



Data Communications



What is MODBUS 485 Communication?

RS-485 is also known as TIA-485 (TIA=Telecommunications Industry Association). RS had been used as an abbreviation for Recommended Standard, but has been dropped by the TIA, yet endures in industry shorthand today. The TIA-485 standard defines the electrical characteristics of drivers and receivers for use in serial communications. Multiple receivers may be connected to a network in a linear multidrop bus. TIA-485 is used in local networks and multidrop communication links using differential signaling over twisted pair. TIA-485 can be used to drive data at rates up to 10Mbit/s at distances up to 4000 ft (Slower data rates are required for longer distances). TIA-485 is often used in building automation as a simple bus wiring ideal for joining remote devices. TIA-485 does not define a communications protocol, merely an electrical interface.

Modbus protocol's are available for serial communication known as Modbus RTU and Modbus ASCII and for Ethernet communication known as Modbus TCP or TCP/iP. Communications protocols are a method used for transmitting information over serial lines between electronic devices. Modbus RTU is a serial communication protocol developed by Modicon® who produced the first programmable logic controllers (PLC's). The device requesting the information over serial lines is called "The Master or the Modbus Master". The devices supplying the information to the Master are known as the slaves. There is a limit of 246 slaves on a Modbus network which are addressed from 1 to 247. The Master can write information to the slaves.

Modbus TCP or TCP/iP is a protocol which allows a large number of concurrent connections, so the initiator of the communication can decide whether to reconnect or use the existing connection. TCP/iP allows an individual transaction to be enclosed within a connection which can be identified, supervised and/or cancelled without requiring specific action of the client-server applications.

One of the most attractive aspects of the Modbus protocol is that it is an open protocol. Any manufacturer can build the Modbus protocol into their equipment without paying a royalty. It has become a standard for industrial communications in industry and is now the most widely available royalty free protocol used to connect industrial devices. Modbus is often used to transmit signals from instrumentation and control devices to a main controller. It is very commonly used to allow a supervisory computer with remote terminal unit (RTU).

Data bits are transmitted as either a positive or negative voltage signifying either a 1 or 0 used to create bytes and eventually words. Typical Modbus transmission speeds are 9600 bits per second (Baud). Each slave in the network is assigned an unique address from 1 to 247. When the master requests data, the first byte it sends is the slave address. Modbus uses this method so that each slave can determine immediately if the message applies to it or should be ignored.

Cyclic Redundancy Checking (CRC) is used as a means to confirm the communication sent and signify an error if it occurs. This is achieved by adding two bytes at the end of every message to calculate the CRC. Both the sending device and the receiving device calculate the CRC and compare the results. The CRC is calculated using every byte within the message. If one byte of data has been corrupted during transmission of the message the CRC values will not agree and an error will result.

A Modbus map is a list of the slave devices that define the network, what the data is, where the data is stored and how the data is stored. Devices can be built with a fixed map defined by the manufacturer or a programmable map to fit the needs of the control system architecture.