EthLinx Pro[1], Pro Duo[2], Pro Quad[4]

User Guide

Document: DM110020485-01EN **Date:** August 29, 2025

A Note on Product Models

This guide covers the entire EthLinx Pro family. Superscript numbers are used to denote features specific to a model:

- **EthLinx Pro[1]:** 1 Serial Channel
- **EthLinx Pro Duo[2]:** 2 Serial Channels
- **EthLinx Pro Quad[4]:** 4 Serial Channels

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1. Introduction

1.1. Welcome

Welcome to the EthLinx Pro! This device is designed to provide a seamless bridge between TCP/IP applications and RS-485 serial communication lines, making it ideal for industrial automation, data logging, manufacture testing and device management.

1.2. Product Overview & Key Features

The EthLinx Pro connects to your computer via a high-speed USB port and appears as a standard network interface. It features one or more independent and electrically isolated RS-485 serial ports, each accessible via a dedicated TCP port. An embedded web server allows for easy configuration and status monitoring.

Key Features:

- USB 2.0 High Speed Interface (480 Mbps)
- 1^1, 2^2, or 4^4 Independent and Isolated RS-485 Channels (Typ. 1.5kV DC, 3kV AC)
- Enhanced Protection Circuitry (GDT and TVS)
- Wide Baud Rate Support (4800 Bd to 15 MBd)
- Software-Enabled Termination and Strong Bus Bias
- Embedded Web Server for Configuration
- Supports 4 Simultaneous TCP Connections per Channel
- Robust Aluminum Enclosure
- Powered via USB Type-C

1.3. Package Contents & System Requirements

Your package includes the EthLinx Pro device, a USB Type-C cable, and one 3-position pluggable terminal block for each serial channel.

System Requirements:

- **Computer:** With an available USB Type-A or Type-C port.
- **Operating System:** Windows Vista or newer (for RNDIS model); Linux/macOS (for CDC-ECM model).
- **Web Browser:** A modern web browser (Chrome, Firefox, Edge).
- **TCP/IP Client Software:** e.g., PuTTY, Tera Term, or custom applications.

2. Getting Started

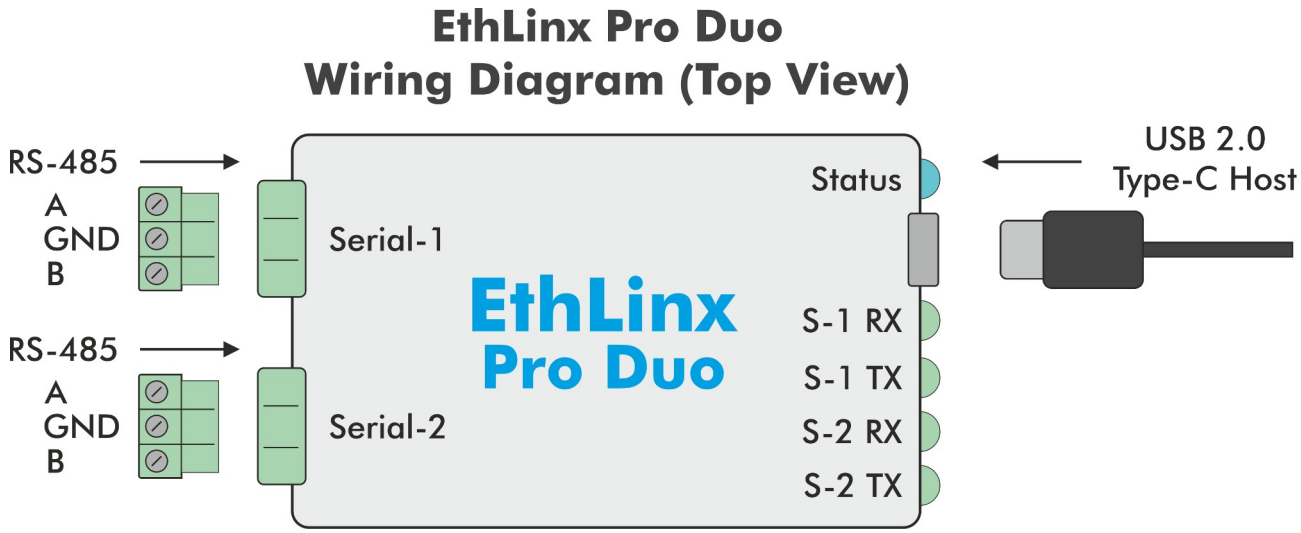

Image 1: Basic Wiring Diagram with serial connections and LED description, EthLinx Pro Duo

2.1. Safety Precautions

- **ESD:** Handle with care, using the grounded enclosure to discharge static potential.
- **Power:** Use only the provided or a recommended high-quality USB Type-C cable.
- **Connections:** Power down the device before wiring the RS-485 lines. Incorrect wiring can cause damage.
- **Servicing:** Do not open the device. Unauthorized modifications will void the warranty.

2.2. Hardware & Software Installation

1. **Connect RS-485 Devices:** Wire your devices to the 3-position terminal blocks (A, B, GND) and plug them into the EthLinx Pro.
2. **Connect USB Cable:** Connect the EthLinx Pro to your computer. The device will power on and show a brief LED startup sequence.
3. **Driver Installation:** In most modern operating systems (Windows, Linux), the necessary network drivers will install automatically. Your computer will recognize the device as a new network adapter.

2.3. Accessing the Web Configuration Interface

The device acts as a DHCP server and will automatically provide an IP address to your computer.

1. Open a web browser.
2. Navigate to one of the following addresses:
    - **Static IP:** `http://192.168.222.1`
    - **Hostname:** `http://ethlinx.tech`

You should now see the "Dashboard" of the embedded web server.

3. Operation and Web Interface

3.1. Web Interface Overview

The web interface is the primary tool for configuring and monitoring your device.

- **Dashboard:** The main landing page with quick links.
- **Settings:** Configure all serial port parameters.
- **Status:** View real-time communication statistics.
- **Device Info:** View hardware details and firmware version.

3.2. Settings Page

This page contains a tab for each available serial channel. The configuration options are identical for all channels.

Parameter	Description	Options / Range	Default
Channel Label	A user-defined name for this channel.	Text string (up to 64 chars)	Serial-X
Baud Rate	The speed of serial communication, in the standard Baud units.	4800 Bd to 15 MBd	115200 Bd
Data Bits	Number of data bits per frame.	7, 8, 9	8
Parity	Method for error checking.	None, Even, Odd	None
Stop Bits	Number of bits to signal frame end.	1, 2	1
Termination	Enables a 120 Ohm termination resistor.	Enabled / Disabled	Disabled
Idle Bus Bias	Enables strong fail-safe biasing resistors.	Enabled / Disabled	Disabled

Note: Not all combinations of Data Bits and Parity are valid. For example, the 9-bit data mode requires Parity to be set to 'None'. The web interface will automatically manage valid selections.

After making changes, click the **"Save Settings For Serial-X"** button for that channel. The settings will be stored to a configuration memory so that it persists. Then the new settings get applied to the Serial interface.

3.3. Status Page

This page displays real-time statistics for data transfer (bytes, packets, rates) and bus errors for all channels. The data is fetched upon page load. A **"Clear Statistics"** button is available to reset all counters.

Besides this button there is another one, „**Restart Device**“ which sends a restart command to the device. The device must be responsive.

3.4. Device Info Page

This page displays static information about your device, including Model Name, Product Code, Unique ID, Firmware Version, and Runtime.

4. Advanced Features & Configuration

4.1. Network Configuration Details

- **DHCP Server:** The device runs a DHCP server that assigns the IP `192.168.222.2` to your computer. The device itself is the gateway at `192.168.222.1`.
- **Hostname Access:** The device can be reached at `ethlinx.tech` (via local DNS) or `ethlinx` or `converter` (via NetBIOS).

4.2. Serial Port Advanced Settings (Termination & Bias)

- **Termination:** Enable this setting if the EthLinx Pro is at one of the physical ends of the RS-485 bus to prevent signal reflections.
- **Idle Bus Bias:** Enable this setting if your RS-485 bus is not maintaining a stable idle state when no devices are transmitting. Typically, only one device on a bus segment should provide strong biasing. Recommended only when having devices wired at a very long wire segment bus.

4.3. Multiple TCP Connections (Spy Mode)

Each serial channel supports up to **4 simultaneous TCP connections**. When data is received on the RS-485 port, it is broadcast to **all** the connected TCP clients. This allows one client to be a primary application while other clients act as a passive logger or "spy".

4.4. Interpreting LED Error States

- **Red Blinking LED:** Indicates a bus error. Common causes include baud rate mismatch, data collisions, framing errors, or excessive electrical noise. Check your settings and wiring.
- **Purple Blinking LED:** Indicates that serial data is being received, but no TCP client is connected to that port. The data is being dropped.

4.5. Data Transmission Considerations

The device has a large internal buffer (16384 Bytes) and manages TCP flow control automatically. Your application has to respect standard TCP windowing to ensure reliable data transfer. The device uses an immediate ACK option so that it can always provide a relevant TCP window value.

4.6. Programmatic Control (API)

The device can be fully controlled programmatically via an HTTP API. For detailed information on endpoints and usage, please refer to the separate **EthLinx Pro - API Reference Guide**.

5. Technical Specifications

Feature	Specification
USB Interface	USB 2.0 High Speed (480 Mbps), Type-C Connector
Serial Channels	1[1], 2[2], or 4[4], RS-485 2-wire, Isolated (1.5kV DC, 3kV AC)
Baud Rates	4800 Bd to 15 MBd
Serial Parameters	7/8/9 Data Bits; None/Even/Odd Parity; 1/2 Stop Bits
Termination	Software-selectable 120 Ohm per channel
Idle Bus Bias	Software-selectable strong 470 Ohm bias per channel
TCP Ports	Serial 1: `11000`, Serial 2: `12000`[2], Serial 3: `13000`[4], Serial 4: `14000`[4]
Max TCP Buffer	16384 Bytes
Power Input	5V DC via USB, Typ. ~170 mA (Idle), Max. ~500 mA (Peak)
Dimensions	80 mm x 50 mm x 20 mm, 67 g
Enclosure	Extruded Aluminum, Black Matte Finish
Operating Temp.	-20°C to +70°C (0°C to +45°C Recommended)

6. Troubleshooting

Issue	Suggestion
LEDs are OFF	Check USB cable and port. Try a different, certified high-quality cable.
Cannot access Web UI	Verify the device appears as a network adapter. Ping ***192.168.222.1***. If no success, refer to the „**PC gets no IP**“ Issue.
No Serial Data	Double-check serial settings (baud, etc.), wiring (A/B lines, Ground), and termination/bias settings.
Data Corruption	Ensure proper termination is enabled only at bus ends. Check for electrical noise sources. Use shielded, twisted-pair cable. Adjust bias and termination settings. Use lower transmission speed, if possible. Check the Ethlinx wire connections, including the Ground.
PC gets no IP	Try disconnecting/reconnecting the USB. On Windows, a computer restart often resolves this. On Linux, try restarting the DHCP client for the interface. Verify the device appears as a network adapter.

7. Regulatory and Warranty Information

This product complies with applicable CE, FCC, RoHS, and WEEE directives. For full details and warranty information, please visit our website. The design aims to meet aspects of IEC 61000-4-2 (ESD), IEC 61000-4-4 (EFT), and IEC 61000-4-5 (Surge).

8. Contact and Support

- **Manufacturer:** NECOSIN Systems s.r.o.
- **Website:** necosin.com
- **Support Email:** support@necosin.com
- **Address:** Nove sady 988/2, 602 00 Brno, Czechia

9. Device Marking

The underside of the device contains information about the product variant:

Product ID	Device Type Explanation
10021485R	**EthLinx Pro** (USB RNDIS Device Class), 1x RS-485 Bus
10022485R	**EthLinx Pro Duo** (USB RNDIS Device Class), 2x RS-485 Bus
10024485R	**EthLinx Pro Quad** (USB RNDIS Device Class), 4x RS-485 Bus
10021485C	**EthLinx Pro** (USB CDC-ECM Device Class), 1x RS-485 Bus
10022485C	**EthLinx Pro Duo** (USB CDC-ECM Device Class), 2x RS-485 Bus
10024485C	**EthLinx Pro Quad** (USB CDC-ECM Device Class), 4x RS-485 Bus

10. Firmware License and Proprietary Notice

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