

DIAGNOSTIC INDICATORS — NOT CERTIFICATION LIMITS

Bias values, cable length, device count and vendor design all shift these numbers. The manufacturer's spec always wins.

RS-485 — BACnet MS/TP and Modbus RTU (same wire, same tests)

Measurement	Bus state	Typical / diagnostic	A bad reading suggests
Resistance, A-B	Powered OFF	~60Ω (two 120Ω in parallel)	Much higher = missing terminator; much lower = over-terminated or shorted
Voltage, A-B	Idle	Positive, commonly 1–5 V DC	0 V = no transmitter power or broken cable; at/below ~200 mV = weak or missing bias
Voltage, A-B	Active traffic	Swinging, roughly ±5 V DC	Flat and unchanging during known traffic = no data actually moving
A-gnd / B-gnd	Idle	Roughly –7 V to +12 V	Outside this range = grounding problem or ground loop
Voltage, A-B	Idle (polarity)	A reads positive relative to B	If reversed, A/B are swapped — safe to flip and retest on standard RS-485

LonWorks FT-10 — a different electrical layer; the table above does not apply

Measurement	What it actually tells you
DC voltage, Net A-B, idle	Nothing useful — transformer-coupled, reads ~0 V on healthy and dead segments alike
Resistance, powered off	Unreliable — the terminator is an RC network; the series capacitor makes it drift toward open
Continuity (no power)	Genuinely useful — confirms no open circuit in the run
Short check (no power)	Genuinely useful — confirms no dead short between conductors
A/B polarity	Not applicable — differential Manchester coding is polarity-insensitive by design

FT-10 termination: free topology = one RC terminator, $R1 = 52.3\Omega$, anywhere on the segment.

Doubly-terminated bus = one at each end, $R1 = 105\Omega$. Distance @78 kbps: 500 m free topology / 2700 m bus (Echelon FTT-10A).

Ethernet — BACnet/IP, Modbus TCP, OPC UA

Check	Tool
Cable pinout and continuity, all 8 conductors	Ethernet cable tester — seconds, and far quicker than a DMM
Link established	Switch port link light
Reachability / routing	ping, then tracert — Chapter 19
Port actually open	ping proves the IP layer ONLY — a blocked port looks identical to a dead device

Where a multimeter stops:

Noise, reflections and ringing need an oscilloscope; message-level faults need a protocol analyzer.