

RS485 Converter

technical



WHAT IS A RS232 TO RS485 CONVERTER?

The LEDsynergy RS-232 to RS-485 converter is used to convert RS-232 three wire unbalanced serial communication to RS-485 two wire balanced shared line communication. Typically a computer serial communication port (COM1 / COM2) is a RS232 device and it is through this type of port that communication can be established with an electronic display.

The three wire unbalanced communication of RS232 is:

GND – Ground – This is the common ground of RS232 signals.

TX – Transmit – Transmission from the serial communication port. This is the voltage in respect to the signal ground and is negative if the line is idle and alternate between that negative level and a positive level when data is sent with a magnitude of ± 5 to ± 15 volts.

RX – Receive – Receipt of transmission from external device to the serial communication port.

The two wire balanced communication of RS485 is:

A – Non-inverted differential terminal A

B – Inverted differential terminal B

In a balanced differential system the voltage produced by the driver appears across a pair of signal lines that transmit only one signal. A balanced line driver will produce a voltage from 2 to 6 volts across its A and B output terminals.

A balanced differential line receiver senses the voltage state of the transmission line across two signal input lines, A and B.

When the A terminal of the driver is negative with respect to the B terminal, the line is in the binary 1 or OFF state.

When the A terminal of the driver is positive with respect to the B terminal, the line is in the binary 0 or ON state.

WHAT IS THE RS232 TO RS485 CONVERTER CAPABLE OF DOING?

The RS232 to RS485 converter is capable of connecting many signs together on the same line and with no conflicts. It allows a balanced transmission line to be shared in a party line or multidrop mode. As many as 32 driver/ receiver pairs can share a multidrop network.

It has been specifically designed for multipoint transmission on long bus lines in noisy environments.

RS232 to RS485 converter – front view



RS232 to RS485 converter – rear view



EXTERNAL DESCRIPTION OF CONVERTER

A look at the front of the converter will show 3 LED (Light Emitting Diode) Indicators:

Power – The power indicator displays that the converter has power connected to it.

TX – Transmit indicator – Will light up when there is a transmission from the converter.

RX – Receive indicator – Will light up when there is a transmission received from a device on the line.

The back of the converter reveals 3 connectors:

12VDC – This connector

RS232 – DB9 female type connector. Connected to a RS232 serial communication port, typically the communication port of a PC

RS485 – DB9 male type connector. Connected to the two wire balanced transmission line, typically connected to a number of electronic displays.

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FEATURES OF THE RS232 TO RS485 CONVERTER

Transient Protection

The RS232 to RS485 converter is protected against unwanted transients by means of optical-isolation. This separates the signal reference from any fixed ground. An optical isolator is an integrated circuit that converts the electrical signal to light and back again, thereby eliminating electrical continuity. The entire isolated circuitry floats to the level of the transient without disrupting data communications. This type of isolation is effective against common mode transients.

The power supply section of the circuitry is isolated using transformer type isolation, namely a DC to DC converter.

In practice this means that the RS232 to RS485 converter is less susceptible to electrical noise, RF interference, and immune to voltage and ground differentials between two separate areas.

Auto Sensing

As described earlier, RS485 is a two wire differential / balanced communication system. Therefore it is possible to either transmit or receive at any one time on the balanced line. So the RS485 converter has in effect two modes of operation, either transmit or receive.

In transmit mode, the RS485 output is enabled, or voltage is placed on the transmission line to enable transmission.

In receive mode, the RS485 output is disabled, or it waits for voltage to be placed on the line from another RS485 device. In effect it is "listening" to the line awaiting a response transmission from a RS485 device on the line. In many RS485 converters this switching from Transmit to Receive mode is done manually via the use of the DTR (Data Terminal Ready) pin on the RS232 serial communication port.

This means that a software programmers would have to write routines in their software code to enable the RS485 converter to operate correctly. Unfortunately, high level programming languages do not give direct access to these parameters and therefore it becomes difficult to switch the RS485 converter accurately, without any timing errors or loss of part or all of a transmission received as a reply on the transmission line.

Auto Sensing automatically detects the end of transmission onto the transmission line and then switches over into receive or "listen" mode for the reply from a RS485 device on the line. This means software programmers do not have to write specific routines in their code to enable the correct operation of the RS485 converter since it is automatically done by the Auto Sensing feature. Software developers therefore are able to save on product development time.

External Power Supply Unit

Each RS232 to RS485 converter comes with its own external European Standard power supply unit. This makes the converter unit less cumbersome and more aesthetically pleasing. The unit is also more reliable and better suited to a larger variety of applications.

