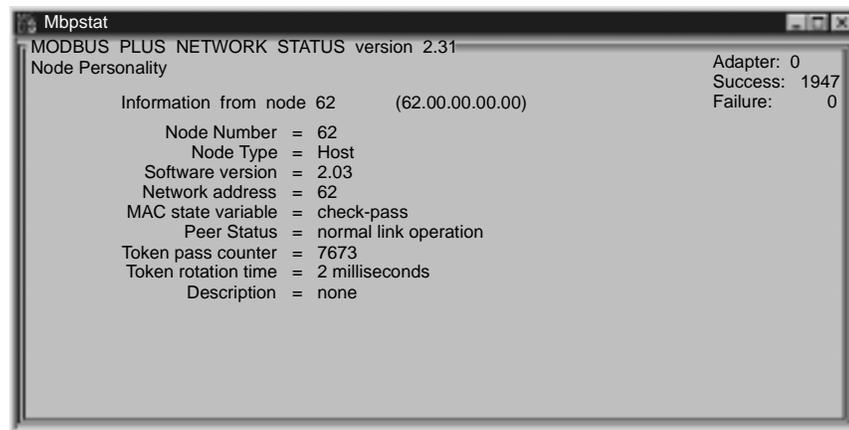
**Network
Diagnosis**

If you select option 10, "Show Node Personality" the MBPSTAT program, your screen will display the same kind of status information that is shown by the flashing patterns of your network indicator. Status is shown in the "Peer Status" line of your MBPSTAT screen.

The following table shows how your MBPSTAT screen messages correspond to the indicator patterns.

MBPSTAT Message	Indicator Pattern
Normal Link Operation	Six flashes per second
Monitor Link Operation	One flash per second
Never Receiving Token	Two flashes, then OFF for two seconds
Sole Station	Three flashes, then OFF for 1.7 seconds
Duplicate Station	Four flashes, then OFF for 1.4 seconds

The following figure shows the MBPSTAT screen, for option 10 -- Node Personality.



Labeling the Modbus Plus Port



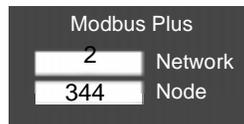
Labeling the Modbus Plus Port

Labeling

Two sets of labels are provided with the PCI-85 Interface Adapter to identify its Modbus Plus network and node address. One label should be attached to the computer when you complete the connection to the network. The other label is a spare.

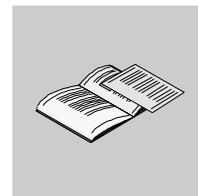
Enter the Modbus Plus network number and node address that you have assigned to the PCI-85 Interface Adapter on the label. Place the label so it can easily be seen on the PC.

The following figure shows an example of the completed label.



Labeling the Modbus Plus Port

Appendices



At a Glance

Introduction

The Appendix provides specifications for the Modbus Plus PCI-85 Interface Adapter.

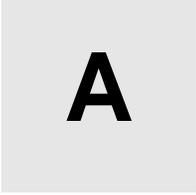
What's in this Appendix?

The Appendix contains the following Chapters:

Chapter	Chaptername	Page
A	Specifications	39

Appendices

Specifications



Specifications

Overview

Refer to the following tables for information about the PCI-85 Interface Adapter specifications.

Physical

The following table lists the physical specifications for the PCI-85 Adapter.

Physical	
Name	Modbus Plus PCI Bus Adapter with Plug and Play Capability
Part Number	416NHM30030 (single cable) 416NHM30032 (dual cable)
Size	6.6" x 4.7"

Mechanical and Electrical

The following table lists the mechanical and electrical specifications for the PCI-85 Adapter.

Mechanical and Electrical	
Shock, non operating 3 shocks/axis	30g, 11ms
Free Fall (unpackaged)	1 meter
Vibration Operating	10-57 Hz 0.07mmDA, 57-150 Hz 1g
Altitude	15,000 ft. (4500m)
Power	250 mA

Specifications

Environmental The following table lists environmental specifications for the PCI-85 Adapter.

Environmental	
Storage Temperature	+85 degrees C, -40 degrees C
Operating Temperature	0 degrees C, +60 degrees C
Humidity non-operating	93% RH @ 60 degrees C Non Condensing
Humidity operating	93% RH @ 60 degrees C Condensing

Software The following table lists software specifications for the PCI-85 Adapter.

Software	
Operating System	32 bit drivers for Windows 95, Windows 98, Windows Me, Windows NT4.0 SP3 or higher, and Windows 2000
C Library	Compilers
	MSVC 4.2
	MSVC 5.0
	MSVC 6.0



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