GETTING STARTED

CHAPTER 1

In This Chapter...

About This Manual

The Purpose of this Manual

This manual is written for the user of the Protos X™ line of I/O products. This manual shows you how to install and wire the equipment. It also provides specifications for the couplers, input and output modules.

Supplemental Manuals

In some cases you may need an additional manual such as the master PLC User Manual or perhaps the manual for the PC-based control software you may be using.

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Conventions Used

WHEN YOU SEE THE "NOTEPAD" ICON IN THE LEFT-HAND MARGIN, THE PARAGRAPH TO ITS IMMEDIATE RIGHT WILL BE A SPECIAL NOTE. THE WORD NOTE: IN BOLDFACE WILL MARK THE BEGINNING OF THE TEXT.

When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death (in extreme cases). The word WARNING: in boldface will mark the beginning of the text.

Key Topics for Each Chapter

The beginning of each chapter will list the key topics that can be found in that chapter.

Getting Started!

CHAPTER
1

In This Chapter...

Introduction

The Protos X™ I/O system allows a user to install remote field I/O devices without having to invest in another PLC. The small footprint of the Protos X I/O system allows it to be installed in tight locations at or in the vicinity of the equipment it is monitoring and/or controlling. The multiple I/O count options give the user the ability to monitor/control just a few points to a couple hundred points depending on the number of terminals used.

Communications to the bus couplers is done by Modbus communications. There are two Modbus TCP couplers (PX-TCP1 and PX-TCP2) and one RS-485 serial Modbus RTU\ASCII coupler (PX-MOD). Modbus addressing for the Field I/O can be easily identified by using the Protos X configuration software PX-CFGSW. The Modbus addressing can then be used by any controller that can communicate via Modbus to read/write data to the Protos X I/O.

To communicate using Ethernet an EtherNet/IP coupler (PX-EIP1) is available. This performs as an EtherNet/IP server in a EtherNet/IP network. Communication to the client is via an RJ45 Ethernet port. The maximum distance from client to the PX-EIP1 is 330 feet (100 meters) using 24AWG shielded, twisted pair Cat5e cable. It is highly recommended that a dedicated network be used for the Protos X system.

As shown below, the Protos X I/O system is a modular, field I/O system consisting of a Bus Coupler and its associated input/output Terminals. The Protos X field I/O series offers:

- 2, 4, 8, and 16-point discrete I/O terminals
- 2, 4 and 8-channel analog I/O terminals
- Three Bus Couplers that utilize the Modbus protocol with Modbus RTU/ASCII and Modbus TCP option
- An EtherNet/IP Bus Coupler that communicates via EtherNet/IP network
- Bus expansion terminals for expansion up to 255 I/O terminals per specific Bus Couplers
- And a variety of power supply options.
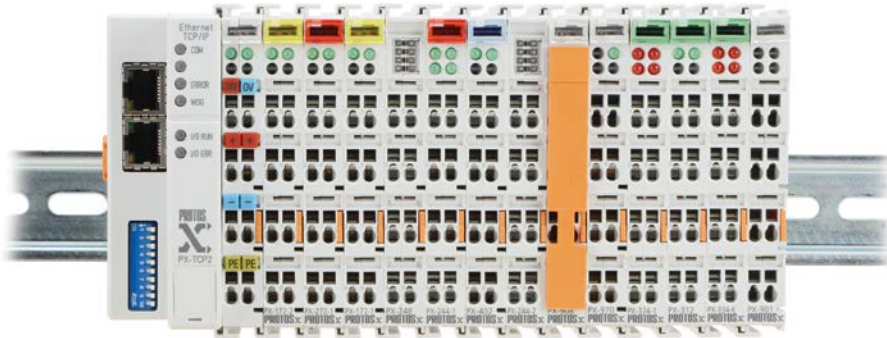
Protos X I/O System Components

Bus Couplers

Bus Couplers are available in four configurations. The PX-MOD provides EtherNet/IP or Modbus RTU/ASCII over RS485. The PX-EIP1 offers EtherNet/IP. The PX-TCP1 and PX-TCP2 modules offer Modbus TCP over Ethernet. The PX-TCP2 provides an additional port which can act as a switch to other couplers of the same type.

I/O Terminals

There are twelve discrete input and output terminals available offering 2 points, 4 points, 8 points or 16 points per terminal and include AC, DC and relay form factors.

There are also eighteen analog input and output terminals available offering 2 channels, 4 channels or 8 channels per terminal and include 4–20 mA, PT100 RTD, Type J and K thermocouple and 0–10 VDC or ±10VDC form factors.

Bus End Terminal/Bus Expansion Coupler Terminals

A Bus End Terminal, located at the end of a terminal assembly, is required for proper I/O bus communication. Bus expansion is available for the PX-MOD, PX-TCP1 and PX-EIP1 Bus Couplers. Bus expansion requires that a Bus Expansion End Terminal be used in place of the Bus End Terminal and a Bus Expansion Coupler Terminal be used in place of the PX-MOD, PX-TCP1 or PX-EIP1 at each expansion assembly.

Power Distribution Terminal

A Power Distribution Terminal is available to provide access to the integrated 24VDC Terminal Power Bus. The terminal provides 8 connection points each of 24V and 0V.

Power Separation Terminal

A Power Separation Terminal is available to provide interruption of power along the Terminal Power Bus.

Power Feed Terminals

Two Power Feed Terminals, 24VDC or 120–230 VAC, are available to add or change supply power to the Terminal Power Bus.

Protos X Bus Couplers	
Part Number	Description
PX-MOD	Modbus RTU/ASCII Bus Coupler
PX-TCP1	Modbus TCP Bus Coupler (1 port)
PX-TCP2	Modbus TCP Bus Coupler (2 ports)
PX-EIP1	EtherNet/IP Bus Coupler (1 port)

Bus Expansion Terminals	
Part Number	Description
PX-901	Bus End Terminal
PX-902	Bus Expansion End Terminal
PX-903	Bus Expansion Coupler Terminal

Power Distribution Terminal	
Part Number	Description
PX-949	24VDC Power Distribution Terminal

Power Feed Terminals	
Part Number	Description
PX-940	24VDC Power Feed Terminal
PX-970	120-230 VAC Power Feed Terminal

Protos X I/O System Components, (cont'd)

Discrete Input/Output Terminals	
Part Number	Description
PX-144	24VDC 4-point Input Terminal
PX-148	24VDC 8-point Input Terminal
PX-149	24VDC 16-point Input Terminal
PX-172-1	120–230 VAC 2-point Input Terminal
PX-172-2	120 VAC/VDC 2-point Input Terminal
PX-244-1	24VDC 4-point Output Terminal (0.5 A per point)
PX-244-2	24VDC 4-point Output Terminal (2A per point)
PX-248	24VDC 8-point Output Terminal (0.5 A per point)
PX-249	24VDC 16-point Output Terminal (0.5 A per point)
PX-272-1	230VAC/VDC 2-point Output Terminal (0.3 A per point)
PX-272-2	230VAC / 30VDC 2-point Output Terminal (2A per point)
PX-549	24VDC 8-point Input/ 24VDC 8-point Output Combination Terminal

Analog Input/Output Terminals	
Part Number	Description
PX-302	4–20 mA 2-channel Current Input Terminal
PX-304	4–20 mA 4-channel Current Input Terminal
PX-308	4–20 mA 8-channel Current Input Terminal
PX-312	±10VDC 2-channel Voltage Input Terminal
PX-314	±10VDC 4-channel Voltage Input Terminal
PX-318	±10VDC 8-channel Voltage Input Terminal
PX-322-1	2 Channel RTD Terminal
PX-324-1	4 Channel RTD Terminal
PX-332-J	2 Channel Thermocouple Terminal (J type)
PX-332-K	2 Channel Thermocouple Terminal (K type)
PX-334-J	4 Channel Thermocouple Terminal (J type)
PX-334-K	4 Channel Thermocouple Terminal (K type)
PX-402	4–20 mA 2-channel Current Output Terminal
PX-404	4–20 mA 4-channel Current Output Terminal
PX-408	4–20 mA 8-channel Current Output Terminal
PX-412	0–10 VDC 2-channel Voltage Output Terminal
PX-414	0–10 VDC 4-channel Voltage Output Terminal
PX-418	±10VDC 8-channel Voltage Output Terminal

Configuration Cable (USB v2.0)

A communications cable is available for configuration of the Bus Couplers. The cable has a USB type A connector for the PC and a 4-pin custom micro connector for the bus coupler.

Software Configuration Tool

Configuration Cable (USB)	
Part Number	Description
PX-USB-232	Configuration Cable 3m (9.8 ft)

The software configuration tool (PX-CFGSW) auto-configures the Modbus addresses and the interface allows the user to:

- Run the configurator
- View the configured Modbus addresses
- Modify the baud rate
- Change the Modbus offset
- Reboot the coupler
- Disable or modify Watchdog timer
- Configure first three octets of the IP address

Protos X I/O System Example

Typical System Setup

An example of a typical Protos X I/O system can be seen below. An **I/O Bus**, powered through the Bus Coupler, provides data communication across the terminal assembly via six contacts located on the side walls of the terminals. A **Terminal Power Bus** provides power for the I/O terminals via two power contacts. A power source of 24VAC or 24VDC must be connected to the Bus Coupler from an external supply.

If additional 24VDC supply is required for terminal wiring, eight points of 24VDC power can be distributed from the Terminal Power Bus using a **Power Distribution Terminal (PX-949)**. This terminal must be mounted to the right of a terminal that passes 24VDC on the power bus. Both I/O Bus communication and terminal bus power are passed through to adjoining terminals.

For expansion beyond a 64 terminal assembly, a **Bus Expansion End Terminal (PX-902)** is used in place of a standard **Bus End Terminal (PX-901)**. A **Bus Expansion Coupler Terminal (PX-903)** is used at each expansion assembly in place of a **PX-MOD or PX-TCP1 Bus Coupler**. Up to 31 Expansion couplers can be used in a group of assemblies. Connection is made between the Expansion Coupler Terminals via standard RJ45 Ethernet patch cable.

NOTE: THE PX-TCP2 BUS COUPLER DOES NOT SUPPORT EXPANSION.