The PX-TCP1 Modbus TCP Bus Coupler server allows connection of up to 64 terminals per assembly, 256 terminals total, and communicates in a Modbus TCP network using high-level Modbus commands and supports 512 bytes input data and 512 bytes output data. The PX-TCP1 consists of one RJ45 Ethernet 10/100 Base T port for connection to a Modbus client. Use with the Protos X™ I/O System.

### PX-TCP1 Modbus TCP Bus Coupler with 1 RJ45 Port

**Overview**

- **Red LED 1: WD ERR**: Watchdog error if no data transmitted within the set WD time. Reset using PX-CFGSW, power cycle, or using ladder logic. See PX-USER-M manual.
- **Green LED 2: COM**: Ethernet data is active (On or Flashing). No data is being Received.
- **Red LED 3: ERR/RST**: Flashing waiting for IP address if fail to DHCP or Switch. No Error.
- **Green LED 4: RTE**: Not used. Not used.
- **Red LED 7: I/O Bus Run**: I/O Bus Data Active (On or Flashing). No I/O Bus Activity.
- **Yellow ACT LED**: On = 100 Mbaud OFF = 10 Mbaud

**Protocol**: Modbus TCP

**Data Transfer Rates**: 10/100 Mbaud

**Connection Type**: Ethernet, RJ45

**Maximum Cable Length**: 100m between Coupler and switch

**Data Transfer Rates**: 10/100 Mbaud

**Protocol**: Modbus TCP

**Number of Terminals Supported**: 64 per assembly, 255 with I/O Bus Expansion (based on power budget).

**Number of Analog Inputs/Outputs**: 128 total

**Number of Discrete Inputs/Outputs**: 1020 Inputs and 1020 Outputs with dip switches and PX-CFGSW software.

**Number of Power Contacts**: 3 (+24 VAC/VDC, 0V, PE)

**Maximum Current**: 10A

**Supply Power for Terminal Bus**: 24 VAC/VDC

**Maximum Number of Data Bytes**: 512 Input Bytes and 512 Output Bytes

**Mounting/Orientation**: DIN Rail/Locking, Field Mountable

**Environment**: Air No corrosive gases permitted

**Relative Humidity**: 5% to 95%, non-condensing

**Operating Temp**: 32° to 131°F (0° to 55°C)

**Vibration**: conforms to EN 60068-2-6

**Noise Immunity**: conforms to EN 61000-6-2

**Protection Class**: IP00

**Weight**: 100g

**Dimensions (W/H/D)**: 44 x 100 x 66.4 mm (1.73 x 3.94 x 2.61 in)

**Agency Approvals**: UL, File No. E715392, CSA

**Configuration Port**: Requires cable PX-CUSB-232, with a USB 2.0-type A connector for the PC and a 4-pin custom mini connector on the PX-CUSB-232 for the PX-TCP1. Works with PX-CFGSW software.

**I/O Bus Error, blinking Code**: See PX-CFGSW Help file or PX-USER-M manual for codes.

**Terminal Power**: 24VDC Power

**Terminal Power Supply**: 24VDC Power or 24VAC Power

**Recommended Fuse**: 10A Max

**Input Current from Power Supply**: 70mA + (total I/O bus current) / 4

**Supply Power for I/O Bus**: 24VDC (-15%/+20%)

**Restrictions**: 35mm DIN rail/None

**Connection Type**: Ethernet, RJ45

**Maximum Cable Length**: 100m between Coupler and switch

**Data Transfer Rates**: 10/100 Mbaud

**Protocol**: Modbus TCP

**Number of Power Contacts**: 3 (+24 VAC/VDC, 0V, PE)

**Maximum Current**: 10A

**Supply Power for Terminal Bus**: 24 VAC/VDC

**Maximum Number of Data Bytes**: 512 Input Bytes and 512 Output Bytes

**Number of Analog Inputs/Outputs**: 128 total

**Number of Discrete Inputs/Outputs**: 1020 Inputs and 1020 Outputs with dip switches and PX-CFGSW software.

**Number of Bus Terminals Supported**: 64 per assembly, 255 with I/O Bus Expansion (based on power budget).

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**Configuration Port**: Requires cable PX-CUSB-232, with a USB 2.0-type A connector for the PC and a 4-pin custom mini connector on the PX-CUSB-232 for the PX-TCP1. Works with PX-CFGSW software.

**I/O Bus Error, blinking Code**: See PX-CFGSW Help file or PX-USER-M manual for codes.
### SYSTEM CONSIDERATIONS

The PX-TCP1 performs as a Modbus TCP server in a Modbus network. Communication to the client is via an RJ45 Ethernet port. The maximum distance allowed for the PX-TCP1 is 330 feet (100 meters) using 24 AWG shielded, twisted pair Cat5e cable. It is highly recommended that a dedicated network be used for the ProtoX system.

The PX-TCP1 Bus Coupler supports up to 64 terminals per assembly, 255 with Bus Expansion Couplers. A minimal assembly consists of a PX-TCP1 Bus Coupler, I/O Terminals and a Bus End Terminal.

The PX-TCP1 automatically assigns Modbus addresses for inputs and outputs. The images in the manual show the assignments. The maximum number of data is 512 bytes of input data and 512 bytes of output data, with up to 1020 inputs, 1020 outputs, and 128 analog inputs or outputs, when using bus expansion.

An I/O Bus, powered through the Bus Coupler, provides data communication across the terminal assembly via six contacts located on the sides of the terminals. This bus also supplies low voltage power to the I/O terminals. The I/O Bus supply is rated at a maximum of 1000mA, which must be taken into consideration when planning an assembly. Each terminal has an I/O bus current consumption listing which can be used to determine the total I/O bus current. The maximum I/O bus current of the coupler must not be exceeded as there is no internal overcurrent protection.

A Terminal Power Bus provides power for the I/O terminals via three contacts, 24V, 0V, and PE. A power source of 24VAC or 24VDC must be connected to the bus Coupler from an external supply. The PE Bus is available for terminals that support PE connectivity.

A variety of Power Terminals are available for isolating, changing, or supplying power to the I/O terminals. For isolating voltages across the Terminal Power Bus a Power Separation Terminal (PX-908) is used. This terminal separates the Terminal Power contacts but passes I/O Bus communication.

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.

To connect field power to the Terminal Power Bus, or to change from one voltage to another, Power Feed Terminals (PX-948 & PX-970) are used. Power Feed Terminals are available in 24VDC or 120-230VAC, and provide power to I/O Terminals located to the right of the Power Feed Terminal. This terminal passes I/O Bus communication. Power Terminals do not consume any addresses.

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-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 cable.

It is important to stay within the following three specifications:

1. Do not exceed the total number of 64 Terminals allowed per Assembly.
2. Do not exceed the total number of 512 Input Bytes and 512 Output Bytes.
3. Do not exceed the Coupler I/O Bus Power Budget of 1500mA as there is no internal current protection.

For complete assembly instructions and compatibility between terminals see the PX-USER-M Manual.

### MOUNTING

For system assembly, first attach a bus coupler by snapping onto 35mm DIN rail and securing into position using the DIN rail locking wheel located on the left side of the coupler. To add a bus terminal, insert unit onto right side of bus coupler using the tongue and groove at the top and bottom of the unit, pressing gently until it snaps onto the DIN rail. A proper connection cannot be made by sliding the units together on the DIN rail. When correctly installed, no significant gap can be seen between the attached units. Bus connection is made through the six slide contacts located on the upper right side of the units. Add up to 64 terminals per bus coupler, including a bus end terminal.

**IMPORTANT:** For complete assembly instructions and compatibility between terminals see the PX-USER-M manual available for free download at www.automationdirect.com.

### REMOVAL

A locking mechanism prevents individual units from being pulled off. For bus terminal removal, pull the orange DIN rail release tab firmly to unlatch the unit from the rail. If attached to other terminal units, slide unit forward until released. For bus couplers, release the DIN rail locking wheel, then pull firmly on DIN rail release tab.

Where applicable, rotate Locking Wheel to unlock Bus Coupler

Insert unit using tongue and groove molded guide and press gently until it becomes firmly seated on DIN rail.

**Where applicable, rotate Locking Wheel to lock Bus Coupler**

Align tab with molded guide

Firmly pull DIN Rail Release Tab to unlatch unit from rail.

### HOT SWAP NOT PERMITTED

Always remove power from the system before inserting or removing bus terminals or couplers as failure to do so could cause malfunction or damage to the terminals, couplers or other connected devices.

### MODBUS FEATURES

The PX-TCP1 Bus Coupler functions as a server in a Modbus TCP network for complete details see the PX-USER-M manual.

### WIRING CONNECTION

Wire connection is made through a spring clamp style terminal. This terminal is designed for a single-conductor solid or stranded wire. Wire connection is made by firmly pushing the screwdriver into the screwdriver slot, inserting the wire into the wire slot and removing the screwdriver, locking the wire into position.

### SAFETY

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed. You are also responsible to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

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### DOCUMENTATION

For complete assembly instructions and compatibility between terminals see the PX-USER-M Manual available for free download at www.automationdirect.com.

### MODBUS FEATURE CONSIDERATIONS

- **Power Terminals**: PX-948 & PX-970
- **Power Distribution Terminal**: PX-949
- **Expansion Coupler Terminal**: PX-903
- **Expansion End Terminal**: PX-902
- **Terminal Power Bus**: PX-908
- **Bus Coupler**: PX-TCP1

### INSTALLATION INSTRUCTIONS

1. **Prepare the Terminal Power Bus**
   - Ensure proper grounding is maintained.
   - Use stranded wire for optimal performance.

2. **Install the PX-TCP1 Bus Coupler**
   - Snap onto 35mm DIN rail.
   - Secure using DIN rail locking wheel.

3. **Add Expansion Terminals**
   - Use PX-902 and PX-903 for additional terminals.
   - Ensure proper mating of tabs and slots.

4. **Connect Field Power**
   - Use Power Feed Terminals (PX-948 & PX-970).
   - Power supply must not exceed 1000mA.

5. **Verify Communication**
   - Use Modbus TCP for network communication.
   - Ensure addresses are within specified limits.

### VOLTAGE RATING

- **Bus Power**: 24VDC or 120-230VAC
- **Terminal Power Bus**: 1000mA

### MAINTENANCE

- **Clean**: Use a dry, lint-free cloth.
- **Inspect**: Regularly check connections and terminals.

### DOCUMENTATION AVAILABILITY

- PX-USER-M Manual
- PX-TCPIP-DS Manual

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