User documentation:

CoDeSys V2.3

ModBusTCPSrv.lib

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1 General information

The MODBUS protocol is a client-server communication protocol for the simple exchange of data between intelligent devices. It was developed by MODICON and has established itself as an industrial standard.

The library ModbusTCPSrv.lib was implemented for the programming system „CoDeSys“ from 3S – Smart Software Solutions GmbH.

It is based on the documents

- “Modbus_Messaging_Implementation_Guide_V1_0b.pdf” und
- “Modbus_Application_Protocol_V1_1b.pdf”

which are both available for download on the web page www.modbus.org.

The library implements the functions

- FC1 Read Coils
- FC2 Read Discrete inputs
- FC3 Read Holding Registers
- FC5 Write Single Coil
- FC6 Write Single Register
- FC15 Write Multiple Coils
- FC16 Write Multiple Registers
- FC23 Read Write Multiple Registers

Separate data areas can be specified for bit access (FC1, FC2, FC5 und FC15) and 16-bit access (FC3, FC6, FC16 und FC23).

The MODBUS library is based on the libraries SysLibSockets.lib (TCP-connections) and SysLibCallbacks.lib (system calls). Both are delivered along with a 3S runtime system (e.g. SoftPLC).

With the library ModbusTCPSrv.lib a PLC is able to answer the requests of a ModBus Client. The user just has to provide 2 data areas the library will work with. So its possible to exchange data with a ModBus client without knowing the protocol itself.

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2 Using the library

In order to be able to use the MODBUS library in a CoDeSys application (PLC program) it has to be inserted.

This is done by opening the Library Manager and choosing “Insert -> Additional library…“.

Insert the ModBusTCPSrv.lib. The system libraries “SysLibCallback.lib“ and “SysLibSockets.lib“ should be inserted automatically.

Only the global function block instance g_aModBusServer[0] of the library can be used by the application. All other functions are used internally by the library itself as only the library can make sensible use of them.

The global function block instance g_aModBusServer[0]

The implementation of the ModBus Server only requires the call of this global instance of function block MODBUSSERVER_TCPIP.

Function block inputs:

- wPort: WORD;
- pBitData: POINTER TO ARRAY OF BYTE;
- wMaxBitData: WORD;
- pWorkingData: POINTER TO ARRAY OF WORD;
- wMaxWorkingData: WORD;
- bEnableModSrv: BOOL;

The following parameters have to be passed:

- wPort: Number of the port on which the server receives telegrams. The ModBus protocol specification intends port 502 to be the standard port which must be supported by all ModBus devices. So normally here the constant 502 can be passed, which is also the default value.
- pBitData: Address of the data area for bit access via FC1, FC2, FC5 and FC15 (calculation via ADR()).
- wMaxBitData: Size of the data area for bit access. Default: 1024 Bytes.
- pWorkingData: Address of the data area for 16-bit access via FC3, FC4, FC6, FC16 and FC23 (calculation via ADR()).
- wMaxBitData: Size of the data area for 16-bit access. Default: 1024 Words.
- bEnableModSrv: Boolean value for activating the server. Default: TRUE.

Now the server waits for ModBus clients requests. Per default at most 16 client connections (and thus ModBus functions) can be handled at the same time (global constant MAXCLIENTCONNECTIONS). Always when this number is exceeded, the server terminates any client connection in order to get able to respond to the new request. There is no priority-controlled distinction of the clients.

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3 Example project ModbusTCPSlave(Server) Example.pro

The sample project provided with the library contains a call of the global instance of function block MODBUSSERVER_TCPIP:

g_aModBusServer[0](Port := 502, pBitData:=ADR(awModbusData) , pWorkingData:= ADR(awModbusData));

Modify the Port parameter if the port number should be another than the ModBus standard (Port 502). The data area of the server (array awModbusData) has a size of 1024 bytes.

For all ModBus FC's an array with a size of 512 Words is used as data area (awModbusData).

After having loaded and started the project on the PLC, the server waits for ModBus client requests on the specified port.

By setting the flag bSimulate, all values in the data area will be incremented by 1 each 100 ms as far as the client does not modify any value. The flag bReset serves for re-initialization of the data area with 0.

In the visualization PLC_VISU a table shows the content of the data area. Two further buttons allow a convenient operating of the above mentioned flags.

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Change History

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0.1	Issued	FH	23.04.2007
0.2	Formal Review + English version issued	MN	04.05.2007
0.3	Validation of content	AF	15.05.2007
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