



# What is EIA – 232, 422, & 485?

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In mission-critical IA applications, every link in the data chain must be reliable. Cable is often the weak link in a poorly designed IA network. Incorrect cable can result in lost or corrupted data, damaged equipment, invalid monitoring results, scrapped work, lost time and even operator injury. Take time to make sure you pick the best cable for your industrial application.

## **EIA-232**

## **EIA-422**

## **EIA-485**

**EIA-232 (also called RS-232)** - Oldest common standard for serial communication.

There are two types of devices, Data Terminal Equipment (DTE) and Data Communications Equipment (DCE). EIA-232 defines a set of signals for connecting DTE equipment to DCE equipment. The signals are wired straight through for DTE-DCE.

DTE refers to terminals, printers and computers that are at the end of the data chain. These devices display information in ways humans can read.

DCE refers to Modems, CSUs/DSUs and similar equipment that connect serial cables to telecommunications or phone lines.

Straight-through cables connect computers or terminals to modems. Null modem cables connect two computers together, eliminating the need for modems. Null modem cables should cross all the signals over in a prescribed manner, however many commercially made "Null modem" cables do not follow the prescribed standard fully or correctly.

The EIA-232 standard includes one transmit wire, one receive wire and a single reference ground for transmit, receive and all hardware control signals. It is used for inexpensive, relatively slower communications for short distances. Other characteristics:

- Data rates of up to 115K (some special chips can support faster speeds) for short distances but speed decreases with distance; practical limits are usually 9600-38400 baud with longer cable runs
- Distances from 50-100 feet, depending on environment (or 140 feet with low capacitance cable such as CAT5)
- Can only be used for point-to-point communications

**EIA-422 (also called RS-422)** – Newer standard which addresses the major limitations of EIA-232.

EIA-422 uses balanced signals (Transmit + and Transmit -, Receive + and Receive -) to allow reliable data transmission at higher speeds and for longer distances than EIA-232.

EIA-422 can be used in a limited manner for multi-drop applications, but is primarily intended for point-to-point communications. (The transmitters are always on, so only one transmitter can be on at a network at a time.) Other characteristics:

- Data rates of up to 10M.
- Distances up to 4000 feet.
- Recommended for point-to-point communications, limited multi-drop capability

**EIA-485 (also called RS-485)** – Extension of the EIA-422 standard to allow for true multi-point communications between devices on a single wire.

EIA-485 allows up to 32 drivers and receivers to be on a single two-wire bus. With serial repeaters or special drivers, this number can be extended to hundreds or thousands of nodes. EIA-485 chipsets have the ability to turn their (tri-stated) transmitters on and off very quickly, so multiple transmitters can be attached to the network and activate as necessary. Because long idle times are not required the network can be used at very high utilization rates. Characteristics:

- Data rates of up to 10M
- Distances of up to 4000 feet
- Recommended for use when multi-point communications are required