CONV422/DB9

DB9 RS232 to RS422 or RS485 serial converter

Simple and easy industrial communications

The CONV422/DB9, unlike other converters can use signal power to run converter components for at least one RS-422 device from any standard RS-232 port of a PC. This makes the CONV422/DB9 one of the most cost effective RS-422 solutions on the market. Use with your standard PC or laptop to control RS-422 devices directly with no special software required. Any standard communications software for your RS-232 serial ports will work. Plugs directly into standard DB9 male RS-232 port that comes with your PC or convert any number of your RS232 ports on a multiple port card with DB9 connectors to RS-422. You can also make a RS-232 device a RS-485 device on a RS-485 network. The CONV422/DB9 can be used to communicate with any 2-wire, half-duplex RS-485 type device or any 4-wire, full-duplex RS-422 or RS-485 devices. CONV422/DB9 supports 4-wire RS-485 and RS-422 communications, which only allows two peer participants (or one master and multiple slaves) but is full-duplex (both peers, or the master and one slave, may talk at the same time.) CONV422/DB9 can also support 2-wire RS-485 if the transmit and receive pins are tied together, but in this configuration it echoes on the RS-232 side. The TD and RD lines of the RS-232 are converted to balanced lines and the RD line is automatically disabled when data is being transmitted to the RS-485 network. CONV422/DB9, when external power is supplied, can support up to 31 RS-485 devices. The converter can transmit and receive transparently at whatever speed the data is flowing, up to 230kbps. At 9600 baud, distances of up to 4000 feet are possible.

Power for the CONV485/DB9 operation is drawn from the RS-232 port DTR and RTS lines and can be used where the communication cable is short. Optional external power of between 5.5VDC and 16VDC at 40mA is all that is required when communicating with multiple devices or long distances. External power is connected via pin eight for voltage and pin five of ground of the RS-422 DB9 connector.

- **Lowest cost RS-422 port for your PC**
- **Maximum data rate of 230.4kbps**
- **No external power required when communicating via a short cable with one device**
- **Simple installation, no need to shut off the PC to connect**
- **Full duplex RS-422/485 or half duplex RS-485**
- **Nothing to configure, no jumpers to set**
- **Automatically adjusts to the speed of the data**
- **Auto RTS built in**
- **Plugs directly in standard PC RS-232**

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RS-422 Full Duplex

The CONV422/DB9 transmit lines connect to the other RS-422 device receive lines of the same polarity (TX+ to RX+, TX- to RX-) and the CONV422/DB9 receive lines connect to the other RS-422 device transmit lines of the same polarity (RX+ to TX+, RX- to TX-)

RS-485 (2-wire) Half Duplex

The CONV422/DB9 transmit & receive lines are connected together at the RS-422 port connector by the user (TX+ to RX+, TX- to RX-). The combined lines connect to the other RS-485 device ('s) lines of the same polarity. The user's software control must enable the RTS signal only during the transmit cycle and then disable RTS to allow the other RS-485 devices to drive the network during transmission. The characters transmitted by the CONV422/DB9 will be echoed to the Converter receiver.

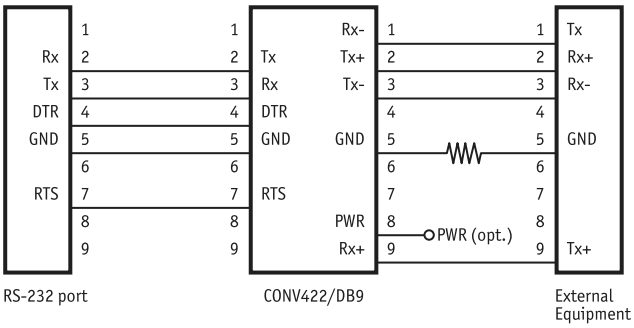
RS-485 (4-wire) Full Duplex

When the CONV422/DB9 is connected at a device that is being used as a "SLAVE" the CONV422/DB9 transmit lines connect to the "MASTER" device receive lines of the same polarity. The transmit lines must be enabled by the RTS signal only during the transmission from the slave unit and disabled when other slave units are talking. The CONV422/DB9 receive lines connect to the "MASTER" device transmit lines of the same polarity.

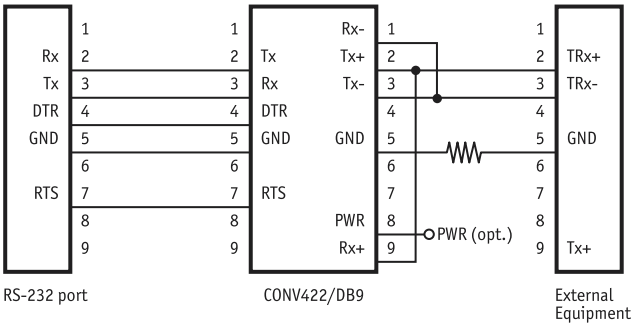
TABLE 1: Connector Pin Assignments

J1, RS-232 DB9 Female	Pin #	J1, RS-422 DB9 Male	Pin #
N/C	1	Receive- (RX-)	1
Transmit Out	2	Transmit+ (Tx+)	2
Receive In	3	Transmit- (Tx-)	3
DTR	4	N/C	4
GND	5	GND	5
NC	6	N/C	6
RTS	7	N/C	7
N/C	8	Optional External Power	8
N/C	9	Receive+ (RX+)	9

Connection Diagram (RS-422 or 4-wire RS-485 Connection)



Connection Diagram (2-wire RS-485 Connection)



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Termination

In order to avoid noise and reflections in long lines, a cable with a characteristic impedance of 120ohm should be selected and the line should be terminated on both ends with 120ohm resistors. For short lines (when the propagation of the signal is less than 4% of the time to transmit a bit), the termination might not be needed. This simplifies the network and eliminates the need of external biasing resistors.

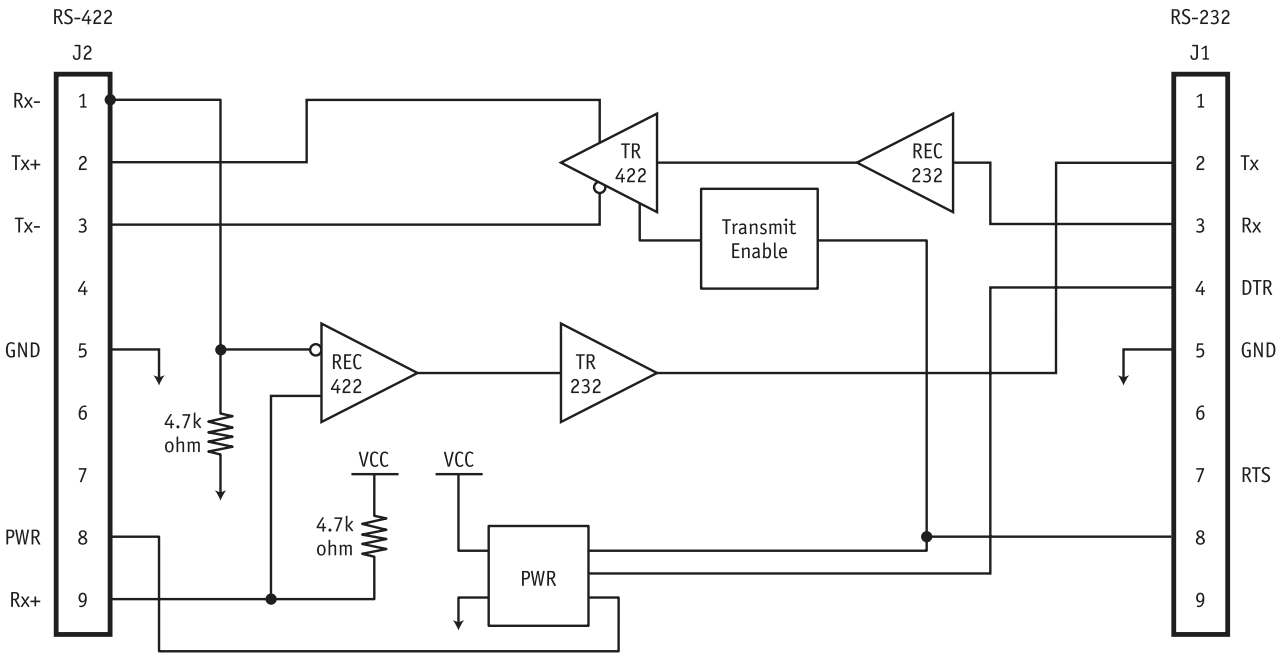
Bias

Two 4.7k ohm biasing resistors on the CONV422/DB9 RS-422 receive lines are provided to avoid erroneous signal reception when all the transmitters are disabled. Whenever the RS-422 transmitter is enabled, the driver has full control of the transmission line. When the network is terminated with 120ohm on both ends of the transmission line and configured with multiple (up to 32) nodes, the total bias in the network should be 620ohm pull up and 620ohm pull down resistors (or lower resistance for a stronger bias). This is to satisfy the minimum requirement of 200mV of differential signal.

Grounding

The operation of an RS-422 system requires proper grounding. The presence of a signal reference for both sides of the interconnected equipment is required. An extra conductor in the cable is an easy way to achieve this connection. Alternatively, you could achieve this by connecting the ground pin of each device to earth ground on each end of the network. A 100ohm ½W resistance must be added between the earth ground and the signal ground on one side of the network to limit any recirculating currents.

Functional Block Diagram



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Power Considerations

The CONV422/DB9 is powered from RS-232 handshake lines RTS and DTR or from an external power source. When powered from the handshake lines, DTR will provide power to the unit and RTS provides both power for the unit, and control for the transmitter. The RS-422 transmitter is enabled only when RTS is high (see Table 2). The RS-422 receiver is always enabled. When the RTS signals are being used to control the RS-422 transmitter, the CONV422/DB9 can be used as an RS-232 to 2- and 4-wire RS-485 converter. The CONV422/DB9 should be powered from external power when the line is terminated with 2x 120ohm resistors and the network is configured with multiple nodes (up to 32).

Control of RTS and DTR

DOS, Linux®: these signals (RTS & DTR) are both high unless your software specifically exerts a control over them to bring them low.

Windows®NT: these signals can be somewhat controlled under "hardware flow control" in the *properties* tab under the *ports* applette. Do not set to "Hardware" flow control. For best results, set to "none".

Windows 95x: these signals are controlled under *Control Panel*, *System*, *Device Manager*, *Ports*, "hardware flow control". Do not set to "hardware" flow control. For best results, set to "none".

TABLE 2: Converter Power and Control Considerations

RTS STATE (Control and Power line) Female	DTR STATE	EXTERNAL POWER	FUNCTIONS
Low	Low	Off	None
Low	High	Off	RS-422/485 RX only
High	High	Off	RS-422/485 RX/TX
High	Low	Off	RS-422/485 RX/TX
High	Don't Care	On	RS-422/485 RX/TX
Low	Don't Care	On	RS-422/485 RX/TX only

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CONV422/DB9 - Technical Specifications

Serial Ports
- One RS-232 to RS422 or RS-485
- 31 external RS-485 devices supported

Throughput
- Serial - 230.4kbps (max.)

Connectors
- One 9-pin DB female RS-232 connection
- One 9-pin DB male RS-422/485 connection

Minimum Sensitivity of RS-422 Receiver
- 200mV

Driver Output Voltage
- Unloaded: 4.1V (peak typical)
- With 50ohm load: 2V p/p (min.)

Common Mode Voltage of RS-422 receiver
- -7V < Vcm < 12V

Bias Resistors
- 4.7k ohm pull-up and 4.7k ohm pull-down on receive lines

ESD Protection
- ±15kV air-gap discharge
- ±4kV contact discharge

Power Requirements
- Not required for single device in shorter distances
- +5.5VDC to +16VDC @ 30 to 40mA to J2 (RS422) pin eight with return via J2 (RS422) pin five for multiple devices and long cabling

Environmental
Operating Temperature
- 0 ° to 60 °C (32 ° to 140 °F)

Humidity
- 90% at STP

OS Support
- Works with any RS-232 device communication software under all OS

Support
- Superior pre- and post sales technical support
- Two year limited warranty

Ordering Guide
CONV422/DB9
- Converter for RS-232 to RS-422

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