

The RS232/RS485 to Ethernet Survival Guide

Stop guessing. Use this cheat sheet to select the correct isolation voltage, wire your legacy serial devices correctly, and configure your network without polling timeouts.

1. The Isolation Voltage Cheat Sheet

Unprotected serial lines act as antennas for electromagnetic interference (EMI). Choosing the wrong isolation level will result in destroyed PLCs and blown communication ports.

Isolation Level	When to Use It (Application Scenario)	Risk if Ignored
None (0V)	Clean indoor environments, server rooms, short cable runs (< 5 meters). Device and converter share the exact same power ground.	Ground loops will cause data corruption. A voltage spike will destroy both the converter and the connected device.
1500V (Basic)	Standard factory floors. Devices are in different control panels within the same building . Cable runs up to 100 meters.	Protects against minor electrostatic discharge (ESD) and ground potential differences between panels.
3000V (Enhanced)	Outdoor deployments, solar farms, pump stations, long cable runs (> 100m), or areas near heavy AC motors/VFDs.	Crucial: Protects against induced voltage from nearby lightning strikes and severe EMI. Sacrifices the converter to save your \$5,000 PLC.

2. RS485 Wiring & Termination Rules

RS485 issues account for 80% of "No Communication" errors. Always verify these three physical layer rules before troubleshooting software.

- A/B Polarity:** RS485 uses 2 wires. Unfortunately, manufacturers label them inconsistently. If TX/RX LEDs do not flash, simply swap the **Data+ (A)** and **Data- (B)** wires. This will not damage the hardware.
- The Daisy-Chain Rule:** Never wire RS485 in a "Star" topology. Devices must be wired sequentially from node to node.
- Termination Resistors (120-Ohm):** If your cable run exceeds 200 meters or operates at high baud rates (>19200 bps), signal reflection will corrupt the data packets. You must enable the 120Ω termination resistor at the physical end of the serial bus.

3. The RS232 "Null Modem" Trap

 **DTE vs. DCE Mismatch**

If your RS232 device is physically plugged in but no data is transmitting, you likely have a TX/RX pinout collision.

RS232 devices are either **DTE** (Data Terminal Equipment, like PCs/PLCs) or **DCE** (Data Circuit-Terminating Equipment, like modems). If you connect a DTE device to a DTE converter using a standard straight-through cable, the Transmit (TX) pins will collide. You must use a **Null-Modem (Crossover) Cable** to swap Pin 2 (RX) and Pin 3 (TX).

4. Selecting the Correct Software Operating Mode

Operating Mode	How It Works	Best For...
TCP Server	Converter waits for a PC/SCADA to initiate connection.	Standard local monitoring where SCADA software acts as the client polling the devices.
TCP Client	Converter actively pushes data to a central IP address.	Bypassing IT firewalls. Pushing remote site data to a central Cloud server.
Virtual COM (VCOM)	Maps an IP address to a virtual port (e.g., COM3).	Legacy software that physically cannot understand IP addresses.
Modbus Gateway	Actively translates Modbus TCP (Ethernet) to Modbus RTU (Serial).	Bridging multiple RS485 sensors to modern SCADA/HMI. Crucial: Prevents data collisions using FIFO buffering.

Need help with your specific network topology?

The Valtoris engineering team provides free hardware evaluations.

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