

RS-485 & Ethernet Serial Converters 2-Wire or 4-Wire Connections

RS-485 CONNECTIONS FAQ

How Do I Make RS-485 Connections?

A: First check the pinout connections and specifications of the devices you want to connect in order to determine whether you need a “2-wire” RS-485 connection or a “4-wire” RS-485 connection. If you can’t obtain this information before selecting a converter or serial card, select a converter or device which can easily be set to work in either mode by using switches, jumpers or other options.

Most often you will be setting up and connecting a card or converter as a Master to one or more Slave devices. Following are figures for three types of 2-wire Master connections, and one type of 4-wire connection. Usually Termination is not required for baud rates 19.2K or lower at distances up to 1220 m (4000 ft.), so it is not shown in the simplified figures that follow. (See note on page 4 regarding markings and pinouts.)

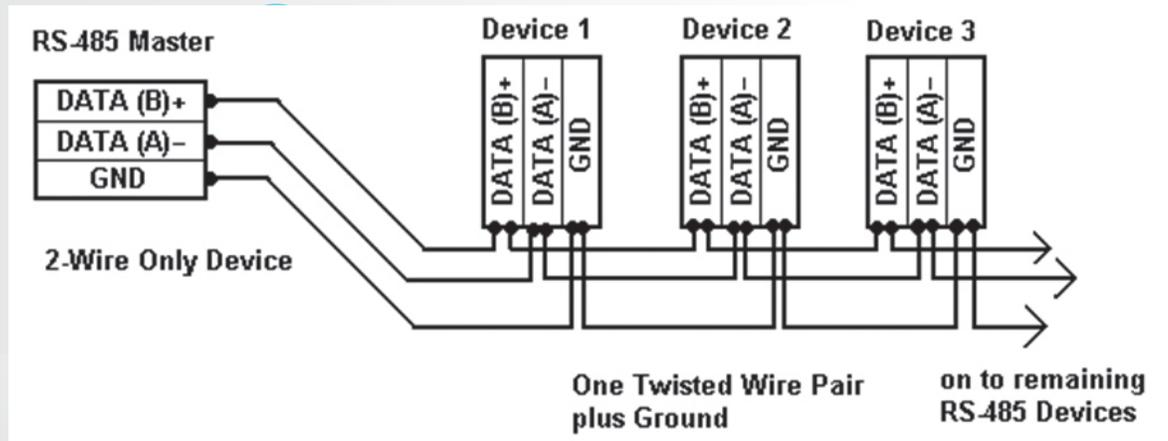


Figure 1. 2-Wire RS-485 Connections

Figure 1 applies to many Ethernet/Serial servers and a few B+B SmartWorx RS-485 converters such as Models 485SD9TB, 485SD9R and 485SD9RJ.

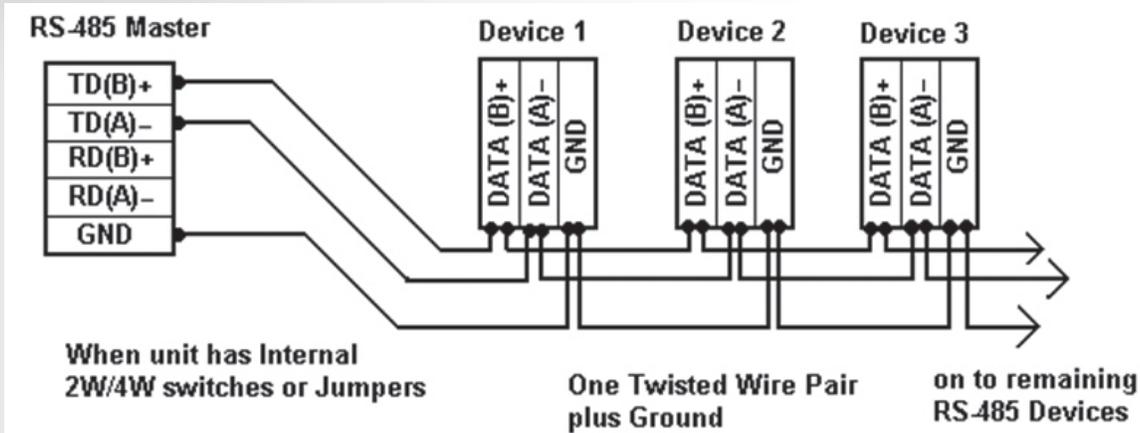


Figure 2. Two-Wire RS-485 Connections

Figure 2 applies to several B+B SmartWorx converters such as Models 485LDRC, 485LDRC9 and 4WSD9R. Two switches are set for 2W or to 2-wire RS-485 Mode.

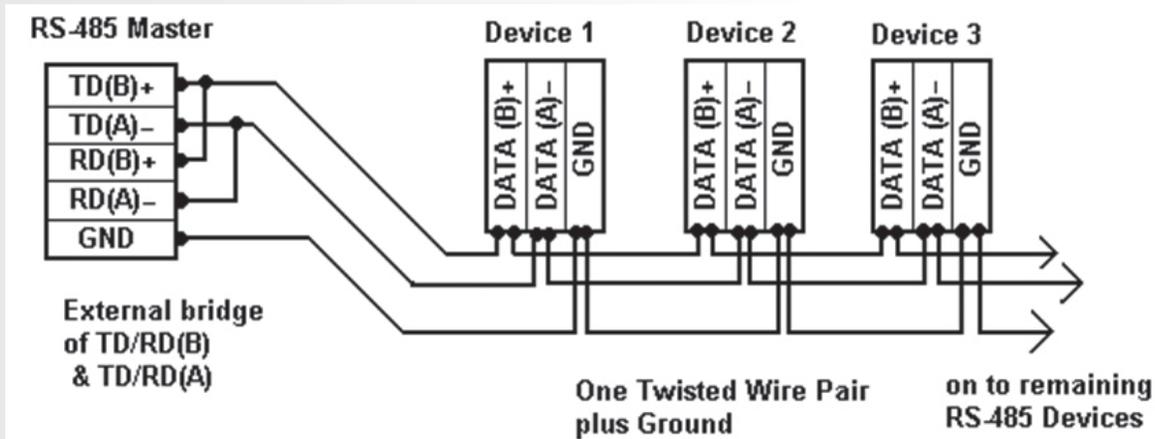


Figure 3. Two-Wire RS-485 Connections

Figure 3 applies to most B+B SmartWorx RS-485 converters or serial cards that can be set for 2-wire or 4-wire operation, and for some 2-wire converters that use the same circuit board for the RS-422 model. Check the data sheet schematic or block diagram. Figure 3 is also used for Repeaters/Optical Isolated Repeaters such as the 485RPTR, 485OP, 485OPDR. An RS-422 device does not tri-state the transmitter, so it cannot use these connections.

Some B+B SmartWorx converters include models 485BAT3, 485CON, 485COSR, 485CSP2, 485TBLED and 485HSPR.

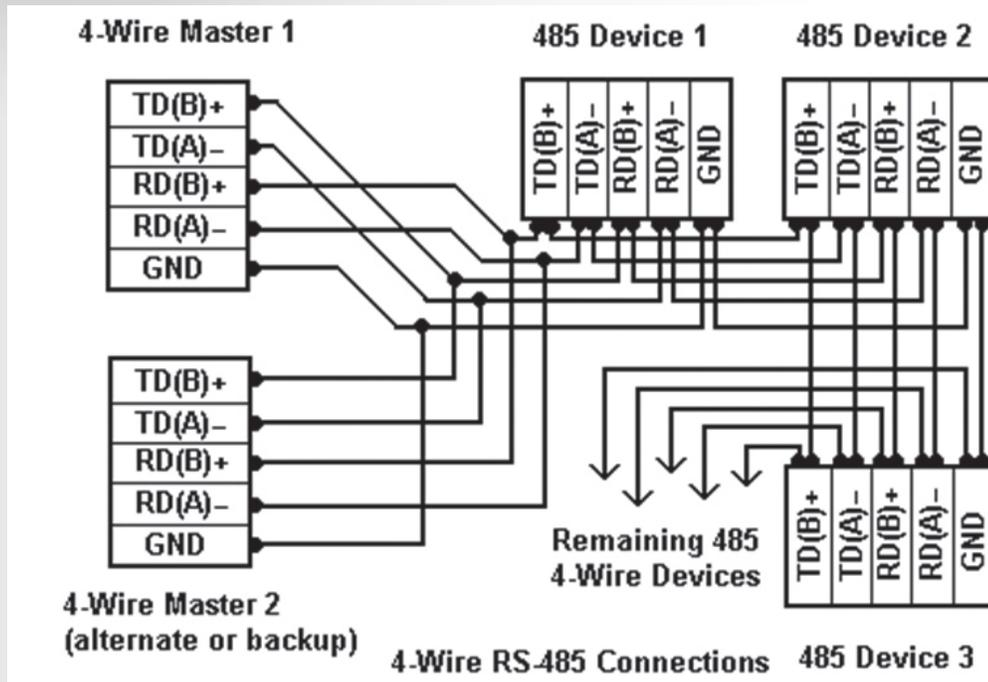
Four-Wire Multi-Master

Figure 4. Four-Wire Multi-Master Connections

Figure 5 – This connection is less common – Master 2 may be anywhere else on the network and may be used for collecting data returned from the devices. It can monitor the data from the devices only, but is not able to monitor the data requests from the other Master without additional connections. Only one Master can talk to the devices at a time, so one Master must stop transmitting for a time (to avoid data collisions) so the other Master can access the same devices, or use some software protocol established for device sharing. When Master 2 is used as backup, the program on Master 2 begins polling the devices when the Slave devices stop responding for a predetermined time.

Note on RS-485 Pinout Markings: Sometimes a device will be marked with the polarity reversed from normal RS-485 standards where the Data A or TD(A)/RD(A) line is (+) and the Data B line or TD(B)/RD(B) is (-). In a system with 2-wire connections, try reversing the lines to see if the device will respond. In a system with 4-wire connections, try reversing the Receive pair polarity and Transmit pair polarity. If the connections are wrong, you won't be able to communicate because the data bits are upside down, but swapping polarity won't damage anything. The marking Rx or Tx may be used instead of TD and RD or in a 2-wire system, TxRx+ and TxRx-, or Dx+ and Dx- for the data lines. Many naming schemes are in use. RS-485 pinouts also have many variations and there is no single standard pinout arrangement or connector type – DB9, DB15, DB25, RJ-11, RJ-12, RJ-45 or DIN connector.

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