



# Integrity Instruments Incorporated

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## INTEGRITY INSTRUMENTS RS-485 and RS-422

### RS-485

RS-485 by definition is a balanced interface that supports multi-point connections for typically up to 255 nodes, which is to say 255 different devices on the same link. It is very tolerant of electrical noise because it is a balanced differential signal and as such makes it an ideal communication device for harsh noisy environments as found in industrial and manufacturing complexes. This also allows cable lengths of up to 4,000 feet and speeds potentially up to 10Mb.p.s. Connections are normally “daisychained” together and terminated with a resistor at the extreme ends of the daisychain. Unlike RS-232 there is no specific connector assigned for RS-485. Connections are typically made to terminal strips which easily facilitates the daisychain type connection.

In the two wire mode data is both sent and received on the same differential pair, which is half duplex transmission. Software controlling the devices on the 485 link must be capable of handling this situation. Devices on the RS-485 link normally have an address so that communications can be handled easily. At present there is no specific communication protocol suggested or assigned for controlling the communications on an RS-485 link. Consequently many manufacturers use communications protocol to fit their products needs or requirements. On the other hand other suppliers have used or tailored their products to use existing RS-485 protocols. Mod-bus is one of these. Many times this is “convenient” or is requested by end users as they are familiar with the mod-bus operating system.

Signal characteristics for two wire (A and B) RS-485:

DC Voltage	B > A	A > B
Binary state	1	0
Signal condition	Mark	Space
Signal function	Off	On
Driver output voltage level	A +1 volt B +4 volt	A +4 volt B +1 volt

The difference between the A and B signals at the driver is typically 3 volts, and cannot be below 1.5 volts, and not above 5 volts. The difference at the receiver must be at least .2 volts between the A and B signals and neither of the lines can exceed -7 to + 12 volts.

Transmission distances for the RS-485 communications can be typically 4,000 feet. The distance however is dependent on several factors such as wire gauge size, shielding, and baud rates. Belden wire for example, make “special” cable specifically for RS-485 data transmission. Belden #9841 and #9463 are two such cables.



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## RS-422

RS-422 has the same electronic characteristics as RS-485. RS-422 however uses two pair of wires, one for transmit data and one for the receive data. This makes the RS-422 communications full duplex as it can both send and receive at the same time. RS-422 can be wired for multi-nodes, but it is generally “messy” as the entire node transmit lines are tied together and connected to a host receive, and similarly the entire receive nodes are tied together and connected to a host transmit. Generally RS-422 is used as a point to point system where full duplex is required over a long range. A typical application would be to extend an RS-232 simplex connection so long data transmission distances could be achieved.