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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





XPress™ DR+ Industrial Device Server User Guide

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Contacts

Lantronix, Inc.
7535 Irvine Center Drive
Suite 100
Irvine, CA 92618, USA

Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support Online: www.lantronix.com/support

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Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

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The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

Revision History

Date	Rev.	Comments
March 2006	A	Initial document.
October 2006	B	Added description of wireless functionality.
June 2008	C	Added RoHs notice.
August 2013	D	Removed reference to FM cert and GS mark from xPress IO User Guide and updated LTX address.
December 2017	E	Updated enhanced password information.

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Chapter 1: Using This Guide

Purpose and Audience

This manual describes the Lantronix® XPress™ DR+ and XPress™ DR+W device servers. These device servers are members of the XPress family that work with Industrial Automation Protocols. The XPress DR+ W has wireless as well as wired capability.

This guide provides the information needed to configure, use, and update the XPress DR+ device servers. It is for system administrators and those responsible for installing and maintaining these device servers.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
Chapter 2: Introduction	Describes the main features of the XPress DR+ and the protocols it supports.
Chapter 3: Installation and Hardware	Describes the unit's interfaces and power requirements. Provides instructions for physically connecting the unit.
Chapter 4: XPress DR+W	Describes the XPress DR+W and how to install and configure the unit initially.
Chapter 5: Using DeviceInstaller	Provides information for getting your unit up and running, using DeviceInstaller to assign an IP address.
Chapter 6: Configuration Using Web Manager	Details using the Web Manager to set parameters such as port and server properties.
Chapter 7: Configuration Using Telnet or Serial Port (Setup Mode)	Provides instructions for accessing Setup Mode (command line interface) using a Telnet connection through the network or a terminal or terminal emulation program through the serial port.
Chapter 8: Setup Mode: Server Configuration	Details the network (server) settings
Chapter 9: Setup Mode: Channel Configuration	Details the serial port settings.
Chapter 10: Setup Mode: Advanced Settings	Details email, expert, and security settings and explains how to reset the unit to factory default values.
Chapter 11: Firmware Upgrades	Provides instructions for obtaining the latest firmware and updating the XPress DR+.
Chapter 12: Monitor Mode	Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems.

Chapter	Description
Chapter 13: Troubleshooting and Technical Support	Describes common problems and error messages and how to contact Lantronix Technical Support.
Appendix A: Technical Specifications	Lists technical information about the unit.
Appendix C: Alternative Methods of Assigning an IP Address	Describes other ways to assign an IP address, for example, though ARP and Telnet.
Appendix D: Binary to Hexadecimal Conversions	Provides instructions for converting binary numbers to hexadecimals.
Appendix E: Compliance Information	Provides the Declaration of Conformity and other regulatory information.
Appendix F: Warranty	

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
XPress DR+ Quick Start or XPress DR+W Quick Start	Provides the steps for getting the XPress DR+ or XPress DR+W up and running.
Com Port Redirector Quick Start and Com Port Redirector Online Help	Provides information on using the Windows®-based utility to create a virtual com port.
DeviceInstaller Online Help	Provides information on using DeviceInstaller® to locate Lantronix devices on the network and configure IP addresses.
"Live" tutorials on the Lantronix Web Site	Explain and demonstrate assigning an IP address and setting up the unit and the Redirector. See http://ts.lantronix.com/tutorials.html . Note: The instructions for the UDS products apply to the XPress DR+ as well.
Protocol Documentation	Provides guides for the protocols, such as Modbus Bridge and Multi-Master DF1, which you can load on the XPress DR+.

Chapter 2: Introduction

This chapter provides basic information about the wired and wireless versions of the XPress DR+. The wireless version has two modes of operation: wireless and wired. In wired mode, the wireless functionality is not used, and the unit behaves identically to the wired XPress DR+. In wireless mode, the unit's behavior is wireless to serial, and the Ethernet ports are not functional.

Unless otherwise noted, information in this User Guide applies to both versions of the product. Information specific to the wireless version of the XPress DR+ unit is in [Chapter 4: XPress DR+W](#).

Note: In this User Guide we sometimes refer to the XPress DR+W as "the wireless unit" or the "wireless device server."

Product Description

The Lantronix XPress DR+ Industrial Device Server is a robust, feature-rich, and cost effective way to network-enable equipment in an industrial automation environment. The XPress DR+ provides two serial ports, two switched Ethernet ports, a wide power input range, and expanded environmental specifications, making it an ideal solution for connecting multiple asynchronous RS232, RS422, or RS485 serial devices to an Ethernet network.

The internal two-port Ethernet switch allows the XPress DR+ to cascade connections from a single network drop to another Ethernet device or from one XPress DR+ to another and another, and so on. By leveraging a single network drop to connect multiple devices, the XPress DR+ greatly reduces device connectivity costs, reduces cabling cost and simplifies system changes and device moves.

By encapsulating serial data and transporting it over Ethernet, the XPress DR+ allows virtual serial links over Ethernet and IP (TCP/IP, UDP/IP) networks. As a result, you can extend limited distance, point-to-point, direct serial connections within the plant, throughout the facility, or across the global enterprise.

The XPress DR+ provides an impressive list of features and functions enabling multiple industrial devices to be connected, controlled, configured, managed, and updated over a network. With two serial ports and two auto-sensing Ethernet ports, the XPress DR+ can easily connect multiple serial devices to a network and cascade from one XPress DR+ to another from a single network drop.

Types of supported devices:

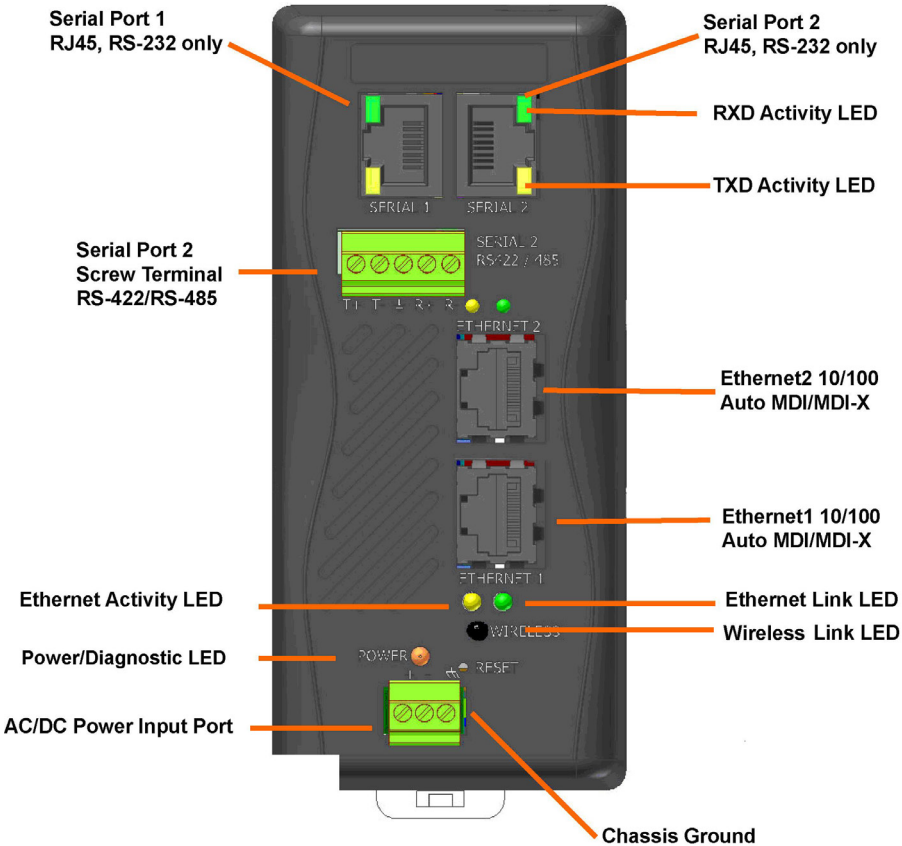
- ◆ Programmable controllers (PLCs)
- ◆ Process controllers
- ◆ Motor drive controllers
- ◆ Power monitoring equipment

- ◆ Human-machine interfaces
- ◆ Robots
- ◆ Flow meters
- ◆ Temperature monitoring equipment
- ◆ Scales
- ◆ Mixing stations
- ◆ Gas detection devices
- ◆ CNC Machines

The XPress DR+ can connect devices using various methods of TCP/IP communications, for example, through a TCP data channel, using UDP datagrams, or through a Telnet connection. Communication can be established from the XPress DR+ to a host computer or another device or from a host computer or device to the XPress DR+.

Figure 2-1. XPress DR+ (Front)

Note: For a diagram and description of XPress DR+W, see [Front Panel Description on page 32](#).



The XPress DR+ supports RS-232 through RJ45 connectors. It also supports RS-422/485 by means of screw terminals (Serial Port 2 only). It has two Ethernet Ports 10/100Base-T and –TX with Auto MDI/MDI-X by means of RJ45 connectors. You can use either Ethernet port for daisy-chained configuration.

Industrial Automation Protocols

The XPress DR+, adapted to multiple factory environments, can unite any mixture of equipment from industrial automation vendors into a single reliable pipeline. This new and open infrastructure opens the way for data to flow in real time from all your plant devices up to your IT layer.

The XPress DR+ is delivered with IAP Standard Tunneling protocol and can be loaded with industrial communication protocols. The suite of protocols includes DF1 Multi-Master (Rockwell Automation) and Modbus Bridge, which supports MODBUS/TCP, MODBUS/ASCII, and MODBUS/RTU (Schneider Electric). Where the IAP Standard Tunneling protocol is limited to standard ASCII device-to-device connections, the industrial protocols offer connections to other devices that require special formatting or features simultaneously.

For information about using any of the industrial communication protocols, see the specific protocol guides on the software CD or the Lantronix web site. Protocol firmware files are also on the CD.

Note: Please check the Lantronix web site for newer versions that may become available.

You can set up the unit using serial port 1 or remotely over Ethernet using Telnet or, when using the Standard Tunneling firmware, a web browser. The CD that comes with your device server includes DeviceInstaller, a Windows-based configuration software that simplifies the process of installing protocols and configuring them for use with attached devices. The XPress DR+ uses Flash memory for maintenance-free, non-volatile storage that allows fast system upgrades.

Network Protocols (Serial Tunneling)

The XPress DR+ uses TCP/IP protocols for network communication. The supported standards are ARP, UDP, TCP, ICMP, Telnet, TFTP, DHCP, AutoIP, MODBUS/TCP, and SNMP. For transparent connections, TCP/IP (binary stream) or Telnet protocols are used. You can perform firmware upgrades with the TFTP protocol.

The IP (Internet Protocol) protocol defines addressing, routing, and data-block handling over the network. The TCP (transmission control protocol) assures that no data is lost or duplicated, and that everything sent into the connection on one side arrives at the target exactly as it was sent.

For typical datagram applications, where devices interact with others without maintaining a point-to-point connection, UDP datagram is supported in the Standard Tunnel Protocol.

XPress DR+ comes loaded with Standard Tunnel Protocol. Standard Tunneling is a serial communications protocol used by most Lantronix device servers. You can configure it to Ethernet-enable most serial devices such as barcode scanners, weigh scales, operator panels, data access devices, alphanumeric displays, and thousands of intelligent serial devices.

Loading industrial protocols such as Modbus Bridge to an XPress DR+ changes the configuration dialogs. See the user guides on individual protocols for protocol-specific settings and configuration dialogs. Protocol manuals are on the software CD.

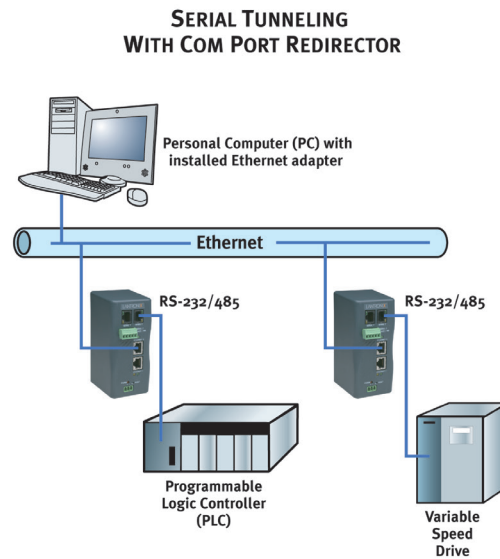
Note: This User Guide describes the setup and configuration dialogs for the Standard Tunnel Protocol.

XPress DR+ Application Examples

Note: For XPress DR+W application examples, see [Chapter 4: XPress DR+W](#).

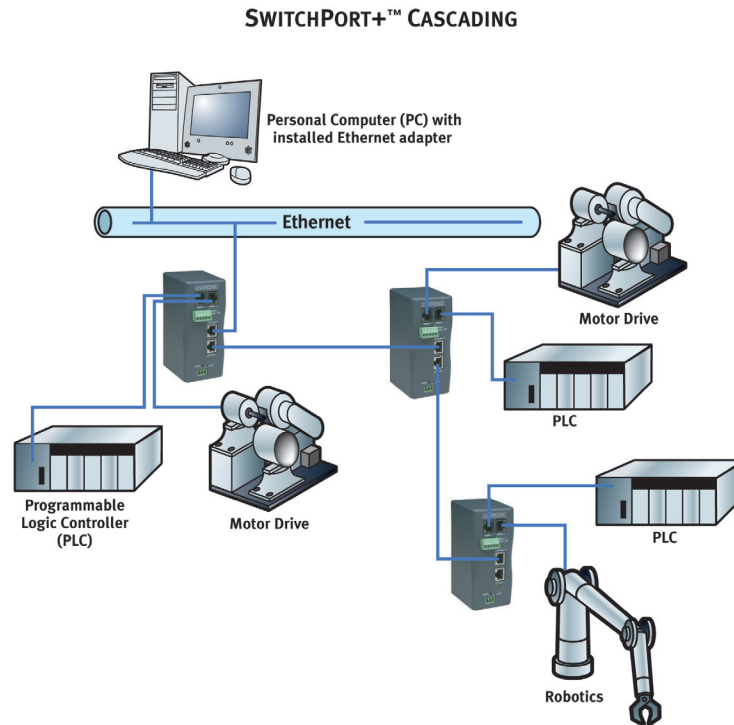
Using a method called serial tunneling, the XPress DR+ encapsulates serial data into packets and transports them over Ethernet. Using two XPress DR+ units, connected by a network, you can extend virtual serial connections across a facility or around the world.

Figure 2-2. Example of Serial Tunneling



The internal two-port Ethernet switch allows the XPress DR+ to cascade connections from a single network drop to another Ethernet device or from one XPress DR+ to another and another, and so on.

Figure 2-3. Example of Cascading Multiple XPress DR+ Units



Note: For examples of wireless applications, see [Chapter 4: XPress DR+W](#).

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the Ethernet address or MAC address. The first three bytes of the Ethernet address are fixed and read 00-20-4A, identifying the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

Figure 2-4. Sample Hardware Address

```
00-20-4A-14-01-18 or 00:20:4A:14:01:18
```

IP Address

Every device connected to an IP network must have a unique IP address. This address references the specific unit.

Port Numbers

Every TCP connection and every UDP datagram is defined by a destination IP address and a port number. For example, a Telnet application commonly uses port number 23. A port number is similar to an extension on a phone system.

You can associate the unit's serial channel (port) with a specific TCP/UDP port number. Port number 9999 is reserved for access to the unit's Setup (configuration) Mode.

Configuration Methods

After installation, the XPress DR+ requires configuration for the unit to operate correctly on a network. There are three basic methods for logging into the XPress DR+ and editing the configurable settings.

DeviceInstaller: Configures the IP address and other network settings on the XPress DR+ using a Graphical User Interface (GUI) on a PC attached to a network. (See [Chapter 5: Using DeviceInstaller](#).)

Web Manager: Through a web interface, configures the XPress DR+ settings using the Lantronix Web Manager. (See [Chapter 6: Configuration Using Web Manager](#).)

Serial and Telnet Ports: There are two approaches to accessing Setup Mode: making a Telnet connection to the network port (9999) or connecting a terminal (or a PC running a terminal emulation program) to the unit's serial port. To use DeviceInstaller for communication to an XPress DR+W over a wireless network, the WLAN network settings must be configured first.

Chapter 3: Installation and Hardware

What's in the Box?

Verify and inspect the contents of the package using the enclosed packing slip or the list below. If any item is missing or damaged, contact your place of purchase immediately.

- ◆ XPress DR+ or XPress DR+W
- ◆ Resource CD
- ◆ Quick Start Guide
- ◆ P/N: 500-103 RJ45-DB9F serial cable.
- ◆ P/N 930-029 antenna (XPress DR+W only)
- ◆ Accessory DIN-rail wall mount bracket
- ◆ 3 terminal screw connector for power input
- ◆ 5 terminal screw connector for serial port

What Must the User Provide?

- ◆ 9-30 VDC or 9-24 VAC power source
- ◆ CAT 5 Ethernet cable (for wired XPress DR+ and the wireless version operating in wired mode)

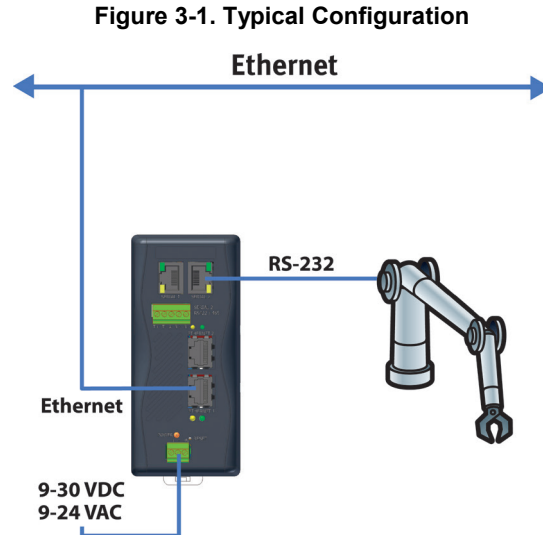
Physically Connecting the XPress DR+

Note: for information on physically connecting the XPress DR+W in wireless mode, see [Chapter 4: XPress DR+W](#).

Note: To comply with the hazardous location approval of the XPress DR+, the unit must be installed in a tool-secured enclosure and wiring must be installed in accordance with Division 2 wiring practices as specified by the NEC.

This section describes the procedures for getting your unit up and running. For a short version, see the Quick Start Guide. Detailed descriptions of the hardware components of the XPress DR+ follow this simple installation procedure.

The following diagram shows the basic connectivity of an XPress DR+ to the network and a serial device. The Lantronix-supplied P/N: 500-103 serial cable can be used on the RJ45 RS232 serial ports to connect the XPress DR+ to a PC or to a serial device that has a DB9M RS232 DTE interface. If the device being connected uses a different serial interface, please refer to page 23 for the serial interface pinout or to [Appendix B: Lantronix Cables and Adapters](#) for a list of serial cables or adapters.



1. Connect a serial device to your XPress DR+. (See *Serial Interface* on page 21 for cable and connector specifications.)
2. Connect an Ethernet cable to the Ethernet port. (See *Ethernet Interface* on page 24.)
3. Supply power to your XPress DR+ using a 9-30 VDC or 9-24 VAC (2.3W maximum) source. (See *Power Requirements* on page 25.)
4. Supply power to the serial device.

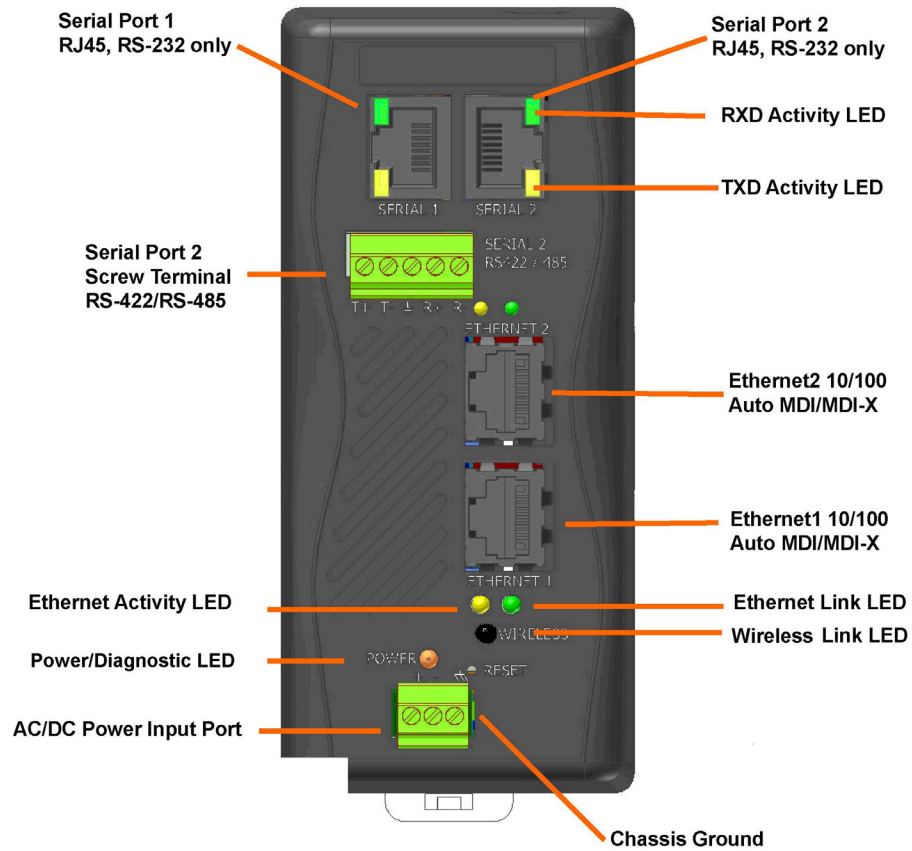
Note: Connecting a device to an active Ethernet network can disrupt communications on the network. Make sure the device is configured for your application before connecting it to an active network

XPress DR+ Front Panel

The following figure illustrates the screw block connector pinouts and other components of the XPress DR+.

Note: For a description of the XPress DR+W front panel, see *Chapter 4: XPress DR+W*.

Figure 3-2. Front of XPress DR+



Serial Interface

The XPress DR+ supports RS-232 via RJ45 connectors. It also supports RS-422/485 via screw terminals (Serial Port 2 only).

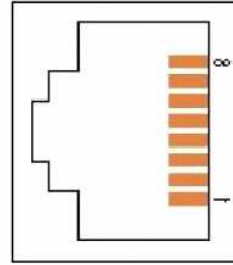
Note: Serial Port 2 supports RS232, RS422, and RS485, but only one mode at a time. This means you can use either the RJ45 connector or the terminal block, not both.

The RJ45 serial connectors only support RS232, up to 230400 bits per second.

Table 3-1. RJ45 Serial Connector Pinouts

Pin	Direction	Name	Function
1	Output from DR+	RTS	Ready To Send
2	Output from DR+	DTR	Data Terminal Ready
3	Output from DR+	TXD	Transmitted Data
4	Ground	GND	Signal Ground
5	Ground	GND	Signal Ground
6	Input to DR+	RXD	Received Data
7	Input to DR+	DSR	Data Set Ready
8	Input to DR+	CTS	Clear To Send

Figure 3-3. RJ45 Connector – Front View



Screw Terminal Serial Connectors

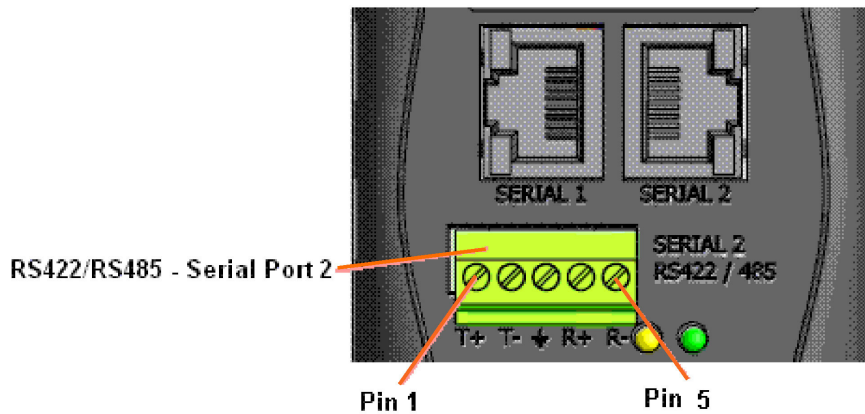
Table 3-2. Serial Screw Terminal Pinout for RS422 (4-Wire)

Pin	Direction	Name	Function
1	Output	TX+	Transmit Data +
2	Output	TX-	Transmit Data -
3	Ground	GND	Signal Ground
4	Input	RX+	Received Data +
5	Input	RX-	Received Data -

Table 3-3. Serial Screw Terminal Pinout for RS485 (2-Wire)

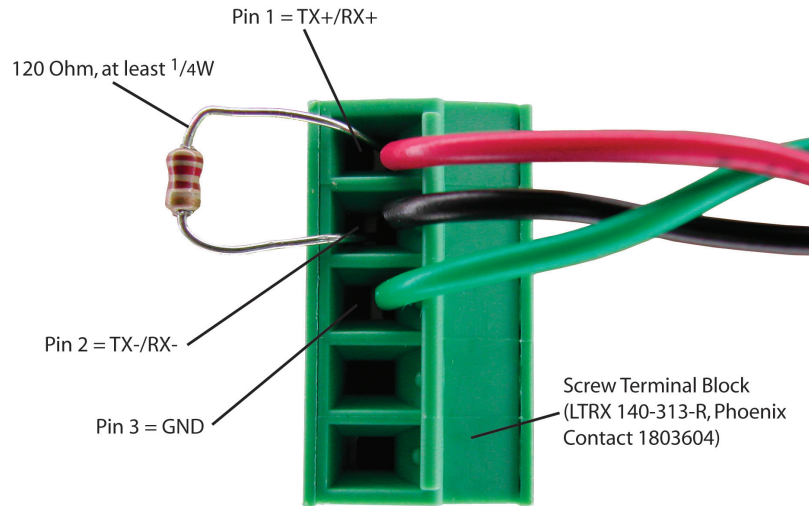
Pin	Direction	Name	Function
1	Bi-directional	TX+/RX+	Transmit Data + and Received Data +
2	Bi-directional	TX-/RX-	Transmit Data - and Received Data -
3	Ground	GND	Signal Ground
4	Not Applicable	Not Applicable	Not Used
5	Not Applicable	Not Applicable	Not Used

Figure 3-4. Screw Terminal Ports



Note: Termination resistors ($R = 120 \text{ Ohm}$) are used to match impedance of a node to the impedance of the transmission (TX) line. Termination resistors should be placed only at the extreme ends of the data line, and no more than two terminations should be placed in any single segment of an RS-485 network. The termination resistors may not be needed for your application.

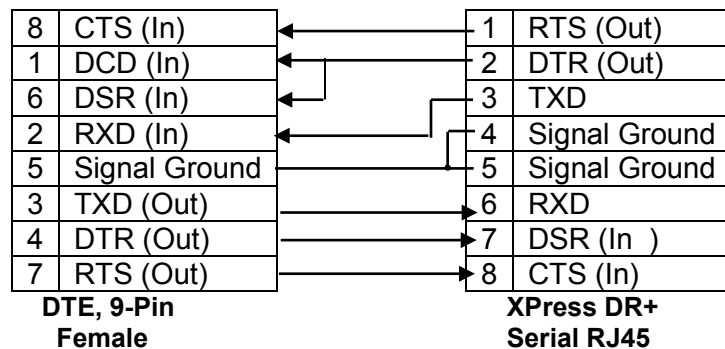
Figure 3-5. Termination Resistor for 2-Wire Connection



9-Pin RS-232 to Serial RJ45 Cable (P/N 500-103)

The included Lantronix (P/N 500-103) RJ45-DB9F serial cable assumes you are connecting a typical PC Com port to the XPress DR+ serial port. This cable is pinned to provide full serial line control to an RS232 DTE device. Lantronix offers a comprehensive list of cables and adapters to simplify device connectivity to the XPress DR+. See [Appendix B: Lantronix Cables and Adapters](#) for a full listing.

Figure 3-6. Lantronix P/N 500-103 RJ45-DB9F Serial Cable Pinout



Ethernet Interface

The XPress DR+ includes a two-port unmanaged Ethernet switch with a future option to migrate to a managed solution.

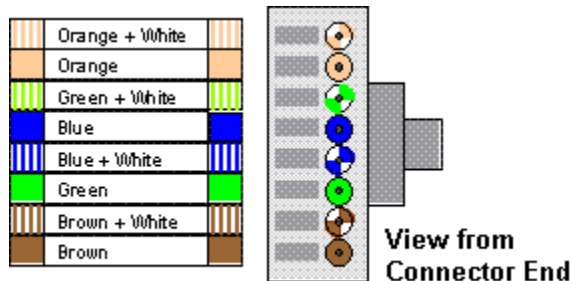
The internal IEEE 802.3-compliant Ethernet switch is non-blocking, using a 1K MAC address lookup table with store-and-forward architecture. The XPress DR+ supports auto-negotiation for 10Base-T or 100Base-TX in full and half-duplex modes, as well as automatic MDI/MDIX crossover, allowing use of both straight-through and crossed Ethernet cables. The unit also supports IEEE 802.1d spanning tree, which protects against the possibility of a network loop.

Table 3-4. Ethernet Interface Signals

Pin	Direction	Name	Function
TX+	Out	1	Transmit Data +
TX-	Out	2	Transmit Data -
RX+	In	3	Differential Ethernet Receive Data +
RX-	In	6	Differential Ethernet Receive Data -

The next drawing shows a typical RJ45 connector. The color is not standard but very typical of an Ethernet patch cable. Pin 1 is located at the top of the connector (orange + white). The view is from the end of the connector.

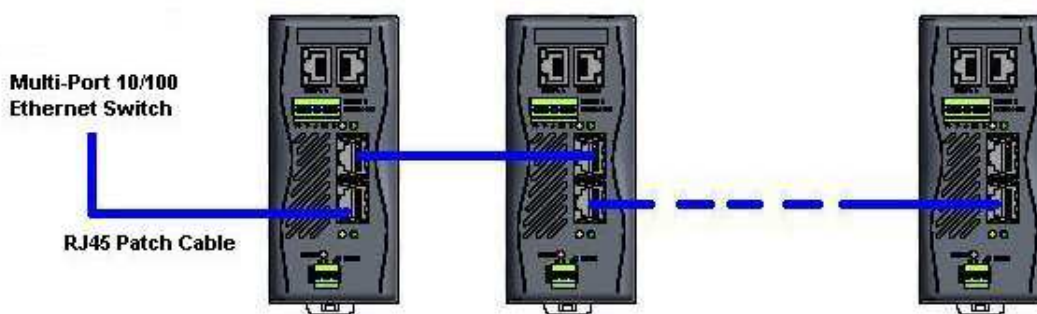
Table 3-5. Typical RJ45 Connector



Multi-Drop Ethernet Connections

Although there are two Ethernet ports, the XPress DR+ only has one MAC address and IP address. Either port can be used as the primary connection with the other used to inter-connect other Ethernet devices or cascade from one XPress DR+ to another.

Figure 3-7. Multi-Drop Ethernet Connections



Power Requirements

As with most industrial automation devices, the XPress DR+ does not ship with a power supply. Its flexible power input circuit allows the product to be powered by any 9-30 VDC or 9-24 VAC power supply that can provide the 2.3-Watt maximum required by the XPress DR+.

In addition to the wide power input range, the XPress DR+ provides:

- ◆ 2K VAC and 2.8K VDC galvanic isolation between the power input and the Ethernet ports
- ◆ 2K VAC and 2.8K VDC galvanic isolation between the power input and the serial ports

Reset Switch

The XPress DR+ includes a hardware reset switch located in the small hole above the power connector. Pressing the reset switch causes a hardware reboot of the XPress DR+. The hardware reset does not reset or change the configuration of the XPress DR+.