When legacy automation systems are expanded or modernized, operators are often left with a heterogeneous landscape. Open, standardized communication protocols must be used if the individual systems are to be combined to a comprehensive, high-performance system. MODBUS/TCP is a convenient way of integrating SIMATIC automation systems into multi-vendor landscapes.

The challenge
MODBUS is an open protocol used around the world and supported by many different manufacturers. Along with MODBUS, MODBUS/TCP was developed for use in modern networks. This protocol now ranks as an open Internet draft standard introduced to IETF, the Internet Engineering Task Force responsible for Internet standardization. As a result, manufacturers and users everywhere are free to implement this open protocol, and many leading manufacturers have already taken advantage of this opportunity.

With the increasing popularity of Ethernet communications in both industry and offices, MODBUS/TCP is enjoying an increasingly broad use in all industries. In particular, heterogeneous system landscapes are typical areas of application.

SIMATIC systems on MODBUS/TCP networks
Networking SIMATIC systems to other systems via MODBUS Industrial Ethernet is a very attractive option, especially when

- SIMATIC automation systems are being used to expand or modernize legacy configurations
- controllers and systems from multiple vendors are being networked (including when constructing new plants)

So far, however, SIMATIC systems didn’t feature MODBUS/TCP for Industrial Ethernet as a standard. Therefore we have now designed an interface solution.

Good reasons for MODBUS/TCP:
- Multi-vendor systems can be easily linked to SIMATIC automation systems by Industrial Ethernet
- Step-by-step expansion or modernization of legacy systems with the latest SIMATIC technology is highly cost-effective
- You can rely on dependable, Siemens-quality support
- Using the MODBUS function block requires no specific expertise
- You benefit from the familiar look and feel of SIMATIC engineering of STEP 7 and PCS 7
- For PN-CPUs, a Wizard is used for configuration
Our solution

MODBUS Versions

MODBUS block for CPs
This MODBUS version is applicable to SIMATIC S7 300 and 400 PLCs. A CP343-1 or CP443-1 is additionally required for the MODBUS communication.

MODBUS block for PN PLCs
This MODBUS version is applicable to SIMATIC S7 PN PLCs and ET200S PN PLCs. In this case, the integrated PN-interface is used for the MODBUS communication.

MODBUS block with redundancy functionality
This MODBUS version is applicable to SIMATIC S7 400H systems. A CP443-1 is additionally required for every subsystem for the MODBUS communication.

Range of Functions

Client/Server
The server mode as well as the client mode is supported. For the server mode, please note that not all SIMATIC PN PLCs support port 502 for the communication.

MODBUS services in accordance with the specification
All MODBUS versions support conformance class 0 with the function codes 3 and 16. The 2nd version also supports conformance class 1 (only for PN-CPUs).

Redundancy
The block with redundancy function provides the possibility to establish a redundant communication. If one connection is interrupted, the block automatically switches to another connection. Depending on the partner, the redundancy can be created either one-sided or double-sided.

Mode of Operation

Native TCP connections are established for the MODBUS communication between SIMATIC stations and other MODBUS partners. In this case, the standard functions of the SIMATIC S7 library are used (AG_SEND, AG_RECV for the CP versions and T blocks for the PN PLC versions). All MODBUS blocks have multi-instance capability.

Hardware Requirements
For the current hardware requirements for the different MODBUS versions see: www.siemens.com/s7modbus

Software Requirements
- SIMATIC STEP 7 version 5.3 or higher for the CP versions of the MODBUS blocks and
- SIMATIC STEP 7 version 5.4 SP4 or higher for the PN PLC versions of the MODBUS blocks

Simple Configuration
The configuration is carried out with the standard tool SIMATIC STEP 7. For the MODBUS block for the PN PLCs, there is the additional option of a Wizzard which provides the possibility of a very fast and comfortable configuration.

Scope of Delivery and Documentation
Included in delivery are:
- SIMATIC S7 library with the relevant MODBUS block
- Functionblock onlinehelp (F1)
- STEP 7 sample project
- Manual (PDF format) in German and English

The installation is done with a setup program.

Order Data
S7 OpenMODBUS/TCP Single License
MODBUS communication via CPs; order number: 2XV9450-1MB00

S7 OpenMODBUS/TCP RED Single License
Redundant MODBUS communication via CPs (S7-400H system); order number: 2XV9450-1MB01

S7 OpenMODBUS/TCP PN PLC Single License
MODBUS communication via the integrated PN-interface; order number: 2XV9450-1MB02