



Tech-note

Modbus TCP Server Driver for JMobile

This Technical Note describes the JMobile implementation of the Modbus TCP Server protocol. Using this communication driver, multiple HMI panels acting as Servers can be connected to a Modbus TCP network. A subset of the standard Modbus function codes has been implemented to allow for an easy and efficient information flow between the Clients on the network and the Panel Servers.

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Modbus TCP Server Driver

The Modbus TCP Server communication driver lets you connect the panel as a Server in a Modbus TCP network. It is possible for Modbus TCP Clients to connect then to multiple HMI panels acting as Servers. The information exchange will use standard Modbus messages over TCP/IP. This approach will also offer an interesting way to connect the HMI panels to SCADA systems through the universally supported Modbus TCP communication protocol.

Principle of operation

This communication driver will implement a Modbus TCP Server unit in HMI device. A subset of the complete range of Modbus Function Codes will be supported. The available Function Codes will allow the transfer of data between Clients on the TCP network and the Server.

The diagram in the following Figure shows the system architecture. Note that the panel is actually simulating the communication interface of a PLC: it has two data types (Coils and Registers) that are respectively Boolean and 16 bit integers.

The panel will always access data in its internal memory. Data can be transferred to and from the Modbus Client only on the initiative of the Client itself.

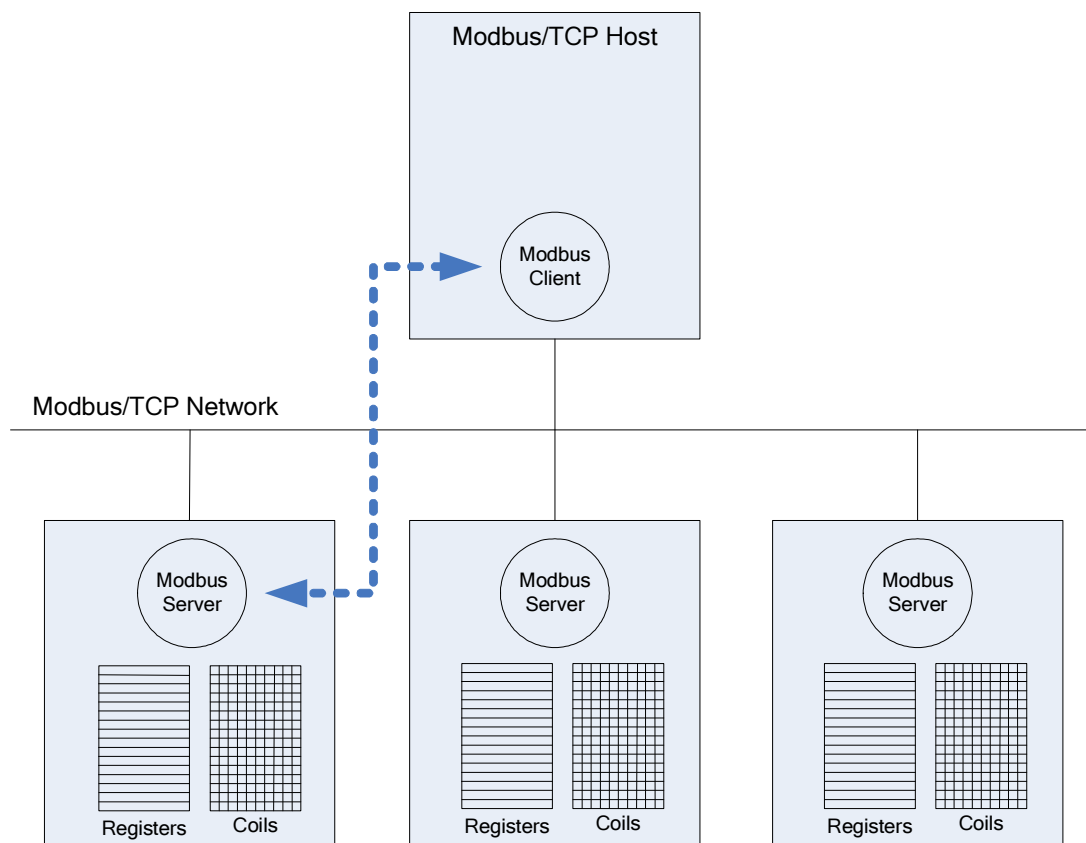


Figure 1 – System Architecture

Settings

Protocol Editor Settings

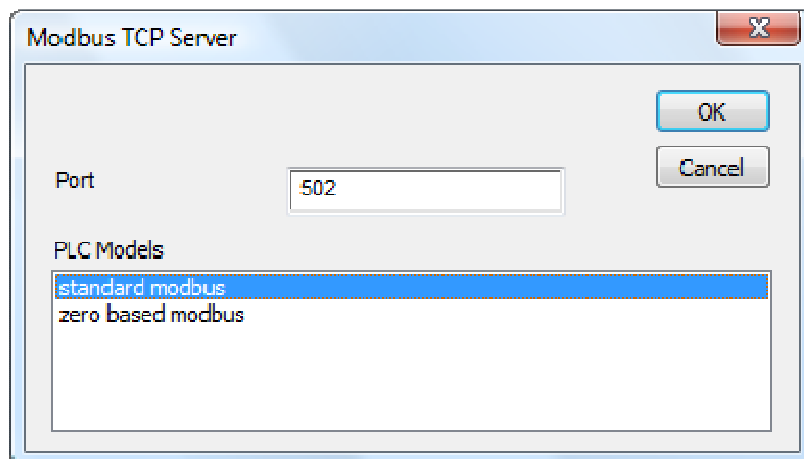


Figure 2

Port

By default, the Modbus TCP protocol uses port 502 for communication with the nodes in the network. Unless your network uses a different port you should leave the Port setting to the default value of 502 otherwise set it to the value expected by your Modbus TCP network.

PLC Models

The Controller Setup dialog box allows you to select between two different flavours of Modbus TCP. You can select the flavour most appropriate for your needs. The 'Standard Modbus' model type implements a Holding Register range of between 400001 and 401098 and an Output Coils range of between 1 and 9998. The "Zero based Modbus" model type, on the other hand, implements a Holding Register range of between 400000 and 401097 and an Output Coils range of between 0 and 9997. Please note that the address range used in the Modbus frames will always be respectively between 0 and 1097 for the Holding Registers and between 0 and 9997 for Coils.

Communication Status

The panel is a Server station in the Modbus TCP network. The current implementation of the protocol will not report any communication error code, unless the standard communication error codes related to the proper driver loading.

Implementation Details

This Modbus TCP Server implementation supports only a subset of the standard Modbus Function Codes. Only the Function Codes necessary for the data exchange between the HMI and a Modbus TCP Client have been implemented.

The supported Function Codes are listed in the table below.

Code	Function	Description
01	Read Coil Status	Reads multiple bits in the Panel Coil area
02	Read Input Status	Reads multiple bits in the Panel Coil area
03	Read Holding Registers	Read multiple Panel Registers
03	Read Input Registers	Read multiple Panel Registers
05	Force Single Coil	Forces a single Panel Coil to either ON or OFF
06	Preset Single Register	Presets a value in a Panel Register
15	Force Multiple Coils	Forces multiple Panel Coils to either ON or OFF
16	Preset Multiple Registers	Presets value in multiple Panel Registers

The panel will return the Exception Code 01 (Illegal Function) if the Function Code received in the query is not supported.

The amount of memory available in the panel is as follows:

Data Type	Type	Range
Coils	Bit	0 – 9997
Registers	Word	0 – 1097

The panel protocol will return the Exception Code 02 (Illegal Data Address) if the Data Address received in the query exceeds the predefined data ranges.

Please note that for both PLC models available the 'Read Coil Status' and 'Read Input Status' function codes both access the same 'Coil' memory area in the panel memory. Also, the 'Read Holding Registers' and 'Read Input Registers' function codes both access the same 'Register' area in the Panel memory.

Please note that a single Panel Modbus TCP Server can only support a maximum of 3 concurrent connections. This means that up to 3 Clients could be connected to a Panel Modbus TCP Server at the same time. However, a 4th Client, should it attempt to connect while the other 3 Clients are connected, will be unable to do so.