

Generating the Parameters for the Modbus TCP Communication using the Modbus TCP Wizard

Modbus TCP Wizard

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SIMATIC Modbus TCP Wizard

Modbus TCP Kommunikation

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Warranty and Liability

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1 Automation Task

1.1 Overview

Introduction

However, the configuration of the Modbus TCP communication via integrated PROFINET interface is only possible using the function blocks of the Modbus TCP communication.

The connection description does not occur via a configuration (in NetPro), therefore the parameters for each connection must be specified in a data block.

2 Automation Solution

2.1 Overview

The Automation solution

Using the “Modbus TCP Wizard” tool enables simple and clear specification of the connection parameters. The tool then exports a DB with all parameters into your STEP 7 project.

Advantage of this solution

The Modbus TCP Wizard provides the following advantages:

- simplified generation of new connection descriptions
- reduced susceptibility to errors
- reduces the parameter input to actually required parameters
- existing connections can be uploaded (upload) and represented
- Overview of the connection can be exported in a *.csv file.
- an existing connection can be used as template for a new connection (copy)
- an existing connection can be changed (change)

2.2 Required Hardware and Software Components

The application was generated with the following components:

Standard software components

Table 2-1

Component	No.	MLFB / order number	Note
SIMATIC STEP 7 Version 5.4 + SP1	1	6ES7810-4CC08-0YA5	Or higher
Microsoft Visual Studio .NET	1		

Additional software components

Operating the OC Wizard requires the installation of .NET Framework on your PG/PC. After Installation of STEP 7 at your PC this .NET Framework is already installed. Therefore it is not necessary to install .Net Framework manually.

Sample files and projects

The following list includes all files and projects that are used in this example.

Table 2-2

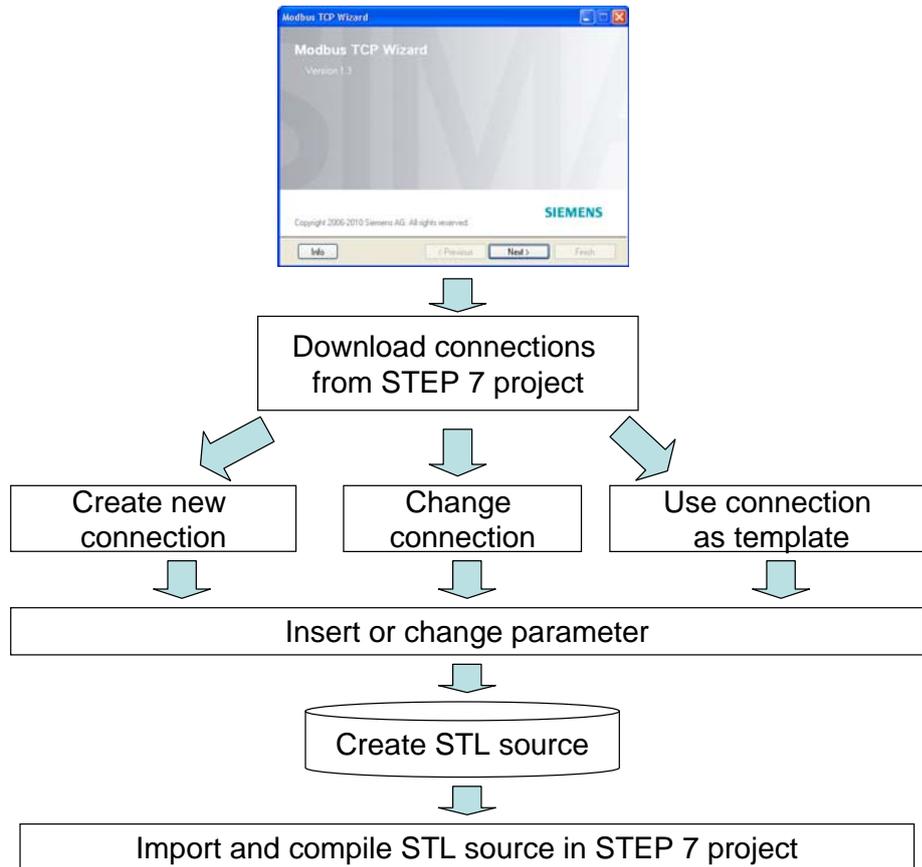
Component	Note
31535566_Modbus_TCP_Wizard_CODE_V13.zip	Installation program for the Tool – Modbus TCP Wizard
31535566_Modbus_TCP_Wizard_DOKU_v13_e.pdf	This document.

3 Function Mechanisms of this Application

3.1 Overview

General overview

Figure 3-1



4 Installation

4.1 Installation of the Tool

Software Preconditions

The Modbus TCP Wizard is running under:

- MS Windows 7 Ultimate 32 bit/ Professional 32 bit
- MS Windows XP Professional with SP2 or SP3
- MS Vista 32bit Ultimate and Business with or without SP1
- MS Windows Server 2003 SP2 Standard Edition with or without R2 as workstation

Installing the Wizard

Retrieve the zip-file (31535566_Modbus_TCP_Wizard_CODE_V13.zip) and go through the setup process. The tool is available after installation at 'Start->SIMATIC'.

5 Operation of the Application

5.1 Functions of the Modbus TCP Wizard as an overview

All functions of the Modbus TCP Wizard are described here. The “step by step” instructions are given in the course of this document.

Generating a new Modbus TCP connection

The Modbus TCP Wizard enables you to configure new connections. The Modbus TCP connection data is stored directly in your project in a DB.

Uploading the connections from a STEP 7 project

Modbus TCP Wizard can read out the existing Modbus TCP connections from the STEP 7 project. In STEP 7 the Modbus TCP Wizard searches the blocks (UDT, DB) of a station for structures, which contain the connection data. The loaded data can be used for further processing.

Exporting the overview of the uploaded connection

An overview of the uploaded Modbus TCP connection of a station can be saved as *.csv file. This data can be used for example for your documentation.

Creating data block with connection data

The tool can save the connection data in a global data block. A new block can be created as well as connection data attached to an existing block.

Change an existing connection

Uploaded Modbus TCP connections can be changed with the tool. Subsequently, the data are filed at the same location in the STEP 7 project.

NOTICE The Modbus TCP Wizard enables you to identify your connections by assigning a connection name in plain text.

This connection name is saved in some comment lines of the connection data. These comment lines are not available for other usage!

NOTE In the overview the connection data are shaded in gray, if these data cannot be changed. This includes the following:

- Connection data of the open communication. These data can be further used with the Open Communication Wizard. These connection data are represented in the overview in order to avoid conflicts with the connections of the open communication when generating the connection data for Modbus TCP communication.
- The connection data in an instance data block. Changing these data may cause time stamp conflicts.
- Connection data in structures with nesting depth > 1 (e.g. DB1.TCON.CPU319.TCP.Verb1.block_length.....).

Generate new connection by means of the copying function

New Modbus TCP connections can be generated by copying and changing an uploaded connection. This facilitates the data input in case of many identical parameters.

Modbus TCP connection data shaded in gray can be used during copying.

Specifying the connection name

A name can be specified for a connection. This facilitates the clarity in case of several connections. This connection name is stored in the comment of the data block.

5.2 General information on the dialog masks

Subsequently dialogs of the Modbus TCP Wizard are described from a general point of view. This description serves as a supplementation of the step-by-step instruction, which you find in the further course of the document.

Dialog mask: Welcome

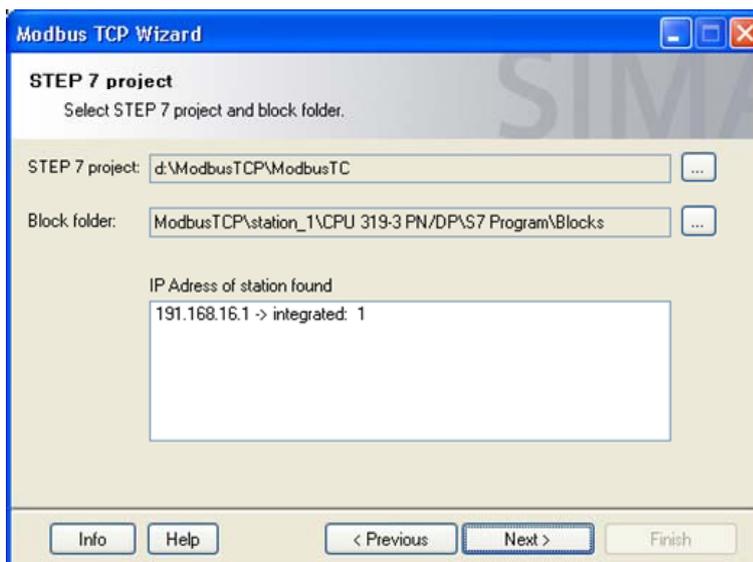
Figure 5-1



The Modbus TCP Wizard starts with this dialog. Here you find information on the Modbus TCP Wizard. Further information on the Modbus TCP communication is available on the internet.

Dialog mask: STEP 7 project

Figure 5-2



The STEP 7 project selected in this dialog as well as the block folder can be considered as a source station. From this station connection data are uploaded.

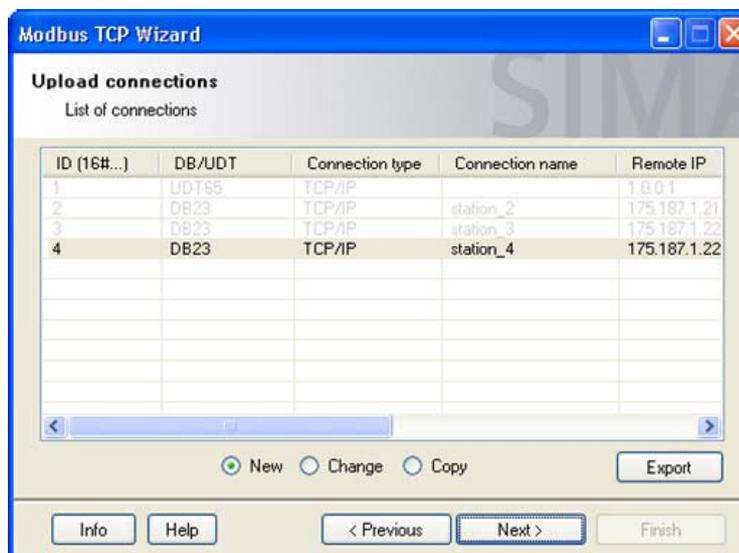
After using the “Next” Button the upload of the specified project starts automatically.

This station is at the same time used as target station, if the details on the STEP 7 project and/or the block folder are not changed in the dialog mask “Select Step 7 project and block folder” in the further course of the configuration.

The tool determines IP addresses of the selected station. These IP addresses can be considered as local IP addresses. The Modbus TCP communication generally only uses TCP/IP as connection type. For this reason, only the IP address of the integrated Ethernet interface is suitable as local IP address of the configuration.

Dialog mask: Upload connections

Figure 5-3



In this dialog the uploaded connections in the overview are represented. Here you can switch between functions of the Modbus TCP Wizard.

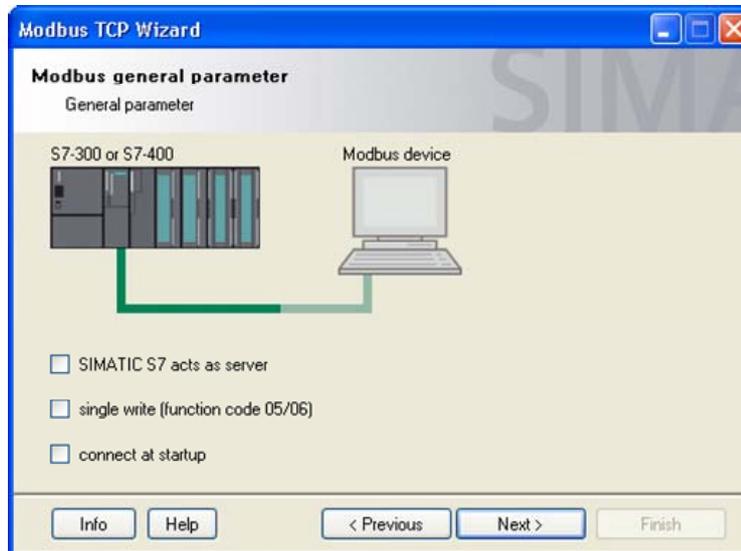
The upload starts automatically. This gives you an overview of the connections of the selected station. Furthermore the ID is preassigned with the next free value for a new connection

The overview can be exported as *.csv file. To do this click “export”.

The functions “Change” and “Copy” assume the selection of an uploaded connection in the overview.

Dialog mask: Modbus general parameter

Figure 5-4



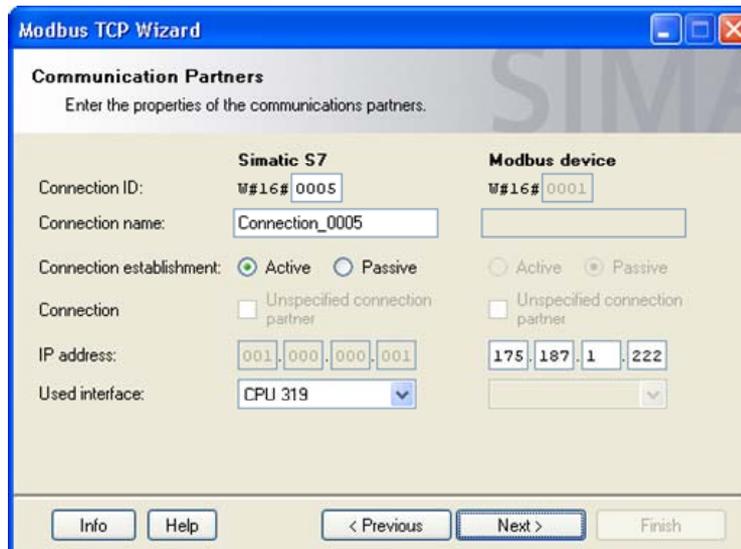
Here you can enter general parameters for Modbus TCP communication.

The option “single write...” (Write values individually...) is only available when the option “SIMATIC S7 acts as Server” has been selected.

Changing the option “SIMATIC S7 acts as Server” causes a change of values in the further course of the configuration (i.e. connection establishment, etc.).

Dialog mask: Communication partners

Figure 5-5



Here you enter connection parameters. Please ensure that the correct interface has been selected.

If you do not enter a connection name, a name automatically generated by the tool is used (in the format “autogen_name_”). The connection name is filed in the comment.

In the following dialogs, changing the options causes some values to be reset (e.g. port number, etc.)

Dialog mask: Connection parameters

Figure 5-6

In this dialog you enter the port number for the connection.

The Modbus communication usually runs via port 502. Please note that not all CPU types can use port 502.

We recommend using a port number from the range 2000 to 5000.

Dialog mask: Modbus TCP address reference

Figure 5-7

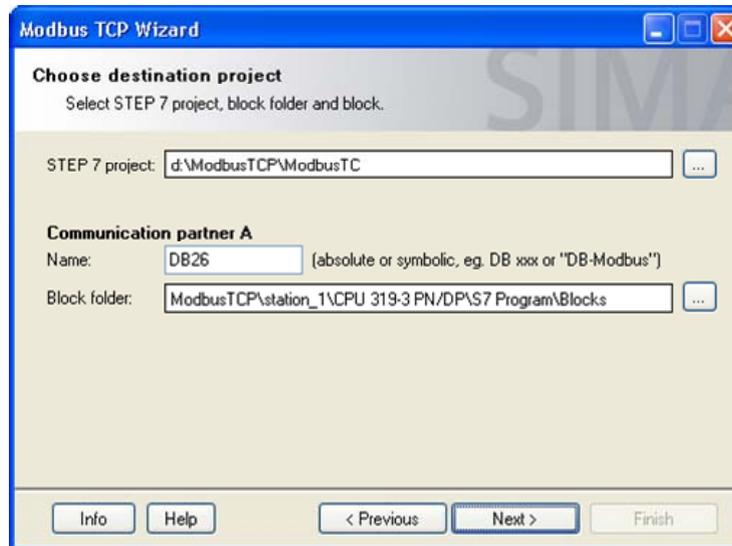
Data area	Data type	Start address	End address	DB number
1	Holding Registers	0	100	10
2	not used	0	100	11
3	not used	0	100	12
4	not used	0	100	13
5	not used	0	100	14
6	not used	0	100	15
7	not used	0	100	16
8	not used	0	100	17

In this dialog you enter the Modbus TCP address reference. The first data range is always used. A seamless continuation is not required.

The used data areas must not overlap. The values in the grayed fields are not considered in this check.

Dialog mask: Select destination project

Figure 5-8



In the dialog please specify to which project and to which block folder the generated DB should be imported. The selected STEP 7 project and the block folder can in this dialog be considered as target station. These details are preassigned here.

You can accept this preassignment or also specify a different target project or target folder to which the completed block is compiled and inserted. If you specified a different target project and after using the “Next” Button a new upload of the specified project starts automatically.

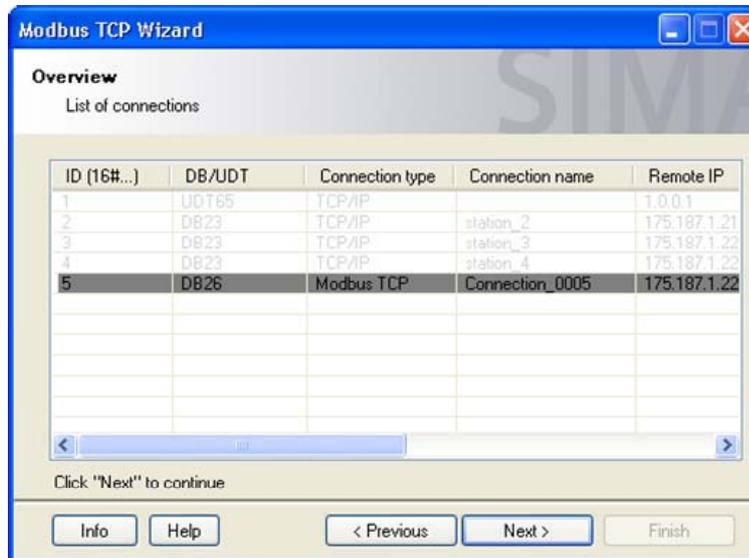
If a connection is changed (function “Change”), details in this dialog cannot be changed. The connection data are filed in the same data block and at the same location.

Assign any DB name. When using a symbolic name ensure that the symbolic name is defined in your S7 program.

The OC Wizard checks whether the specified block already exists in your S7 program. If the block does not yet exist in your S7 program, it will be generated. An existing data block is analyzed by the OC Wizard and, after a successful analysis, connection data can be assigned to the data block.

Dialog mask: Overview

Figure 5-9



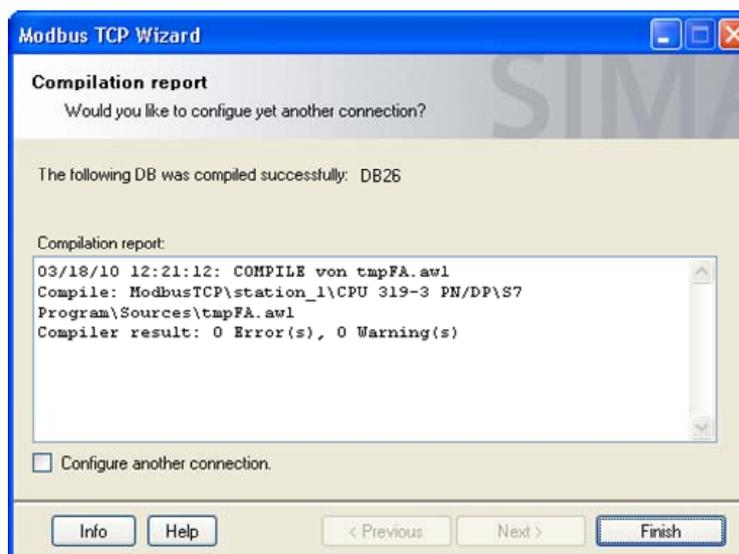
To check the performed changes the connections are again represented as an overview in this dialog. The changes are shaded in gray.

Note

Up to this dialog mask no changes have yet been made in the STEP 7 project. Continuing the Modbus TCP Wizard by pressing the "Next" button causes the compilation and insertion of the block into your selected target project.

Dialog mask: Compilation report

Figure 5-10



5.2 13B General information on the dialog masks

In this dialog the results of the compilation are displayed. If no errors are displayed in the report, the changes in the STEP 7 project are made successfully. In case of an error no changes are made.

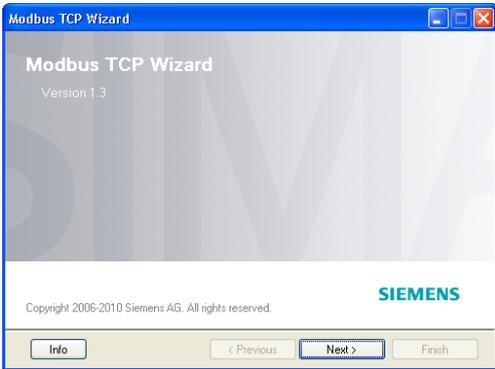
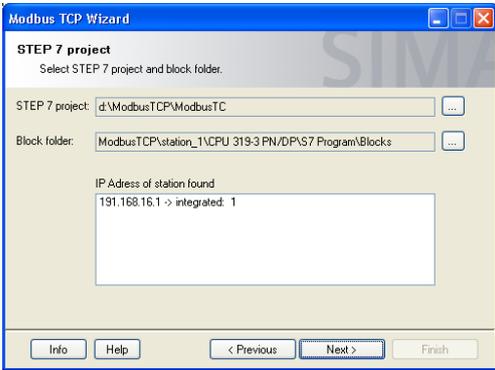
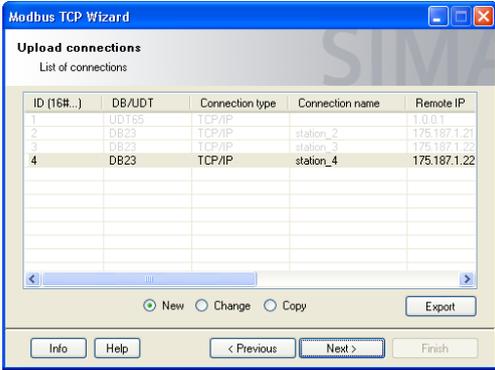
If an error message is displayed in the report, you check whether the used data block has not been opened otherwise.

5.3 Step by step instruction: Create new connection

In this chapter we show you step by step the procedure for generating a new Modbus TCP connection.

Note

If already configured Modbus TCP connections exist in your project, you can also create new connections via the “Copy” option. See: ([Step by step instruction: Copy connection / use as template](#)).

	Description	Wizard
1.	Click “Next” in this dialog. Further information on this dialog is available in chapter “ Dialog mask: Welcome mask ”.	
2.	In this dialog you select a STEP 7 project and a block folder. Further information on this dialog is available in chapter “ Dialog mask: STEP 7 project ” or by calling the online help with the “Help” button.	
3.	In this dialog the option “New” has been selected as a standard. Click “Next” in to get to the next dialog. Further information on this dialog is available in chapter “ Dialog mask: Upload connections ” or by calling the online help with the “Help” button.	

5 Operation of the Application

5.3 14B Step by step instruction: Create new connection

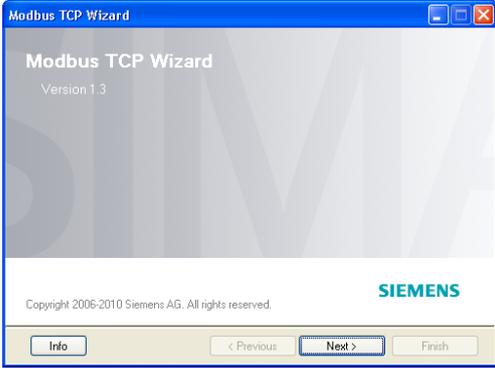
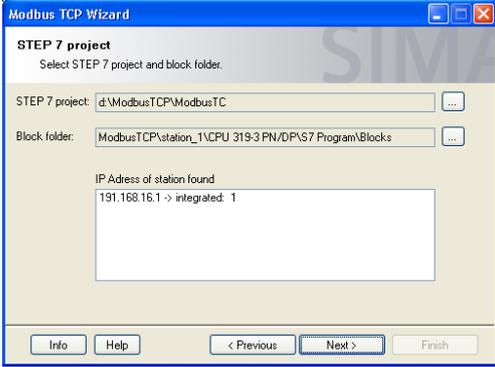
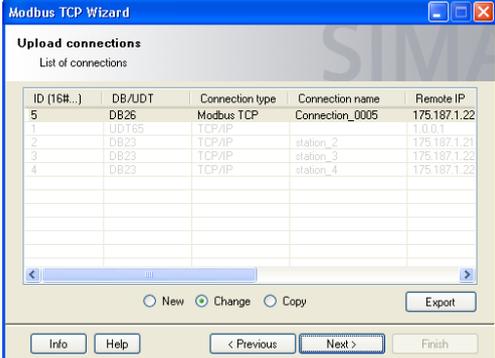
	Description	Wizard
4.	<p>In these dialogs you enter the parameters for Modbus TCP communication.</p> <p>Further information on this dialog is available in chapter “Dialog mask: Modbus general parameter”.</p> <p>“Dialog mask: Communication partners”,</p> <p>“Dialog mask: Connection parameters”,</p> <p>“Dialog mask: Modbus TCP address reference”</p> <p>or by calling the online help with the “Help” button.</p>	<p>The wizard consists of four sequential dialog boxes:</p> <ul style="list-style-type: none"> Modbus general parameter: Shows a diagram of an S7-300 or S7-400 PLC connected to a Modbus device. Options include "SIMATIC S7 acts as server", "single write (function code 05/06)", and "connect at startup". Communication Partners: Fields for Connection ID (W#16#0005), Connection name (Connection_0005), and Modbus device ID (W#16#0001). Includes radio buttons for Active/Passive connection establishment and Unspecified connection partner. Connection parameters: Fields for Local port no. (ASCII/HEX), Specify port (checked), and Modbus device port (2005/705). Modbus TCP address reference: A table listing data areas with their types, start/end addresses, and DB numbers.

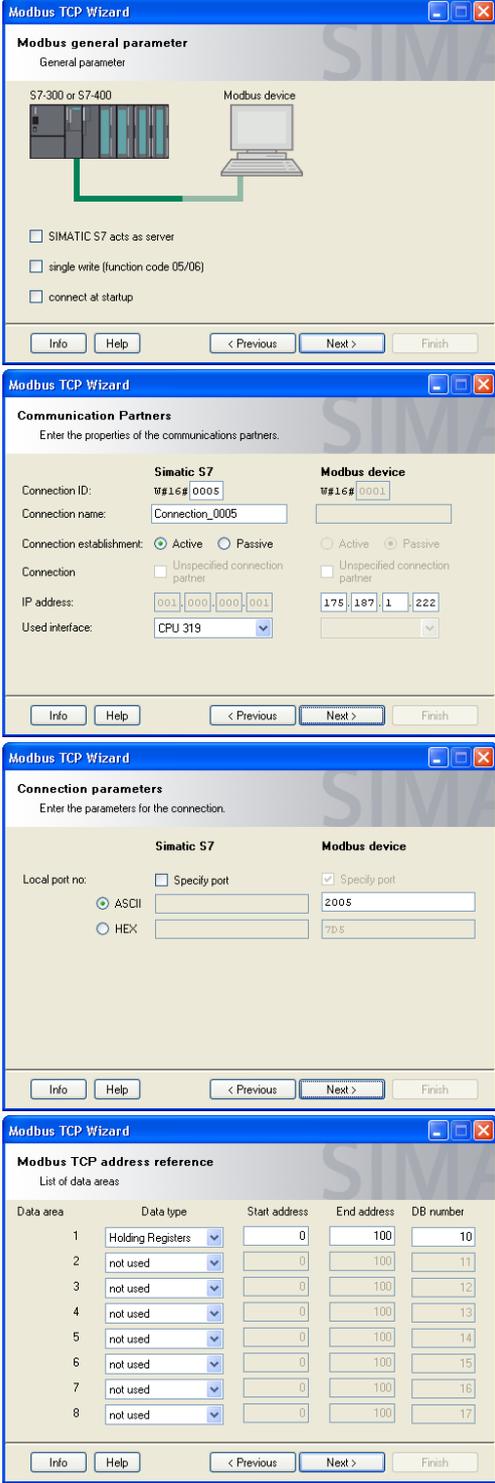
5.3 14B Step by step instruction: Create new connection

	Description	Wizard																														
5.	<p>In this dialog you enter any DB name. Further information on this dialog is available in chapter “Dialog mask: Select destination project” or by calling the online help with the “Help” button.</p>																															
6.	<p>In this dialog you check your details and click “Next”. Further information on this dialog is available in chapter “Dialog mask: Overview” or by calling the online help with the “Help” button.</p>	<table border="1" data-bbox="874 790 1353 969"> <thead> <tr> <th>ID (16#...)</th> <th>DB/UDT</th> <th>Connection type</th> <th>Connection name</th> <th>Remote IP</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UDT55</td> <td>TCP/IP</td> <td></td> <td>175.187.1.21</td> </tr> <tr> <td>2</td> <td>DB23</td> <td>TCP/IP</td> <td>station_2</td> <td>175.187.1.21</td> </tr> <tr> <td>3</td> <td>DB23</td> <td>TCP/IP</td> <td>station_3</td> <td>175.187.1.22</td> </tr> <tr> <td>4</td> <td>DB23</td> <td>TCP/IP</td> <td>station_4</td> <td>175.187.1.23</td> </tr> <tr> <td>5</td> <td>DB26</td> <td>Modbus TCP</td> <td>Connection_0005</td> <td>175.187.1.22</td> </tr> </tbody> </table>	ID (16#...)	DB/UDT	Connection type	Connection name	Remote IP	1	UDT55	TCP/IP		175.187.1.21	2	DB23	TCP/IP	station_2	175.187.1.21	3	DB23	TCP/IP	station_3	175.187.1.22	4	DB23	TCP/IP	station_4	175.187.1.23	5	DB26	Modbus TCP	Connection_0005	175.187.1.22
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4	DB23	TCP/IP	station_4	175.187.1.23																												
5	DB26	Modbus TCP	Connection_0005	175.187.1.22																												
7.	<p>A new connection was configured. Click “Finish”. Further information on this dialog is available in chapter “Dialog mask: Compilation report” or by calling the online help with the “Help” button.</p>																															

5.4 Step by step instruction: Change connection

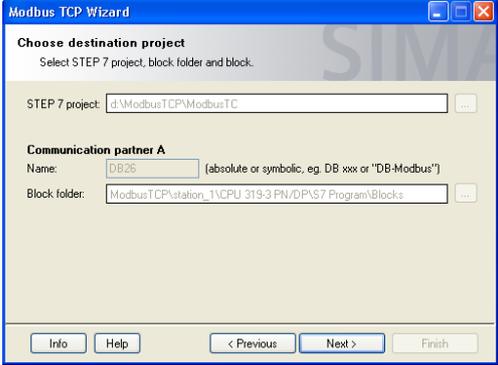
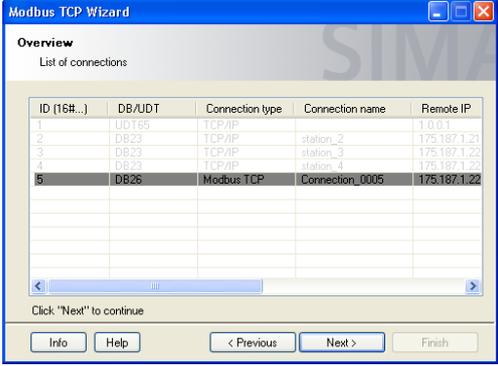
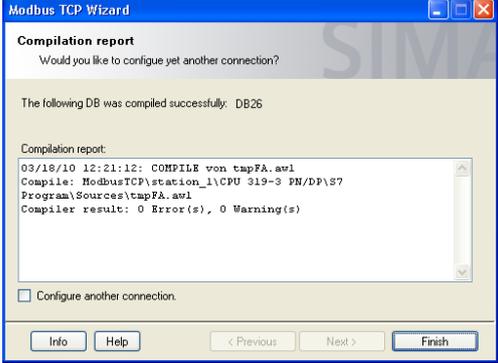
In this chapter we show you step by step the procedure for changing an existing TCP Modbus connection.

	Description	Wizard																														
1.	<p>Click “Next” in this dialog. Further information on this dialog is available in chapter “Dialog mask: Welcome mask”.</p>																															
2.	<p>In this dialog you select a STEP 7 project and a block folder. Further information on this dialog is available in chapter “Dialog mask: STEP 7 project” or by calling the online help with the “Help” button.</p>																															
3.	<p>In this dialog you select an uploaded connection in the overview. Activate the “Change” option and click “Next”. Further information on this dialog is available in chapter “Dialog mask: Upload connections” or by calling the online help with the “Help” button.</p>	 <table border="1" data-bbox="869 1361 1340 1467"> <thead> <tr> <th>ID (16#...)</th> <th>DB/AUT</th> <th>Connection type</th> <th>Connection name</th> <th>Remote IP</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>DB26</td> <td>Modbus TCP</td> <td>Connection_0005</td> <td>175.187.1.22</td> </tr> <tr> <td>1</td> <td>DB165</td> <td>TCP/IP</td> <td></td> <td>175.187.1.21</td> </tr> <tr> <td>2</td> <td>DB23</td> <td>TCP/IP</td> <td>station_2</td> <td>175.187.1.21</td> </tr> <tr> <td>3</td> <td>DB23</td> <td>TCP/IP</td> <td>station_3</td> <td>175.187.1.22</td> </tr> <tr> <td>4</td> <td>DB23</td> <td>TCP/IP</td> <td>station_4</td> <td>175.187.1.22</td> </tr> </tbody> </table>	ID (16#...)	DB/AUT	Connection type	Connection name	Remote IP	5	DB26	Modbus TCP	Connection_0005	175.187.1.22	1	DB165	TCP/IP		175.187.1.21	2	DB23	TCP/IP	station_2	175.187.1.21	3	DB23	TCP/IP	station_3	175.187.1.22	4	DB23	TCP/IP	station_4	175.187.1.22
ID (16#...)	DB/AUT	Connection type	Connection name	Remote IP																												
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1	DB165	TCP/IP		175.187.1.21																												
2	DB23	TCP/IP	station_2	175.187.1.21																												
3	DB23	TCP/IP	station_3	175.187.1.22																												
4	DB23	TCP/IP	station_4	175.187.1.22																												

	Description	Wizard
<p>4.</p>	<p>In these dialogs you can change the parameters for Modbus TCP communication. Further information on this dialog is available in chapter “Dialog mask: Modbus general parameter”.</p> <p>“Dialog mask: Communication partners”,</p> <p>“Dialog mask: Connection parameters”,</p> <p>“Dialog mask: Modbus TCP address reference”.</p> <p>or by calling the online help with the “Help” button.</p>	 <p>The wizard consists of four sequential dialog boxes:</p> <ul style="list-style-type: none"> Modbus general parameter: Shows a diagram of a SIMATIC S7 rack connected to a Modbus device. Options include: SIMATIC S7 acts as server, single write (function code 05/06), and connect at startup. Communication Partners: Allows defining connection properties. Fields include Connection ID, Connection name, Connection establishment (Active/Passive), Connection type (Unspecified connection partner), IP address, and Used interface (CPU 319). Connection parameters: Configures local port and communication protocol. Options include ASCII/HEX and Specify port. Modbus TCP address reference: Lists data areas with columns for Data area, Data type, Start address, End address, and DB number.

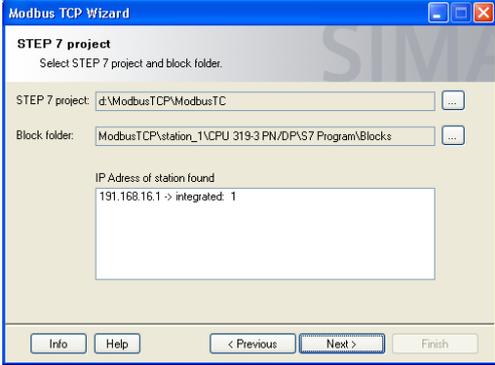
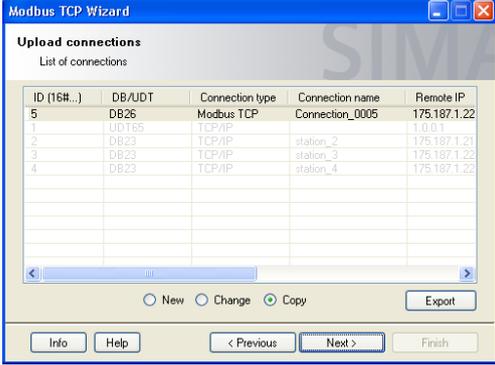
5 Operation of the Application

5.4 15BStep by step instruction: Change connection

	Description	Wizard
5.	<p>Click "Next" in this dialog.</p> <p>Further information on this dialog is available in chapter "Dialog mask: Select destination project" or by calling the online help with the "Help" button.</p>	
6.	<p>In this dialog you check your details and click "Next".</p> <p>Further information on this dialog is available in chapter "Dialog mask: Overview" or by calling the online help with the "Help" button.</p>	
7.	<p>The selected connection was changed. Click "Finish".</p> <p>Further information on this dialog is available in chapter "Dialog mask: Compilation report" or by calling the online help with the "Help" button.</p>	

5.5 Step by step instruction: Copy connection / use as template

In this chapter we show you step by step the procedure for copying or using an existing TCP Modbus connection as template for creating a new connection.

	Description	Wizard																														
8.	Click "Next" in this dialog. Further information on this dialog is available in chapter " Dialog mask: Welcome mask ".																															
9.	In this dialog you select a STEP 7 project and a block folder. Further information on this dialog is available in chapter " Dialog mask: STEP 7 project " or by calling the online help with the "Help" button.																															
10.	In this dialog you select an uploaded connection in the overview. Activate the "Copy" option and click "Next". Further information on this dialog is available in chapter " Dialog mask: Upload connections " or by calling the online help with the "Help" button.	 <table border="1" data-bbox="874 1429 1337 1529"> <thead> <tr> <th>ID (16B...)</th> <th>DB/UDT</th> <th>Connection type</th> <th>Connection name</th> <th>Remote IP</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>DB26</td> <td>Modbus TCP</td> <td>Connection_0005</td> <td>175.187.1.22</td> </tr> <tr> <td>1</td> <td>UD165</td> <td>TCP/IP</td> <td></td> <td>175.187.1.21</td> </tr> <tr> <td>2</td> <td>DB23</td> <td>TCP/IP</td> <td>station_2</td> <td>175.187.1.21</td> </tr> <tr> <td>3</td> <td>DB23</td> <td>TCP/IP</td> <td>station_3</td> <td>175.187.1.22</td> </tr> <tr> <td>4</td> <td>DB23</td> <td>TCP/IP</td> <td>station_4</td> <td>175.187.1.22</td> </tr> </tbody> </table>	ID (16B...)	DB/UDT	Connection type	Connection name	Remote IP	5	DB26	Modbus TCP	Connection_0005	175.187.1.22	1	UD165	TCP/IP		175.187.1.21	2	DB23	TCP/IP	station_2	175.187.1.21	3	DB23	TCP/IP	station_3	175.187.1.22	4	DB23	TCP/IP	station_4	175.187.1.22
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4	DB23	TCP/IP	station_4	175.187.1.22																												

5 Operation of the Application

5.5 16B Step by step instruction: Copy connection / use as template

	Description	Wizard
11.	<p>In these dialogs you can change the parameters for Modbus TCP communication. Further information on this dialog is available in chapter “Dialog mask: Modbus general parameter”.</p> <p>“Dialog mask: Communication partners”,</p> <p>“Dialog mask: Connection parameters”,</p> <p>“Dialog mask: Modbus TCP address reference”</p> <p>or by calling the online help with the “Help” button.</p>	<p>The wizard consists of four sequential dialog boxes:</p> <ul style="list-style-type: none"> Modbus general parameter: Shows a diagram of an S7-300 or S7-400 PLC connected to a Modbus device. Options include "SIMATIC S7 acts as server", "single write (function code 05/06)", and "connect at startup". Communication Partners: Allows defining properties for the communication partners. Fields include Connection ID (W#16#0006), Connection name (Connection_0006), Connection establishment (Active/Passive), and IP address (001.000.000.001). Connection parameters: Defines the connection parameters. Fields include Local port no., Data type (ASCII/HEX), and Specify port options (2005, 705). Modbus TCP address reference: Shows a list of data areas with columns for Data area, Data type, Start address, End address, and DB number.

5.5 16B Step by step instruction: Copy connection / use as template

	Description	Wizard																																			
12.	<p>In this dialog you enter any DB name. Further information on this dialog is available in chapter “Dialog mask: Select destination project” or by calling the online help with the “Help” button.</p>																																				
13.	<p>In this dialog you check your details and click “Next”. Further information on this dialog is available in chapter “Dialog mask: Overview” or by calling the online help with the “Help” button.</p>	<table border="1"> <thead> <tr> <th>ID (16#...)</th> <th>DB/UDT</th> <th>Connection type</th> <th>Connection name</th> <th>Remote IP</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>DB26</td> <td>Modbus TCP</td> <td>Connection_0005</td> <td>175.187.1.22</td> </tr> <tr> <td>1</td> <td>UDT65</td> <td>TCP/IP</td> <td></td> <td>10.0.1</td> </tr> <tr> <td>2</td> <td>DB23</td> <td>TCP/IP</td> <td>station_2</td> <td>175.187.1.21</td> </tr> <tr> <td>3</td> <td>DB23</td> <td>TCP/IP</td> <td>station_3</td> <td>175.187.1.22</td> </tr> <tr> <td>4</td> <td>DB23</td> <td>TCP/IP</td> <td>station_4</td> <td>175.187.1.22</td> </tr> <tr> <td>6</td> <td>DB26</td> <td>Modbus TCP</td> <td>Connection_0006</td> <td>175.187.1.22</td> </tr> </tbody> </table>	ID (16#...)	DB/UDT	Connection type	Connection name	Remote IP	5	DB26	Modbus TCP	Connection_0005	175.187.1.22	1	UDT65	TCP/IP		10.0.1	2	DB23	TCP/IP	station_2	175.187.1.21	3	DB23	TCP/IP	station_3	175.187.1.22	4	DB23	TCP/IP	station_4	175.187.1.22	6	DB26	Modbus TCP	Connection_0006	175.187.1.22
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14.	<p>A new connection was configured from the template. Click “Finish”. Further information on this dialog is available in chapter “Dialog mask: Compilation report” or by calling the online help with the “Help” button.</p>																																				

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6 Related Literature

6.1 Internet Link Specifications

This list is not complete and only represents a selection of relevant information.

Table 6-1

	Subject	Title
\1\	Website "HMI & Industrial Communication"	http://www.siemens.com/s7modbus

7 History

Table 7-1

Version	Date	Modifications
V1.0	10.09.2008	First issue
V1.1	24.06.2009	Small changes
V1.3	18.03.2010	Modification of GUI
V1.3	28.11.2012	Small changes in Documentation