SIEMENS

WinCC

Communication Manual

Manual 2

This manual is part of the documentation package with the order number: **6AV6392-1CA05-0AB0** C79000-G8276-C156-01

Release: September 1999

WinCC, SIMATIC, SINEC, STEP are trademarks of Siemens.

The other names used in this manual may be trademarks; their owners' rights may be violated if they are used by third parties for their own purposes.

(The transmission and reproduction of this document, and utilization and disclosure of its contents are not permitted unless expressly authorized. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.)	(We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvements are welcomed.)
© Siemens AG 1994 - 1999 All rights reserved	Technical data subject to change
C79000-G8276-C156-01	

C79000-G8276-C156-01 Printed in the Federal Republic of Germany

Siemens Aktiengesellschaft

Table of contents

1	Samp	le Projects	1-1
2	Comm (Hardu	nunication to the SIMATIC S7 via Industrial Ethernet	2_1
	2 1	Startup of the Communication Processor CP 1412	∠- 1
	2.1	Creation of the STEP7 Project S7 JEH	2-3 2-13
	2.2	Creation of the WinCC Project WinCC S7 JEH	2.10
	2.4	Diagnosis of the Communication Connection	2-45
3	Comm	nunication to the SIMATIC S7 via Industrial Ethernet	
	(Softn	let)	3-1
	3.1	Startup of the Communication Processor CP 1411	3-3
	3.2	Creation of the STEP7 Project S7_IES	3-17
	3.3	Creation of the WinCC Project WinCC_S7_IES	3-35
	3.4	Diagnosis of the Communication Connection	3-48
4	Comm	nunication to the SIMATIC S7 via TCP/IP	4-1
	4.1	Startup of the Communication Processor CP 1411	4-3
	4.2	Creation of the STEP7 Project S7_IETCP	4-17
	4.3	Creation of the WinCC Project WinCC_S7_IETCP	4-35
	4.4	Diagnosis of the Communication Connection	4-48
5	Comm	nunication to the SIMATIC S7 via OPC	5-1
	5.1	Startup of the Communication Processor CP 1413	5-3
	5.2	Creation of the STEP7 Project S7_OPC	5-12
	5.3	Configuration of the S7 OPC Server	5-29
	5.4	Creation of the WinCC Project WinCC_S7_OPC	5-44
	5.5	Diagnosis of the Communication Connection	5-57
6	Comm	nunication to the SIMATIC S7 via PROFIBUS	6-1
	6.1	Startup of the Communication Processor CP 5412 A2	6-3
	6.2	Creation of the STEP7 Project S7_PB	6-12
	6.3	Creation of the WinCC Project WinCC_S7_PB	6-31
	6.4	Diagnosis of the Communication Connection	6-45
7	Comm	nunication to the SIMATIC S5 via Industrial Ethernet	7-1
	7.1	Startup of the Communication Processor CP 1413	7-3
	7.2	Creation of the STEP5 Project S5_IEHst	7-12
	7.3	Creation of the WinCC Project WinCC_S5_IEH	7-18
	7.4	Diagnosis of the Communication Connection	7-31
8	Comm	nunication to the SIMATIC S5 via PROFIBUS FMS	8-1
	8.1	Startup of the Communication Processor CP 5412 A2	8-3
	8.2	Creation of the STEP5 Project S5_FMSst	8-20
	8.3	Creation of the WinCC Project WinCC_S5_FMS	8-27

	8.4	Diagnosis of the Communication Connection	8-38
9	Comm	nunication to the SIMATIC S5 via PROFIBUS FDL	9-1
	9.1	Startup of the Communication Processor CP 5412 A2	9-3
	9.2	Creation of the STEP5 Project S5_FDLst	9-13
	9.3	Creation of the WinCC Project WinCC_S5_FDL	9-21
	9.4	Diagnosis of the Communication Connection	9-33
10	Comm	nunication WinCC-WinCC via OPC	10-1
	10.1	Configuration of the WinCC Stations	10-3
	10.2	Creation of the WinCC Project WinCC_OPC_SERVER	10-11
	10.3	Creation of the WinCC Project WinCC_OPC_CLIENT	10-19
	10.4	Diagnosis of the Communication Connection	10-29

Preface

Purpose of this Manual

This manual contains various sample projects pertaining to the topic communication between WinCC and a PLC. It emphasizes the different communication options to the SIMATIC S5 and SIMATIC S7.

This manual is available in printed form as well as an electronic online document. The table of contents or the index will quickly point you to the information required. The online document also provides an expanded search function.

Additional Support

For technical questions, please contact your Siemens representative at your local Siemens branch.

In addition, you can contact our Hotline at the following number: +49 (911) 895-7000 (Fax -7001)

Information about SIMATIC Products

Constantly updated information about SIMATIC products can be found in the CA01 catalog. This catalog can be accessed at the following Internet address: http://www.ad.siemens.de/ca01online/

In addition, the SIEMENS Customer Support provides you with current information and downloads. A collection of frequently asked questions is listed at the following Internet

address:

http://www.ad.siemens.de/support/html_00/index.shtml

1 Sample Projects

This chapter illustrates the configuration of the communication between a WinCC station and a PLC by means of sample projects. Each of the sample projects is based on the application of a certain communication option and hardware combination.

Content of the Examples

The sample projects described below can be copied directly from the online document to your hard drive.

The functionality of the sample projects is limited to the application and display of a few tag values. The emphasis is placed on the configuration of the communication.

Structure of the Samples

The steps necessary to successfully start up the communication connection are described in detail. In general, the individual descriptions are structured into the following sections:

- Overview of the sample project
- Installation of the necessary components in the PC
- Creation of the project for the PLC
- Creation of the WinCC project
- Diagnosis of the communication connection

Software

The samples have been created with the following software versions:

- WinCC Version 5.0
- STEP5 Version 4.6
- STEP7 Version 5.0
- SIMATIC NET 05/99

2 Communication to the SIMATIC S7 via Industrial Ethernet (Hardnet)

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder *C:\Communication_Manual*. You have the option to copy the following components to the hard drive:

S7_IEH The STEP7 project we will create.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S7 and WinCC. The communication connection is realized via the Industrial Ethernet. The communication card CP 1413 used in the computer has its own CPU onboard. This will free the CPU of the computer from communication tasks. Such a configuration is generally referred to as Hardnet.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 1413*. To install this communication processor in the computer, the driver *IE S7 1413*, located on the *SIMATIC NET* CD-ROM, is needed. In the WinCC project, the communication driver *SIMATIC S7 Protocol Suite* must be installed. Via its channel unit *Industrial Ethernet*, the connection to the *SIMATIC S7* is configured.

The PLC is equipped with a *CPU 416-1* module. The connection to the network is established via the communication processor *CP 443-1*. For the configuration of this communication processor with the STEP7 software, the option package *NCM S7 Industrial Ethernet* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 1413
- Creation of the STEP7 Project S7_IEH
- Creation of the WinCC Project WinCC_S7_IEH
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>IE S7-1413</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 1413</i> .
STEP7	STEP7 software with option package <i>NCM for</i> <i>Industrial Ethernet</i> for the creation of the STEP7 project.
WinCC	WinCC with the communication driver <i>SIMATIC S7</i> <i>Protocol Suite</i> for the creation of the WinCC project.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 1413</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack UR1
Power Supply	Power supply PS 407 10A in slot 1 and 2.
CPU Module	CPU module CPU 416-1 in slot 3.
Communication Processor	Communication processor CP 443-1 in slot 4.

2.1 Startup of the Communication Processor CP 1413

The following description details the configuration steps necessary to successfully start up the communication processor CP 1413.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 1413*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Assigning the Communication Processor
- E: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer

Step	A: Mounting the Communication Processor in the Computer
1	Check the selected jumper settings at the CP 1413.
	During the installation of the <i>CP 1413</i> , the <i>I/O Range</i> must be specified. The I/O Range is set via <i>jumpers</i> .
	By default, the <i>I/O Range</i> is set to 03E0-03E7. The settings 0100-0117 and 0390-0397 are also possible. The following graphic illustrates the jumper settings necessary for the various <i>I/O Ranges</i> .
	$\frac{2 \bullet \bullet 1}{4 \bullet \bullet 3}$ $\frac{1/0 \text{ Area}}{0100-0107} \bullet \bullet \bullet \bullet \bullet$
2	Mount the module according to the installation instructions. Among other things, follow the steps for handling electrostatic sensitive devices (ESD). The module must only be installed while the computer is off.
	For the communication card <i>CP 1413</i> , a free ISA slot in the computer is required. After the installation of the <i>CP 1413</i> , close the computer's case and start the computer.

B: Installing the Communication Driver

Step	B: Installing the Communication Driver	
1	Install the communication driver IE S7-1413 from the SIMATIC NET CD-ROM.	
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.	
	The installation of the software is started via the button displayed below.	
	SIMATIC NET Software Installieren	
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>IE S7-1413</i> to be installed must be selected. Finish the installation.	
	SIMATIC NET Software: Components	
	Please select the programs to be installed.	
	SIMATIC Software Software Description SIMATIC NET Industrial Ethernet S7-1413/Windows NT 4.0 Version 5.1 Description SIMATIC NET Industrial Ethernet S7-1413/Windows NT 4.0 Version 5.1 Description SIMATIC NET Industrial Ethernet S7-1413/Windows NT 4.0 Version 5.1 Description SIMATIC NET Industrial Ethernet S7-1413/Windows NT 4.0	
	Required on C: 19 MByte Available on C: 727 MByte	
	< <u>B</u> ack <u>N</u> ext> Cancel	

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor CP 1413 via the program Setting the PG/PC Interface.
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the <i>Install</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	<none> Properties</none>
	KNone> TCP/IP >> DEC PCI East Ethernet
	Copy
	Delete
	- Interfaces
	Install
	OK Cancel Help
-	OK Cancel Help
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. Event the St. In the set of the se
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button.
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection:
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Installed: TCP/IP -> DEC PCI Fast Ethernet Bo
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Installed: CP1413 (256k DP-RAM) Install -> Install -> Install -> Install ->
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Imstall ->
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Install / Remove Interfaces Selection: Install -> Insta
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Imstall -> Imstall -> </td
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Installation of the communication processor is started by clicking on the Installation. Install / Remove Interfaces Selection: CP1413 CP5611 CP5611 MPI-ISA card MPI-ISA on board CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: Install-2 CP1413 [256k DP-RAM] CP5411 CP5411 CP5412A2 CP5611 MPI-ISA Card MPI-ISA on board CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
3	OK Cancel Help The dialog box Install/Remove Modules will be displayed. The Selection field lists all interfaces that can be installed. Among them will be the entry CP 1413, if the communication driver has been installed previously as outlined in step B. From the Selection field, select the entry CP 1413. The installation of the communication processor is started by clicking on the Install -> button. Install / Remove Interfaces Selection: CP1413 CP1413 CP1413 CP5611 MPI-ISA Card MPI-ISA on board CP1413 Conse

Step	C: Installing the Communication Processor
4	The dialog box Resources - CP 1413 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the Jumper Settings at the <i>CP</i> 1413.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can
	be obtained from the <i>Resources</i> tab accessed via <i>Start</i> \rightarrow <i>Programs</i> \rightarrow
	Administrative Tools (Common) \rightarrow Windows NT Diagnostics.
	Close the <i>Resources</i> tab by clicking on <i>OK</i> .
	Resources - CP1413 <board 1=""></board>
	Memory range: 0000D0000-000DFFFF
	Input / output range: 03E0-03E7
	Interrupt request:
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help

Step	C: Installing the Communication Processor
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 1413</i> .
	Exit the dialog box Install/Remove Modules via the Close button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1413 (256k DP-RAM) CP5411 CP5412A2 CP5511 CP5611 MPI-ISA Card MPI-ISA on board ▼ CP5611 CP5611 MPI-ISA on board ▼ CP5611 MPI-ISA on board ■ MPI-ISA on board ■ MPI-ISA Card
	CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
	<u>Close</u> Help

D: Assigning the Communication Processor

Step	D: Assigning the Communication Processor			
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_H1_1</i> : to the just installed interface.			
	The access point CP_H1_1: is the default access point used by WinCC for the communication via the Industrial Ethernet. It has been created automatically during the installation of the communication driver IE S7-1413.			
	In the field <i>Access Point of the Application</i> , set the entry <i>CP_H1_1</i> :. In the field below, select the entry <i>CP1413</i> . This completes the assignment between the access point and the communication processor.			
	Setting the PG/PC Interface (V5.0)			
	Access Path			
	Access point of application:			
	CP_H1_1:> CP1413			
	(for CP1413 SIMATIC NET)			
	Interface parameter set <u>u</u> sed:			
	CP1413 Eroperties			
	Kone> Diagnostics			
	TCP/IP -> DEC PCI Fast Ethernet			
	Delete			
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)			
	Interfaces			
	<u>Install</u>			
	OK Cancel Help			

Step	D: Assigning the Communication Processor			
2	Setting the properties of the communication processor CP 1413. The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.			
	The dialog box Properties - CP 1413 will be displayed.			
	In the <i>Ethernet (MAC) Address</i> tab, enter the <i>Ethernet Address</i> of the <i>CP 1413</i> . In our sample, this is 08.00.06.01.00.01.			
	The <i>Ethernet Address</i> is six Bytes long and structured as follows for SIEMENS devices:			
	• 08.00.06: The first six digits of the hexadecimal value correspond to the number for SIEMENS.			
	• 01: The next two digits specify the range for SIEMENS.			
	• 0: The next digit signifies the SIMATIC system.			
	• 0.01: The last three digits correspond to the significant station address of a SIEMENS device.			
	Properties - CP1413			
	Ethernet(MAC)-Address 37 Protocol Mode			
	Database			
	□ <u>A</u> ctivate TF			
	TF Database			
	<u>S</u> earch			
	Busparameter of Industrial Ethernet			
	Ethernet-Address: 08 00 06 01 00 01			
	Please build six groups with two hevadecimal characters			
	separated by points. Example "01.23.45.67.89.AB". To activate the TF database, please click checkbox 'Activate TF'.			
	UK Uancel <u>S</u> tandard Help			

Step	D: Assigning the Communication Processor			
3	Exit the program Setting the PG/PC Interface via the OK button.			
	A dialog box will be displayed requesting the restart of the <i>CP 1413</i> . Acknowledge this dialog box by clicking on <i>OK</i> , which will result in the restart of the communication processor <i>CP 1413</i> .			
	This completes the installation of the communication processor.			
	Changed SIMATIC NET settings You changed your SIMATIC NET settings. To activate the changes, a restart of the parameter settings is necessary.			
	Restart now?			
	Cancel			

E: Testing the Communication Processor

Step	E: Testing the Communication Processor			
1	Check the proper installation of the communication processor <i>CP 1413</i> via the program <i>Setting the PG/PC Interface</i> .			
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.			
	Setting the PG/PC Interface			

Step	E: Testing the Communication Processor			
2	The program Setting the PG/PC Interface will be displayed.			
	Select the interface to be checked. In this case, select the entry <i>CP 1413</i> . Make sure that the assignments between access points and the interfaces are not changed			
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i>			
	button.			
	Setting the PG/PC Interface (V5.0)			
	Access Path			
	Access point of application:			
	CP_H1_1:> CP1413			
	(for CP1413 SIMATIC NET)			
	Interface parameter set <u>u</u> sed:			
	CP1413 <active> Properties</active>			
	<none></none>			
	TCP/IP -> DEC PCI Fast Ethernet Copy			
	Delete			
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)			
	Interfaces			
	Install			
	OK Cancel Help			

Step	E: Testing the Communication Processor		
3	The dialog box Simatic NET Diagnostics will be displayed.		
	In the <i>IE Network Diagnostics</i> tab, the diagnosis is started via the <i>Test</i> button.		
	I he result of the diagnosis will be displayed after that.		
	be exited with OK. In this case, the program Setting the PG/PC Interface can also		
	be closed by clicking on <i>OK</i> . The configuration of the communication to the S7		
	via the <i>Industrial Ethernet</i> is continued in the following section.		
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described		
	SIMATIC NET diagnostice		
	S7 Trace SR Protocol SR Trace DP-RAM		
	IE Network Diagnostics S7 Protocol		
	Firmware version: V1.81 , 13.07.1998 NDIS: not active		
	Ethernet address: 08.00.06.01.00.01		
	Buffer Statistics		
	No. Size Total Free Max. Request Reject		
	5 512 60 58 3 13 0		
	TF Application Associations		
	Name Status Reason		
	OK Cancel Apply Help		

2.3 Creation of the STEP7 Project S7_IEH

The following description details the configuration steps necessary to create and start up the STEP7 project *S7_IEH*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP7 project S7_IEH:

- A: Installing the Hardware
- B: Installing the Option Package
- C: Creating the STEP7 Project
- D: Configuring the Hardware
- E: Loading the Hardware Configuration
- F: Testing the Hardware Configuration
- G: Creating the STEP7 Program
- H: Testing the STEP7 Program

A: Installing the Hardware

Step	A: Installing the Hardware
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 407 10A</i> , the CPU module <i>CPU 416-1</i> and the communication processor <i>CP 443-1</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 1413</i> in the computer to the communication processor <i>CP 443-1</i> in the PLC.

B: Installing the Option Package

Step	B: Installing the Option Package			
1	If the option package NCM S7 Industrial Ethernet has not been installed during the installation of STEP7, install it now from the STEP7 CD-ROM. This option package is required for the configuration of the communication processor CP 443-1 via the STEP7 software.			
	After inserting the <i>STEP7</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.			
	setup.exe			
2	This starts the installation program. Follow the instructions of the installation program. On the <i>Components</i> page, select the check-box <i>NCM S7 Ind. Ethernet</i> . Finish the installation.			
	🛃 Setup - STEP 7: Components 🛛 🔀			
	Programs to be installed.			
	SIMATIC Software NCM S7 - PROFIBUS V5.0 SP1 W AuthorsW V2.0.1 So MB			
	Description NCM S7 - Industrial Ethernet V5.0 ServicePack 1 - Optional package for CP configuration with STEP 7.			
	Estimated installation time: 00:03 (hh:mm)			
	< <u>B</u> ack <u>N</u> ext > Cancel			

C: Creating the STEP7 Project

Step	C: Creating the STEP7 Project		
1	Create a new STEP7 project in the SIMATIC Manager.		
	It is started via $Start \rightarrow Simatic \rightarrow SIMATIC Manager$.		
	SIMATIC Manager		
2	This displays the SIMATIC Manager.		
	Via the menus $File \rightarrow New$, the dialog box for specifying the parameters of a new STEP7 project will be opened.		
	The New dialog box will be displayed.		
	The radio-button <i>New Project</i> must be selected. In the <i>Name</i> field, the name of the new project to be created is entered. The names of the STEP7 projects created within the framework of this manual all start with <i>S7</i> . They also include a reference to the communication type used. The project of this sample has the name <i>S7 IEH</i> .		
	By default, projects are stored in the <i>C</i> :\ <i>SIEMENS</i> \ <i>STEP7</i> \ <i>S7proj</i> folder. This can be changed at any time via the <i>Browse</i> button.		
	The <i>New</i> dialog box is closed via the <i>OK</i> button.		
	New		
	New project O New library		
	Name:		
	S7_IEH		
	Name Storage Path		
	Image location (path): Browse C:\SIEMENS\STEP7\S7proj		
	Cancel Help		

D: Configuring the Hardware

Step	D: Configuring the Hardware				
1	The new pro The hardwar One SIMATI components S7_IEH and Insert New C	ject will be disp e for this projec C 400-Station a are added to the then selecting In Object \rightarrow Ind	layed in the SIMA t must be configur nd for its networki SIMATIC Manag nsert New Object fustrial Ethernet fr	TIC Manager. red. Two components are n ing an Industrial Ethernet. er via a ⊕R on the proje → SIMATIC 400-Static om the pop-up menu.	needed: .These ect name on and
	⊕- (37_5	Cut Copy Paste Delete	Ctrl+X Ctrl+C Ctrl+V Del		
		Insert New Obj Print Object Properti	w Object	SIMATIC 400 Station SIMATIC 300 Station Other Station SIMATIC H Station SIMATIC PC Station SIMATIC S5 PG/PC	
				MPI PROFIBUS Industrial Ethernet PTP	
				S7 Program M7 Program OS	
				US (MultiClient)	l .

Step	D: Configuring the Hardware		
2	The just added components will be displayed in the right window of the <i>SIMATIC Manager</i> .		
	📓 SIMATIC 400(1) 🛛 🏋 MPI(1)	╂┸ Ethernet(1)	
	By OD on the component SIMATIC	400(1) in the right window, the point	
	Hardware will be displayed. By ${}^{f}\mathbb{D}$ then selecting <i>Open Object</i> from the pobe started.	on the point <i>Hardware</i> or ${}^{\circ}\mathbb{O}R$ on it and op-up menu, the program <i>HW Config</i> will	
	S7_IEH K:\com S7_ieh\S7_IEI		
	⊡ 🚑 S7_IEH ⊡ 📇 SIMATIC 400(1)	Hardware Open Object Ctrl+Alt+O	
		Cut Ctrl+X Copy Ctrl+C Paste Ctrl+V	
		Delete Del	
		Print	
3	The program HW Config is displayed.		
	This program is used to exactly define t	the hardware used in the PLC and to	
	HW Konfig		
4	By clicking on the toolbar button of the <i>Hardware Catalog</i> is opened. This cata components.	e program <i>HW Config</i> displayed below, the alog is used to select the required hardware	
	Catalog		



Step	D: Configuring the Hardware		
6	The program HW Config displays the currently still empty rack. It received the Rack Number 0. During the configuration of the connection in the WinCC project, the Rack Number is one of the parameters that must be set.		
	(0) UR1 2 3 4 5 6 7 0		
7	Arrange the other hardware components in the rack. This is done by Dragging Dropping the desired components from the Hardware Catalog to the corresponding slot in the rack.		
	This sample uses the power supply <i>PS 407 10A</i> . It is inserted into slot 1. A power supply of this type occupies two slots.		
	As the CPU module, this sample uses a <i>CPU 416-1</i> . This module is inserted into slot 3. Another parameter to be set during the configuration of the connection in the WinCC project is the slot number of the CPU module.		
	We also require the communication processor <i>CP</i> 443-1. This CP is only available from the <i>Hardware Catalog</i> if the option package <i>NCM S7 Industrial Ethernet</i> has been installed. After the communication processor <i>CP</i> 443-1 has been inserted in the rack, its properties dialog box will open.		

Step	D: Configuring the Hardware				
8	 The Ethernet Interface properties dialog box of the CP 443-1 will be displayed. In the <i>MAC Address</i> field of the <i>Parameters</i> tab, enter the desired Ethernet address of the communication processor. In this sample, the address 08.00.06.01.00.00 is specified. Another parameter to be set during the configuration of the connection in the WinCC project is this Ethernet address. In the <i>Subnet</i> field below, assign the entry <i>Ethernet(1)</i> to the communication processor. Close the dialog box by clicking on OK. 				
	Properties - Ethernet Node CP 443-1 (R0/S4)				
	General Parameters				
	MAC address: 08.00.06.01.00.00				
	Subnet: Not Networked Ethernet(1) Properties Delete OK Cancel Help				
9	The following graphic shows the completed hardware arrangement of the sample				
	Image: CPU416-1 Image: CPU416-1 4 + 5 6 7 0				
10	Save the settings made in the program <i>HW Config</i> . This is done via the toolbar button displayed below.				

E: Loading the Hardware Configuration

Step	E: Loading the Hardware Configuration					
1	The hardware configuration created in the program <i>HW Config</i> must be transferred to the PLC.					
	This is done via the toolbar button displayed below.					
	Download to Module					
2	A dialog box will be displayed from which the components to be loaded can be selected.					
	For this sample, all displayed components will be selected. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> . Close the dialog box by clicking on <i>OK</i> .					
	Select Target Module					
	Target modules:					
	Module Rack Slot					
	CPU416-1 0 3 CP 443-1 0 4					
	Select <u>All</u>					
	Cancel Help					

Step	E: Loading the Hardware Configuration				
3	Now the dialog box <i>Select Station Address</i> will be displayed. In this dialog box, specify which station address is used by the STEP7 software to communicate with the CPU module. In this sample, the communication is carried out via the MPI interface. The <i>Address</i> of the CPU module is 2. Close the dialog box by clicking on <i>OK</i> .				
	Select Node Address				
	Which node address links the programming device with module CPU416-1?				
	Rac <u>k</u> :				
	Slot:				
	Target Station O Reached via router				
	Connection to Target Station				
	Address: 2				
	Cancel Help				
4	The configuration data will now be transferred to the PLC. If necessary, the individual modules will be set to the STOP status				
	The program <i>HW Config</i> can be exited.				
	The newly added components will be displayed by the <i>SIMATIC Manager</i> for the station <i>SIMATIC 400(1)</i> .				
	⊡ ·· 💽 S7_IEH ⊡ ·· मा SIMATIC 400(1) ⊡ ·· मा ÷ CP 443-1 ⊡ ·· I CPU416-1				

F: Testing the Hardware Configuration

Step	F: Testing the Hardware Configuration				
1	Testing of the hardware configuration made.				
	If the key switch of the CPU module is set to <i>RUN</i> or <i>RUN-P</i> and the operating mode switch of the communication processor is set to <i>RUN</i> , only the status LEDs signifying the <i>RUN</i> operating mode should be displayed.				
	If this is not the case, there is an error. The following steps help you localize this error. However, these steps should still be performed even if the status LEDs show no error. This allows you to recognize uncritical errors and faulty configurations.				

Step	F: Testing the Hardware Configuration						
2	Testing the configuration of the CPU module.						
	This is done via the dialog box Module Status in the SIMATIC Manager. It is						
	opened by a ${}^{\prime} \ensuremath{\mathbb{O}} \ensuremath{\mathbb{R}}$ on the entry of the CPU module in the left window and th						
	selecting Target System \rightarrow Module Status from the pop-up menu.						
	The dialog box <i>Module Status</i> of the CPU module will be displayed.						
	The <i>General</i> tab displays various general data of the CPU module. In the <i>Status</i> field, the current module status and any existing errors are displayed.						
	The Diagnosis Buffer tab contains more detailed information about existing errors and how to correct them.						
	The dialog box can be exited via the <i>Close</i> button.						
	Module Information - CPU416-1 ONLINE						
	Path: S7_IEH\SIMATIC 400(1)\CPU416-1 CPU operating mode: RUN Status: OK No force job.						
	Time System Performance Data Communication Stacks General Diagnostic Buffer Memory Scan Cycle Time						
	Description: CPU416-1 System ID: SIMATIC 400						
	Version: Order No./Description Component Version 6ES7 416-1XJ01-0AB0 ··· -79						
	Rack: 0 Address:						
	Slot: 3 Module width: 1						
	Status: Module present and OK.						
	Close Update Print Help						

Step	F: Testing the Hardware Configuration						
3	Testing the configuration of the communication processor.						
	This is done via the dialog box <i>Module Status</i> in the <i>SIMATIC Manager</i> . It is						
	opened by a \sqrt{BR} on the entry of the communication processor in the left						
	window and then selecting <i>Target System</i> \rightarrow <i>Module Status</i> from the pop-up menu.						
	The dialog box <i>Module Status</i> of the communication processor will be displayed.						
	The General tab displays various general data of the module.						
	A dialog box for be accessed via t	A dialog box for a more detailed diagnosis of the communication processor can be accessed via the <i>Special Diagnosis</i> button.					
	Module Informa	tion - CP 443-1 ONLINE		_ _ ×			
	Path: S7_IEH\SIM	ATIC 400(1)\CP 443-1	CPU operating mo Module operating r	CPU operating mode: RUN Module operating mode: RUN			
	General Diagnostic Buffer						
	Description:	CP 443-1	System ID:	SIMATIC 400			
	⊻ersion:	Order No./Description 6GK7 443-1BX00-0XE0	Component	Version -32472			
	Rack:	0	Address:	I 16380			
	Slot:	4	Module width:	1			
	<u>S</u> tatus:	Module present and OK. No LED display.					
	Close	Update Print	Spe <u>c</u> ial Diagnostics	Help			

Step	F: Testing the Hardware Configuration						
4	The dialog box NCM S7 Industrial Ethernet Diagnosis will be displayed.						
	The <i>CP Information</i> tab displays general information about the module. Among other things, the network address set can be checked.						
	The dialog box can be exited via the <i>Close</i> button. The Module Status dialog bo can also be exited via the <i>Close</i> button.						
	NCM S7 Industrial Ethernet Diagnostics						
	CP Information Diagnostic Buffer Operating Mode ISO Transport Options						
	Online Path						
	Interface: MPI/PROFIBUS/AUTO Address of router:						
	S7 Subnet ID of the Address of destination destination network: station network attachment: 0						
	Rack: 0 Slot: 4						
	General Module Information						
	CP Type: CP 443-1						
	CP Version: L2.96						
	Order Number: 6GK7 443-1BX00-0XE0						
	Network Type: Industrial Ethernet						
	Network Address: 08.00.06.01.00.00						
	C Status of the Module:						
	Operating Mode: Run Cause: OK						
	Uose CP Change Cyc. Upd. On Update Help						

G: Creating the STEP7 Program

Step	G: Creating the STE	Creating the STEP7 Program					
1	Creation of the S7 Pro	n of the S7 Program.					
	This sample project re	ple project requires the operation block OB1 and a data block. OB1 is					
	available by default, the	by default, the required data block must be created. This is done in the					
	Program(1) of the con	C Manager via a UR on the sub-entry Modules of the entry S7 (1) of the configured CPU module and then selecting <i>Insert New Object</i>					
	\rightarrow Data Block from	ta Block from the pop-up menu.					
	The properties dialog enter <i>DB75</i> and close	erties dialog box of the data block will be opened. As the block's <i>Name</i> 75 and close the dialog box with <i>OK</i> .					
	⊡… 🚺 CPU416-1 ⊟-ஞ_ S7 Program(1)						
		Cut	Ctrl+X				
		Copy	Ctrl+C				
		Paste	U(II+V				
		Delete	Del				
		Insert New Object	•	Organization Block			
		PLC	•	Function			
		Options	+	Data Block			
		Print	•	Vata Type Variable Table			
		Object Properties Special Object Propertie	Alt+Return				
2	The newly created dat	a block DB75 will be a	lisplayed in the	right window of the			
2	The newly created data block $DB/3$ will be displayed in the right window of the project.						
	Via a D on this data block or a R and then selecting Open Object from the						
	pop-up menu, the content of the block can be programmed. This starts the program LAD/STL/SCF.						
	- DB75						
	Open Objec	ct Ctrl+Alt+O					
	Cut	Ctrl+X					
	Сору	Ctrl+C					
	Paste	Ctrl+V					
	Delete	Del					
	PLC		•				
	Options		•				
	Print		•				
	Object Prop Special Obj	erties Alt+Return ect Properties	ר •				

Step	G: Creatin	g the STEP7 P	rogram		
3	The program <i>LAD/STL/SCF</i> is displayed. Acknowledge the dialog box <i>New Data Block</i> by clicking on <i>OK</i> .				
	KOP AWL FL	JP			
4	Programmin	ng the DB75.			
	In this data be determin	block, two tags led in <i>OB1</i> and	with a length of 1 then be written to	6 Bits are created. another tag with a	Their sum is to length of 16 Bits.
	Two additional tags with a length of 16 Bits are created, whose values are cyclically incremented in OBI				
	The tags cre	eated in the data	a block <i>DB75</i> are v	visualized in the W	inCC project. To
	The fellowi	c tags with co	leve the program	results are created to DP'	75
		ng graphic disp	ays the programm	neu uata block DB	
	DB75-57	_IERASIMATIC 400		T - 14 1 - 1 - 77 - 1	
	Address	Name	зтрист	Initial Value	Comment
	+0.0	Var 01	WORD	W#16#0	Value 1
	+2.0	Var 02	WORD	W#16#0	Value 2
	+4.0	Var_03	WORD	W#16#O	Summ
	+6.0	Var_04	WORD	W#16#O	Inc 1
	+8.0	Var_05	WORD	W#16#O	Inc 2
	=10.0		END_STRUCT		
5	Save the blo	ock and load it i	into the PLC. This	is done via the too	olbar button
	operating m	ode switch is s	et to STOP or RU	N-P.	ossible while the
	Download				
6	Programmi	ng the OB1.			
	Open the bl	ock in the prog	ram <i>LAD/STL/SCI</i>	F.	
	First, two values in the <i>DB75</i> are added and then stored again in <i>DB75</i> . Netzwerk 1: Addition				
	The res	ult is sto	red in anot	her	
	16-Bit Value				
	0	PN DB	75		
	L	DBW	0		
	L	DBW	2		
		I	4		
		DRM	4		
	Next, a value in the <i>DB75</i> is incremented every second.				
Step	G: Creating the STEP7 Program				
------	---				
	Network 2: Second Cycle				
	Generation of a second cycle at M 0.0				
	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$				
	Network 3: Counting in a second cycle Counting a value in a second cycle At 10000, reset to 0				
	AN M 0.0 JC M001 L DBW 6 L 1 +I				
	T DBW 6 L 10000 <i JC M001 L 0</i 				
	T DBW 6 MOO1: NOP O				
	Finally, a value in the <i>DB75</i> is incremented every time the <i>OB1</i> run. Network 4 : Counting in the cycle time				
	Counting a value each time the OB is executed At 10000, reset to 0				
	L DBW 8 L 1 +I				
	T DBW 8 L 10000 <i JC M002</i 				
	L 0 T DBW 8 M002: NOP 0				
7	Save the block <i>OB1</i> and load it into the PLC. This is done via the corresponding buttons on the toolbar. This completes the creation of the STEP7 project and it can now be run. Exit the program <i>LAD/STL/SCF</i> .				

H: Testing the STEP7 Program

Step	H: Testing the	STEP	7 Progr	am						
1	Testing the pro	gram v	with the S	STEP7 s	oftware.					
	For this purpos	ose, a tag table is created. This is done in the SIMATIC Manager via								
	$a \mathcal{T} \mathbf{R}$ on the d	entry of the configured CPU module and then selecting Target								
	System ${}^{\sim} \mathbb{O}_{\mathbb{R}}$ M	R Monitor/Control Tag from the pop-up menu.								
	⊡@ CPU416- ⊡@ S7-Pr	Cut Copy			Ctrl+X Ctrl+C					
	🔁 U	Paste			Ctrl+∀					
	_	Delete	•		Del					
		Insert New Object								
		PLC				Þ	CPU	Message	BS	
		Optior	ns			•	Displ	ay Force	Values	
		Print				•	Moni	tor/Modi	fy Variable	s
		Obiec	t Propertie	s	Alt+Return	_	Modu	ule Inform	nation	
		Speci	al Object F	Properties		►	Oper Clear	ating Mo /Reset	de	Ctrl+l
							Set D)ate and	Time	
							Save	RAM to	ROM	
							Diag	nose Har	dware	
2	An editor for c	reating	and usir	ng a tag	table will	be	displa	iyed.		
	The following shows a completed tag table. In this table, enter all tags created in									
	the <i>DB75</i> .									
	🕌 @Variable Tal	ble1 ON	LINE			_				
	Address		Symbol	Monitor	: Format	Mo	nitor	Value	Modify	Value
	DB75.DBW	0		DEC		12			12	
	DB75.DBW	4		DEC		24			12	
	DB75.DBW	6		DEC		52.	54			
	DB75.DBW	8		DEC		88	47			

Step	H: Testing the STEP7 Program
3	Monitoring the current tag values.
	By clicking on the toolbar button displayed below, the current values of the corresponding tags in the PLC are displayed in the column Status Value.
	€¢
	Monitor (according to trigger)
	Controlling the tag values.
	Values can be entered in the column Control Value. By clicking on the toolbar button displayed below, these values will be written to the corresponding tags in the PLC.
	Note that tags can only be controlled while the operating mode switch of the CPU module is set to <i>RUN-P</i> .
	Modify (according to trigger)
4	The created tag table can now be saved.
	In this sample, the table is saved under the name <i>VAT1</i> . After checking the program in the PLC, the tag table can be closed. This concludes the configuration of the STEP7 project and the <i>SIMATIC Manager</i> can be exited.
	I VAT1

2.4 Creation of the WinCC Project WinCC_S7_IEH

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S7_IEH*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S7_IEH*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	The WinCC Explorer will be displayed.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	WinCC Explorer
	Create a New Project
	Single-User Project
	C Multi-Client Project
	C Open an Existing Project
	Cancel

Step	A: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S7_IEH</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.
	Create a new project ? × Project Name: Project Path WinCC_S7_IEH Create WinCC_S7_IEH

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	<u>Find</u>
	<u>P</u> roperties

Step	B: Creating the Connection
2	The dialog box Add New Driver will be displayed.
	This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S7</i> , the driver <i>SIMATIC S7 Protocol Suite</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking
	on Open.
	Add new driver.
	Look jn: 🔁 Bin 💌 🖭 📰
	📄 ccTlg 🛛 📓 SIMATIC S5 PMC Profibus.chn
	PDLCache SIMATIC S5 Profibus FDL.chn
	SIMATIC S7 Protocol Suite.CHN
	SIMATIC SS Ethernet Layer 4.cnn Mar TEth.cnn
	SIMATIC S5 PMC Ethernet.chn
	•
	File name: SIMATIC S7 Protocol Suite.CHN Open
	Files of type: WinCC Communication Driver (*.chn) Cancel
3	The newly added driver <i>SIMATIC S7 Protocol Suite</i> will be displayed as a sub- entry to <i>Tag Management</i> .
	The driver contains eight different channel units. To operate a computer with two <i>CP 1413</i> communication processors, two <i>Industrial Ethernet</i> channel units are available.
	In this sample, the channel unit Industrial Ethernet is used. Create a new
	connection for this channel unit by OR on <i>Industrial Ethernet</i> and then selecting <i>New Driver Connection</i> from the pop-up menu.
	Image: Simple state sta

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S7_IEH_01</i> .
	Click on the <i>Properties</i> button to define the connection properties.
	Connection properties X
	General
	Name: S7_IEH_01
	Unit: Industrial Ethernet
	Server List
	OK Cancel Help

Step	B: Creating the Connection
5	The dialog box Connection Properties will be displayed.
	In the <i>Ethernet Address</i> field, enter the address that has been set for the communication processor <i>CP</i> 443-1. In this sample, this is the Ethernet Address 08.00.06.01.00.00.
	Additionally, the Rack Number and Slot Number of the CPU module to be accessed must be entered. Make sure that the values of the CPU module are entered here and not the values of the communication processor.
	Close the dialog box by clicking on <i>OK</i> . Also close the <i>Connection Properties</i> dialog box by clicking on <i>OK</i> .
	Connection Parameter - Industrial Ethernet
	Connection
	S7 Network Address
	Ethernet Address: 08 00 06 01 00 00
	Back Number:
	Slo <u>t</u> Number: 3
	☐ Send/receive ra <u>w</u> data block
	Connection Resource: 02
	OK Cancel Help

Step	B: Creating the Connection
6	Setting the system parameters of the Industrial Ethernet channel unit.
	These settings are made in the <i>System Parameters</i> dialog box, which is accessed
	via a UR on the <i>Industrial Ethernet</i> entry and then selecting <i>System Parameters</i> from the pop-up menu
	In the <i>Channel</i> tab, various settings pertaining to the communication and monitoring a communication can be made. These settings will apply to all channel units of the communication driver.
	System Parameter - Industrial Ethernet
	Channel Unit
	These parameters are valid for all units local to the computer!
	Cycle formation
	Use cyclic read service of PLC
	Lifebeat monitoring
	Monitoring of CPU-stop
	I Activat <u>e</u>
	Cancel Help

Step	B: Creating the Connection
7	In the Device tab, the access point used by the connection to access the PLC is specified.
	By default, the access point <i>CP_H1_1</i> : is set. Previously, the communication processor <i>CP 1413</i> has been assigned to the access point CP_H1_1: in the program <i>Setting the PG/PC Interface</i> . If you want the access point to be set automatically, make sure that the correct one is being used, especially if multiple communication processors are used.
	Close the dialog box by clicking on <i>OK</i> .
	System Parameter - Industrial Ethernet
	Channel Unit
	Select logical device name
	CP-Type/Bus Profile: Industrial Ethernet
	Logical device name: CP_H1_1:
	E Set automatically
	Job processing
	☐ <u>W</u> rite with priority
	OK Cancel Help

C: Creating the WinCC Tags

1 Creation of the WinCC tags required for the sample. This is done via a the newly created connection <i>S7_IEH_01</i> and then selecting <i>New Tag</i> from pop-up menu. SIMATIC S7 PROTOCOL SUITE Industrial Ethernet STEP OF New Group MPI Named Conne PROFIBUS PROFIBUS (II Slot PLC TCP/IP	me of
	<i>me</i> of
2 The properties dialog box of the tag will be displayed. In the sample, the <i>Na</i> the first tag is <i>S16x</i> . <i>S71EH01</i> . 01. The tag is of the <i>Signed 16 Bit Value</i> date	
type. Click on the <i>Select</i> button to set the <i>Address</i> of the new tag.	L
Tag properties	×
General Limits/Reporting	
Properties of Tags	
Name: S16x_S7IEH01_01	
Datagype : Signed 16-bit value	
Address:	
Adapt format: ShortToSignedWord	
C Eroject-wide update C Computer-local update	
Linear scaling	
Process Value Range Tag Value Range	
From	
То	
OK Cancel Help	1

Step	C: Creating the WinCC Tags
3	The dialog box Address Properties will be displayed.
	Set <i>DB</i> as the <i>Data Range</i> and the value 75 as the <i>DB No</i> . Set <i>Word</i> in the Address field and the value 0 in the <i>DBW</i> field. Close the dialog how by clicking
	on <i>OK</i> . The properties dialog box of the tag is also closed by clicking on <i>OK</i> .
	The just created WinCC tag is addressed in the range of the DB75, where the first
	of the two values to be added is located.
	Address properties
	Address
	Description
	Data DB 🔽 D <u>B</u> No. 75
	Address Word
	DBW 0 Length 1
	Dualitu Code
	OK Cancel Help
4	Creation of the remaining WinCC tags required.
	and addresses of the tags used in this sample are listed in the following graphic.
	Name Type Parameters
	S16x_S7IEH01_01 Signed 16-bit value DB75,DW0
	S16x_S7lEH01_02 Signed 16-bit value DB75,DW0
	S16x_S7IEH01_04 Signed 16-bit value DB75,DW0
	S16x_S7IEH01_05 Signed 16-bit value DB75,DW0

D: Creating the WinCC Screen

Step	D: Creating the WinCC Screen	
1	Creation of a WinCC screen in which the previously created tags are visualized.	
	Open the <i>Graphics Designer</i> editor via a ${}^{\frown}\mathbb{C}R$ and then selecting <i>Open</i> from the pop-up menu.	
	Graphics Designer Open New picture Graphic OLL Select ActiveX Control Convert pictures Convert global library Convert project library Eind Properties	
2	This will open the Graphics Designer editor with a new (blank) screen. To display the first tag, configure a <i>Smart Object</i> \rightarrow <i>I/O Field</i> . To do so, select the <i>I/O Field</i> object from the <i>Object Palette</i> and place it on the screen	
	Objects Image: Standard Objects Standard Objects Smart Objects Application Window Picture Window Picture Window Picture Window OLE Element Image: OLE Element Image: OLE Element Image: OLE E	

Step	D: Creating the WinCC Screen
3	After placing the I/O Field on the screen, its Configuration dialog box will be displayed.
	In the <i>Tag</i> field, set the tag $S16x_S71EH01_01$ via the button displayed below.
	Leave the Update of the tag at 2 s. Keep the default settings for the remaining options. Close the dialog box by clicking on OK.
	I/O-Field Configuration
	Tag: S16x_S7IEH01_01 Update: 2 s
	C Output C Input C Both
	Format Font Size 12 Font Name Arial Color
	Cancel
4	Changing the output format of the <i>I/O Field</i> . For this, open its properties dialog box via a OR on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	Cut Ctrl+X © Copy Ctrl+C Duplicate Case Ctrl+V Delete Del
	Custo <u>m</u> ized object
	Linking
	Configuration Dialog
	P <u>r</u> operties

Step	D: Creating the WinCC Screen	
5	The dialog box Object Properties will be displayed.	
	On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a \mathcal{D}_D on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.	
	Chiect Properties	
	->> 1/0 Field //0Field1	
	Properties Events	
	Image: Idea of the second s	
6	Creation of four additional <i>I/O Fields</i> for the display of the remaining tags.	
	Follow steps 2 to 5 to create the remaining I/O fields.	
7	Save the screen. In the sample project, the screen is saved under the name com_S7IEH_01.pdl. The screen can be switched directly to runtime from the Graphics Designer via the button displayed below.	



2.5 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S7_IEH* and the SIMATIC S7 station. A diagnosis of the sample according to the following description makes only sense, if the checks listed below have been completed successfully. Startup of the Communication Processor CP 1413

- E: Testing the Communication Processor
- Creation of the STEP7 Project S7_IEH
- F: Testing the Hardware Configuration
- I: Testing the STEP7 Program

WinCC Explorer

Step	WinCC Explorer	
1	Diagnosis of the communication connection in the WinCC Explorer.	
	Switch the project <i>WinCC_S7_IEH</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.	
	The created WinCC screen <i>com_3_S7IEH_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.	
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.	
	Language Status of Driver Connections Status of Multi-User Operation	

Step	WinCC Explorer
3	The dialog box Status - Logical Connections will be displayed.
	This dialog box lists all configured connections. For this sample, only the connection S7 <i>IFH 01</i> will be displayed
	The displayed values correspond to the status at the moment the dialog box was
	opened. By selecting the appropriate check-box, a Cyclic Update of the display
	can be achieved.
	TeelD News Cyty Teered Deduce Teering With the
	Tag ID Name Status Tag read Read req Tag written Write requ 2 \$7_IEH_01 0K 885 0 2 0 2 \$7_IEH_01 0K 885 0 2 0 Image: status Image: status Image: status Image: status Image: status 0 2 0 2 \$7_IEH_01 0K 885 0 2 0
4	Another way to obtain information about the connection status in general and
	about the connection status of individual tags is provided by <i>Tag Management</i> .
	pointing the mouse on the connection in question.
	Name Parameters
	S7_IEH_01 H1,08 00 06 01 00 00,,0,3,02
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection
	Name I ype Parameters
	Process value: 34 Quality: c0 Last Change:6/30/99 1:41:24 PM

Channel Diagnosis

Step	Channel Diagnosis
1	Diagnosis of the communication connection via the program <i>WinCC Channel</i> <i>Diagnosis</i> . Start this program via <i>Start</i> \rightarrow <i>Simatic</i> \rightarrow <i>WinCC</i> \rightarrow <i>Channel</i> <i>Diagnosis</i>
	Channel Diagnosis
2	The program WinCC Channel Diagnosis will be displayed.
	The <i>Channels/Connections</i> tab displays detailed information about the status of each configured connection. By default, the display is updated every second. The update cycle can be changed in the input field located at the bottom.
	📩 WinCC Channel Diagnosis
	Channels/Connections Configuration
	Image: Similar Similare Similare Similare Similar Similar Similar Similar Similar Simil
3	If a connection error is detected, the <i>Error Code</i> line in the right window half
	will display a value specifying the error cause. Detailed information about this
	error code is displayed by $\bigcup \mathbb{C}\mathbb{R}$ on the <i>Error Code</i> entry and then selecting <i>Help</i> from the pop-up menu
	Counters Value
	State disconnected
	Error Cou Help 1

Step	Channel Diagnosis		
4	This opens the Online Help to WinCC containing a description of the corresponding error code. Additionally, possible error causes are also listed.		
	🛷 WinCC Online Help		
<u>File Edit Bookmark Options H</u> elp			
	<u>Contents</u> Index <u>Find</u> <u>Back</u> <u>Print</u> <u>≤</u> < <u>></u> >		
	Error 4110 - L4_REM_ABORT Connection has been aborted. • PLC or CP has been turned off or reset. • PLC not connected to bus or bus system error. • Maximum number of permissible connections in the PLC exceeded.		

3 Communication to the SIMATIC S7 via Industrial Ethernet (Softnet)

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder *C:\Communication_Manual*. You have the option to copy the following components to the hard drive:



The STEP7 project we will create.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S7 and WinCC. The communication connection is realized via the Industrial Ethernet. The CP 1411 communication processor used in the computer has no separate CPU, the computer's CPU handles all communication tasks. Such a configuration is generally referred to as Softnet.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 1411*. To install this communication processor in the computer, the driver *IE SOFTNET-S7 BASIC*, located on the *SIMATIC NET* CD-ROM, is needed.

In the WinCC project, the communication driver *SIMATIC S7 Protocol Suite* must be installed. Via its channel unit *Industrial Ethernet*, the connection to the *SIMATIC S7* is configured.

The PLC is equipped with a *CPU 416-1* module. The connection to the network is established via the communication processor *CP 443-1*. For the configuration of this communication processor with the STEP7 software, the option package *NCM S7 Industrial Ethernet* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 1411
- Creation of the STEP7 Project S7_IES
- Creation of the WinCC Project WinCC_S7_IES
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>IE SOFTNET S7 BASIC</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 1411</i> .
Windows NT	Windows NT installation software for the installation of the communication processor <i>CP 1411</i> .
STEP7	STEP7 software with option package <i>NCM for Industrial Ethernet</i> for the creation of the STEP7 project.
WinCC	WinCC with the communication driver <i>SIMATIC S7</i> <i>Protocol Suite</i> for the creation of the WinCC project.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 1411</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack UR1
Power Supply	Power supply PS 407 10A in slot 1 and 2.
CPU Module	CPU module CPU 416-1 in slot 3.
Communication Processor	Communication processor CP 443-1 in slot 4.

3.1 Startup of the Communication Processor CP 1411

The following description details the configuration steps necessary to successfully start up the communication processor CP 1411. The communication is handled by the SIEMENS Industrial Ethernet protocol.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 1411*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Installing the Communication Protocol
- E: Configuring the Bindings
- F: Creating an Access Point
- G: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer

Step	A: Mounting the Communication Processor in the Computer
1	Mount the module according to the installation instructions. Among other things,
	follow the steps for handling electrostatic sensitive devices (ESD). The module must only be installed while the computer is off.
	The communication card <i>CP 1411</i> requires a free ISA slot in the computer. After the installation of the <i>CP 1411</i> , close the computer's case and start the computer.

B: Installing the Communication Driver

Step	B: Installing the Communication Driver
1	Install the communication driver <i>IE SOFTNET S7 BASIC</i> from the <i>SIMATIC NET</i> CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.



C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 1411</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	C: Installing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the <i>Install</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	S70NLINE (STEP 7)
	(Standard for STEP 7)
	Interface parameter set used:
	<none></none>
	KNone> TCP/IP -> DEC PCI Fast Ethernet
	Copy
	Delete
	- Interfaces
	intenaces
	OK Cancel Help
3	The dialog box Install/Remove Modules will be displayed. The Selection field
	lists all interfaces that can be installed. Among them will be the entry <i>CP 1411</i> , if the communication driver has been installed previously as outlined in step B
	Select the entry <i>CP 1411 (AMD PCNET-Family)</i> . The installation of the
	communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installed:
	CP1411 AMD PUNET Fra CP1413 C
	CP1413(256k DP-HAM) CP1511(Accton EN2216
	CP54112A2
	<u>H</u> esources
	CD1.411 Judicative ENDIC Maturality and (Dires Dires)
	CETATE Industrial Ethemet NDTS NetWorkboard (Flug&Flay)
	<u>Close</u>

Step	C: Installing the Communication Processor
4	This opens the <i>Network</i> dialog box. In the <i>Adapters</i> tab, install the communication card <i>CP 1411</i> by clicking on the <i>Add</i> button.
	Network ? 🗙
	Identification Services Protocols Adapters Bindings
	Network Adapters:
	Image: [1] DEC PCI Fast Ethernet DECchip 21140 Image: [1] DEC PCI Fast Ethernet DECchip 21140
	Item Notes:
	DEC PCI Fast Ethernet DECchip 21140
	OK Cancel
5	The Select Network Adapter dialog box will be displayed.
	From the <i>Network Adapter</i> list, select the entry <i>AMD PCNET-Family Ethernet-</i> <i>Adapter</i> . Close the <i>Select Network Adapter</i> dialog box by clicking on <i>OK</i> .
	Select Network Adapter
	Click the Network Adapter that matches your hardware, and then click OK. If you have an installation disk for this component, click Have Disk.
	Network Adapter:
	Allied Telesyn AT-2560 Series PCI/100 Ethernet Adapter AMD PCNET Family Ethernet Adapter Andrew ISA IIA Token Ring Adapter Arcnet/TCNS (All Types) Cabletron E21XX Ethernet Adapter Cabletron E21XX Ethernet Adapter
	<u>H</u> ave Disk
	OK Cancel

Step	C: Installing the Communication Processor
6	The <i>Windows NT Setup</i> dialog box will be displayed. This dialog box informs you that some Windows NT files must be copied for the installation of the <i>CP</i> 1411.
	In the input field at the bottom, specify the path in which the appropriate files can be found. Normally, this is the path to the CD-ROM drive (if the files are copied from a Windows NT Installation CD-ROM).
	Conclude the Windows NT Setup by clicking on the Continue button.
	Windows NT Setup
	Setup needs to copy some Windows NT files. Setup will look for the files in the location specified below. If you want Setup to look in a different place, type the new location. When the location is correct, click Continue.
	c:\winnt\
7	The setup dialog box for the CP 1411 will be displayed.
	Keep the default settings for the various options. Close the setup dialog box by clicking on <i>OK</i> .
	AMD PCNET ISA/VESA Ethernet Adapter v3.23
	I/O Port: Auto_Scan ▼ □ IP
	IRQ <u>N</u> umber: Auto_Scan <u>B</u> us to scan
	DMA Number: Auto_Scan ▼ C PNP C VESA
	Eull Duplex: Default C ISA
	Bus Timer: Default
	<u> </u>

Step	C: Installing the Communication Processor
8	After the installation of the <i>CP 1411</i> is complete, the entry <i>AMD PCNET</i> <i>ISA/VESA Ethernet-Adapter</i> will be displayed in the <i>Network Adapters</i> list of the <i>Adapters</i> tab.
	Network ? X
	Identification Services Protocols Adapters Bindings
	Network Adapters:
	I] DEC PCI Fast Ethernet DECchip 21140
	AMD PONET ISA/VESA Ethernet Adapter
	Add <u>R</u> emove <u>Properties</u> <u>Update</u>
	Item Notes:
	AMD PUNET ISA/VESA Ethernet Adapter
	Close Cancel

D: Installing the Communication Protocol

Step	D: Installing the Communication Protocol
1	Installation of the SIEMENS Industrial Ethernet protocol.
	This is done in the <i>Protocols</i> tab of the <i>Network</i> dialog box via the <i>Add</i> button.
	Network
	Identification Services Protocols Adapters Bindings
	Network Protocols:
	Image: TCP/IP Protocol Add Bemove Properties Update Description: Transport Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
	Close Cancel

Step	D: Installing the Communication Protocol
2	This opens the Select Network Protocol dialog box.
	From the <i>Network Protocol</i> list, select the entry <i>SIEMENS Industrial Ethernet</i> (<i>ISO</i>). Close the <i>Select Network Protocol</i> dialog box by clicking on <i>OK</i> .
	Select Network Protocol
	Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this component, click Have Disk.
	Network Protocol:
	 NWLink IPX/SPX Compatible Transport Point To Point Tunneling Protocol SIEMENS Industrial Ethernet (ISO) Streams Environment TCP/IP Protocol
	Have Disk
	OK Cancel
3	After the installation of the <i>SIEMENS Industrial Ethernet</i> protocol is complete, it will be displayed in the <i>Network Protocols</i> field of the <i>Protocols</i> tab.
	Network ? X
	Identification Services Protocols Adapters Bindings
	Network Protocols:
	TCP/IP Protocol
	Add <u>R</u> emove <u>P</u> roperties <u>U</u> pdate
	Description: SIEMENS Industrial Ethernet (ISO) Transport
	Close Cancel

E: Configuring the Bindings

Step	E: Configuring the Bindings
1	The bindings of the communication processor CP 1411 must be configured. This is done in the Bindings tab of the Network dialog box.
	In the Show Bindings for: field, select the entry all adapters.
	Select all protocols to be used by the communication processor <i>CP 1411</i> . In this sample, the communication processor only communicates via the <i>SIEMENS Industrial Ethernet (ISO)</i> protocol. For this purpose, all available protocols except for the <i>SIEMENS Industrial Ethernet (ISO)</i> must be disabled for the <i>AMD PCNET-Family Ethernet-Adapter</i> entry.
	A protocol is disabled via the <i>Disable</i> button. Disabled protocols are marked as follows:
	0
	Close the <i>Network</i> dialog box by clicking on the <i>OK</i> button.
	Network ? X
	Identification Services Protocols Adapters Bindings
	Network bindings are connections between network cards, protocols, and services installed on this computer. You can use this page to disable network bindings or arrange the order in which this computer finds information on the network.
	Show Bindings for: all adapters
	[1] DEC PCI Fast Ethernet DECchip 21140 [2] AMD PCNET ISA/VESA Ethernet Adapter SIEMENS Industrial Ethernet (ISO) TCP/IP Protocol WINS Client(TCP/IP)
	Enable Disable Move Up Move Down
	Close Cancel

Step	E: Configuring the Bindings
2	The installation and settings made require a restart of the computer. Acknowledge the dialog box displayed by clicking on <i>Yes</i> .
	Network Settings Change
	You must shut down and restart your computer before the new settings will take effect. Do you want to restart your computer now?
	<u>Yes</u> <u>N</u> o

F: Creating an Access Point

Step	F: Creating an Access Point
1	Creation of an access point for the communication processor <i>CP 1411</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via $Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.$
2	The program <i>Setting the PG/PC Interface</i> will be displayed. The dialog box for adding a new access point is opened via the <i>Add/Delete</i> entry from the <i>Access Point of the Application</i> list-box.
	Access Path Access point of application: S70NLINE (STEP 7) Access Path
	COMPUTING MPI (WinCC) S7ONLINE (STEP 7)
	<none> CNone> ISO Ind. Ethernet -> CP1411 Copy</none>
	Delete
	Interfaces
	OK Cancel Help

Step	F: Creating an Access Point
3	The dialog box <i>Add/Delete Access Points</i> will be displayed.
	In the <i>New Access Point</i> field, enter the name of the new access point. For this sample, the name CP_H1_1 : is entered. The access point CP_H1_1 : is the defaul access point used by WinCC for the communication via the <i>Industrial Ethernet</i> . In the <i>Description</i> field, additional information about the access point can be entered.
	The access point is created via the <i>Add</i> button. The access point will then be displayed in the list of available access points.
	Exit the dialog box Add/Delete Access Points by clicking on the Close button.
	Add 7 Delete Access Points
	Cļose Help

Step	F: Creating an Access Point
4	In the program <i>Setting the PG/PC Interface</i> , assign the communication processor <i>CP 1411</i> to the new access point.
	To do so, set the <i>CP-H1_1</i> : entry in the <i>Access Point of the Application</i> field. In the field below, select the entry <i>ISO Ind. Ethernet -> CP1411</i> . This completes the assignment between the access point and the communication processor.
	Close the program <i>Setting the PG/PC Interface</i> by clicking on the <i>OK</i> button. This concludes the installations and settings required for the operation of the <i>CP</i> 1411.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:> ISO Ind. Ethernet -> CP1411
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP1413 <active> Properties</active>
	<none> ISO Ind. Ethernet-> CP1411</none>
	TCP/IP -> DEC PCI Fast Ethernet
	Delete
	Interfaces
	Install
	OK Cancel Help

G: Testing the Communication Processor

Step	G: Testing the Communication Processor
1	Check the proper installation of the communication processor <i>CP</i> 1411 via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface to be checked. In this case, select the entry <i>ISO Ind. Ethernet</i> -> <i>CP 1411</i> . Make sure that the assignments between access points and the interfaces are not changed.
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:> ISO Ind. Ethernet -> CP1411
	(for CP1411 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	ISE Ind. Ethernet -> CP1411 Properties
	(None> Diagnostics
	TCP/IP -> DEC PCI Fast Ethernet Copy
	Instait
	OK Cancel Help
3	The dialog box Simatic NET Diagnostics will be displayed.
	In the <i>SOFTNET IE</i> tab, the diagnosis is started via the <i>Test</i> button. The result of the diagnosis will be displayed immediately following
	If the result of the diagnosis is positive (correct installation), the dialog box can
	be exited with OK.

Step	G: Testing the Communication Processor
	In this case, the program <i>Setting the PG/PC Interface</i> can also be closed by clicking on <i>OK</i> . The configuration of the communication to the S7 via the <i>Industrial Ethernet</i> is continued in the following section.
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described in the section Is the Communication Module in the Computer operational?.
	SIMATIC NET diagnostics
	SUFTNET IE S7-Protokoll S7-Trace SR-Protokoll SR-Trace
	Firmware version: 6.400.3008.1281 NDIS: active Ethernet address: 00.00.e8.3c.6e.71
	OK Cancel Apply Help
3.2 Creation of the STEP7 Project S7_IES

The following description details the configuration steps necessary to create and start up the STEP7 project *S7_IES*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP7 project S7_IES:

- A: Installing the Hardware
- B: Installing the Option Package
- C: Creating the STEP7 Project
- D: Configuring the Hardware
- E: Loading the Hardware Configuration
- F: Testing the Hardware Configuration
- G: Creating the STEP7 Program
- H: Testing the STEP7 Program

A: Installing the Hardware

Step	A: Installing the Hardware
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 407 10A</i> , the CPU module <i>CPU 416-1</i> and the communication processor <i>CP 443-1</i> .
	Establishing the connection from the computer to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 1411</i> in the computer to the communication processor <i>CP 443-1</i> in the PLC.

B: Installing the Option Package

Step	B: Installing the Option Package
1	If the option package <i>NCM S7 Industrial Ethernet</i> has not been installed during the installation of <i>STEP7</i> , install it now from the <i>STEP7</i> CD-ROM. This option package is required for the configuration of the communication processor <i>CP</i> 443-1 via the <i>STEP7</i> software.
	After inserting the <i>STEP7</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	setup.exe

Step	B: Installing the Option Package
2	This starts the installation program. Follow the instructions of the installation program. On the <i>Components</i> page, select the check-box <i>NCM S7 Ind. Ethernet</i> . Finish the installation.
	Setup - STEP 7: Components ▼ Programs to be installed. B B MS Internet Explorer V4.01 SP1 Software STEP 7 V5.0 SP1 NCM S7 - PROFIBUS V5.0 SP1 29 MB NCM S7 - Ind. Ethernet V5.0 SP1 18 MB AuthorsW V2.0.1 2 MB Description NCM S7 - Industrial Ethernet V5.0 ServicePack 1 - Optional package for CP configuration with STEP 7. Beadme Estimated installation time: 00:03 (hh:mm)
	< <u>B</u> ack <u>N</u> ext > Cancel

C: Creating the STEP7 Project

Step	C: Creating the STEP7 Project
1	Create a new STEP7 project in the SIMATIC Manager.
	It is started via $Start \rightarrow Simatic \rightarrow SIMATIC Manager$.
	S
	SIMATIC Manager
2	This displays the SIMATIC Manager.
	Via the menus $File \rightarrow New$, the dialog box for specifying the parameters of a new STEP7 project will be opened.
	The New dialog box will be displayed.
	The radio-button <i>New Project</i> must be selected. In the <i>Name</i> field, the name of the new project to be created is entered. The names of the STEP7 projects created within the framework of this manual all start with <i>S7</i> . They also include a reference to the communication type used. The project of this sample has the name <i>S7_IES</i> .

Step	C: Creating the STEP7 Project
	By default, projects are stored in the <i>C</i> :\ <i>SIEMENS</i> \ <i>STEP7</i> \ <i>S7proj</i> folder. This can be changed at any time via the <i>Browse</i> button.
	The <i>New</i> dialog box is closed via the <i>OK</i> button.
	New
	New project New library
	Na <u>m</u> e:
	S7_IES
	Name Storage Path
	▼ Type: Project ▼
	Storage location (path): Browse
	C:\SIEMENS\STEP7\S7proj
	Cancel Help

D: Configuring the Hardware

Step	D: Configuring the Hardware	
1	The new project will be displayed in the <i>SIMAT</i> . The hardware for this project must be configure One <i>SIMATIC 400-Station</i> and for its networking	TIC Manager. ed. Two components are needed: ng an Industrial Ethernet.
	These components are added to the SIMATIC M name $S7_IES$ and then selecting Insert New Ob and Insert New Object \rightarrow Industrial Etherne	Manager via a $\bigcirc \mathbf{R}$ on the project ject \rightarrow SIMATIC 400-Station et from the pop-up menu.
	D-Cut Ctrl+X Copy Ctrl+C Paste Ctrl+V Delete Del	
	Insert New Object ▶ Print ▶ Object Properties Alt+Return	SIMATIC 400 Station SIMATIC 300 Station Other Station SIMATIC H Station SIMATIC PC Station SIMATIC S5 PG/PC
		MPI PROFIBUS Industrial Ethernet PTP
		S7 Program M7 Program
		OS OS (MultiClient)
2	The just added components will be displayed in <i>SIMATIC Manager</i> .	the right window of the
	I SIMATIC 400(1) 紫카머미(1) 물루 프	thernet(1)

Step	D: Configuring the Hardware
	By \bigcirc D on the component <i>SIMATIC 400(1)</i> in the right window, the point <i>Hardware</i> will be displayed. By \bigcirc D on the point <i>Hardware</i> or \bigcirc D on it and then selecting <i>Open Object</i> from the pop-up menu, the program <i>HW Config</i> will be started.
	S7_IES K:\com S7_ies\S7_ies S7_IES SIMATIC 400(1) Cut Ctrl+Alt+0 Cut Ctrl+X Copy Ctrl+C Paste Ctrl+V Delete Del Print
3	The program <i>HW Config</i> will be displayed. This program is used to exactly define the hardware used in the PLC and to configure their properties.
4	By clicking on the toolbar button of the program <i>HW Config</i> displayed below, the <i>Hardware Catalog</i> is opened. This catalog is used to select the required hardware components.



Step	D: Configuring the Hardware
	This sample uses the power supply PS 407 10A. It is inserted into slot 1. A power supply of this type occupies two slots.
	As the CPU module, this sample uses a CPU 416-1. This module is inserted into slot 3. Another parameter to be set during the configuration of the connection in the WinCC project is the slot number of the CPU module.
	We also require the communication processor <i>CP</i> 443-1. This CP is only available from the <i>Hardware Catalog</i> if the option package <i>NCM S7 Industrial Ethernet</i> has been installed. After the communication processor <i>CP</i> 443-1 has been inserted in the rack, its properties dialog box will open.
8	The properties dialog box of the communication processor <i>CP 443-1</i> will be displayed.
	In the <i>MAC Address</i> field of the <i>Parameters</i> tab, enter the desired Ethernet address of the communication processor. In this sample, the address <i>08.00.06.01.00.00</i> is specified. Another parameter to be set during the configuration of the connection in the WinCC project is this Ethernet address. In the Subnet field below, assign the entry Ethernet(1) to the communication processor. Close the dialog box by clicking on OK.
	Properties - Ethernet Node CP 443-1 (R0/S4)
	General Parameters
	MAL address: [08.00.06.01.00.00
	Subnet:
	Ethernet(1)
	Delete
	Cancel Help
9	The following graphic shows the completed hardware arrangement of the sample.
	1 PS407 10A 3 CPU416-1 4 CP 443-1 5 6 7 - 0 -

Step	D: Configuring the Hardware
10	Save the settings made in the program <i>HW Config</i> . This is done via the toolbar button displayed below.
	Save

E: Loading the Hardware Configuration

Step	E: Loading the Hardware Configuration
1	The hardware configuration created in the program <i>HW Config</i> must be transferred to the PLC.
	This is done via the toolbar button displayed below.
	Download to Module
2	A dialog box will be displayed from which the components to be loaded can be selected.
	For this sample, all displayed components will be selected. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> . Close the dialog box by clicking on <i>OK</i> .
	Select Target Module
	Target modules:
	Module Back Slot
	CPU416-1 0 3
	CP 443-1 0 4
	Select <u>A</u> ll
	Cancel Help

Step	E: Loading the Hardware Configuration
3	Now the dialog box <i>Select Station Address</i> will be displayed. In this dialog box, specify which station address is used by the STEP7 software to communicate with the CPU module. In this sample, the communication is carried out via the MPI interface. The <i>Address</i> of the CPU module is 2. Close the dialog box by clicking on <i>OK</i> .
	Select Node Address
	Which node address links the programming device with module CPU416-1?
	Rac <u>k</u> :
	Target Station O Reached via router
	Connection to Target Station
	<u>Т</u> уре: МРІ
	Address: 2
	Cancel Help
4	The configuration data will now be transferred to the PLC. If necessary, the individual modules will be get to the STOP status
	The program <i>HW Config</i> can be exited.
	The newly added components will be displayed by the <i>SIMATIC Manager</i> for the station <i>SIMATIC 400(1)</i> .
	⊡ · ⁽ S7_IES) ⊡ · • SIMATIC 400(1) ⊕ · + • • • • • • • • • • • • • • • • • •

F: Testing the Hardware Configuration

Step	F: Testing the Hardware Configuration
1	Testing of the hardware configuration made. If the key switch of the CPU module is set to <i>RUN</i> or <i>RUN-P</i> and the operating mode switch of the communication processor is set to <i>RUN</i> , only the status LEDs
	signifying the <i>RUN</i> operating mode should be displayed. If this is not the case, there is an error. The following steps help you localize this error. However, these steps should still be performed even if the status LEDs show no error. This allows you to recognize uncritical errors and faulty configurations.

Step	F: Testing the Ha	rdware Configuration	
2	Testing the configu	aration of the CPU module.	
	This is done via the	e dialog box Module Status	in the SIMATIC Manager. It is
	opened by a	on the entry of the CPU mo	dule in the left window and then
	selecting Target Sy	$stem \rightarrow Module Status f$	from the pop-up menu.
	The dialog box Ma	odule Status of the CPU mod	dule will be displayed.
	The <i>General</i> tab di field, the current m	splays various general data nodule status and any existin	of the CPU module. In the <i>Status</i> ng errors are displayed.
	The <i>Diagnosis Bug</i> errors and how to a	<i>fer</i> tab contains more detaile correct them.	ed information about existing
	The dialog box car	be exited via the Close but	ton.
	Module Information	n - CPU416-1 ONLINE	
	Pa <u>t</u> h: S7_IES\SIMAT Status: OK	IC 400(1)\CPU416-1	CPU operating mode: RUN No force job.
	Time System General	Performance Data Diagnostic Buffer	Communication Stacks Memory Scan Cycle Time
	Description:	CPU416-1	System ID: SIMATIC 400
	⊻ersion:	Order No./Description Compo 6ES7 416-1×J01-0AB0 ····	nent Version 1
	Rack:	0	Address: ····
	Slot:	3	Module width: 1
	<u>S</u> tatus:	Module present and OK.	
		poare <u>Print</u>	нер

Step	F: Testing the H	ardware Configurati	on	
3	Testing the config	guration of the commu	nication processor.	
	This is done via the dialog box Module Status in the SIMATIC Manager. It is			
	opened by a OF	R on the entry of the co	mmunication processo	or in the left
	window and then menu.	selecting Target System	m → Module Status	from the pop-up
	The dialog box M	Iodule Status of the con	mmunication processor	will be displayed.
	The General tab	displays various genera	al data of the module.	
	A dialog box for the accessed via the beaccessed vi	a more detailed diagno ne <i>Special Diagnosis</i> b	sis of the communicati	on processor can
	Module Informati	on - CP 443-1 ONLINE		
	Path: S7_IES\SIMA Status: OK	TIC 400(1)\CP 443-1	CPU operating mo Module operating r	de: RUN mode: RUN
	General Diagnostic	Buffer		
	Description:	CP 443-1	System ID:	SIMATIC 400
	⊻ersion:	Order No./Description 6GK7 443-1BX00-0XE0	Component	Version 3.0
	Rack:	0	Address:	I 16380
	Slot:	4	Module width:	1
	<u>S</u> tatus:	Module present and OK. No LED display.		
	Close	Update Print	Spe <u>c</u> ial Diagnostics	Help

Step	F: Testing the Hardware Configuration
4	The dialog box NCM S7 Industrial Ethernet Diagnosis will be displayed.
	The <i>CP Information</i> tab displays general information about the module. Among other things, the network address set can be checked.
	The dialog box can be exited via the <i>Close</i> button. The Module Status dialog box can also be exited via the <i>Close</i> button.
	🔣 NCM S7 Industrial Ethernet Diagnostics
	CP Information Diagnostic Buffer Operating Mode ISO Transport Options
	Online Path
	Interface: MPI/PROFIBUS/AUTO Address of router:
	S7 Subnet ID of the Address of destination destination network: station network attachment: 0
	Rack: 0 Slot: 4
	General Module Information
	CP Type: CP 443-1
	CP Version: L2.96
	Order Number: 6GK7 443-1BX00-0XE0
	Network Type: Industrial Ethernet
	Network Address: 08.00.06.01.00.00
	Status of the Module:
	Operating Mode: Run Cause: OK
	Close CP Change Cyc. Upd. <u>O</u> n Update Help

G: Creating the STEP7 Program

Step	G: Creating the STEP7 Program
1	Creation of the S7 Program.
	This sample project requires the operation block <i>OB1</i> and a data block. <i>OB1</i> is available by default, the required data block must be created. This is done in the
	SIMATIC Manager via a \bigcirc R on the sub-entry Modules of the entry S7 Program(1) of the configured CPU module and then selecting Insert New Object \rightarrow Data Block from the pop-up menu.
	The properties dialog box of the data block will be opened. As the block's <i>Name</i> enter $DB75$ and close the dialog box with OK .
	E ST CPU416-1 E ST S7 Program(1) Source Files Blocks
	Cut Ctrl+X
	Copy Ctrl+C
	Paste Ctrl+V
	Delete Del
	Insert New Object Organization Block
	PLC Function Block
	Options Data Block
	Print Data Type
	Object Properties Alt+Return Special Object Properties
2	The newly created data block DR75 will be displayed in the right window of the
2	project.
	Via a \square On this data block or a \square and then selecting <i>Open Object</i> from the
	pop-up menu, the content of the block can be programmed. This starts the
	program LAD/STL/SCF.
	DB75
	Open Object Ctrl+Alt+O
	Cut Ctrl+X
	Copy Ctrl+C
	Paste Ctrl+V
	Delete Del
	PLC •
	Options •
	Print
	Object Properties Alt+Return Special Object Properties

Step	G: Creating the STEP7 Program				
3	The program LAD/STL/SCF is displayed.				
	Acknowledge the dialog box New Data Block by clicking on OK.				
	KOP AWL FL	IP			
4	Programmir	ng the DB75.			
	In this data be determine Two additio	block, two tags ed in <i>OB1</i> and t nal tags with a l	with a length of 16 hen be written to a ength of 16 Bits a	Bits are created. nother tag with a re created, whose	Their sum is to length of 16 Bits. values are
	cyclically in	cremented in O	B1.		
	The tags cre do so, WinC	ated in the data CC tags with cor	block <i>DB75</i> are viresponding addres	sualized in the W ses are created th	inCC project. To ere.
	The following	ng graphic displ	ays the programm	ed data block DB	75.
	■ DB75 S7	_IEH\SIMATIC 400(1)\CPU416-1		
	Address	Name	Туре	Initial Value	Comment
	0.0		STRUCT		
	+0.0	Var_01	WORD	W#16#0	Value 1
	+2.0	Var_02	MORD	W#16#0	Summ
	+6.0	Var_03	WORD	W#16#0	Inc 1
	+8.0	Var 05	WORD	W#16#0	Inc 2
	=10.0		END_STRUCT		
5	Save the block and load it into the PLC. This is done via the toolbar button displayed below. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> .				
6	D	1 001			
6	Programmin	ig the OBI .			
	Open the blo	ock in the progr	am LAD/STL/SCF		D.D.7.5
	First, two va	alues in the $DB/$	5 are added and th	ien stored again ii	DB/3.
	Netzwerk	L: Addit:	.on		
	Adding two 16-Bit Values The result is stored in another 16-Bit Value				
	OI	PN DB	75		
	L	DBW	0		
		DBW	2		
	+] T	L DBM	4		
			• •		
	Next, a value in the DB75 is incremented every second.				

Step	G: Creating the STEP7 Program
	Network 2: Second Cycle
	Generation of a second cycle at M 0.0
	AN M 0.0 L S5T#1S
	SD T 1
	$ \begin{array}{cccc} A & T & 1 \\ = & M & 0.0 \end{array} $
	Network 3: Counting in a second cycle
	Counting a value in a second cycle At 10000, reset to 0
	AN M 0.0
	L DBW 6
	L 1 +I
	T DBW 6
	<i< th=""></i<>
	JC M001 L 0
	T DBW 6
	MODI: NOP 0
	Finally, a value in the $DB75$ is incremented every time the $OB1$ run.
	Network 4: Counting in the cycle time
	Counting a value each time the OB is executed At 10000, reset to 0
	L DBW 8 I. 1
	L 10000
	<i jc="" mod2<="" th=""></i>
	T DBW 8 M002: NOP 0
7	Save the block <i>OB1</i> and load it into the PLC. This is done via the corresponding
	buttons on the toolbar. This completes the greation of the STEP7 project and it can now be say. Fuit the
	program <i>LAD/STL/SCF</i> .

H: Testing the STEP7 Program

Step	H: Testing the STEP7 Program				
1	Testing the program with the STEP7 software.				
	For this purpos	se, a tag table is	s created. This is d	lone in the SIMA	ATIC Manager via
	$a \mathcal{B}_{R \text{ on the }}$	entry of the cor	nfigured CPU mo	dule and then se	lecting Target
	System $\rightarrow M$	Aonitor/Contro	l Tag from the po	p-up menu.	0
	⊡ · 🔄 CPU416-1 ⊡ · 🗊 S7-Pr	Cut Copy	Ctrl+X Ctrl+C		
		Paste	Ctrl+V		
		Delete	Del		
		Insert New Object	st I	•	
		PLC		CPU Messages	
		Oetiene		Display Force V	alues
	-	Uptions		Monitor/Modify	Variables
	-	Print		Module Informa	tion
		Object Properties	s Alt+Return	Operating Mode	e Ctrl+l
		Special Ubject Pi	roperties	Clear/Reset	
				Set Date and T	ime
				Save RAM to R	UM
				Diagnose Hardy	ware
The following shows a completed tag table. In this table, enter a the <i>DB75</i> .					
	Address	Symbol	Monitor Format	Monitor Value	Modify Value
	DB75.DBW	0	DEC	12	12
	DB75.DBW	2	DEC	12	12
	DB75.DBW	4	DEC	24	
	DB75.DBW	8	DEC	5454 8847	
2		1	1		
3	Monitoring the	current tag val	lues.		1 6.1
	By clicking on	the toolbar but	ton displayed belo	ow, the current v	values of the
		tags in the TEC	e are displayed in		us vanc.
	66.				
	Monitor (acc	ording to trigger)			
	Controlling the	taσ values Va	lues can be entere	d in the column	Control Value
	By clicking on	the toolbar but	tton displayed bel	ow, these values	will be written to
	the correspond	ing tags in the	PLC.Note that tag	s can only be co	ontrolled while the
	operating mode	e switch of the	CPU module is se	et to RUN-P.	
1					

Step	H: Testing the STEP7 Program
4	The created tag table can now be saved.
	In this sample, the table is saved under the name <i>VAT1</i> . After checking the program in the PLC, the tag table can be closed. This concludes the configuration of the STEP7 project and the <i>SIMATIC Manager</i> can be exited.
	I VAT1

3.3 Creation of the WinCC Project WinCC_S7_IES

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S7_IES*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S7_IES*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	This will display the WinCC Explorer.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on <i>OK</i> .
	WinCC Explorer ? × Create a New Project
	O Open an Existing Project
	Cancel

Step	A: Creating the WinCC Project			
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S7_IES</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button			
	Create a new project ? × Project Name: Project Path WinCC_S7_IES Eolder WinCC_S7_IES [] WinCC_S7_IES Help WinCC_S7_IES Drive: Vou can use this dialog box to create a new WinCC project. Drive: Drive: C:			

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	<u> </u>
	Properties

Step	B: Creating the Connection
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S7</i> , the driver <i>SIMATIC S7 Protocol Suite</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .
	Add new driver.
	Look in: 🔄 Bin 🔽 💼 📺
	 ccTlg PDLCache SIMATIC S5 PMC Profibus.chn SIMATIC S5 Profibus FDL.chn SIMATIC S5 Ethernet Layer 4.chn SIMATIC S5 Ethernet TF.CHN SIMATIC S5 PMC Ethernet.chn
	File name: SIMATIC S7 Protocol Suite.CHNpen
	Files of type: WinCC Communication Driver (*.chn)
3	The newly added driver <i>SIMATIC S7 Protocol Suite</i> will be displayed as a sub-
	The driver contains eight different channel units. To operate a computer with two <i>CP 1413</i> communication processors, two <i>Industrial Ethernet</i> channel units are available.
	In this sample, the channel unit <i>Industrial Ethernet</i> is used. Create a new
	connection for this channel unit by ${}^{\bigcirc}\mathbb{C}\mathbb{R}$ on <i>Industrial Ethernet</i> and then selecting <i>New Driver Connection</i> from the pop-up menu.
	SIMATIC S7 PROTOCOL SUITE MPI PROFIBUS Industrial Ethernet Slot PLC TCP/IP PROFIBUS (II) Industrial Ethernet Named Connection Properties

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S7_IES_01</i> .
	Click on the <i>Properties</i> button to define the connection properties.
	Connection properties
	General
	Name: S7_IES_01 Properties
	Unit: Industrial Ethernet 🔽
	Server List
	21P-WS5
	OK Cancel Help

Step	B: Creating the Connection
5	The dialog box Connection Properties will be displayed.
	In the <i>Ethernet Address</i> field, enter the address that has been set for the communication processor <i>CP 443-1</i> . In this sample, this is the Ethernet Address 08.00.06.01.00.00.
	Additionally, the Rack Number and Slot Number of the CPU module to be accessed must be entered. Make sure that the values of the CPU module are entered here and not the values of the communication processor.
	Close the dialog box by clicking on <i>OK</i> . Also close the <i>Connection Properties</i> dialog box by clicking on <i>OK</i> .
	Connection Parameter - Industrial Ethernet
	Connection
	S7 Network Address
	Ethernet Address: 08 00 06 01 00 00
	Rack Number:
	Slo <u>t</u> Number: 3
	Send/receive ra <u>w</u> data block
	Connection Resource: 02
	Cancel Help

Step	B: Creating the Connection	
6	Setting the system parameters of the <i>Industrial Ethernet</i> channel unit. These settings are made in the <i>System Parameters</i> dialog box, which is accessed via a \bigoplus R on the <i>Industrial Ethernet</i> entry and then selecting <i>System Parameters</i> from the pop-up menu. In the <i>Channel</i> tab, various settings pertaining to the communication and monitoring a communication can be made. These settings will apply to all	
	channel units of the communication driver.	
	System Parameter - Industrial Ethernet	
	These parameters are valid for all units local to the computer! Cycle formation Image: Use cyclic read service of PLC Lifebeat monitoring Image: Activate 60 Interval 30 Monitoring interval Monitoring of CPU-stop Image: Activate	
	OK Cancel Help	

Step	B: Creating the Connection
7	In the <i>Device</i> tab, the access point used by the connection to access the PLC is specified.
	By default, the access point <i>CP_H1_1</i> : is set. Previously, the communication processor <i>CP 1411</i> has been assigned to the access point CP_H1_1: in the program <i>Setting the PG/PC Interface</i> . If you want the access point to be set automatically, make sure that the correct one is being used, especially if multiple communication processors are used.
	Close the dialog box by clicking on <i>OK</i> .
	System Parameter - Industrial Ethernet
	Channel Unit
	Select logical device name
	CP-Type/Bus Profile: Industrial Ethernet
	Logical <u>d</u> evice name: CP_H1_1:
	Set automatically
	Job processing
	☐ <u>W</u> rite with priority
	OK Cancel Help

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags
1	Creation of the WinCC tags required for the sample.
	This is done via a ${}^{\frown}\mathbb{O}R$ on the newly created connection <i>S7_IES_01</i> and then selecting <i>New Tag</i> from the pop-up menu.
	SIMATIC S7 PROTOCOL SUITE MPI PROFIBUS Industrial Ethernet Slot PLC TCP/IP PROFIBUS (II Industrial Ethe Named Conne Ut Copy Paste Delete Properties
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16x_S7IES01_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type. <i>Click on the Select button to set the Address of the new tag.</i>
	Tag properties
	General Limits/Reporting
	Properties of Tags
	Name: S16x_S7IES01_01
	Adapt format: ShortToSignedWord
	O Eroject-wide update O Computer-local update
	Linear scaling
	Process Value Range
	From From
	Το
	OK Cancel Help

Step	C: Creating the WinCC	Tags	
3	The dialog box Address Pri Set DB as the Data Range Address field and the value on OK. The properties dial The just created WinCC ta of the two values to be add	<i>roperties</i> will be displayed and the value 75 as the I e 0 in the <i>DBW</i> field. Clob log box of the tag is also ag is addressed in the rangled is located.	ed. <i>DB No</i> Set <i>Word</i> in the ose the dialog box by clicking closed by clicking on <i>OK</i> . ge of the DB75, where the first
	Address properties		×
	Address Description <u>C</u> PU Data Address Word DBW 0	DB No.	75 1 Quality Code
	OK	Cancel	Help
4	Creation of the remaining Follow steps 1 to 3 for the and addresses of the tags u	WinCC tags required. creation of the remainin used in this sample are list	g tags. The names, data types sted in the following graphic.
	Name	Туре	Parameters
	S16x_S7IES01_01	Signed 16-bit value	DB75,DW0
	S16x_S7IES01_02	Signed 16-bit value	DB75,DW0
	S16x_S7IES01_03	Signed 16-bit value	DB75,DW0
	S16x_S7ES01_04	Signed 16-bit value	DB75,DWU
	SI6X_S/IESU1_05	Signed T6-bit Value	DR12,DM0

D: Creating the WinCC Screen



Step	D: Creating the WinCC Screen		
	The <i>Update</i> of the tag is set to <i>Upon Change</i> . Keep the default settings for the remaining options. Close the dialog has by dialog on <i>OK</i> .		
	I/O-Field Configuration		
	Tag: \$16x_\$7!E\$01_01 Update: 2 s Type • Output • Input • Both Format Format Font Size 12 Font Name Arial Color		
	Cancel		
4	Changing the output format of the <i>I/O Field</i> .		
	For this, open its properties dialog box via a \mathcal{B} R on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.		
	■ Copy Ctrl+C		
	Duplicate		
	🛱 Paste Ctrl+V		
	Custo <u>m</u> ized object		
	Linking		
	Configuration Dialog		
	Properties		

Step	D: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed.
	On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a \bigcirc D on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.
	Construction of the second sec
	Properties Events
	Image: Decimal static stati
6	Creation of four additional <i>I/O Fields</i> for the display of the remaining tags.
	Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen.
	In the sample project, the screen is saved under the name <i>com_3_S7IES_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.
	Runtime



3.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S7_IES* and the SIMATIC S7 station. A diagnosis of the sample according to this description makes only sense, if the checks listed below have been completed successfully. Startup of the Communication Processor CP 1411

• G: Testing the Communication Processor

Creation of the STEP7 Project S7_IES

- F: Testing the Hardware Configuration
- I: Testing the STEP7 Program

WinCC Explorer

Step	WinCC Explorer	
1	Diagnosis of the communication connection in the WinCC Explorer.	
	Switch the project <i>WinCC_S7_IES</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.	
	Activate	
	The created WinCC screen <i>com_3_S7IES_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.	
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.	
	Tools	
	Language	
	Status of <u>D</u> river Connections	
	Status of Multi-User Operation	

Step	WinCC Explorer
3	The dialog box <i>Status - Logical Connections</i> will be displayed. This dialog box lists all configured connections. For this sample, only the connection <i>S7_IES_01</i> will be displayed.
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.
	Status - Logical Connections 🔀
	Tag ID Name Status Tag read Read requ Tag written Write requ 2 S7_IES_01 OK 90 0 0 0 2 S7_IES_01 OK 90 0 0 0 4 × 250 ms Update Help Olose
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> . The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.
	Name Parameters § §
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type Parameters S16x_S7IES01_01 Signed 16-bit value DB75,DW0
	MΩ Process value: 34 Quality: c0 Last Change:7/1/99 2:50:18 PM

Channel Diagnosis

Step	Channel Diagnosis
1	Diagnosis of the communication connection via the program <i>WinCC Channel Diagnosis</i> .
	Start this program via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Channel Diagnosis.$
	Channel Diagnosis
2	
2	The <i>Channels/Connections</i> tab displays detailed information about the status of each configured connection. By default, the display is updated every second. The update cycle can be changed in the input field located at the bottom.
	📩 WinCC Channel Diagnosis
	Channels/Connections Configuration
	B-V SIMATIC S7 PROTOCOL SUITE Counters Value
	State ready Error Code none Error Count 0 Unit Industrial Ethernet Device ISO Ind. Ethernet Own Cycles 0 AS Cycles 1 Max. AS Cycles 32 ConnectionState ready ForceConnectionAddress H1.08 00 06 01 00 00,,0,3, ProjectedConnectionAddress H1.08 00 06 01 00 00,,0,3,
3	If a connection error is detected, the <i>Error Code</i> line in the right window half will display a value specifying the error cause. Detailed information about this
	error code is displayed by UR on the <i>Error Code</i> entry and then selecting <i>Help</i> from the pop-up menu
	Counters Value State disconnected Error Code 410E Error Code 1

Step	Channel Diagnosis
4	This opens the Online Help to WinCC containing a description of the corresponding error code. Additionally, possible error causes are also listed.
	🛷 WinCC Online Help 📃 🗆 🗙
	<u>File Edit Bookmark Options H</u> elp
	<u>Contents</u> Index <u>Find</u> <u>Back</u> <u>Print</u> <u>≤</u> < <u>></u> >
	Error 4110 - L4_REM_ABORT
	Connection has been aborted.
	PLC or CP has been turned off or reset.
	PLC not connected to bus or bus system error.
	Maximum number of permissible connections in the PLC exceeded.
4 Communication to the SIMATIC S7 via TCP/IP

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder $C:\Communication_Manual$. You have the option to copy the following components to the hard drive:



The STEP7 project we will create.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S7 and WinCC. The communication connection is realized via the Industrial Ethernet. As the transport protocol, the TCP/IP Protocol will be used.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 1411*. To install this communication processor in the computer, the driver *IE SOFTNET-S7 BASIC*, located on the *SIMATIC NET* CD-ROM, is needed.

In the WinCC project, the communication driver *SIMATIC S7 Protocol Suite* must be installed. Via its channel unit *TCP/IP*, the connection to the *SIMATIC S7* is configured. The PLC is equipped with a *CPU 416-1* module. The connection to the network is established via the communication processor *CP 443-1 TCP*. For the configuration of this communication processor with the STEP7 software, the option package *NCM S7 Industrial Ethernet* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 1411
- Creation of the STEP7 Project S7_IETCP
- Creation of the WinCC Project WinCC_S7_IETCP
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>IE SOFTNET S7 BASIC</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 1411</i> .
Windows NT	Windows NT installation software for the installation of the communication processor <i>CP 1411</i> and the <i>TCP/IP Protocol</i> .
STEP7	STEP7 software with option package <i>NCM for Industrial Ethernet</i> for the creation of the STEP7 project.
WinCC	WinCC with the communication driver <i>SIMATIC S7</i> <i>Protocol Suite</i> for the creation of the WinCC project.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 1411</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack UR1
Power Supply	Power supply PS 407 10A in slot 1 and 2.
CPU Module	CPU module CPU 416-1 in slot 3.
Communication Processor	Communication processor CP 443-1 TCP in slot 4.

4.1 Startup of the Communication Processor CP 1411

The following description details the configuration steps necessary to successfully start up the communication processor *CP 1411*. The communication is handled by the *TCP/IP Protocol*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 1411*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Installing the Communication Protocol
- E: Configuring the Bindings
- F: Creating an Access Point

A: Mounting the Communication Processor in the Computer

Step	A: Mounting the Communication Processor in the Computer
1	Mount the module according to the installation instructions. Among other things, follow the steps for handling electrostatic sensitive devices (ESD). The module must only be installed while the computer is off.
	The communication card <i>CP 1411</i> requires a free ISA slot in the computer. After the installation of the <i>CP 1411</i> , close the computer's case and start the computer.

B: Installing the Communication Driver

Step	B: Installing the Communication Driver
1	Install the communication driver <i>IE SOFTNET S7 BASIC</i> from the <i>SIMATIC NET</i> CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.

Step	B: Installing the Communication Driver
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>IE SOFTNET-S7 BASIC</i> to be installed must be selected. Finish the installation.
	SIMATIC NET Software: Components
	SIMATIC NET Software: Components Image: Similar to the state of the programs to be installed. Image: Similar to the programs to the programs to be installed. Image: Similar to the programs to the programs to be installed. Image: Similar to the programs to the programs to be installed. Image: Similar to the programs to the programs to the programs to the program to the
	Required on C: 7 MByte Available on C: 667 MByte < <u>B</u> ack <u>N</u> ext > Cancel

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 1411</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	C: Installing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the Install button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	S7ONLINE (STEP 7)
	(Standard for STEP 7)
	Interface parameter set used:
	<none> Properties</none>
	<none></none>
	TCP/IP -> DEC PCI Fast Ethernet
	Delete
	_ Interfaces
	Install
3	The dialog box Install/Remove Modules will be displayed. The Selection field
	lists all interfaces that can be installed. Among them will be the entry <i>CP 1411</i> , if the communication driver has been installed previously as outlined in step B.
	Select the entry <i>CP 1411 (AMD PCNET-Family)</i> . The installation of the
	communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1411(AMD PCNET-Fa CP1413
	CP1413 (256k DP-RAM) [Install>]
	CP5411 < Berrove
	Hesources
	CP1411 Industrial Ethernet NDIS Networkboard (Plug&Play)
	<u>C</u> lose Help

Step	C: Installing the Communication Processor
4	This opens the <i>Network</i> dialog box. In the <i>Adapters</i> tab, install the communication card <i>CP 1411</i> by clicking on the <i>Add</i> button.
	Network ? X Identification Services Protocols Adapters Bindings Network Adapters: Image: Comparison of the service of
	OK Cancel

Step	C: Installing the Communication Processor
5	The Select Network Adapter dialog box will be displayed. From the Network Adapter list, select the entry AMD PCNET-Family Ethernet- Adapter. Close the Select Network Adapter dialog box by clicking on OK.
	Select Network Adapter ? × Click the Network Adapter that matches your hardware, and then click OK. If you have an installation disk for this component, click Have Disk. Network Adapter: Allied Telesyn AT-2560 Series PCI/100 Ethernet Adapter
	AMD PCNET Family Ethernet Adapter Andrew ISA IIA Token Ring Adapter Arcnet/TCNS (All Types) Cabletron E21XX Ethernet Adapter Cabletron E22XX Ethernet Adapter Have Disk
	OK Cancel
6	The <i>Windows NT Setup</i> dialog box will be displayed. This dialog box informs you that some Windows NT files must be copied for the installation of the <i>CP</i> 1411. In the input field at the bottom, specify the path in which the appropriate files can be found. Normally, this is the path to the CD-ROM drive (if the files are copied
	from a Windows NT Installation CD-ROM). Conclude the <i>Windows NT Setup</i> by clicking on the <i>Continue</i> button
	Windows NT Setup
	Setup needs to copy some Windows NT files. Setup will look for the files in the location specified below. If you want Setup to look in a different place, type the new location. When the location is correct, click Continue. Cancel
	c:\winnt\

Step	C: Installing the Communication Processor
7	The setup dialog box for the <i>CP 1411</i> will be displayed.
	Keep the default settings for the various options. Close the setup dialog box by clicking on <i>OK</i> .
	AMD PCNET ISA/VESA Ethernet Adapter v3.23
	I/O Port: Auto_Scan 🔽 🗖 TP
	IRQ <u>N</u> umber: Auto_Scan v <u>B</u> us to scan
	DMA Number: Auto_Scan V C PNP
	Eull Duplex: Default C ISA
	Bus Timer: Default
	<u>OK</u> ancel <u>H</u> elp
8	After the installation of the <i>CP 1411</i> is complete, the entry <i>AMD PCNET</i> <i>ISA/VESA Ethernet-Adapter</i> will be displayed in the <i>Network Adapters</i> list of the <i>Adapters</i> tab.
	Network ? X
	Identification Services Protocols Adapters Bindings
	Network Adapters:
	[1] DEC PCI Fast Ethernet DECchip 21140 [2] AMD PCNET ISA/VESA Ethernet Adapter
	Add <u>R</u> emove <u>Properties</u> <u>U</u> pdate
	Item Notes:
	AMD PCNET ISA/VESA Ethernet Adapter
	Close Cancel

Step	D: Installing the Communication Protocol	
1	The <i>TCP/IP Protocol</i> must be installed. All protocols already installed are displayed in the <i>Protocols</i> tab of the <i>Network</i> dialog box.	
	If the <i>TCP/IP Protocol</i> entry is not available, install it via the <i>Add</i> button.	
	Identification Services Protocols Adapters Bindings	
	Network Protocols:	
	Add Bernove Properties Update Description:	
	Close Cancel	

D: Installing the Communication Protocol

Step	D: Installing the Communication Protocol
2	This opens the Select Network Protocol dialog box.
	From the <i>Network Protocol</i> list, select the entry <i>TCP/IP Protocol</i> . Close the <i>Select Network Protocol</i> dialog box by clicking on <i>OK</i> .
	Select Network Protocol
	Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this component, click Have Disk.
	Network Protocol:
	 NWLink IPX/SPX Compatible Transport Point To Point Tunneling Protocol SIEMENS Industrial Ethernet (ISO) Streams Environment TCP/IP Protocol
	<u>H</u> ave Disk
	OK Cancel
3	The TCP/IP Setup dialog box will be displayed.
	Answer the question if the configuration data for the <i>TCP/IP Protocol</i> are to be
	retrieved from a DHCP server with <i>No</i> .
	If there is a DHCP server on your network, TCP/IP can be configured to dynamically provide an IP address. If you are not sure, ask your system administrator. Do you wish to use DHCP?
	<u>Y</u> es
4	The <i>Windows NT Setup</i> dialog box will be displayed. This dialog box informs you that some Windows NT files must be copied for the installation of the <i>TCP/IP Protocol</i> . In the input field at the bottom, specify the path in which the appropriate files can be found. Normally, this is the path to the CD-ROM drive (if the files are copied from a Windows NT Installation CD-ROM).Conclude the <i>Windows NT Setup</i> by clicking on the <i>Continue</i> button.
	Windows NT Setup
	Setup needs to copy some Windows NT files. Setup will look for the files in the location specified below. If you want Setup to look in a different place, type the new location. When the location is correct, click Continue.
	c:\winnt\

Step	D: Installing the Communication Protocol
5	After the installation of the <i>TCP/IP Protocol</i> is complete, it will be displayed in the <i>Network Protocols</i> field of the <i>Protocols</i> tab.
	Network ?X
	Identification Services Protocols Adapters Bindings
	Network Protocols:
	Image: TCP/IP Protocol Add Bemove Properties Update Description: Transport Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
	Close Cancel

E: Configuring the Bindings

Step	E: Configuring the Bindings
1	The bindings of the communication processor <i>CP 1411</i> must be configured. This is done in the <i>Bindings</i> tab of the <i>Network</i> dialog box.
	In the Show Bindings for: field, select the entry all adapters.
	Select all protocols to be used by the communication processor <i>CP 1411</i> . In this sample, the communication processor only communicates via the <i>TCP/IP Protocol</i> . For this purpose, all available protocols except for the <i>TCP/IP Protocol</i> must be disabled for the <i>AMD PCNET ISA/VESA Ethernet-Adapter</i> entry.
	A protocol is disabled via the <i>Disable</i> button. Disabled protocols are marked as follows:
	0

Step	E: Configuring the Bindings
	Close the Network dialog box by clicking on the <i>OK</i> button.
	Network ?X
	Identification Services Protocols Adapters Bindings
	Network bindings are connections between network cards, protocols, and services installed on this computer. You can use this page to disable network bindings or arrange the order in which this computer finds information on the network.
	Show Bindings for: all adapters
	Enable Disable Move Up Move Down
	OK Cancel

Step	E: Configuring the Bindings
2	The properties dialog box of the TCP/IP Protocol will be displayed. In the <i>Adapter</i> field of the <i>IP Address</i> tab, set the entry <i>AMD PCNET ISA/VESA</i> <i>Ethernet-Adapter</i> for the communication processor <i>CP 1411</i> .
	The radio-button <i>Specify an IP address</i> is selected to specify an <i>IP Address</i> and <i>Subnet Mask</i> . The same Subnet Mask must also be specified in the configuration of the PLC's <i>CP 443-1 TCP</i> communication processor.
	Close the properties dialog box of the <i>TCP/IP Protocol</i> by clicking on <i>OK</i> .
	Microsoft TCP/IP Properties ? X
	IP Address DNS WINS Address Routing
	An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
	Adagter:
	C Obtain an IP address from a DHCP server
	O Specify an IP address
	<u>IP Address:</u> 140.80.0.1
	Subnet Mask: 255 . 255 . 0 . 0
	Default <u>G</u> ateway:
	Advanced
	Cancel Apply
3	The installation and settings made require a restart of the computer. Acknowledge the dialog box displayed by clicking on <i>Yes</i> .
	Network Settings Change
	You must shut down and restart your computer before the new settings will take effect. Do you want to restart your computer now?
	<u>Yes</u> <u>N</u> o

F: Creating an Access Point

Step	F: Creating an Access Point	
1	Creation of an access point for the communication processor <i>CP 1411</i> via the program <i>Setting the PG/PC Interface</i> .	
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.	
	Setting the PG/PC Interface	
2	The program Setting the PG/PC Interface will be displayed.	
	The dialog box for adding a new access point is opened via the <i>Add/Delete</i> entry from the <i>Access Point of the Application</i> list-box.	
	Setting the PG/PC Interface (V5.0)	
	Access Path	
	Access point of application:	
	S7ONLINE (STEP 7)	
	CP_H1_1: CP_L2_1: FWL_LOAD MPI (WinCC)	
	S70NLINE (STEP 7)	
	TCP/IP -> CP1411 TCP/IP -> DEC PCI Fast Ethernet	
	Interfaces	
	OK Cancel Help	

Step	F: Creating an Access Point
3	The dialog box Add/Delete Access Points will be displayed.
	In the <i>New Access Point</i> field, enter the name of the new access point. For this sample, the name <i>CP-TCPIP</i> is entered. The access point CP-TCPIP is the default access point used by WinCC for the communication via the <i>TCP/IP Protocol</i> . In the <i>Description</i> field, additional information about the access point can be entered.
	displayed in the list of available access points.
	Exit the dialog box <i>Add/Delete Access Points</i> by clicking on the <i>Close</i> button.
	Add / Delete Access Points Add New access point: CP-TCPIP Description: for WinCC TCP/IP-Unit Delete CP_H1_1: CP_L2_1: PWL_LOAD MPI (WinCC) STONLINE Standard for STEP 7
	Close Help

Step	F: Creating an Access Point
4	In the program <i>Setting the PG/PC Interface</i> , assign the communication processor <i>CP 1411</i> to the new access point.
	To do so, set the <i>CP-TCPIP</i> entry in the <i>Access Point of the Application</i> field. In the field below, select the entry $TCP/IP \rightarrow CP1411$. This completes the assignment between the access point and the communication processor. Exit the program Setting the <i>PC/PC</i> Interface via the <i>OK</i> button. This concludes
	the installations and settings required for the operation of the <i>CP 1411</i> .
	Setting the PG/PC Interface (V5.0)
	Access point of application:
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP1413 <active> Properties</active>
	<none> Diagnostics</none>
	TCP/IP -> DEC PCI Fast Ethernet
	Interfaces
	OK Cancel Help

4.2 Creation of the STEP7 Project S7_IETCP

The following description details the configuration steps necessary to create and start up the STEP7 project *S7_IETCP*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP7 project *S7_IETCP*:

- A: Installing the Hardware
- B: Installing the Option Package
- C: Creating the STEP7 Project
- D: Configuring the Hardware
- E: Loading the Hardware Configuration
- F: Testing the Hardware Configuration
- G: Creating the STEP7 Program
- H: Testing the STEP7 Program

A: Installing the Hardware

Step	A: Installing the Hardware
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 407 10A</i> , the CPU module <i>CPU 416-1</i> and the communication processor <i>CP 443-1 TCP</i> .
	Establishing the connection from the computer to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 1411</i> in the computer to the communication processor <i>CP 443-1 TCP</i> in the PLC.

B: Installing the Option Package

Step	B: Installing the Option Package
1	If the option package <i>NCM S7 Industrial Ethernet</i> has not been installed during the installation of <i>STEP7</i> , install it now from the <i>STEP7</i> CD-ROM. This option package is required for the configuration of the communication processor <i>CP</i> 443-1 TCP via the <i>STEP7</i> software.
	After inserting the <i>STEP7</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	setup.exe

Step	B: Installing the Option P	Package	
2	This starts the installation program. Follow the instructions of the installation program. On the <i>Componen</i> select the check-box <i>NCM S7 Ind. Ethernet</i> . Finish the installation.		<i>onents</i> page, n.
	Setup - STEP 7: Compor	nents rograms to be installed.	×
	SIMATIC Software	MS Internet Explorer V4.01 SP1 Acrobat Reader V3.01 STEP 7 V5.0 SP 1 NCM S7 · PROFIBUS V5.0 SP1 NCM S7 · Ind. Ethernet V5.0 SP1 AuthorsW V2.0.1	36 MB 3 MB 190 MB 29 MB 18 MB 2 MB
		Description NCM S7 - Industrial Ethernet V5.0 ServicePacl package for CP configuration with STEP 7.	k 1 - Optional <u>R</u> eadme
		< <u>B</u> ack <u>N</u> ext >	Cancel

C: Creating the STEP7 Project

Step	C: Creating the STEP7 Project	
1	Create a new STEP7 project in the SIMATIC Manager.	
	It is started via $Start \rightarrow Simatic \rightarrow SIMATIC Manager$.	
	SIMATIC Manager	

Step	C: Creating the STEP7 Project
2	This displays the SIMATIC Manager.
	Via the menus $File \rightarrow New$, the dialog box for specifying the parameters of a new STEP7 project will be opened.
	The New dialog box will be displayed.
	The radio-button <i>New Project</i> must be selected. In the <i>Name</i> field, the name of the new project to be created is entered. The names of the STEP7 projects created within the framework of this manual all start with <i>S7</i> . They also include a reference to the communication type used. The project of this sample has the name <i>S7_IETCP</i> .
	By default, projects are stored in the <i>C:\SIEMENS\STEP7\S7proj</i> folder. This can be changed at any time via the <i>Browse</i> button.
	The New dialog box is closed via the OK button.
	New
	New project New library
	Na <u>m</u> e:
	S7_IETCP
	Name Storage Path
	Storage location (path): C:\SIEMENS\STEP7\S7proj
	Cancel Help

D: Configuring the Hardware

Step	D: Configuring the Hardware		
1	The new project will be displayed in the SIMATIC Manager.		
	The hardware for this project must be configured. Two components are needed: One <i>SIMATIC 400-Station</i> and for its networking an <i>Industrial Ethernet</i> .		
	These components are added to the <i>SIMA</i> name S7 <i>IETCP</i> and then selecting <i>Inser</i>	TIC Manager via a $\mathcal{T}R$ on the project	
	Station and Insert New Object — Indu	<i>ustrial Ethernet</i> from the pop-up menu.	
		r r r	
	Cut Ctrl+X Copy Ctrl+C Paste Crrl+V		
	Deles Del	-	
	Delete Del		
	Print	SIMATIC 400 Station SIMATIC 300 Station Other Station	
	Ubject Properties Alt+Heturn	SIMATIC PC Station SIMATIC S5 PG/PC	
		MPI PROFIBUS Industrial Ethernet PTP	
		S7 Program M7 Program	
		OS OS (MultiClient)	
2	The just added components will be displa SIMATIC Manager.	yed in the right window of the	
	📓 SIMATIC 400(1) 📲 MPI(1)	뿧Ethernet(1)	

Step	D: Configuring the Hardware
	By \textcircled{D} on the component <i>SIMATIC 400(1)</i> in the right window, the point <i>Hardware</i> will be displayed. By \textcircled{D} on the point <i>Hardware</i> or \textcircled{D} R on it and then selecting <i>Open Object</i> from the pop-up menu, the program <i>HW Config</i> will be started.
	S7_IETCP C:\SIEMENS\STEP7\S7proj\S7_ietcp S7_IETCP SIMATIC 400(1) Cut Copy Ctrl+X Copy Ctrl+V Delete Print
3	The program <i>HW Config</i> will be displayed. This program is used to exactly define the hardware used in the PLC and to configure their properties.
4	By clicking on the toolbar button of the program <i>HW Config</i> displayed below, the <i>Hardware Catalog</i> is opened. This catalog is used to select the required hardware components.



Step	D: Configuring the Hardware		
	This sample uses the power supply <i>PS 407 10A</i> . It is inserted into slot 1. A power supply of this type occupies two slots.		
	As the CPU module, this sample uses a <i>CPU 416-1</i> . This module is inserted into slot <i>3</i> . Another parameter to be set during the configuration of the connection in the WinCC project is the slot number of the CPU module.		
	We also require the communication processor <i>CP 443-1 TCP</i> . This CP is only available from the <i>Hardware Catalog</i> if the option package <i>NCM S7 Industrial Ethernet</i> has been installed. After the communication processor <i>CP 443-1 TCP</i> has been inserted in the rack, its properties dialog box will open.		
8	The properties dialog box of the communication processor <i>CP 443-1 TCP</i> will be displayed.		
	In the MAC Address field of the Parameters tab, enter the desired Ethernet address of the communication processor. However, the settings relevant for the communication via the TCP/IP Protocol are the IP Address and the Subnet Mask.		
	During the configuration of the connection in the WinCC project, the IP Address of the communication processor <i>CP 443-1 TCP</i> is another parameter that has to be set. The value set for the <i>Subnet Mask</i> must be the same value that has been set for the Subnet Mask during the installation of the communication processor <i>CP 1411</i> .		
	In the <i>Subnet</i> field below, assign the entry <i>Ethernet(1)</i> to the communication processor. Close the dialog box by clicking on <i>OK</i> .		
	Properties - Ethernet Node CP 443-1 TCP (R0/S5)		
	General Parameters		
	MAC address: 08.00.06.01.00.00		
	IP address: 140.80.0.1		
	Subnet mask: 255.255.0.0 C Use router		
	Address: 140.80.0.1		
	Subnet		
	Not Networked New Ethemet(1)		
	Properties		
	Delete		
	Cancel Help		

Step	D: Configuring the Hardware
9	The following graphic shows the completed hardware arrangement of the sample.
	3 CPU416-1 4 CP 443-1 TCP 5 6 7 •
10	Save the settings made in the program <i>HW Config</i> . This is done via the toolbar button displayed below.
	Save

E: Loading the Hardware Configuration

Step	E: Loading the Hardware Configuration		
1	The hardware configuration created in the program <i>HW Config</i> must be transferred to the PLC.		
	This is done via the toolbar button displayed below.		
	Download to Module		
2	A dialog box will be displayed from which the components to be loaded can be selected.		
	For this sample, all displayed components will be selected. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or RUN_P . Close the dialog how by clicking on OK		
	Select Target Module X Target modules:		
	Module Rack Slot		
	CPU416-1 0 3 CP 443-1 0 4		
	Select <u>All</u>		
	Cancel Help		

Step	E: Loading the Hardware Configuration
3	Now the dialog box Select Station Address will be displayed.
	In this dialog box, specify which station address is used by the STEP7 software to communicate with the CPU module. In this sample, the communication is carried out via the MPI interface. The <i>Address</i> of the CPU module is 2.
	Close the dialog box by clicking on <i>OK</i> .
	Select Node Address
	Which node address links the programming device with module CPU416-1?
	Rac <u>k</u> :
	Slot: 3 🚔
	Target Station O In Jocal network C Reached via router
	Connection to Target Station Iype: MPI Address: 2
	Cancel Help
4	The configuration data will now be transferred to the PLC. If necessary, the
	The program <i>HW Config</i> can be exited. The newly added components will be displayed by the <i>SIMATIC Manager</i> for the station <i>SIMATIC 400(1)</i> .
	⊟≪ <mark>S7_IETCP</mark> È∰ SIMATIC 400(1) È∺∰ CP 443-1 È ¶ CPU416-1

F:	Testing	the	Hardware	Configuration
----	---------	-----	----------	---------------

Step	F: Testing the Hardware Configuration
1	Testing of the hardware configuration made. If the key switch of the CPU module is set to <i>RUN</i> or <i>RUN-P</i> and the operating mode switch of the communication processor is set to <i>RUN</i> , only the status LEDs signifying the <i>RUN</i> operating mode should be displayed. If this is not the case, there is an error. The following steps help you localize this
	error. However, these steps should still be performed even if the status LEDs show no error. This allows you to recognize uncritical errors and faulty configurations.

Step	F: Testing the Hardware Configuration				
2	Testing the configura	Testing the configuration of the CPU module.			
	This is done via the o	dialog box Module Status	in the SIMATIC Manager. It is		
	opened by a $\mathcal{O}R$ or	n the entry of the CPU mo	odule in the left window and then		
	selecting Target Syst	$em \rightarrow Module Status f$	from the pop-up menu.		
	The dialog box Mode	ule Status of the CPU mod	dule will be displayed.		
	The <i>General</i> tab disp field, the current mod	blays various general data dule status and any existin	of the CPU module. In the <i>Status</i> ng errors are displayed.		
	The <i>Diagnosis Buffe</i> errors and how to con	r tab contains more detaile rrect them.	ed information about existing		
	The dialog box can b	be exited via the Close but	tton.		
	Module Information -	CPU416-1 ONLINE			
	Path: S7_IES\SIMATIC Status: OK	400(1)\CPU416-1	CPU operating mode: RUN No force job.		
	Time System General	Performance Data Diagnostic Buffer	Communication Stacks Memory Scan Cycle Time		
	Description: Cl	PU416-1	System ID: SIMATIC 400		
	⊻ersion: €	Order No./Description Compo EES7 416-1XJ01-0AB0 ····	nent Version 1		
	Rack: 0		Address:		
	Slot: 3		Module width: 1		
	<u>S</u> tatus:	fodule present and OK.			
		ate <u>P</u> rint	Help		

Step	F: Testing the Hardware Configuration					
3	Testing the config	guration of the commu	nication processor.			
	This is done via the	he dialog box Module	Status in the SIMATIC	<i>Manager</i> . It is		
	opened by a $\mathcal{T}R$ on the entry of the communication processor in the left					
	window and then	selecting Target Syste	m 💛 Module Status	from the pop-up		
	menu.					
	The dialog box M	Iodule Status of the con	mmunication processor	will be displayed.		
	The General tab	displays various genera	al data of the module.			
	A dialog box for	a more detailed diagno	sis of the communicati	on processor can		
	be accessed via th	ne Special Diagnosis b	utton.			
	Module Information	ON - CP 443-1 ONLINE	CPU operating more			
	Status: OK	110 400(1)/07 443-1	Module operating n	node: RUN		
	General Diagnostic Buffer					
	Description:	CP 443-1	Sustem ID:	SIMATIC 400		
			-,			
	⊻ersion:	Order No./Description	Component	Version		
		BUK7 443-18700-0760		112		
	Rack:	0	Address:	I 16380		
	Slot	4	Module width:	1		
	<u>S</u> tatus:	Module present and OK				
		No LED display.				
	Close	Update <u>P</u> rint	Spe <u>c</u> ial Diagnostics	Help		

Step	F: Testing the Hardware Configuration		
4	The dialog box NCM S7 Industrial Ethernet Diagnosis will be displayed.		
	The CP Information tab displays general information about the module.		
	The dialog box can be exited via the <i>Close</i> button. The Module Status dialog box		
	can also be exited via the <i>Close</i> button.		
	NCM S7 Industrial Ethernet Diagnostics		
	CP Information Diagnostic Buffer Operating Mode ISO Transport Options		
	Online Path		
	Interface: MPI/PROFIBUS/AUTO Address of router:		
	S7 Subnet ID of the Address of destination destination network: station network attachment: 2		
	Rack: 0 Slot: 4		
	General Module Information		
	CP Type: CP 443-1		
	CP Version: L2.96		
	Order Number: 6GK7 443-1BX00-0XE0		
	Network Type: Industrial Ethernet		
	Network Address: 08.00.06.01.00.00		
	Status of the Module:		
	Operating Mode: Run Cause: OK		
	CP Change Cyc. Upd. <u>O</u> n Update Help		

G: Creating the STEP7 Program

Step	G: Creating the STEP7 Program					
1	Creation of the S7 Pro	ation of the S7 Program.				
	This sample project re available by default, th	sample project requires the operation block <i>OB1</i> and a data block. <i>OB1</i> is ble by default, the required data block must be created. This is done in the				
	SIMATIC Manager via $Program(1)$ of the con	C Manager via a $\mathcal{P}R$ on the sub-entry Modules of the entry S7 $n(1)$ of the configured CPU module and then selecting Insert New Object				
	The properties dialog enter DB75 and close	<i>ata Block</i> from the pop-up menu. berties dialog box of the data block will be opened. As the block's Name B75 and close the dialog box with OK.				
	⊡… 📓 CPU416-1 ⊡	CPU416-1				
	Blocks	Source Files Blocks				
		Cut	Ctrl+X Ctrl+C			
		Paste	Ctrl+V			
		Delete	Del			
		Insert New Object		 Organization Block 		
		PLC		Function Block Function		
		Options		Data Block		
		Print		Data Type Variable Table		
		Object Properties Special Object Proper	Alt+Return ties	•		
2	The newly created dat	a block <i>DB75</i> will be	e displayed in t	he right window of the		
	project. 一					
	Via a $\overline{\ }$ UD on this data block or a $\overline{\ }$ UR and then selecting <i>Open Object</i> from the pop-up menu, the content of the block can be programmed. This starts the program <i>LAD/STL/SCF</i> .					
	Open Objec	t Ctrl+Alt+	0			
	Cut	Ctrl+X				
	Сору	Ctrl+C				
	Paste	Ctrl+V				
	Delete	Del				
	PLC		•			
	Options		•			
	Print		•			
	Object Prop Special Obje	erties Alt+Retu ect Properties	ım 🕨			

Step	G: Creating the STEP7 Program					
3	The program <i>LAD/STL/SCF</i> is displayed.					
	Acknowledge the dialog box <i>New Data Block</i> by clicking on <i>OK</i> .					
4	Programmir	Programming the DB75.				
	In this data block, two tags with a length of 16 Bits are created. Their sum is to be determined in <i>OB1</i> and then be written to another tag with a length of 16 Bits. Two additional tags with a length of 16 Bits are created, whose values are					
			DI		CC and a to Ta	
	do so Win	C tags with co	a block <i>DB</i> /5 are v	visualized in the w	ere	
	The followi	ng graphic disp	lays the program	ned data block DR	75	
				ned data block DB		
	Address	мате	туре	Initial Value		
	+0.0	Var 01	WORD	W#16#0	Value 1	
	+2.0	Var 02	WORD	W#16#0	Value 2	
	+4.0		WORD	W#16#0	Summ	
	+6.0	Var_04	WORD	W#16#O	Inc 1	
	+8.0	Var_05	WORD	W#16#O	Inc 2	
	=10.0		END_STRUCT		_	
5	Save the block and load it into the PLC. This is done via the toolbar button displayed below. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> .					
6	Programmir	ng the OB1.				
	Open the block in the program LAD/STL/SCF.					
	First, two values in the DB75 are added and then stored again in DB75.					
	Netzwerk 1: Addition					
	Adding two 16-Bit Values The result is stored in another 16-Bit Value					
	01	PN DB	75			
	L	DBW	0			
	L DBW 2					
	+1 T	I DBW	4			
	Next, a value in the <i>DB75</i> is incremented every second.					

Step	G: Creating the STEP7 Program				
	Network 2: Second Cycle				
	Generation of a second cycle at M 0.0				
	AN M 0.0 L S5T#1S SD T 1 A T 1 = M 0.0				
	Network 3: Counting in a second cycle				
	Counting a value in a second cycle At 10000, reset to 0				
	AN M 0.0 JC M001 L DBW 6 L 1 +I				
	T DBW 6 L 10000 <i JC M001 L 0</i 				
	T DBW 6 MOO1: NOP O				
	Finally, a value in the <i>DB75</i> is incremented every time the <i>OB1</i> run. Network 4 : Counting in the cycle time				
	Counting a value each time the OB is executed At 10000, reset to 0				
	L DBW 8 L 1 +I T DBW 8				
	L 10000 <i JC M002</i 				
	L U T DBW 8 MOO2: NOP O				
7	Save the block <i>OB1</i> and load it into the PLC. This is done via the corresponding buttons on the toolbar. This completes the creation of the STEP7 project and it can now be run. Exit the program <i>LAD/STL/SCF</i> .				

Step	H: Testing the STEP7 Program						
1	Testing the pro	gram v	with the	STEP7 software.			
	For this purpose, a tag table is created. This is done in the <i>SIMATIC Manager</i> via						
	a \sqrt{CR} on the entry of the configured CPU module and then selecting <i>Target</i>						
	System \rightarrow Monitor/Control Tag from the pop-up menu.						
	🖃 😂 CPU416-1	Cut		Ctrl+X			
	⊡⊶isn S7-Pr	Сору		Ctrl+C			
	B	Paste	;	Ctrl+V			
		Delet	e	Del			
		Insert	New Obje	ect	•		
		PLC			CPU Mes	sages	
		Optio	ns		Display F	orce Values	
		Print			Monitor/	Aodify Variables	
		Obied	t Propertie	s Alt+Beturn	Module II	nformation	
		Spec	ial Object F	Properties	Operating Clear/Be	g Mode Ctrl+l set	
	-				Set Date	and Time	
					Save RA	M to ROM	
					Diagnose	Hardware	_
2	An editor for c	reating	and using	ng a tag table wil	l be displayed	1.	
	The following shows a completed tag table. In this table, enter all tags created in						
	Address		Symbol	Monitor Format	Monitor Va	lue Modify Value	읙
	DB75.DBW	0		DEC	12	12	뤼
	DB75.DBW	2		DEC	12	12	
	DB75.DBW	4 6		DEC	24 5254		
	DB75.DBW	8		DEC	8847		
3	Monitoring the	currer	nt tag val	lues.			
	By clicking on	the too	olbar but	ton displayed bel	ow, the curre	ent values of the	
	corresponding	tags in	the PLC	are displayed in	the column 3	Status Value.	
	6 C						
	Monitor (acc	ordina t	o trigger)				
	Controlling the	tao va	lues				
	Values can be	entered	in the c	column Control V	alue By clic	king on the toolbar	
	button displaye	ed belo	w, these	values will be wi	ritten to the c	orresponding tags in	n
	the PLC.						

H: Testing the STEP7 Program

Step	H: Testing the STEP7 Program		
	Note that tags can only be controlled while the operating mode switch of the CPU module is set to <i>RUN-P</i> .		
	Modify (according to trigger)		
4	The created tag table can now be saved.		
	In this sample, the table is saved under the name <i>VAT1</i> . After checking the program in the PLC, the tag table can be closed. This concludes the configuration of the STEP7 project and the <i>SIMATIC Manager</i> can be exited.		
	I VAT1		

4.3 Creation of the WinCC Project WinCC_S7_IETCP

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S7_IETCP*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S7_IETCP*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project				
1	Creation of a new WinCC project in the WinCC Explorer.				
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$				
	WinCCExplorer				
2	This will display the WinCC Explorer.				
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened. For this sample project, a <i>Single-User Project</i> is created.				
	Exit the dialog box by clicking on <i>OK</i> .				
	WinCC Explorer ? X				
	Create a New Project				
	Single-User Project				
	BAR O Multi-User Project				
	Difference Multi-Client Project				
	🖉 O Open an Existing Project				
	Cancel				

Step	A: Creating the WinCC Project			
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S7_IETCP</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.			
	Create a new project ? × Project Name: Project Path WinCC_S7_IETCP Create New Subfolder: Eolder WinCC_S7_IETCP Help You can use this dialog box to create a new WinCC project. Drive: Drive: C:			

B: Creating the Connection

Step	B: Creating the Connection		
1	The new project will be displayed in the WinCC Explorer.		
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.		
	Eind		
	<u>P</u> roperties		
Step	B: Creating the Connection		
------	--		
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S7</i> , the driver <i>SIMATIC S7 Protocol Suite</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .		
	Add new driver. ? × Look in: Bin Image: Control of the second secon		
	File name: SIMATIC S7 Protocol Suite.CHN Files of type: WinCC Communication Driver (*.chn) Cancel		
3	The newly added driver SIMATIC S7 Protocol Suite will be displayed as a sub- entry to Tag Management. The driver contains eight different channel units. In this sample, the channel unit <i>TCP/IP</i> is used. Create a new connection for this channel unit by TR on <i>TCP/IP</i> and then selecting <i>New Driver Connection</i> from the pop-up menu.		

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S7_IETCP_01</i> .
	Click on the <i>Properties</i> button to define the connection properties.
	Connection properties
	General
	Name: S7_IETCP_01 Properties
	Unit: TCP/IP
	Server List
	OK Cancel Help

Step	B: Creating the Connection
5	The dialog box Connection Properties will be displayed.
	In the IP Address field, enter the address that has been set for the communication processor <i>CP 443-1 TCP</i> . For this sample, this is the address <i>140.80.0.2</i> .
	Additionally, the Rack Number and Slot Number of the CPU module to be accessed must be entered. Make sure that the values of the CPU module are entered here and not the values of the communication processor.
	Close the dialog box by clicking on <i>OK</i> . Also close the <i>Connection Properties</i> dialog box by clicking on <i>OK</i> .
	Connection Parameter - TCP/IP
	Connection
	S7 Network Address
	IP Address: 140.80.0.2
	Back Number: 0
	Slo <u>t</u> Number: 3
	Send/receive ra <u>w</u> data block
	Connection Resource: 02
	OK Cancel Help

Step	B: Creating the Connection
6	Setting the system parameters of the <i>TCP/IP</i> channel unit. These settings are made in the <i>System Parameters</i> dialog box accessed via a R on the <i>TCP/IP</i> entry and then selecting <i>System Parameters</i> from the pop-up menu. In the <i>Channel</i> tab, various settings pertaining to the communication and monitoring a communication can be made. These settings will apply to all channel units of the communication driver.
	System Parameter - TCP/IP Channel Unit These parameters are valid for all units local to the computer! Cycle formation Image: Use gyclic read service of PLC Lifebeat monitoring Image: Activate 60 Image: Activate I
	OK Cancel Help

Step	B: Creating the Connection
7	In the <i>Device</i> tab, the access point used by the connection to access the PLC is specified.
	By default, the access point <i>CP-TCPIP</i> is set. Previously, the communication processor <i>CP 1411</i> has been assigned to the access point CP-TCPIP in the program <i>Setting the PG/PC Interface</i> . If you want the access point to be set automatically, make sure that the correct one is being used, especially if multiple communication processors are used.
	Close the dialog box by clicking on <i>OK</i> .
	System Parameter - TCP/IP
	Channel Unit
	Select logical device name
	CP-Type/Bus Profile: TCP/IP
	Logical device name: CP-TCPIP
	Set automatically
	Job processing
	☐ <u>W</u> rite with priority
	Cancel Help

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags
1	Creation of the WinCC tags required for the sample.
	This is done via a ${}^{f}\mathbb{O}R$ on the newly created connection <i>S7_IETCP_01</i> and then selecting <i>New Tag</i> from the pop-up menu.
2	TCP/IP New Group New Tag Find Cut Copy Paste Delete Properties The properties dialog box of the tag will be displayed.
	In the sample, the <i>Name</i> of the first tag is <i>S16x_S71ETCP01_01</i> . The tag is of the
	Signed 16-Bit Value data type. Click on the Select button to set the Address of the new tag.
	Tag properties
	General Limits/Reporting
	Properties of Tags
	Name: S16x_S7IETCP01_01
	Datatype : Signed 16-bit value
	Length: 2
	Address:
	C Traferenzare C Fallbarenzearahaare
	Linear scaling
	Process Value Range Tag Value Range
	From From To
	OK Cancel Help

Step	C: Creating the WinCC Tags
3	The dialog box <i>Address Properties</i> will be displayed. Set <i>DB</i> as the <i>Data Range</i> and the value 75 as the <i>DB No</i> Set <i>Word</i> in the Address field and the value 0 in the <i>DBW</i> field. Close the dialog box by clicking on <i>OK</i> . The properties dialog box of the tag is also closed by clicking on <i>OK</i> . The just created WinCC tag is addressed in the range of the DB75, where the first of the two values to be added is located.
	Address properties
	Address
	Data DB ▼ DB No. 75 Address Word ▼
	DBW 0 Length 1
	🗖 Quality Code
	OK Cancel Help
4	Creation of the remaining WinCC tags required. Follow steps 1 to 3 for the creation of the remaining tags. The names, data types and addresses of the tags used in this sample are listed in the following graphic.
	NameTypeParametersS16x_S7IETCP01_01Signed 16-bit valueDB75,DW0S16x_S7IETCP01_02Signed 16-bit valueDB75,DW2S16x_S7IETCP01_03Signed 16-bit valueDB75,DW4S16x_S7IETCP01_04Signed 16-bit valueDB75,DW6S16x_S7IETCP01_05Signed 16-bit valueDB75,DW8

D: Creating the WinCC Screen



Step	D: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be
	In the <i>Tag</i> field, set the tag <i>S16x S7IETCP01 01</i> via the button displayed below.
	Leave the <i>Undate</i> of the tag at 2 s. Keep the default settings for the remaining
	options. Close the dialog box by clicking on <i>OK</i> .
	1/O-Field Configuration ? 🗙
	Tag: S16x_S7IETCP01_
	Update: 2 a
	Туре
	C Output C Input Both
	Format
	Font Size 12
	Font Name Arial
	Color
	Cancel
4	Changing the output format of the <i>I/Q Field</i>
	Even this open its properties dialog here via a \mathcal{A} p on the UO Field and then
	select <i>Properties</i> from the pop-up menu.
	• 0.000
	Cut Ctrl+X
	■ Eopy Ctrl+C
	Duplicate
	Easte Ctrl+V
	Customized object
	Linking
	Configuration Dialog
	Properties

Step	D: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed. On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a OD on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.
	Properties Events
	Image: Provide the static s
6	Creation of four additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen. In the sample project, the screen is saved under the name $com_3_S7IETCP_01.pdl$. The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.

Step	D: Creating the WinCC Screen
	If the screen is in runtime, the PLC started and the network connection established, the current values of the PLC will be displayed in the I/O fields. They can be changed by entering values in the individual <i>I/O Fields</i> .
	WinCC-Runtime -
	Communication SIMATIC S7 Protocol Suite - TCP/IP
	+56 Inc 1: +1134
	+ +4 Inc 2: +7690
	+60
	If there is no connection to the PLC, the <i>I/O Fields</i> will be displayed grayed out. In this case an error is present at some point of the communication connection.
	*0

4.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S7_IETCP* and the SIMATIC S7 station. A diagnosis of the sample according to this description makes only sense, if the checks listed below have been completed successfully. Creation of the STEP7 Project S7_IETCP

- F: Testing the Hardware Configuration
- H: Testing the STEP7 Program

WinCC Explorer

Step	WinCC Explorer
1	Diagnosis of the communication connection from the WinCC Explorer.
	Switch the project <i>WinCC_S7_IETCP</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.
	Activate
	The created WinCC screen <i>com_3_S7IETCP_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.
	Language
	Status of <u>D</u> river Connections
	Status of Multi-User Operation

Step	WinCC Explorer
3	The dialog box <i>Status - Logical Connections</i> will be displayed. This dialog box lists all configured connections. For this sample, only the connection <i>S7_IETCP_01</i> will be displayed.
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 2 S7_IETCP_01 OK 35 0 0 0 2 S7_IETCP_01 OK 35 0 0 0 Update
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> .
	The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.
	Name Parameters
	S7_IETCP_01 H1,08 00 06 01 00 00,,0,3,02
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type Parameters
	S16x_S7IETCP01_01 Signed 16-bit value DB75,DW0
	Process value: 56 Quality: c0 Last Change:7/1/99 2:50:18 PM

Channel Diagnosis

Step	Channel Diagnosis		
1	Diagnosis of the communication co Diagnosis.	onnection via the prog	gram WinCC Channel
	Start this program via <i>Start</i> \rightarrow <i>S Diagnosis</i> .	'imatic → WinCC	→ Channel
	T. S.		
	Channel Diagnosis		
2	The program WinCC Channel Diag	gnosis will be display	ed.
	The <i>Channels/Connections</i> tab disp each configured connection. By def update cycle can be changed in the	blays detailed information fault, the display is up input field located at	ation about the status of odated every second. The the bottom.
	- rev WinCC Channel Diagnosis		×
	Channels/Connections Configuration		
	B SIMATIC S7 PROTOCOL SUITE	Counters	Value
	Cyclic Update: ■ 1000	State Error Code Error Count Unit Device PDU Size Request Counter Response Counter Own Cycles Max. AS Cycles ConnectionState ConnectionState ForceConnectionAddress ProjectedConnectionAddress	ready none 0 TCP/IP CP-TCPIP 480 7 50 0 1 32 ready automatic up projected IP,140.80.0.2,,0,3,02 ▼
3	If a connection error is detected, the will display a value specifying the	e <i>Error Code</i> line in t error cause. Detailed	the right window half information about this
	error code is displayed by ${}^{\checkmark}\mathbb{O}R$ on from the pop-up menu.	the Error Code entry	y and then selecting Help
	Counters Value		
	State disconr Error Code 4022 Error Col <mark>Help</mark> 0	nected	

Step	Channel Diagnosis		
4	This opens the Online Help to WinCC containing a description of the corresponding error code. Additionally, possible error causes are also listed.		
	🛷 WinCC - Online Help 📃 🔍		
	<u>File E</u> dit Book <u>m</u> ark <u>O</u> ptions <u>H</u> elp		
	<u>Contents</u> <u>Index</u> <u>Find</u> <u>Back</u> <u>Print</u> <u>≤</u> < <u>></u> >		
	Error 4022 - S7DOS_SRV_TIMEOUT		
	No return message from the PLC.		
	The PLC could not fulfill a request within the timeout period.		
	Station address exists multiple times at the bus.		

5 Communication to the SIMATIC S7 via OPC

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder C:\Communication_Manual. You have the option to copy the following components to the hard drive:



The database file of the communication processor CP 1413.



The STEP7 project we will create.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a *SIMATIC S7* and *WinCC*. In this sample, the communication connection is realized via the *Industrial Ethernet*. By making only slight changes, the communication via the *PROFIBUS* is also possible.

The S7 OPC Server running on the computer makes the data of the PLC available to other applications running on the same computer and to applications running on the network. The S7 OPC Server communicates with the PLC via the communication processor CP 1413.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 1413*. To install this communication processor in the computer, the driver *IE S7 1413*, located on the *SIMATIC NET* CD-ROM, is needed. In addition, the *S7 OPC Server*, also located on the *SIMATIC NET* CD-ROM, is needed. In the WinCC project, the communication driver *OPC* must be installed. Using this *OPC Client*, the connection to the *S7 OPC Server* is configured.

The PLC is equipped with a *CPU 416-1* module. The connection to the network is established via the communication processor *CP 443-1*. For the configuration of this communication processor with the STEP7 software, the option package *NCM S7 Industrial Ethernet* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 1413
- Creation of the STEP7 Project S7_OPC
- Configuration of the S7 OPC Server
- Creation of the WinCC Project WinCC_S7_OPC
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>IE S7-1413</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 1413</i> .
	<i>S7 OPC Server</i> for the communication to the <i>OPC Client</i> from WinCC.
STEP7	STEP7 software with option package <i>NCM for Industrial Ethernet</i> for the creation of the STEP7 project.
WinCC	WinCC with the communication driver <i>OPC</i> for the creation of the WinCC project.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 1413</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack UR1
Power Supply	Power supply PS 407 10A in slot 1 and 2.
CPU Module	CPU module CPU 416-1 in slot 3.
Communication Processor	Communication processor CP 443-1 in slot 4.

5.1 Startup of the Communication Processor CP 1413

The following description details the configuration steps necessary to successfully start up the communication processor *CP 1413*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 1413*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Assigning the Communication Processor
- E: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer



Step	B: Installing the Communication Driver
1	Install the communication driver IE S7-1413 from the SIMATIC NET CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.
	SIMATIC NET Software Installieren
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>IE S7-1413</i> to be installed must be selected. Finish the installation.
	🚽 SIMATIC NET Software: Components 🛛 🛛 🔀
	Please select the programs to be installed.
	SIMATIC □ AuthorsW V2.0.1 2 MB Software □ IE PG-1413 V5.1 17 MB □ IE Software □ IE TF-1413 V5.1 17 MB □ IE SOFTNET PG V3.1 5 MB □ IE SOFTNET ST PASIC V3.1 5 MB
	Description SIMATIC NET Industrial Ethernet S7-1413/Windows NT 4.0 Version 5.1
	Destination directory: c:\siemens\simatic.net Browse
	Required on C: 19 MByte Available on C: 727 MByte
	< <u>B</u> ack <u>N</u> ext > Cancel

B: Installing the Communication Driver

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 1413</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via $Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.$
	Setting the PG/PC Interface

Step	C: Installing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the Install button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	(for CP1413 SIMATIC NET)
	Interface parameter set used:
	<none> Properties</none>
	<none></none>
	Copy
	Delete
	luteferer (
	Interraces
	<u>Install</u>
	OK Cancel Help
3	The dialog box Install/Remove Modules will be displayed. The Selection field
	lists all interfaces that can be installed. Among them will be the entry <i>CP 1413</i> , if the communication driver has been installed previously as outlined in step B
	From the <i>Selection</i> field, select the entry <i>CP</i> 1413. The installation of the
	communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1413 CP1413 (256k DP-RAM)
	CP5411 CP5412A2
	CP5511 CP5611
	MPI-ISA Card MPI-ISA on board
	Besources
	CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
	<u>C</u> lose Help

Step	C: Installing the Communication Processor
4	The dialog box Resources - CP 1413 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the <i>Jumper Settings</i> at the <i>CP</i> 1413.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can be obtained from the <i>Resources</i> tab accessed via <i>Start</i> \rightarrow <i>Programs</i>
	Administrative Tools (Common) \rightarrow Windows NT Diagnostics.
	Close the <i>Resources</i> tab by clicking on <i>OK</i> .
	Resources - CP1413 <board 1=""></board>
	Memory range: 0000D0000-000DFFFF
	Input / output range: 03E0-03E7
	Interrupt request: 15 💌
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 1413</i> .
	Exit the dialog box Install/Remove Modules via the Close button.
	Install / Remove Interfaces 🛛
	Selection: Installed: CP1413 CP1413 Board 1 CP5411 CP5411 TCP/IP -> DEC PCI Fast Ethernet Bo CP5511 < Remove CP5611
	MPI-ISA on board
	CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
	Help

D: Assigning the Communication Processor

Step	D: Assigning the Communication Processor	
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_H1_1</i> : to the just installed interface.	
	It has been created automatically during the installation of the communication driver <i>IE S7-1413</i> .	
	In the field <i>Access Point of the Application</i> , set the entry <i>CP_H1_1</i> :. In the field below, select the entry <i>CP1413</i> . This completes the assignment between the access point and the communication processor.	
	Setting the PG/PC Interface (V5.0)	
	Access Path	
	Access point of application:	
	CP_H1_1:> CP1413	
	(for CP1413 SIMATIC NET)	
	Interface parameter set <u>u</u> sed:	
	CP1413 Eroperties	
	KNone> Diagnostics	
	TCP/IP -> DEC PCI Fast Ethernet	
	Delete	
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)	
	Interfaces	
	Install	
	OK Cancel Help	

Step	D: Assigning the Communication Processor
2	Setting the properties of the communication processor <i>CP 1413</i> . The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.
	The dialog box Properties - CP 1413 will be displayed.
	In the <i>Ethernet (MAC) Address</i> tab, enter the <i>Ethernet Address</i> of the <i>CP 1413</i> . In our sample, this is 08.00.06.01.00.01.
	The <i>Ethernet Address</i> is six Bytes long and structured as follows for SIEMENS devices:
	• 08.00.06: The first six digits of the hexadecimal value correspond to the number for SIEMENS.
	• 01: The next two digits specify the range for SIEMENS.
	• 0: The next digit signifies the SIMATIC system.
	• 0.01: The last three digits correspond to the significant station address of a SIEMENS device.
	Properties - CP1413
	Ethernet(MAC)-Address S7 Protocol Mode
	Database
	☐ <u>A</u> ctivate TF
	TF <u>D</u> atabase
	Search
	Busparameter of Industrial Ethernet
	Ethernet-Address: 08.00.06.01.00.01
	Please build six groups with two hexadecimal characters, separated by points. Example "01.23.45.67.89.AB". To activate the TF database, please click checkbox 'Activate TF'.
	OK Cancel <u>S</u> tandard Help

Step	D: Assigning the Communication Processor
3	Exit the program <i>Setting the PG/PC Interface</i> via the <i>OK</i> button.
	A dialog box will be displayed requesting the restart of the <i>CP 1413</i> . Acknowledge this dialog box by clicking on <i>OK</i> , which will result in the restart of the communication processor <i>CP 1413</i> .
	This completes the installation of the communication processor.
	Changed SIMATIC NET settings
	You changed your SIMATIC NET settings. To activate the changes, a restart of the parameter settings is necessary.
	Restart now?

E: Testing the Communication Processor

Step	E: Testing the Communication Processor
1	Check the proper installation of the communication processor <i>CP 1413</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	E: Testing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface to be checked. In this case, select the entry <i>CP 1413</i> . Make sure that the assignments between access points and the interfaces are not changed.
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:> CP1413
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP1413 <active> Properties</active>
	(None) CP1413 (Active)
	TCP/IP -> DEC PCI Fast Ethernet
	Delete
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)
	Interfaces
	<u>Install</u>
	OK Cancel Help

Step	E: Testing the Communication Processor	
3	The dialog box Simatic NET Diagnostics will be displayed.	
	In the <i>IE Network Diagnostics</i> tab, the diagnosis is started via the <i>Test</i> button. The result of the diagnosis will be displayed immediately following.	
	If the result of the diagnosis is positive (correct installation), the dialog box can be exited with <i>OK</i> . In this case, the program <i>Setting the PG/PC Interface</i> can also be closed by clicking on <i>OK</i> . The configuration of the communication to the S7 is continued in the following section.	
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described in the section Is the Communication Module in the Computer operational?.	
	SIMATIC NET diagnostics	
	S7 Trace SR Protocol SR Trace DP-RAM IE Network Diagnostics S7 Protocol Status	
	Buffer Statistics No. Size Total Free Max. Request Reject	
	1 32 240 240 0 0 0 1 2 80 240 237 4 80 0 3 128 60 60 0 0 0 4 256 60 60 0 0 0 5 512 60 58 3 13 0 6 1024 50 50 0 0 •	
	TF Application Associations Name Status Reason	
	Cancel Apply Help	

The following description details the configuration steps necessary to create and start up the STEP7 project *S7_OPC*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP7 project S7_OPC:

- A: Installing the Hardware
- B: Installing the Option Package
- C: Creating the STEP7 Project
- D: Configuring the Hardware
- E: Loading the Hardware Configuration
- F: Testing the Hardware Configuration
- G: Creating the STEP7 Program
- H: Testing the STEP7 Program

A: Installing the Hardware

Step	A: Installing the Hardware
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 407 10A</i> , the CPU module <i>CPU 416-1</i> and the communication processor <i>CP 443-1</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 1413</i> in the computer to the communication processor <i>CP 443-1</i> in the PLC.

B: Installing the Option Package

Step	B: Installing the Option Package
1	If the option package <i>NCM S7 Industrial Ethernet</i> has not been installed during the installation of <i>STEP7</i> , install it now from the <i>STEP7</i> CD-ROM. This option package is required for the configuration of the communication processor <i>CP</i> 443-1 via the <i>STEP7</i> software.
	After inserting the <i>STEP7</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	setup.exe

Step	B: Installing the Option Package
2	This starts the installation program. Follow the instructions of the installation program. On the <i>Components</i> page, select the check-box <i>NCM S7 Ind. Ethernet</i> . Finish the installation.
	Setup - STEP 7: Components
	Programs to be installed.
	SIMATIC Software NCM S7 - Industrial Ethernet V5.0 ServicePack 1 - Optional package for CP configuration with STEP 7.
	Estimated installation time: 00:03 (hh:mm)

C: Creating the STEP7 Project

Step	C: Creating the STEP7 Project	
1	Create a new STEP7 project in the SIMATIC Manager.	
	It is started via $Start \rightarrow Simatic \rightarrow SIMATIC Manager.$	
	S	
	SIMATIC Manager	
2	This displays the SIMATIC Manager.	
Via	Via the menus $File \rightarrow New$, the dialog box for specifying the parameters of a new STEP7 project will be opened.	
	The New dialog box will be displayed.	
	The radio-button <i>New Project</i> must be selected. In the <i>Name</i> field, the name of the new project to be created is entered. The names of the STEP7 projects created within the framework of this manual all start with <i>S7</i> . They also include a reference to the communication type used. The project of this sample has the name <i>S7_OPC</i> .	

Step	C: Creating the STEP7 Project
	By default, projects are stored in the <i>C:\SIEMENS\STEP7\S7proj</i> folder. This can be changed at any time via the <i>Browse</i> button.
	The <i>New</i> dialog box is closed via the <i>OK</i> button.
	New
	New project New library
	Na <u>m</u> e:
	S7_OPC
	Name Storage Path
	Image location (nath): Browse
	Storage location (path):
	Cancel Help

D: Configuring the Hardware

Step	D: Configuring the Hardware	
1	The new project will be displayed in the SIMATIC Manager.	
	The hardware for this project must be configured. Three components are needed: A <i>SIMATIC 400-Station</i> , a <i>PG/PC</i> and for their networking an <i>Industrial Ethernet</i> .	

Step	D: Configuring the Hardware	
	These components are added to the SIMAT name S7_IEH and then selecting Insert New and Insert New Object → Industrial Eth S7_OPC Cut Ctrl+X Copy Ctrl+C	$\begin{array}{ccc} & & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ &$
	Paste Util+V	
	Insert New Object	▶ SIMATIC 400 Station
	Print Object Properties Alt+Return	SIMATIC 300 Station Other Station SIMATIC H Station SIMATIC PC Station SIMATIC S5 PG/PC
		MPI PROFIBUS Industrial Ethernet PTP
		S7 Program M7 Program
		OS OS (MultiClient)
2	The just added components will be displayed SIMATIC Manager.	ed in the right window of the
	I SIMATIC 400(1)	Ethernet(1)
	By OD on the component SIMATIC 400(1) in the right window, the point
	Hardware will be displayed. By D on the selecting Open Object from the pop-up be started.	he point <i>Hardware</i> or $\mathcal{H}R$ on it and p menu, the program <i>HW Config</i> will
	S7_IES K:\com S7_ies\S7_ies	
	⊡-∰2 S7_OPC	Cut Ctrl+Alt+O Cut Ctrl+X Copy Ctrl+C Paste Ctrl+V Delete Del
		Print 🕨

Step	D: Configuring the Hardware	
3	The program <i>HW Config</i> will be displayed. This program is used to exactly define the hardware used in the PLC and to configure their properties.	
4	By clicking on the toolbar button of the program <i>HW Config</i> displayed below, the <i>Hardware Catalog</i> is opened. This catalog is used to select the required hardware components.	
5	The Hardware Catalog will be displayed. The first component selected is the rack. On this rack, all other components will be installed. The rack is inserted into the project via a Do r by Dragging Dropping. In this sample, the rack type UR1 is used. Frofile Standard Frofile Standard Frofile Standard FM-400	

Step	D: Configuring the Hardware
6	The program <i>HW Config</i> will display the currently still empty rack.
	1 2 3 4 5 6 7 o
7	Arrange the other hardware components in the rack. This is done by Dragging Dropping the desired components from the <i>Hardware Catalog</i> to the corresponding slot in the rack.
	This sample uses the power supply <i>PS 407 10A</i> . It is inserted into slot <i>1</i> . A power supply of this type occupies two slots.
	As the CPU module, this sample uses a <i>CPU 416-1</i> . This module is inserted into slot <i>3</i> .
	We also require the communication processor <i>CP 443-1</i> . This CP is only available from the <i>Hardware Catalog</i> if the option package <i>NCM S7 Industrial Ethernet</i> has been installed. After the communication processor <i>CP 443-1</i> has been inserted in the rack, its properties dialog box will open.
8	The <i>Ethernet Interface</i> properties dialog box of the <i>CP 443-1</i> will be displayed. In the <i>MAC Address</i> field of the <i>Parameters</i> tab, enter the desired Ethernet address of the communication processor. During the creation of the database file for the communication processor <i>CP 1413</i> in the computer, this address is one of the parameters that must be set.
	In the <i>Subnet</i> field below, assign the entry <i>Ethernet(1)</i> to the communication processor. Close the dialog box by clicking on <i>OK</i> .
	Properties - Ethernet Node CP 443-1 (R0/S4)
	General Parameters
	MAC address: 08.00.06.01.00.00
	Subnet
	Ethernet(1) Properties Delete
	Cancel Help

Step	D: Configuring the Hardware
9	The following graphic shows the completed hardware arrangement of the sample.
10	Save the settings made in the program <i>HW Config</i> . This is done via the toolbar button displayed below.

E: Loading the Hardware Configuration

Step	E: Loading the Hardware Configuration
1	The hardware configuration created in the program <i>HW Config</i> must be transferred to the PLC.
	This is done via the toolbar button displayed below.
	Download to Module
2	A dialog box will be displayed from which the components to be loaded can be selected.
	For this sample, all displayed components will be selected. Note that loading to the CPU module is only possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> . Close the dialog box by clicking on <i>OK</i> .
	Select Target Module X
	Module Rack Slot
	CPU416-1 0 3 CP 443-1 0 4
	Select <u>A</u> ll
	Cancel Help

Step	E: Loading the Hardware Configuration
3	Now the dialog box <i>Select Station Address</i> will be displayed. In this dialog box, specify which station address is used by the STEP7 software to communicate with the CPU module. In this sample, the communication is carried out via the MPI interface. The <i>Address</i> of the CPU module is 2. Close the dialog box by clicking on <i>QK</i>
	Select Node Address
	Which node address links the programming device with module CPU416-1?
	Rac <u>k</u> : 0 == Slot: 3 ==
	Target Station O Reached via router
	Connection to Target Station Iype: MPI Address: 2
	Cancel Help
4	The configuration data will now be transferred to the PLC. If necessary, the individual modules will be set to the STOP status. The program <i>HW Config</i> can be exited. The newly added components will be displayed by the <i>SIMATIC Manager</i> for the station <i>SIMATIC 400(1)</i> .
	E-

Step	F: Testing the Hardware Configuration
1	Testing of the hardware configuration made. If the key switch of the CPU module is set to <i>RUN</i> or <i>RUN-P</i> and the operating mode switch of the communication processor is set to <i>RUN</i> , only the status LEDs signifying the <i>RUN</i> operating mode should be displayed.
	If this is not the case, there is an error. The following steps help you localize this error. However, these steps should still be performed even if the status LEDs show no error. This allows you to recognize uncritical errors and faulty configurations.

F: Testing the Hardware Configuration
Step	F: Testing the Hardware Configuration				
2	Testing the configuration of the CPU module.				
	This is done via the dialog box <i>Module Status</i> in the <i>SIMATIC Manager</i> . It is				
	opened by a \mathcal{O}_{R}	on the entry of the CPU m	nodule in the left wind	low and then	
	selecting Target Sy	ystem — Module Status	s from the pop-up men	iu.	
	The dialog box Ma	odule Status of the CPU me	odule will be displaye	d.	
	The <i>General</i> tab d field, the current n	isplays various general dat nodule status and any exist	ta of the CPU module.	In the <i>Status</i> ed.	
	The <i>Diagnosis Bug</i> errors and how to	ffer tab contains more deta correct them.	iled information abou	t existing	
	The dialog box can	n be exited via the Close be	utton.		
	Module Informatio	n - CPU416-1 ONLINE		×	
	Pa <u>t</u> h: S7_OPC\SIMA Status: OK	TIC 400(1)\CP 443-1	CPU operating mode: No force job.	RUN	
	Time System Performance Data		Communication	Stacks	
	General	Diagnostic Buffer	Memory Scar	Cycle Lime	
	Description:	CPU416-1	System ID:	SIMATIC 400	
	Version:	Order No./Description Com 6ES7 416-1×J01-0AB0 ····	ponent Ver 1	sion	
	Rack:	0	Address:		
	Slot:	3	Module width:	1	
	<u>S</u> tatus:	Module present and OK.			
		Įpdate <u>P</u> rint		Help	

Step	F: Testing the Hardware Configuration				
3	Testing the configuration of the communication processor.				
	This is done via the dialog box <i>Module Status</i> in the <i>SIMATIC Manager</i> . It is				
	opened by a OF	R on the entry of the co	mmunication processo	r in the left	
	window and then	selecting Target System	m 💛 Module Status	from the pop-up	
	menu.				
	The dialog box M	odule Status of the con	mmunication processor	will be displayed.	
	The General tab o	lisplays various genera	al data of the module.		
	A dialog box for a	a more detailed diagno	sis of the communicati	on processor can	
	be accessed via th	e special Diagnosis b	utton.		
	Path: 97 IESISIMA	DN - CP 443-1 UNLINE	CPU operating more		
	Status: OK		Module operating n	node: RUN	
	General Diagnostic	Buffer			
	Description: CP 443-1 System ID: SIMATIC 400				
	⊻ersion:	Order No./Description	Component	Version	
		6GK7 443-1B×00-0×E0		3.0	
	Rack:	0	Address:	I 16380	
	Slot:	4	Module width:	1	
	<u>S</u> tatus:	Module present and OK.			
		No LED display.			
	Close	Undate Print	Special Diagnostics	Help	

Step	F: Testing the Hardware Configuration					
4	The dialog box NCM S7 Industrial Ethernet Diagnosis will be displayed.					
	The <i>CP Information</i> tab displays general information about the module. Among other things, the network address set can be checked.					
	The dialog box can be exited via the <i>Close</i> button. The Module Status dialog box can also be exited via the <i>Close</i> button.					
	NCM S7 Industrial Ethernet Diagnostics					
	CP Information Diagnostic Buffer Operating Mode ISO Transport Options					
	Online Path					
	Interface: MPI/PROFIBUS/AUTO Address of router:					
	S7 Subnet ID of the Address of destination destination network: station network attachment: 0					
	Rack: 0 Slot: 4					
	General Module Information					
	CP Type: CP 443-1					
	CP Version: L2.96					
	Order Number: 6GK7 443-1BX00-0XE0					
	Network Type: Industrial Ethernet					
	Network Address: 08.00.06.01.00.00					
	Status of the Module:					
	Operating Mode: Run Cause: OK					
	Dase CP Change Cuc Lind On Lindate Hein					
	ter change cyc. opo. on opoare Help					

G: Creating the STEP7 Program

Step	G: Creating the STEP7 Program			
1	Creation of the S7 Program.			
	This sample project requires the operation block <i>OB1</i> and a data block. <i>OB1</i> is available by default, the required data block must be created. This is done in the			
	SIMATIC Manager via a $\mathcal{C}R$ on the sub-entry Modules of the entry S7 Program(1) of the configured CPU module and then selecting Insert New Object \Rightarrow Data Block from the pon-up menu			
	The properties dialog box of the data block will be opened. As the block's <i>Name</i> enter $DB75$ and close the dialog box with OK .			
	E ST CPU416-1 E ST S7 Program(1) Source Files Blocks			
	Cut Ctrl+X			
	Copy Ctrl+C			
	Paste Ctrl+V			
	Delete Del			
	Insert New Object Organization Block			
	PLC Function Block			
	Options Data Block			
	Print Data Type			
	Object Properties Alt+Return Special Object Properties			
2	The newly created data block DR75 will be displayed in the right window of the			
2	project.			
	Via a \square On this data block or a \square and then selecting <i>Open Object</i> from the			
	pop-up menu, the content of the block can be programmed. This starts the			
	program LAD/STL/SCF.			
	DB75			
	Open Object Ctrl+Alt+O			
	Cut Ctrl+X			
	Copy Ctrl+C			
	Paste Ctrl+V			
	Delete Del			
	PLC •			
	Options •			
	Print			
	Object Properties Alt+Return Special Object Properties			

Step	G: Creating the STEP7 Program				
3	The program LAD/STL/SCF is displayed.				
	Acknowledge the dialog box New Data Block by clicking on OK.				
	KOP AWL FL	JP			
4	Programmir	ng the DB75.			
	In this data be determin	block, two tags ed in <i>OB1</i> and	with a length of then be written to	16 Bits are created another tag with a	. Their sum is to a length of 16 Bits.
	Two additio	nal tags with a	length of 16 Bits	are created, whose	e values are
	The followi	ng graphic disr	olays the program	med data block <i>DI</i>	375
	DB75 S7)(1)\CPU416-1		
	Address	Name	Type	Initial Value	
	0.0		STRUCT		
	+0.0	Var_01	WORD	W#16#O	Value 1
	+2.0	Var_02	WORD	W#16#O	Value 2
	+4.0	Var_03	WORD	W#16#O	Summ
	+6.0	Var_04	WORD	W#16#O	Inc 1
	+8.0	Var_05	WORD	W#16#0	Inc 2
	=10.0		END_STRUCT		
5	Save the blo displayed be operating m	ock and load it clow. Note that ode switch is s	into the PLC. This loading to the CF et to STOP or RU	s is done via the to PU module is only <i>N-P</i> .	oolbar button possible while the
6	Programmir	ng the OB1.			
	Open the blo	ock in the prog	ram <i>LAD/STL/SC</i>	F.	
	First, two va	alues in the DB	75 are added and	then stored again	in <i>DB75</i> .
	Netzwerk 1: Addition				
	Adding The res 16-Bit	two 16-Bit ult is sto Value	: Values ored in anot	her	
	0	PN DB	75		
	L	DBW	0		
	L	DBW	2		
		L DEM	4		
		DDM	г		
	Next, a value in the DB75 is incremented every second.				

Step	G: Creating the STEP7 Program
	Network 2: Second Cycle
	Generation of a second cycle at M 0.0
	AN M 0.0 L S5T#1S SD T 1 A T 1 = M 0.0
	Network 3: Counting in a second cycle
	Counting a value in a second cycle At 10000, reset to 0
	AN M 0.0 JC M001 L DBW 6 L 1 +T
	T DBW 6 L 10000 <i JC M001 L 0</i
	T DBW 6 MOO1: NOP O
	Finally, a value in the <i>DB75</i> is incremented every time the <i>OB1</i> run. Network 4 : Counting in the cycle time
	Counting a value each time the OB is executed At 10000, reset to 0
	L DBW 8 L 1 +I
	T DBW 8 L 10000 <i JC M002</i
	L 0 T DBW 8 M002: NOP 0
7	Save the block <i>OB1</i> and load it into the PLC. This is done via the corresponding buttons on the toolbar. This completes the creation of the STEP7 project and it can now be run. Exit the program <i>LAD/STL/SCF</i> .

Step	H: Testing the	STEP	7 Progr	am					
1	Testing the program with the STEP7 software.								
	For this purpos	e, a tag	table is	created. This is a	don	e in the SIMA	ATIC Ma	<i>nager</i> via	
	a $\mathcal{T}R$ on the entry of the configured CPU module and then selecting <i>Target</i>								
	System \rightarrow Monitor/Control Tag from the pop-up menu.								
	🖃 😂 CPU416-1	Cut		Ctrl+X		1			
	⊡⊸ <u>s</u> S7-Pr	Сору		Ctrl+C					
	B B	Paste		Ctrl+V					
		Delete		Del					
		Insert N	New Obje	ct	►				
		PLC			►	CPU Message	es		
		Option	s		►	Display Force	Values		
		Print			•	Monitor/Modi	fy Variables	;	
		Object	Propertie	s. Alt+Beturn		Module Inform	nation		
		Specia	l Object P	Properties	•	Operating Mo	de	Ctrl+l	
	-					Set Date and	Time		
						Save RAM to	ROM		
						Diagnose Hai	rdware		
2	An editor for c	reating a	and usi	ng a tag table will	l be	displayed.			
	The following	shows a	compl	eted tag table. In	this	s table, enter a	all tags c	reated in	
	the <i>DB75</i> .								
	avariable Tal	ble1 ONL	INE		_				
	Address		Symbol	Monitor Format	Mo	nitor Value	Modify	Value	
	DB75.DBW	0		DEC	12		12		
	DB75.DBW	4		DEC	24		10		
	DB75.DBW	6		DEC	52	54 47			
	0013.000	0		DEC		11			
2	Monitoring the	aurrant	tog vol	100					
3	By clicking on	the tool	lag val	ues. ton displayed bel	ow	the current a	values of	the	
	corresponding	tags in t	the PLC	are displayed in	the	column Stat	us Value		
	<u>Ar</u>	•							
	Monitor (acc	ording to	trigger)						
	Controlling the	tag val	ues.						
	Values can be e	entered	in the c	olumn Control V	alu	e. By clicking	g on the t	oolbar	
	button displaye	ed below	v, these	values will be wi	ritte	en to the corre	esponding	g tags in	
	the PLC.								

H: Testing the STEP7 Program

Step	H: Testing the STEP7 Program
	Note that tags can only be controlled while the operating mode switch of the CPU module is set to <i>RUN-P</i> .
	Modify (according to trigger)
4	The created tag table can now be saved.
	In this sample, the table is saved under the name <i>VAT1</i> . After checking the program in the PLC, the tag table can be closed. This concludes the configuration of the STEP7 project and the <i>SIMATIC Manager</i> can be exited.
	I VAT1

5.3 Configuration of the S7 OPC Server

The following description details the steps necessary to configure the S7 OPC Server.

Overview of the Configuration Steps

The following lists the steps necessary to configure the S7 OPC Server:

- A: Activating the S7 Protocol
- B: Installing the S7 OPC Server
- C: Setting the DCOM Configuration
- D: Configuring the S7 OPC Server
- E: Testing the S7 OPC Server

A: Activating the S7 Protocol

Step	A: Activating the S7 Protocol		
1	Creation of the database file for the S7 Protocol using the program COML S7.		
	This program is started via $Start \rightarrow Simatic \rightarrow SIMATIC NET \rightarrow COML S7.$		
	COML S7		
2	The program <i>COML S7</i> will be displayed.		
	In the database file, define the <i>S7 Connection</i> which is going to be used by the <i>S7 OPC Server</i> to access the PLC.		
	As the Network Type, select the entry ETHERNET.		
	In the right area of the program's dialog box, the S7 connection properties can be defined. As the <i>Name</i> of the connection, enter <i>S7_Connection_01</i> , as the <i>VFD Name</i> , enter the name <i>VFD1</i> . The <i>Remote Address</i> , that is the Ethernet address of the communication processor in the PLC, this sample uses 08.00.06.01.00.00.		

Step	A: Activating the S7 Protocol			
	As the Local TSAP, this sample uses 01.00. The first two digits represent a device identifier, the second two digits must always be 0. As the Remote TSAP, this sample uses 02.03. The first two digits represent the ID of the resource reserved for an operator station in the S7. The second two digits indicate the rack and slot number of the CPU module to be accessed. Clicking on the <i>Add</i> button adds the new S7 connection to the database file list of existing connections.			
	SIMATIC NET COML S7 - (unnamed)			
	Lie Help Node name: Network type S7 Connection for S7-OPC-Server ETHERNET			
	S7 connection list			
	S7 Connection 01 Name: S7_Connection_01			
	¥FD Name ¥FD1			
	<u>R</u> emote Addr: 08.00.06.01.00.00			
	L <u>o</u> cal TSAP: 01.00 (hexadecimal)			
	Remote TSAP: 02.03 (hexadecimal)			
	Device ID: OS — Rack O Slot 3			
	<u>D</u> elete <u>Insert</u> Repl <u>ace</u> Can <u>c</u> el			
3	Save the settings made as a text file.			
	This is done via the <i>File</i> \rightarrow <i>Save Text DB</i> menu. In this sample, the file is saved under the name S7_OPC.txt.			
	Generation of the binary database file.			
	This is done via the <i>File</i> \rightarrow <i>Generate Binary DB under</i> menu. In this sample, the file is named <i>S7_OPC.ldb</i> .			
	The program <i>COML S7</i> can now be exited.			
	S7_OPC.Idb			
4	Activation of the <i>S7 Protocol</i> for the communication processor <i>CP 1413</i> using the program <i>Setting the PG/PC Interface</i> .			
	This program is accessed via $Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.$			
	Setting the PG/PC Interface			

A: Activating the S7 Protocol					
The program <i>Setting the PG/PC Interface</i> will be displayed.					
In this program, select the entry of the communication processor <i>CP 1413</i> . Make sure that the assignments between access points and the interfaces are not changed.					
Via the <i>Properties</i> button, the properties dialog box of the communication processor <i>CP 1413</i> is opened.					
Setting the PG/PC Interface (V5.0)					
Access Path					
Access point of application:					
CP_H1_1:> CP1413					
(for CP1413 SIMATIC NET)					
Interface parameter set used:					
CP1413 Properties					
Kone> Diagnostics					
TCP/IP -> DEC PCI Fast Ethernet					
Delete					
(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)					
Interfaces					
Install					
OK Cancel Help					

Step	A: Activating the S7 Protocol				
6	The properties dialog box of the communication processor <i>CP 1413</i> will be displayed.In the S7 Protocol tab, select the check-box Activate S7. This enables the input field SAPI S7 Database below. In this field, specify the path to the previously created database file S7_OPC.ldb. You can use the Browse button to do this.				
	Properties - CP1413				
	Ethernet(MAC)-Address S7 Protocol Mode				
	Database				
	✓ Activate S7				
	SAPI-S7 Database C:\SINEC\ComS7.nt\S7_0PC.ldb				
	Browse				
	Description				
	To de-/activate S7 database, click checkbox 'Activate S7'.				
	OK Cancel <u>S</u> tandard Help				

Step	A: Activating the S7 Protocol	
7	In the <i>Operating Status</i> tab, click on the <i>Restart</i> button to restart the communication processor. The settings made will become effective.	
	Close the properties dialog box of the communication processor <i>CP</i> clicking on <i>OK</i> . The program <i>Setting the PG/PC Interface</i> can also be clicking on <i>OK</i> .	1413 by be closed by
	Properties - CP1413	
	Ethernet(MAC)-Address S7 Protocol Mode	
	<u>Reset</u> Reset CP	
	Restart Reset and restart CP	
	Est Functional test	
	OK, Restart CP was completed successfully.	
	-	
	Cancel Standard Help	

B: Installing the S7 OPC Server

Step	B: Installing the S7 OPC Server
1	Install the S7 OPC Server from the SIMATIC NET CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.
	SIMATIC NET Software Installieren

Step	B: Installing the S7 OP	C Server	
	Follow the instructions of select the check-box <i>S7 C</i> a restart of the computer	f the installation program. On the <i>Comp</i> <i>DPC Server</i> . Finish the installation. After is required.	<i>conents</i> page, or the installation,
	🔒 SIMATIC NET Softwar	re: Components	×
		Please select the programs to be installed.	
	CINANTIC	PB SOFTNET DP Slave V1.01	10 MB 🔺
	SIMATIC	DP-OPC-Server V 2.0	10 MB
	Software	FMS OPC Server V 2.0	13 MB
		S7-0PC-Server V 2.0	10 MB
	1.7.524	DP-OLE/DDE Manager V1.5	8 MB 🚽
		FMS-OLE/DDE Manager V1.5	8 MB 💌
		Description SIMATIC NET OPC-Server for S7/Windows N	T Version V2.0
			<u>R</u> ead me
		Destination directory:	
		c:\siemens\simatic.net	Browse
		Required on C: 12 MByte Available on C	: 650 MByte
		< <u>B</u> ack <u>N</u> ext >	Cancel

C: Setting the DCOM Configuration

Step	C: Setting the DCOM Configuration		
1	Setting the DCOM configuration for the S7 OPC Server.		
	The DCOM configuration is set via the program DCOM Configuration		
	<i>Properties</i> . This program is started via <i>Start</i> \rightarrow <i>Run</i> and then entering the program file name <i>dcomcnfg.exe</i> .		
	Run ? 🗙		
	Type the name of a program, folder, or document, and Windows will open it for you.		
	Open: dcomcnfg.exe		
	Run in Separate Memory Space		
	OK Cancel <u>B</u> rowse		

Step	C: Setting the DCOM Configuration
2	The program <i>DCOM Configuration Properties</i> will be displayed. In the <i>Applications</i> tab, select the entry of the <i>S7 OPC Server</i> . This is the entry <i>SimaticNetCoreS7 Server</i> . Clicking on the <i>Properties</i> button will open its properties dialog box.
	Distributed COM Configuration Properties ? × Applications Default Properties Default Security Default Protocols Applications:
	OK Cancel Apply

Step	C: Setting the DCOM Configuration
3	The dialog box SimaticNetCoreS7 Server Properties will be displayed.
	In the <i>Security</i> tab, specify who has access to the <i>S7 OPC Server</i> . To do so, click on the radio-button <i>Use custom access permissions</i> . By clicking on the now enabled <i>Edit</i> button, set the access permissions. Among other things, the <i>System</i> must be accessible.
	During the configuration phase it makes sense to give access permissions to everybody to rule out problems due to insufficient access rights. After the successful commissioning of the communication, you can still limit the access rights of certain users if necessary.
	SimaticNetCoreS7 Server Properties
	General Location Security Identity
	C Use default access permissions
	Use custom access permissions
	You may Registry Value Permissions
	Registry Value: AccessPermission
	Owner: Manfred (Manfred Bader)
	⊙ Use d <u>N</u> ame:
	C Use c 🚱 Jeder Erlauben Zugreifen
	You may Stanfred (Manfred Bader) Erlauben Zugreifen SYSTEM Erlauben Zugreifen
	C Use d
	You may applicatio
	OK Cancel Add Help
	OK Cancel Apply

Step	C: Setting the DCOM Configuration
4	In the Identity tab, the radio-button The interactive user is selected. The dialog box <i>SimaticNetCoreS7 Server Properties</i> can be closed by clicking on <i>OK</i> . The program <i>DCOM Configuration Properties</i> can also be closed by clicking on <i>OK</i> .
	SCoreDP Properties ? ×
	General Location Security Identity
	Which user account do you want to use to run this application?
	The interactive user
	C The Jaunching user
	O This <u>u</u> ser:
	User: Browse
	Eassword:
	C <u>o</u> nfirm Password:
	The System Account (services only)
	OK Cancel Apply

Step	C: Setting the DCOM Configuration
5	In the <i>Default Properties</i> tab, the general properties of the DCOM communication are defined.
	DCOM must be activated on the computer. Via the <i>Default Authentication Level</i> list box, the desired security at the packet level can be defined. Via the <i>Default Impersonation Level</i> list box, you can specify if accessing clients can be identified.
	During the configuration phase it makes sense to choose the lowest security level for both settings. This rules out problems caused by these settings from the beginning.
	The program <i>DCOM Configuration Properties</i> can also be exited by clicking on <i>OK</i> .
	Distributed COM Configuration Properties
	Applications Default Properties Default Security
	☑ Enable Distributed COM on this computer
	- Default Distributed COM communication properties
	The Authentication Level specifies security at the packet level
	Default Authentication Level:
	(None)
	The Impersonation Level specifies whether applications can determine who is calling them, and whether the application can do operations using the client's identity.
	Default Impersonation Level:
	Anonymous
	Provide additional security for reference tracking
	OK Cancel Apply

D: Configuring the S7 OPC Server

Step	D: Configuring the S7 OPC Server
1	Configuration of the S7 OPC Server via the program SIMATIC NET OPC Server.
	This program is started via $Start \rightarrow Simatic \rightarrow SIMATIC NET \rightarrow OPC$
	Server $\rightarrow OPC$ Settings.
	SIMATIC NET OPC-Server 2.0
2	The program <i>SIMATIC NET OPC Server</i> will be displayed.
	In the <i>OPC Parameters</i> tab, specify which protocols are to be supported by the <i>OPC Server</i> . In this sample, only the support for the <i>S7 Protocol</i> is needed. The check-box <i>SR Protocol</i> can be deselected.
	SIMATIC NET OPC Server (V2.0)
	OPC Parameter OPC Reset S7 Protocol
	Installed protocols
	DP Protocol
	S7 Protocoj
	SB Protocol
	EMS Protocol
	Select the protocols that you want to use with your OPC server.
	OPC Trace
	Activate OPC Trace
	Trace file: IVarOPC.log Search
	Number of items in file: 10000
	 <u> DK</u> <u>C</u> ancel <u>Apply</u> <u>H</u> elp

Step	D: Configuring the S7 OPC Server
3	In the <i>S7 Protocol</i> tab, additional settings for the communication with the <i>SIMATIC S7</i> can be made.
	As the scan cycle, this sample uses 2000 ms. In the Select CP/VFD Pairs area, define which access points are to be used by the S7 OPC Server for the communication. In this sample, the access point CP_H1_1: is selected.
	The program <i>SIMATIC NET OPC Server</i> can be exited by clicking on <i>OK</i> .
	SIMATIC NET OPC Server (V2.0)
	OPC Parameter OPC Reset S7 Protocol
	General settings
	Request cycle: 2000 ms
	C Activate simulation connection
	Configuration
	File: c:\SIEC\opc2.nt\binS7\SCoreS7.txt
	Edit S7 configuration file Search
	Selected VFD/CP pairs
	CP VFD ⊠ CP_H1_1: VFD1
	✓ Keep unavailable VFD/CP pairs (⊠)
	Protocol trace
	<u>OK</u> ancel <u>Apply</u> <u>H</u> elp

E: Testing the S7 OPC Server

Step	E: Testing the S7 OPC Server
1	Testing of the S7 OPC Server with the program OPC Scout.
	This program is started via $Start \rightarrow Simatic \rightarrow SIMATIC NET \rightarrow OPC$ Server $\rightarrow OPC$ Scout.

Step	E: Testing the S7 OPC Server		
2	The program OPC Scout will be displayed.The left window lists all available OPC servers. The Local Server(s) list include		
	the entry of the <i>S7 OPC Server</i> . This is the entry <i>OPC.SimaticNET</i> . Via a OD on the entry <i>OPC.SimaticNET</i> , a connection to the <i>S7 OPC Server</i> will be established.		
	Erver(s) Event Local Server(s) DPC.SimaticNET Event Remote Server(s)		
3	The dialog box <i>Add Group</i> will be displayed. Via this dialog box, a new group can be created in the S7 OPC Server. Such a group is used to carry out the exchange of data between an OPC server and an OPC client. The group to be created must be given a name. The update cycle of this group is set to 2000 ms. Clicking on OK creates the group in the OPC Server.		
	Add Group Group Properties: Enter a 'Group Name': S7_Test_Group Create Group Active Update Rate in ms 2000		
	L Extended OK Cancel Apply		
4	The new group will be listed as a sub-entry to the S7 OPC Server entry in the left window. At this time, the group is still empty. Now, the data to be requested from the OPC server is defined. The data provided by an OPC server is called an Item. Via a D on the group in the left window, the required items can be specified.		
5	The dialog box <i>OPC Navigator</i> will be displayed. From this dialog box, all items provided by the server are accessible. Via a OD on the entry of the connection <i>S7_Connection_01</i> and then a OD on the displayed entry <i>objects</i> , all object types available in the PLC will be displayed.		

Step	E: Testing the S7 OPC Server
	These object types also include data blocks. Via a D on the entry <i>DB</i> , the accessible data blocks are displayed. In this sample, only <i>DB75</i> is accessible.
	Via a Do on the entry (<i>New Definition</i>), the required items can be defined.
	□ S7_Connection_01/VFD1/CP_H1_1: □ □ <
6	The dialog box <i>Define New Tag</i> will be displayed.
	From this dialog box, a new item can be created. In this sample, the first item to be created corresponds to the first of the five tags created for the STEP7 program in the <i>DB75</i> .
	In the <i>Data Type</i> field, the type of this item is set to <i>INT</i> . This corresponds to a Signed 16-Bit value. In the <i>Range Byte</i> field, the Byte number 0 is entered. This corresponds to the Byte number of the tag in the data block. In the <i>No. Values</i> field, <i>I</i> is entered. Close the dialog box by clicking on <i>OK</i> .
	OBJECTTYPE_S7
	Datatype Range Byte Range Bjt No. ⊻alues
	0 1 to to 50 51
	Itemalias:
	<u> </u>

Step	E: Testing the S7 OPC Server			
7	The column in the middle will now display the newly of	lefined	item.	
	For the remaining four tags of the <i>DB75</i> , define the condescribed above. However, use the corresponding Byte tag.	rrespon e numbe	ding item er of the r	s as espective
	To insert the just defined items into the group, select the list on the right via the arrow button. By clicking on the inserted into the group.	nem and e <i>OK</i> bi	l move th utton, the	em to the y will be
	Name			
8	 DB75,INT000,1 DB75,INT002,1 DB75,INT004,1 DB75,INT006,1 DB75,INT008,1 	w of th	e progran	1 OPC
Ũ	Scout.	w or th	e program	
	In the Value column, the current tag values will be disp	played.		
	The program <i>OPC Scout</i> can be exited. You also have created project.	the opti	ion to sav	e the just
	Item Names	Value	Format	Туре
	1 [S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,INT000,1	0	Original	integer 16
	2 [S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,INT002,1 3 (S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,INT002,1	12	Original Ocisional	integer 16
	4 [S7:S7_Connection_01/VFD1/CP_H1_1:JDB75,IN1004,1	12 7230	Original Original	integer 16
	5 [S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,INT008,1	7978	Original	integer 16

5.4 Creation of the WinCC Project WinCC_S7_OPC

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S7_OPC*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S7_OPC*:

- A: Installing the OPC Client
- B: Creating the WinCC Project
- C: Creating the Connection
- D: Conventional Configuration
- E: Creating the WinCC Screen

A: Installing the OPC Client

Step	A: Installing the OPC Client		
1	During the installation of WinCC, the <i>OPC Client</i> can be installed as an option. If the OPC client has not been installed yet, it can also be installed afterwards without any problems.		
	Select Components		
	Select the components that you want to install, and deselect the components that you want to remove.W Components		
	Image: Provide state Image: P		
	Options OK Object Manager OK		
	OLE for Process Control. OPC is a new industry standard. WinCC as an OPC server and a WinCC channel-DLL for the communication to other OPC servers.		
	Space Required: Available: 613056 K		
	< <u>B</u> ack <u>N</u> ext > Cancel		

B: Creating the WinCC Project

Step	B: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	The WinCC Explorer will be displayed.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on <i>OK</i> .
	WinCC Explorer
	Create a New Project
	Multi-Client Project
	© Open an Existing Project

Step	B: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S7_OPC</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button
	Create a new project ? × Project Name: Project Path WinCC_S7_OPC Create New Subfolder: Eolder WinCC_S7_OPC Help You can use this dialog box to create a new WinCC project. Drive: Drive: C:

C: Creating the Connection

Step	C: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a $\mathcal{T}R$ on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	⊡ <mark>⊪⊞</mark> Tag Management ⊕∰ Internal tags Add <u>N</u> ew Driver
	<u>F</u> ind
	<u>P</u> roperties

Step	C: Creating the Connection	
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. This sample	
	requires the communication driver <i>OPC</i> . Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .	
	Add new driver.	
	Look in: 🔄 Bin 🔽 💼 📺	
	CCTIg SIMATIC S5 PMC Profibus.chn	
	PDLCache SIMATIC S5 Profibus FDL.chn	
	SIMATIC S5 Ethernet Lauer 4 chn i TIEth chn	
	SIMATIC SS Ethernet TF.CHN	
	SIMATIC S5 PMC Ethernet.chn	
	File <u>n</u> ame: OPC <u>Open</u>	
	Files of type: WinCC Communication Driver (* chn)	
3	The newly added communication driver <i>OPC</i> will be displayed as a sub-entry to <i>Tag Management</i>	
	The communication driver <i>OPC</i> contains one channel unit.	
	The creation of a connection to a certain OPC server and the selection of the	
	items required by this server can be carried out via the OPC Item Manager. The	
	OPC Item Manager is started via ⁷ R on the channel unit OPC Groups (OPCHN Unit #1) and then selecting System Parameters from the pop-up menu.	
	OPC Groups (OPCHN New Driver Connection	
	<u>S</u> ystem Parameter	
	<u>F</u> ind	
	Paste	
	Pr <u>o</u> perties	

Step	C: Creating the Connection
4	The OPC Item Manager will be displayed.
	The desired OPC server can be selected from here. This server can be located on the local computer or on another computer accessible by the network. In this sample, the selected OPC server is located on the local computer.
	Via a ^{CD} D on the <i>LOCAL</i> entry, all OPC servers available on the local computer will be listed. Select the entry <i>OPC.SimaticNET</i> of the <i>S7 OPC Server</i> . Clicking on the button <i>Browse Server</i> displays a selection dialog box for selecting the items available from the <i>S7 OPC Server</i> .
	CPC Item Manager
	Image: Pile View Uptions Help Image: Pile View Uptions Help </th
	Select the desired OPS server from the list.
5	The dialog box <i>Filter Criteria</i> will be displayed.
-	Using this dialog box, the type of the desired items can be specified more exactly. If you want to display all available items, no settings are required. The dialog box can be closed by clicking on <i>Continue-></i> .
	Filter Criteria
	Filter:
	Type: All Types
	Access Authorization
	<- Back

Step	C: Creating the Connection
6	A dialog box for selecting the desired items will be displayed. As a sub-entry to the group <i>DB</i> , this sample only contains <i>DB75</i> . The group <i>DB75</i> contains the five items defined in the previous section with the <i>OPC Scout</i> . These items represent the five tags in the PLC. These five items of the <i>DB75</i> must be selected in the right window. By clicking on the button <i>Add Items</i> , they will be inserted into the WinCC project.
	OPC. SimaticNET - (SERVER_PC) S7_Connection_01/VFD1/CP_H1_1: Items Data Type Objects DB75/INT0,1 Signed 16-bit value DB75/INT2,1 Signed 16-bit value DB75/INT6,1 Signed 16-bit value DB75/INT6,1 Signed 16-bit value DB75/INT8,1 DB75/INT8,1 DB75/INT8,1 DB75/INT8,1 C-Back Additems Item Properties
7	This requires the creation of a new connection into which these items can be inserted as WinCC tags. This connection can be created automatically by the <i>OPC Item Manager</i> . The dialog box <i>New Connection</i> will be displayed. In this dialog box, only the name of the new connection must be entered. In this sample, the name <i>S7_OPC_01</i> is used. Close the dialog box by clicking on <i>OK</i> . New Connection Flease enter a name for the new connection: S7_OPC_01 Cancel

Step	C: Creating the Connection
8	The dialog box <i>Add Tags</i> will be displayed. In this dialog box, the connection is defined to which the tags are added. In this sample, the tags are added to the connection <i>S7_OPC_01</i> created previously. This connection is selected from the field <i>Add Here</i> at the bottom. Optionally, a <i>Prefix</i> and a <i>Suffix</i> can be added to the tag names used by the <i>OPC</i> <i>Item Manager</i> . In this sample, the <i>prefix S16x_S7OPC01_</i> is placed in front of the tag names.
	The dialog box for the selection of the desired items can be exited via the <i><-Back</i> button. The <i>OPC Item Manager</i> can be exited via the <i>Close</i> button.
	Add Tags X Tags to be added: 5
	Tag names shall be completed by : Prefix Name S16x_S70PC01_ ExampleTag
	Example: S16x_S70PC01_ExampleTag
	Add here:
	<- Back [Finish]
9	The following graphic lists the WinCC tags created by the OPC Item Manager. Name Type Parameters S16x_S70PC01_DB75_INT0_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT0,1", ''', 2 S16x_S70PC01_DB75_INT2_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT2,1", ''', 2 S16x_S70PC01_DB75_INT4_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT4,1", ''', 2 S16x_S70PC01_DB75_INT6_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT4,1", ''', 2 S16x_S70PC01_DB75_INT6_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT6,1", ''', 2 S16x_S70PC01_DB75_INT8_1 Sig "S7:[S7_Connection_01/VFD1 CP_H1_1:]DB75,INT6,1", ''', 2

D: Conventional Configuration

Step	D: Conventional Configuration
1	In addition to the procedure described above for the automatic creation of a connection for the <i>OPC</i> communication driver, there is also the option to create the connection using the conventional method. The actions required are described in this step.
	A new connection is created via a \bigcirc R on the channel unit of the communication driver <i>OPC</i> and then selecting <i>New Driver Connection</i> from the pop-up menu.
	The dialog box Connection Properties will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered.
	In the <i>OPC Connection</i> tab, specify the OPC server to be used. In the <i>OPC Server Name</i> field, enter the name of the OPC server to be used and in the field below, enter the name of the computer on which the OPC server is located.
	Clicking on the <i>Test Server</i> button allows you to check, if a connection to the desired OPC server can be established.
	Clicking on the <i>OK</i> button creates the new connection.
	Connection properties X
	General OPC Group Setting
	OPC Server Name
	OPC.SimaticNet
	Run the server on another computer:
	Server Test
	Test OK. This server supports the OPC interface.
	■ Pead data from:
	Select an OPC server and the computer on which you would like to run it.
	OK Cancel Help
2	In addition to the procedure described above for the automatic creation of the tags, there is also the option to create the tags using the conventional method. The actions required are described in this step.
	A new tag is created via a ${}^{\prime}$ ${}^{\circ}$ R on the entry of the appropriate connection (in this sample, this is the connection <i>S7_OPC_01</i>) and then selecting <i>New Tag</i> from the pop-up menu.
	The dialog box Tag Properties will be displayed.

Step	D: Conventional Configuration
	In this dialog box, the name of the tag and its data type is defined. The address of the tag is set via the <i>Select</i> button.
	The dialog box Address Properties will be displayed.
	In the <i>Item Name</i> field, specify the name of the desired item from the OPC server. This name contains the address information. The syntax of this address information is explained by means of the first tag to be created within the framework of this sample. Its <i>Item Name</i> is [S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,INT0,1
	 S7 specifies the OPC server type used (<i>FMS</i> and <i>DP</i> are other examples of available OPC servers from SIMATIC NET).
	• <i>S7_Connection_01</i> is the name of the S7 connection.
	• <i>VFD1</i> is the VFD name (Virtual Field Device).
	• <i>CP_H1_1</i> : is the access point used.
	• <i>DB75</i> indicates the data block number.
	• <i>INTO</i> indicates that it is a Signed 16-Bit Value with a start address of 0.
	• <i>1</i> indicates that it is a single tag as opposed to an array consisting of multiple tags.
	The required syntax must be strictly adhered to.
	Address properties
	OPC Address
	Item Name: [S7:S7_Connection_01/VFD1/CP_H1_1:]DB75,IN
	Access Path:
	Data Type: Signed 16-bit value
	Please enter the name and the access path (if needed) of the OPC item and select its data type.
	Cancel Help

E: Creating the WinCC Screen

Step	E: Creating the WinCC Screen
1	Creation of a WinCC screen in which the previously created tags are visualized.
	Open the <i>Graphics Designer</i> editor via a $\mathcal{O}R$ and then selecting <i>Open</i> from the pop-up menu.
	Graphics Designer Open New picture Graphic OLL Select ActiveX Control Convert pictures Convert global library Convert project library Eind Properties
2	This will open the <i>Graphics Designer</i> editor with a new (blank) screen. To display the first tag, configure a <i>Smart Object</i> \rightarrow <i>I/O Field</i> . To do so, select the <i>I/O Field</i> object from the <i>Object Palette</i> and place it on the screen using the mouse
	Objects Image: Control standard Objects Image: Object Palette Image: Control standard Objects Image: Object Object Standard Objects Image: Control standard Object Image: Object Object Object Image: Control standard Objects Image: Object Object Object Object Image: Control standard Objects Image: Object Object Object Object Object Image: Object Object Objects Image: Object Obje

Step	E: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed.
	In the <i>Tag</i> field, set the tag <i>S16x_S7OPC01_DB75_INT0_1</i> via the button displayed below.
	Leave the <i>Update</i> of the tag at 2 s. Keep the default settings for the remaining options. Close the dialog box by clicking on OK
	I/O-Field Configuration
	Tag: \$16x_\$70PC01_D Update: 2 s Type Output Input Both Format Font Size 12 Font Name Arial Color
	OK Cancel
4	Changing the output format of the <i>I/O Field</i> .
	For this, open its properties dialog box via a the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	& Cut Ctrl+X ■ Duplicate
	Paste Ctrl+V Delete Del
	Custo <u>m</u> ized object Group <u>o</u> bject
	Linking
	Configuration Dialog Properties
	- Pjopenies

Step	E: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed. On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a Do on the output format set, the field can be edited. Select the new format s99999. This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.
	Properties Events Image: Properties Events Image: Properties Events Image: Properties Attribute Image: Properties Geometry Image: Properties Field Type Image: Properties Field Type Image: Properties Properties Image: Properties Properis Image: Prop
6	Creation of four additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen. In the sample project, the screen is saved under the name <i>com_3_S7OPC_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.


5.5 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S7_OPC* and the SIMATIC S7 station.

WinCC Explorer

Step	WinCC Explorer
1	Diagnosis of the communication connection from the <i>WinCC Explorer</i> .
	Switch the project <i>WinCC_S7_OPC</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.
	The created WinCC screen <i>com_3_S7OPC_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections
	can be accessed via the Tools \rightarrow Status of Driver Connections menu. This
	menu point is only accessible if the project is in runtime.
	Language
	Status of <u>D</u> river Connections
	Status of Multi-User Operation
3	The dialog box Status - Logical Connections will be displayed.
	This dialog box lists all configured connections. For this sample, only the
	connection <i>S7_OPC_01</i> will be displayed.
	The displayed values correspond to the status at the moment the dialog box was
	can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 2 S7_OPC_01 OK 1269 0 1 0
	Update
	Cyclic update (4 🛓 × 250 ms) Update Help
1	

Step	WinCC Explore	er		
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> .			
	The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.			
	Name	Paramete	ers	
	S7_OPC_01 OPC.SimaticNet; <local>; 0,00; 0; 0; 1 人 Status: OK</local>			
	The current process value of a certain tag as well as its status can be displayed a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.			as its status can be displayed as you to detect errors concerning
	Name		Туре	Parameters
	S16x_S70PC	01_01	Signed 16-bit value	DB75,DW0
		Process Quality: Last Ch	s value: 34 c0 ange:7/1/99 2:50:18 PM	

Channel Diagnosis

1Diagnosis of the communication connection via the program $WinCC$ Diagnosis. Start this program via $Start \rightarrow Simatic \rightarrow WinCC$	C Channel
Channel Diagnosis.	
2 The program WinCC Channel Diagnosis will be displayed. The Channels/Connections tab displays detailed information about the st configured connection. By default, the display is updated every secon update cycle can be changed in the input field located at the bottom. WINCC Channel Diagnosis Channels/Connections Configuration Counters Value Requested Tags 25 Additem failures 0 DPC Groups 1 Items added 5 Server uses DataAccess V2.0 Server Status RUNNING Last Error 0x00000000 Last Error Name S_OK Server Info SIMATIC NET OPC-Serve Cuclic Update:	etatus of each ond. The

6 Communication to the SIMATIC S7 via PROFIBUS

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder C:\Communication_Manual. You have the option to copy the following components to the hard drive:



The STEP7 project we will create.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S7 and WinCC. The communication connection will be realized via PROFIBUS. The communication card CP 5412 A2 used in the computer has its own CPU onboard. This will free the CPU of the computer from communication tasks.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 5412 A2*. To install this communication processor in the computer, the driver *PB S7-5412*, located on the *SIMATIC NET* CD-ROM, is needed. In the WinCC project, the communication driver *SIMATIC S7 Protocol Suite* must be installed. Via its channel unit *PROFIBUS*, the connection to the *SIMATIC S7* is configured. The PLC is equipped with a *CPU 416-1* module. The connection to the network is established via the communication processor *CP 443-5 BASIC*. For the configuration of this communication processor with the STEP7 software, the option package *NCM S7 PROFIBUS* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 5412 A2
- Creation of the STEP7 Project S7_PB
- Creation of the WinCC Project WinCC_S7_PB
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>PB S7-5412</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 5412 A2</i> .
STEP7	STEP7 software with option package <i>NCM S7 PROFIBUS</i> for the creation of the STEP7 project.
WinCC	WinCC with the communication driver <i>SIMATIC S7</i> <i>Protocol Suite</i> for the creation of the WinCC project.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 5412 A2</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack UR1
Power Supply	Power supply PS 407 10A in slot 1 and 2.
CPU Module	CPU module CPU 416-1 in slot 3.
Communication Processor	Communication processor CP 443-5 BASIC in slot 4.

09.99

6.1 Startup of the Communication Processor CP 5412 A2

The following description details the configuration steps necessary to successfully start up the communication processor *CP 5412 A2*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 5412 A2*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Assigning the Communication Processor
- E: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer



09.99

B: Installing the Communication Driver

Step	B: Installing the Communication Driver
1	Install the communication driver <i>PB S7-5412</i> from the <i>SIMATIC NET</i> CD-ROM. After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM. The installation of the software is started via the button displayed below.
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>PB S7-5412</i> to be installed must be selected. Finish the installation.
	Please select the programs to be installed. I
	< <u>B</u> ack <u>N</u> ext > Cancel

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	C: Installing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the <i>Install</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	<none> Properties</none>
	KNone> TCP//P > DEC PCLEast Ethornet
	Delete
	instal
	OK Cancel Help
3	The dialog box Install/Remove Modules will be displayed.
	The Selection field lists all interfaces that can be installed. Among them will be
	the entry for the <i>CP 5412 A2</i> , if the communication driver has been installed previously as outlined in step B. From the <i>Selection</i> field, select the entry <i>CP</i>
	5412 A2. The installation of the communication processor is started by clicking
	on the <i>Install</i> -> button.
	Install / Remove Interfaces X
	Selection: Installed:
	CP1411(AMD PCNET-Fa A CP1413
	CP1413 (256k DP-RAM) Install> CP1511(Accton EN2216
	CP5411 CP5412A2 < Remove
	Hesources
	CP5412A2: Communications Processor (MPI/PR0FIBUS) for Programming Devices/PCs
	<u>C</u> lose Help

Step	C: Installing the Communication Processor
4	The dialog box Resources - CP 5412 A2 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the Jumper Settings at the <i>CP</i> 5412 A2.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can be obtained from the <i>Resources</i> tab accessed via <i>Start</i> \rightarrow <i>Programs</i> \rightarrow <i>Administrative Tools (Common)</i> \rightarrow <i>Windows NT Diagnostics.</i>
	Close the <i>Resources</i> tab by clicking on <i>OK</i> .
	Resources - CP5412A2 <board 1=""></board>
	Memory range: 0000C8000-000CBFFF
	Input / output range: 0240-0243
	Interrupt request: 15 💌
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 5412 A2</i> .
	Exit the dialog box Install/Remove Modules via the Close button.
	Install / Remove Interfaces
	Selection: Installed: CP1411(AMD PCNET-Fet CP5412A2 Board 1 CP1413 (256k DP-RAM) Install -> CP5412A2 Board 1 CP1511(Accton EN2216 Install -> CP5412A2 Board 1
	CP5412A2: Communications Processor (MPI/PROFIBUS) for Programming Devices/PCs

D: Assigning the Communication Processor

Step	D: Assigning the Communication Processor
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_L2_1</i> : to the just installed interface.
	The access point CP_L2_1: is the default access point used by WinCC for the communication via the PROFIBUS. It has been created automatically during the installation of the communication driver PB S7-5412.
	In the field <i>Access Point of the Application</i> , set the entry <i>CP_L2_1</i> :. In the field below, select the entry <i>CP 5412 A2 (PROFIBUS)</i> . This completes the assignment between the access point and the communication processor.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set used:
	CP5412A2(PR0FIBUS) Properties
	<pre></pre> <pre></pre> <pre> </pre> <pre> </pre> <pre> </pre> <pre> Diagnostics </pre>
	CP5412A2(PROFIBUS) TCP/IP -> DEC PCI Fast Ethernet Copy
	Delete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	<u>Install</u>
	OK Cancel Help

Step	D: Assigning the Communication Processor
2	Setting the properties of the communication processor CP 5412 A2.
	The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.
	The dialog box Properties - CP 5412 (PROFIBUS) will be displayed.
	In the PROFIBUS tab, station and network related parameters are set.
	In this sample, the <i>Local Station Address</i> of the communication processor is set to 2.
	For the <i>PROFIBUS Network</i> , a <i>Baud Rate</i> of <i>1.5 MBit/s</i> is selected. The <i>Highest Station Address</i> is set to the maximum value of <i>126</i> . As the <i>Profile</i> , <i>Universal (DP/FMS)</i> is selected.
	The network settings just made must be uniform for all stations in the <i>PROFIBUS network</i> .
	Close the properties dialog box of the CP 5412 A2 by clicking on OK.
	Properties - CP5412A2(PR0FIBUS)
	PROFIBUS S7 Protocol FMS/DP-Protocol Mode
	Station Parameters
	Address: 2
	✓ PG/PC is the only master on bus
	PCS7 time synchronization
	Network Parameters
	Transmission <u>R</u> ate: 1.5 Mbps
	Highest Station Address: 126
	Profile: DP Standard
	Bus Parameters Universal (DP/FMS) User-Defined
	Net Configuration
	Calculate with this <u>n</u> et configuration
	Master: 2 Slaves: 0
	OK Cancel <u>S</u> tandard Help

Step	D: Assigning the Communication Processor					
3	Exit the program Setting the PG/PC Interface via the OK button.					
	A dialog box will be displayed requesting the restart of the <i>CP</i> 5412 A2. Acknowledge this dialog box by clicking on OK which will result in the restart					
	of the communication processor <i>CP 5412 A2</i> .					
	This completes the installation of the communication processor.					
	Changed SIMATIC NET settings					
	You changed your SIMATIC NET settings. To activate the changes, a restart of the parameter settings is necessary. Restart now?					
	Cancel					

E: Testing the Communication Processor

Step	E: Testing the Communication Processor					
1	Test the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .					
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.					
	Setting the PG/PC Interface					

Step	E: Testing the Communication Processor						
2	The program <i>Setting the PG/PC Interface</i> will be displayed. Select the interface to be checked. In this case, select the entry <i>CP 5412 A2 (PROFIBUS)</i> . Make sure that the assignments between access points and the interfaces are not changed.						
	The check for a proper installation is activated by clicking on the <i>Diagnostic</i> button.						
	Setting the PG/PC Interface (V5.0)						
	Access Path						
	Access point of application:						
	CP_L2_1:> CP5412A2(PROFIBUS)						
	(for CP5412A2 SIMATIC NET)						
	Interface parameter set <u>u</u> sed:						
	CP5412A2(PR0FIBUS) <active> Properties</active>						
	<none> CP5412A2(MPI) Diagnostics</none>						
	CP5412A2(PROFIBUS)						
	Delete						
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)						
	Interfaces						
	Install						
	OK Cancel Help						

Step	E: Testing the Communication Processor					
3	 The dialog box <i>Simatic NET Diagnostics</i> will be displayed. In the <i>PROFIBUS/MPI Network Diagnostics</i> tab, the diagnosis is started via the <i>Test</i> button. The result of the diagnosis will be displayed immediately following. If the result of the diagnosis is positive (correct installation), the dialog box can be exited with <i>OK</i>. In this case, the program <i>Setting the PG/PC Interface</i> can also be closed by clicking on <i>OK</i>. The configuration of the communication to the S7 					
	via PROFIBUS is continued in the following section.					
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described in the section. Is the Communication Module in the Computer operational?					
	SIMATIC NET diagnostics					
	EMS Protocol EMS Trace Read DP Databases DP-BAM					
	PROFIBUS/MPI Network Diagnostics S7 Protocol S7 Trace					
	Status					
	Test OK					
	Station address: 2					
	Bus parameters:					
	Baudrate: 1500.00 Kbps					
	Minimum station delay Time (Min Tsdr): 151 tBit					
	Maximum station delay Time (Max Tsdr): 980 tBit					
	Due Mardee					
	Bead Station passive					
	Station active ready					
	OK Cancel Apply Help					

The following description details the configuration steps necessary to create and start up the STEP7 project *S7_PB*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP7 project S7_PB:

- A: Installing the Hardware
- B: Installing the Option Package
- C: Creating the STEP7 Project
- D: Configuring the Hardware
- E: Loading the Hardware Configuration
- F: Testing the Hardware Configuration
- G: Creating the STEP7 Program
- H: Testing the STEP7 Program

A: Installing the Hardware

Step	A: Installing the Hardware
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 407 10A</i> , the CPU module <i>CPU 416-1</i> and the communication processor <i>CP 443-5 BASIC</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 5412 A2</i> in the computer to the communication processor <i>CP 443-5 BASIC</i> in the PLC.

B: Installing the Option Package

Step	B: Installing the Option Package
1	If the option package NCM S7 PROFIBUS has not been installed during the installation of STEP7, install it now from the STEP7 CD-ROM. This option package is required for the configuration of the communication processor CP 443-5 BASIC via the STEP7 software.
	After inserting the <i>STEP7</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	setup.exe

09.	99
09.	33

Step	B: Installing the Option Package					
2	This starts the installation program. Follow the instructions of the installation program. On the <i>Components</i> page, select the check-box <i>NCM S7-PROFIBUS</i> . Finish the installation.					
	Programs to be installed.					
	SIMATIC MS Internet Explorer V4.01 SP1 36 MB Software Acrobat Reader V3.01 3 MB STEP 7 V5.0 SP1 190 MB NCM S7 · PROFIBUS V5.0 SP1 29 MB NCM S7 · Ind. Ethernet V5.0 SP1 18 MB ✓ AuthorsW V2.0.1 2 MB					
	Description NCM S7 · PROFIBUS V5.0 ServicePack 1 · Optional package for CP configuration with STEP 7.					
	Estimated installation time: 00:03 (hh:mm) < Back Next > Cancel					

C: Creating the STEP7 Project

Step	C: Creating the STEP7 Project				
1	Create a new STEP7 project in the SIMATIC Manager.				
	It is started via $Start \rightarrow Simatic \rightarrow SIMATIC Manager.$				
	S				
	SIMATIC Manager				
2	This displays the SIMATIC Manager.				
	Via the menus $File \rightarrow New$, the dialog box for specifying the parameters of a new STEP7 project will be opened.				
	The New dialog box will be displayed.				
	The radio-button <i>New Project</i> must be selected. In the <i>Name</i> field, the name of the new project to be created is entered. The names of the STEP7 projects create within the framework of this manual all start with <i>S7</i> . They also include a reference to the communication type used. The project of this sample has the name <i>S7_PB</i> .				

Step	C: Creating the STEP7 Project				
	By default, projects are stored in the <i>C</i> :\ <i>SIEMENS</i> \ <i>STEP7</i> \ <i>S7proj</i> folder. This can be changed at any time via the <i>Browse</i> button.				
	The New dialog box is closed via the OK button.				
	New				
	New project O New library				
	Na <u>m</u> e:				
	S7_PB				
	Name Storage Path				
	Type: Project				
	Storage location (path):				
	C:\SIEMENS\STEP7\S7proj				
	Cancel Help				

D: Configuring the Hardware

Step	D: Configuring the Hardware			
1	The new project will be displayed in the SIMATIC Manager.			
	The hardware for this project must be configured. Two components are needed: One <i>SIMATIC 400-Station</i> and for its networking a <i>PROFIBUS</i> .			

Step	D: Configuring the Hardware					
	These components are added to the <i>SIMATIC Manager</i> via a \mathcal{PR} on the project name <i>S7_PB</i> and then selecting <i>Insert New Object</i> \rightarrow <i>SIMATIC 400-Station</i> and <i>Insert New Object</i> \rightarrow <i>PROFIBUS</i> from the pop-up menu.					
	<mark>€</mark> S7_PB ⊡∭_SI Co ⊡¶ Pa ⊡ N Pa	it ipy aste	Ctrl+X Ctrl+C Ctrl+V Del			
	Pri Ot	s <mark>ert New Object</mark> int bject Properties	► Alt+Return	SIMATIC 400 Station SIMATIC 300 Station Other Station SIMATIC H Station SIMATIC PC Station SIMATIC S5 PG/PC		
				MPI PROFIBUS Industrial Ethernet PTP		
				S7 Program M7 Program		
				OS OS (MultiClient)		
2	The just added components will be displayed in the right window of the <i>SIMATIC Manager</i> .				e	
	SIMATIC 400)(1) 물 *MPI(1) 🚦	PROFIBUS(1)		

Step	D: Configuring the Hardware					
	By \textcircled{D} on the component <i>SIMATIC 400(1)</i> in the right window, the point <i>Hardware</i> will be displayed. By \textcircled{D} on the point <i>Hardware</i> or \textcircled{D} R on it and then selecting <i>Open Object</i> from the pop-up menu, the program <i>HW Config</i> will be started.					
	S7_PB K:\com S7_pb\S7_pb S7_PB S7_PB SIMATIC 400(1) Cut Cut Cut Cut+Alt+0 Cut Copy Ctrl+X Copy Ctrl+V Delete Del Print +					
3	The program <i>HW Config</i> will be displayed. This program is used to exactly define the hardware used in the PLC and to configure their properties.					
4	By clicking on the toolbar button of the program <i>HW Config</i> displayed below, the <i>Hardware Catalog</i> is opened. This catalog is used to select the required hardware components.					

Step	D: Configuring the Hardware					
5	The Hardware Catalog will be displayed.					
	The first component selected is the rack. On this rack, all other components will					
	be installed. The rack is inserted into the project via a $\mathcal{D}D$ or by Dragging Dropping. In this sample, the rack type $UR1$ is used.					
	Hardware Catalog					
	Profile Standard SIMATIC 400 Image: CP-400 CP-400 Image: CP-400 FM-400 Image: CP-400 FM-6 PS-400 FM-7 PS-400 FM-7 RACK-400 FM-7 CR2 FR1 ER1 FR2 ER1 FR2 Image: CP-400 FM-7 UR1 UR2 UR2 UR2 UR2 UR2+H Image: CP-400					
	6ES7 400-1TA00-0AA0 Universal rack, 18 slots, not suitable for redundant power supply modules					

Step	D: Configuring the Hardware					
6	The program $HW Config$ will display the currently still empty rack. It received the Rack Number 0 . During the configuration of the connection in the WinCC project, the rack number is one of the parameters that must be set.					
	1 2 3 4 5 6 7 o					
7	Arrange the other hardware components in the rack. This is done by Dragging Dropping the desired components from the <i>Hardware Catalog</i> to the corresponding slot in the rack.					
	This sample uses the power supply <i>PS 407 10A</i> . It is inserted into slot <i>1</i> . A power supply of this type occupies two slots.					
	As the CPU module, this sample uses a <i>CPU 416-1</i> . This module is inserted into slot <i>3</i> . Another parameter to be set during the configuration of the connection in the WinCC project is the slot number of the CPU module.					
	We also require the communication processor <i>CP 443-5 BASIC</i> . This CP is only available from the <i>Hardware Catalog</i> if the option package <i>NCM S7 PROFIBUS</i> has been installed. After the communication processor <i>CP 443-5 BASIC</i> has been inserted in the rack, its properties dialog box will open.					
8	The <i>PROFIBUS Interface</i> properties dialog box of the <i>CP 443-5 BASIC</i> will be displayed.					
	In the <i>Address</i> field of the <i>Parameters</i> tab, enter the desired address of the communication processor. In this sample, the address 3 is specified. Another parameter to be set during the configuration of the connection in the WinCC project is this Station Address. In the <i>Subnet</i> field below, assign the entry <i>PROFIBUS(1)</i> to the communication processor.					

Step	D: Configuring the Hardware					
	The properties of <i>PROFIBUS(1)</i> must be defined. Its properties dialog box is					
	opened via the <i>Properties</i> button.					
	Concord Parameters					
	Address: 3 T Highest MPI address: 126					
	Fransmission rate, n. 5 mpps					
	Subnet:					
	Not Networked PD0EID12(1) 1.5 Mbox					
	Properties					
	Delete					
	OK Cancel Help					
0						
9	I ne dialog box <i>Properties - PROFIBUS</i> will be displayed. In the <i>Natwork Settings</i> tab. the properties of the <i>PROFIBUS Network</i> are					
	defined. The same Network Settings that have used for the installation of the					
	communication processor <i>CP 5412 A2</i> must be used.					
	For the <i>PROFIBUS Network</i> , this sample uses a <i>Baud Rate</i> of 1.5 <i>MBit/s</i> . The <i>Highest PROFIBUS Address</i> is set to the maximum value of 126. As the <i>Profile</i> .					
	Universal (DP/FMS) is selected. Exit the dialog box by clicking on the OK					
	button. The properties dialog box of the <i>PROFIBUS Interface</i> of the <i>CP 443-5</i> BASIC is also closed by clicking on OK.					
	Properties - PROFIBUS					
	General Network Settings					
	Highest PROFIBUS address: 126 Change					
	Activate cyclic distribution of bus parameters					
	Transmission rate: 19.2 Kbps					
	93.75 Kbps 187.5 Kbps					
	500 Kbps 1.5 Mbps					
	Profile:					
	Standard Universal (DP/FMS) Bus Parameters					
	User-defined					
	OK Cancel Help					

Step	D: Configuring the Hardware					
10	The following graphic shows the completed hardware arrangement of the sample.					
11	Save the settings made in the program <i>HW Config</i> . This is done via the toolbar button displayed below.					

E: Loading the Hardware Configuration

Step	E: Loading the Hardware Configuration					
1	The hardware configuration created in the program <i>HW Config</i> must be transferred to the PLC.					
	This is done via the toolbar button displayed below.					
	Download to Module					
2	A dialog box will be displayed from which the components to be loaded can be selected.					
	For this sample, all displayed components will be selected. Note that loading to					
	the CPU module is ony possible while the operating mode switch is set to <i>STOP</i> or <i>RUN-P</i> . Close the dialog box by clicking on <i>OK</i> .					
	Select Target Module					
	Target modules:					
	Module Rack Slot					
	CPU416-1 0 3 CP 443-5 Basic 0 4					
	Select <u>A</u> ll					
	Cancel Help					

Step	E: Loading the Hardware Configuration					
3	Now the dialog box <i>Select Station Address</i> will be displayed. In this dialog box, specify which station address is used by the STEP7 software to communicate with the CPU module. In this sample, the communication is carried out via the MPI interface. The <i>Address</i> of the CPU module is 2. Close the dialog box by clicking on <i>OK</i> .					
	Which node address links the programming device with module CPU416-1?					
	Rac <u>k</u> : 0 == Slot: 3 ==					
	Target Station In Jocal network C Reached via router					
	Connection to Target Station <u>Iype:</u> <u>Address:</u> 2					
	Cancel Help					
4	The configuration data will now be transferred to the PLC. If necessary, the individual modules are set to the STOP status.					
	The newly added components will be displayed by the <i>SIMATIC Manager</i> for the station <i>SIMATIC 400(1)</i> .					
	⊡ - S7_PB ⊡ - SIMATIC 400(1) ⊕ - ≒ + CP 443-5 Basic ⊕ - ௵ CPU416-1					

F:	Testing	the	Hardware	Configuration
----	---------	-----	----------	---------------

Step	F: Testing the Hardware Configuration					
1	ing of the hardware configuration made. e key switch of the CPU module is set to RUN or RUN-P and the operating e switch of the communication processor is set to RUN, only the status LEDs fiving the <i>RUN</i> operating mode should light up					
	If this is not the case, there is an error. The following steps help you localize this error. However, these steps should still be performed even if the status LEDs show no error. This allows you to recognize uncritical errors and faulty configurations.					

Step	F: Testing the Hardware Configuration					
2	Testing the configuration of the CPU module.					
	This is done via the dialog box <i>Module Status</i> in the <i>SIMATIC Manager</i> . It is					
	opened by a \mathcal{O}_{R}	PU module in the left	window and then			
	menu.					
	The dialog box M	odule Status of the CP	U module will be disr	laved.		
	The <i>General</i> tab d field, the current n	isplays various genera	l data of the CPU mod existing errors are disp	dule. In the <i>Status</i> played.		
	The <i>Diagnosis Bu</i> errors and how to	<i>ffer</i> tab contains more correct them.	detailed information a	bout existing		
	The dialog box ca	n be exited via the Clo	ose button.			
	💐 Module Informatio	n - CPU416-1 ONLINE				
	Path: S7_PB\SIMATIC 400(1)\CPU416-1 Status: OK		CPU operating mo No force job.	ide: RUN		
	Time System	Performance Data	Communication	Stacks		
	General	Diagnostic Buffer	Memory	Scan Cycle Time		
	Description:	CPU416-1	System ID:	SIMATIC 400		
	Version:	Order No./Description 6ES7 416-1XJ01-0AB0	Component	Version 1		
	Rack:	0	Address:			
	Slot:	3	Module width:	1		
	<u>S</u> tatus:	Module present and OK.				
	<u>Close</u>	Jpdate <u>P</u> rint		Help		

Step	F: Testing the Hardware Configuration						
3	Testing the configuration of the communication processor. This is done via the dialog box <i>Module Status</i> in the <i>SIMATIC Manager</i> . It is						
	opened by a \mathcal{B}_{R} on the entry of the communication processor in the left						
	window and then	selecting Target Syste	em → Module St	atus from the pop-up			
	menu.						
	The dialog box <i>M</i>	<i>Module Status</i> of the co	mmunication proce	ssor will be displayed.			
	The General tab	displays various gener	al data of the modu	le.			
	A dialog box for	a more detailed diagno	osis of the communi	cation processor can			
	be accessed via t	he <i>Special Diagnosis</i> b	utton.				
	Module Informat	ion - CP 443-5 Basic ONLI	NE				
	Path: S7_PB\SIMA Status: 0K	TIC 400(1)\CP 443-5 Basic	CPU operatin Module opera	g mode: RUN sting mode: RUN			
	General Diagnostic Ruffer						
	Description:	CP 443-5 Basic	System ID:	SIMATIC 400			
	⊻ersion:	Order No./Description	Component	Version			
		6GK7 443-5FX00-0XE0		201			
	Rack:	0	Address:	l 16380			
	Slot:	4	Module width:	1			
	<u>S</u> tatus:	Module present and OK.					
		No LED display.					
		Update <u>Print</u>	Special Diagnostics	Help			

Step	F: Testing the Hardware Configuration
4	The dialog box NCM S7 PROFIBUS Diagnosis will be displayed.
	From the <i>PROFIBUS Station</i> tab, a diagnosis of the <i>PROFIBUS Network</i> can be performed.
	If the physical connection to the communication processor <i>CP 5412 A2</i> has already been established, the list should contain two entries for this example. One entry for the communication processor <i>CP 5412 A2</i> with the address 2 and one entry for the communication processor <i>CP 443-5 BASIC</i> with the address 3.
	If the physical connection to the communication processor <i>CP 5412 A2</i> has not been established yet, at least the entry for the communication processor <i>CP 443-5 BASIC</i> with the address <i>3</i> should be displayed.
	The dialog box can be exited via the <i>Close</i> button. The Module Status dialog box can also be exited via the <i>Close</i> button.
	NCM S7 PROFIBUS Diagnostics
	CP Information Diagnostic Buffer Operating Mode FDL FMS PROFIBUS Nodes PROFIBUS Bus Parameters PROFIBUS Statistics Options
	PROFIBUS Addr. Response on PROFIBUS
	2 active 3 active
	<u>Close</u> CP Change Cyc. Upd. <u>On</u> <u>Update</u> Help

G: Creating the STEP7 Program

Step	G: Creating the STEP7 Program		
1	Creation of the S7 Program.		
	This sample project requires the operation block <i>OB1</i> and a data block. <i>OB1</i> is available by default, the required data block must be created. This is done in the		
	SIMATIC Manager via a ${}^{\bullet}\mathbb{C}\mathbb{R}$ on the sub-entry Modules of the entry S7 Program(1) of the configured CPU module and then selecting Insert New Object \rightarrow Data Block from the pop-up menu.		
	The properties dialog box of the data block will be opened. As the block's Name enter DB75 and close the dialog box with OK.		
	⊡ [I] CPU416-1 ⊡		
	Cut Ctrl+X Copy Ctrl+C		
	Paste Ctrl+V		
	Delete Del		
	Insert New Object Organization Block		
	PLC Function Block		
	Options Data Block		
	Print Data Type		
	Object Properties Alt+Return Special Object Properties		
2	The newly created data block <i>DB75</i> will be displayed in the right window of the		
	project.		
	Via a D on this data block or a R and then selecting <i>Open Object</i> from the		
	pop-up menu, the content of the block can be programmed. This starts the program <i>LAD/STL/SCF</i> .		
	Open Object Ctrl+Alt+O		
	Cut Ctrl+X		
	Copy Ctrl+C		
	Paste Ctrl+V		
	Delete Del		
	PLC •		
	Options		
	Print >		
	Object Properties Alt+Return Special Object Properties		

Step	G: Creating	g the STEP7 P	rogram		
3	The program LAD/STL/SCF is displayed.				
	Acknowledge the dialog box New Data Block by clicking on OK.				
	KOP AWL FL	IP			
4	Programmin	ng the DB75.			
	In this data block, two tags with a length of 16 Bits are created. Their sum is to be determined in $OB1$ and then be written to another tag with a length of 16 Bits			Their sum is to length of 16 Bits.	
	Two additio	nal tags with a	length of 16 Bits	are created, whose	values are
	The followi	ng granhic disr	olays the programm	ned data block <i>DR</i>	75
	DB75 S7		111\CPU416-1	ned data block DD	
	Address	Name	Tyme	Initial Value	Comment
	0.0		STRUCT		
	+0.0	Var_01	WORD	W#16#O	Value 1
	+2.0	Var_02	WORD	W#16#O	Value 2
	+4.0	Var_03	WORD	W#16#O	Summ
	+6.0	Var_04	WORD	W#16#0	Inc 1
	=10.0	Var_05	END STRUCT	W#16#0	=1
			<u>-</u>		
5	Save the blo displayed be operating me Download	ock and load it it elow. Note that ode switch is s	into the PLC. This loading to the CP et to STOP or RUA	s is done via the too PU module is only j N-P.	olbar button possible while the
6	Programmin Open the blo First, two va	ng the <i>OB1</i> . Ock in the prog alues in the <i>DB</i>	ram <i>LAD/STL/SCL</i> 75 are added and a	F. then stored again in	n <i>DB75</i> .
	Netzwerk	1: Addit	ion		
	Adding 1 The rest 16-Bit 1	two 16-Bit ult is sto Value	: Values ored in anot	her	
	OI L L	PN DB DBW DBW	75 0 2		
	T	- DBW	4		
	Next, a valu	e in the DB75	is incremented eve	ery second.	

Step	G: Creating the STEP7 Program
	Network 2: Second Cycle
	Generation of a second cycle at M 0.0
	AN M 0.0 L S5T#1S SD T 1 A T 1 = M 0.0
	Network 3: Counting in a second cycle
	Counting a value in a second cycle At 10000, reset to 0
	AN M 0.0 JC M001 L DBW 6 L 1
	T DBW 6 L 10000 <i JC M001</i
	L U T DBW 6 MOO1: NOP O
	Finally, a value in the <i>DB75</i> is incremented every time the <i>OB1</i> run. Network 4 : Counting in the cycle time
	Counting a value each time the OB is executed At 10000, reset to 0
	L DBW 8 L 1 +I
	T DBW 8 L 10000 <i JC M002</i
	L 0 T DBW 8 M002: NOP 0
7	Save the block <i>OB1</i> and load it into the PLC. This is done via the corresponding buttons on the toolbar. This completes the creation of the STEP7 project and it can now be run. Exit the program <i>LAD/STL/SCF</i> .

Step	H: Testing the	STEP7 Progr	am			
1	Testing the pro	gram with the	STEP7 software.			
	For this purpose, a tag table is created. This is done in the SIMATIC Manager via					
	a \mathcal{T} R on the entry of the configured CPU module and then selecting <i>Target</i>					
	$System \rightarrow Monitor/Control Tag$ from the pop-up menu.					
	🗆 😂 CPU416-	Cut	Ctrl+X			
	🖻 🚮 S7-Pr	Сору	Ctrl+C			
		Paste	Ctrl+V			
		Delete	Del			
		Insert New Obje	ct	•		
		PLC		CPU Messag	es	
		Options		 Display Force 	Values	
		Print		Monitor/Modi	fy Variables	
		Object Propertie	s Alt+Return	Module Inform	nation	
		Special Object F	Properties	Operating Mo Close / Report	ide Ctrl+l	
	-			Set Date and	Time	
				Save RAM to	ROM	
				Diagnose Ha	rdware	
	the <i>DB75</i> .					
	Address	Symbol	Monitor Format	Monitor Value	Modify Value	
	DB75 DBW	0	DEC	12	12	
	DB75.DBW	2	DEC	12	12	
	DB75.DBW	4	DEC	24		
	DB75.DBW	<u>6</u> 8	DEC	5254 8847		
3	Monitoring the	current tag val	ues			
3	Monitoring the By clicking on	current tag val	ues. ton displayed belo	ow, the current	values of the	
3	Monitoring the By clicking on corresponding	current tag val the toolbar but tags in the PLC	ues. ton displayed belo 2 are displayed in	ow, the current the column <i>Stat</i>	values of the us Value.	
3	Monitoring the By clicking on corresponding	current tag val the toolbar but tags in the PLC	ues. ton displayed belo Care displayed in	ow, the current the column <i>Stat</i>	values of the <i>us Value</i> .	
3	Monitoring the By clicking on corresponding	current tag val the toolbar but tags in the PLC	ues. ton displayed belo C are displayed in	ow, the current the column <i>Stat</i>	values of the us Value.	
3	Monitoring the By clicking on corresponding	current tag val the toolbar but tags in the PLC ording to trigger)	ues. ton displayed belo Care displayed in	ow, the current the column Stat	values of the us Value.	
3	Monitoring the By clicking on corresponding	current tag val the toolbar but tags in the PLC ording to trigger) tag values.	ues. ton displayed belo 2 are displayed in	ow, the current the column <i>Stat</i>	values of the us Value.	
3	Monitoring the By clicking on corresponding Monitor (acc Controlling the Values can be	current tag val the toolbar but tags in the PLC ording to trigger) tag values. entered in the c	ues. ton displayed belo c are displayed in olumn <i>Control Vo</i>	ow, the current the column <i>Stat</i>	values of the <i>us Value</i> . g on the toolbar	
3	Monitoring the By clicking on corresponding Monitor (acc Controlling the Values can be ob button displaye	e current tag val the toolbar but tags in the PLC ording to trigger] tag values. entered in the c ed below, these	ues. ton displayed belo c are displayed in olumn <i>Control Va</i> values will be wr	ow, the current the column <i>Stat</i> the column <i>Stat</i> <i>alue</i> . By clicking itten to the corre	values of the us Value. g on the toolbar esponding tags in	

H: Testing the STEP7 Program

Step	H: Testing the STEP7 Program
	Note that tags can only be controlled while the operating mode switch of the CPU module is set to <i>RUN-P</i> .
	Modify (according to trigger)
4	The created tag table can now be saved.
	In this sample, the table is saved under the name <i>VAT1</i> . After checking the program in the PLC, the tag table can be closed. This concludes the configuration of the STEP7 project and the <i>SIMATIC Manager</i> can be exited.
	I VAT1

6.3 Creation of the WinCC Project WinCC_S7_PB

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S7_PB*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S7_PB*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	This will display the WinCC Explorer.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	WinCC Explorer
	Single-User Project
	B ↓ ○ Multi-User Project
	Multi-Client Project
	O Open an Existing Project
	OK Cancel

Step	A: Creating the WinCC Project				
3	The dialog box Create a new Project will be displayed.Specify a Project Name for the new project. The names of the WinCC projects created within the framework of this manual all start with WinCC and also include a reference to the communication partner and communication type used. The project of this sample has the name WinCC_S7_PB.In the Project Path field, set the storage location of the new project.				
	The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.				
	Project Name: Project Path Create WinCC_S7_PB Eolder Cancel WinCC_S7_PB [] WinCC_S7_IES] WinCC_S7_PB WinCC_S7_IETCP] Help You can use this dialog box to create a new WinCC project. Drive: Drive: Image: Comparison of the state of the stat				

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	<u>– Fina</u>
	<u>P</u> roperties

Step	B: Creating the Connection
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S7</i> , the driver <i>SIMATIC S7 Protocol Suite</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .
	Add new driver. ? × Look jn: Bin Image: SIMATIC S5 PMC Profibus.chn ccTlg Image: SIMATIC S5 PMC Profibus.chn PDLCache Image: SIMATIC S5 Profibus FDL.chn OPC.chn Image: SIMATIC S5 Protocol Suite.CHN Image: SIMATIC S5 Ethernet Layer 4.chn Image: TlEth.chn Image: SIMATIC S5 Ethernet TF.CHN Image: SIMATIC S5 PMC Ethernet.chn
	File name: SIMATIC S7 Protocol Suite.CHN Files of type: WinCC Communication Driver (*.chn) Cancel
3	The newly added driver SIMATIC S7 Protocol Suite will be displayed as a sub- entry to Tag Management. The driver contains eight different channel units. To operate a computer with two CP 1413 communication processors, two channel units for the PROFIBUS are available. In this sample, the channel unit PROFIBUS is used. Create a new connection for this channel unit by OR on PROFIBUS and then selecting New Driver Connection from the pop-up menu. E- SIMATIC S7 PROTOCOL SUITE Industrial Ethernet Industrial Ethernet (II) MPI Named Connections PROFIBUS Slot PLC TCP/IP Find Paste Properties

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S7_PB_01</i> .
	Click on the <i>Properties</i> button to define the connection properties.
	Connection properties
	General
	Name: S7_PB_01 Properties
	Unit: PROFIBUS
	Server List
	OK Cancel Help
Step	B: Creating the Connection
------	---
5	The dialog box Connection Properties will be displayed.
	In the <i>Station Address</i> field, the address that has been set for the communication processor <i>CP 443-5 BASIC</i> is entered. For this sample, this is the Address <i>3</i> .
	Additionally, the Rack Number and Slot Number of the CPU module to be accessed must be entered. Make sure that the values of the CPU module are entered here and not the values of the communication processor.
	Close the dialog box by clicking on OK.
	Connection Parameter - PROFIBUS
	Connection
	- S7 Network Address
	Station Address: 3
	Segment-ID :
	Rack Number: 0
	Slo <u>t</u> Number: 3
	☐ Send/receive ra <u>w</u> data block
	Connection Resource: 02
	Cancel Help

Step	B: Creating the Connection
6	Setting the system parameters of the <i>PROFIBUS</i> channel unit.
	These settings are made in the <i>System Parameters</i> dialog box, which is accessed
	via a UR on the <i>PROFIBUS</i> entry and then selecting <i>System Parameters</i> from
	the pop-up menu.
	monitoring a communication can be made. These settings will apply to all channel units of the communication driver.
	System Parameter - PROFIBUS
	Channel Unit
	These parameters are valid for all units local to the computer!
	Cycle formation
	Use cyclic read service of PLC
	Lifebeat monitoring
	✓ Activate 60 Interval 30 Monitoring interval
	- Monitoring of CPU-stop
	IV Activat <u>e</u>
	Cancel Help

Step	B: Creating the Connection
7	In the <i>Device</i> tab, the access point used by the connection to access the PLC is specified.
	By default, the access point CP_L2_1 : is set. Previously, the communication processor CP 5412 A2 has been assigned to the access point CP_L2_1 : in the program <i>Setting the PG/PC Interface</i> . If you want the access point to be set automatically, make sure that the correct one is being used, especially if multiple communication processors are used.
	System Parameter - PROFIBUS
	Channel Unit
	Select logical device name
	CP-Type/Bus Profile: PROFIBUS
	Logical <u>d</u> evice name: CP_L2_1:
	Set automatically
	Job processing
	☐ <u>W</u> rite with priority
	OK Cancel Help

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags
1	Creation of the WinCC tags required for the sample.
	This is done via a $\mathcal{B}R$ on the newly created connection $S7_PB_01$ and then selecting <i>New Tag</i> from the pop-up menu.
	 SIMATIC S7 PROTOCOL SUITE Industrial Ethernet Industrial Ethernet (II) MPI Named Connections PROFIBUS
	E⊡ SIDE PLC New Group ⊡ SIDE PLC
	Cut <u>D</u> opy <u>P</u> aste
	Delete
	Properties

Step	C: Creating the WinCC Tags
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16x_S7PB01_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type. Click on the <i>Select</i> button to set the <i>Address</i> of the new tag.
	Tag properties
	General Limits/Reporting
	Properties of Tags
	Name: \$16x_\$7PB01_01
	Datatype : Signed 16-bit value
	Length: 2
	Adapt format: ShortToSignedWord
	C Eroject-wide update C Computer-local update
	Linear scaling
	Process Value Range
	From
	То
	UK Cancel Help

Step	C: Creating the WinCC Tags
3	The dialog box <i>Address Properties</i> will be displayed. Set <i>DB</i> as the <i>Data Range</i> and the value 75 as the <i>DB No</i> . Set <i>Word</i> in the Address field and the value 0 in the <i>DBW</i> field. Close the dialog box by clicking on <i>OK</i> . The properties dialog box of the tag is also closed by clicking on <i>OK</i> . The just created tag is addressed in the range of the PLC, where the first of the two values to be added is located.
	Address properties
	Address Description QPU Data DB Address Word DBW Length DBW Length Quality Code
	OK Cancel Help
4	
4	Follow steps 1 to 3 for the creation of the remaining tags. The names, data types and addresses of the tags used in this sample are listed in the following graphic.
	Name Type Parameters
	ST6x_S7P801_01 Signed T6-bit value DB75,DW0 Signed 16-bit value DB75,DW2 S16x_S7P801_03 Signed 16-bit value DB75,DW4 S16x_S7P801_04 Signed 16-bit value DB75,DW6 S16x_S7P801_05 Signed 16-bit value DB75,DW8

D: Creating the WinCC Screen

Step	D: Creating the WinCC Screen
1	Creation of a WinCC screen in which the previously created tags are visualized.
	Open the <i>Graphics Designer</i> editor via a $\mathcal{P}R$ and then selecting <i>Open</i> from the pop-up menu.
	Graphics Designer Open New picture Graphic OLL Select ActiveX Control Convert pictures Convert global library Convert project library Eind Properties
2	This will open the <i>Graphics Designer</i> editor with a new (blank) screen.
	To display the first tag, configure a <i>Smart Object</i> → <i>I/O Field</i> . To do so, select the <i>I/O Field</i> object from the <i>Object Palette</i> and place it on the screen using the mouse. Objects Selection Standard Objects Smart Objects Smart Objects Application Window Picture Window Control OLE Element I/O Field Bar Graphic Object Status Display Text List JD-Bar Group Display Windows Objects Standard

Step	D: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed
	In the <i>Tag</i> field, set the tag $S16x_S7PB01_01$ via the button displayed below.
	options. Close the dialog box by clicking on <i>OK</i> .
	I/O-Field Configuration
	Tag: \$16x_\$7PB01_01 Update: 2 s Type Output Input Both Format Forn Size 12 Font Name Arial Color Color Cancel
4	Changing the output format of the <i>I/O Field</i> . For this, open its properties dialog box via a select <i>Properties</i> from the pop-up menu.
	Cut Ctrl+X Copy Ctrl+C Duplicate Paste Ctrl+V Delete Del
	Custo <u>m</u> ized object
	Linking
	Configuration Dialog
	Properties

Step	D: Creating the WinCC Screen
5	The dialog box Object Properties will be displayed.
	On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a OD on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.
	I/O Field Properties Events
	I/O Field Attribute Static Dynamic Curr I Geometry Field Type I/O Field I/O I/O I/O I/O Colors Output Value 0.00000e+000 \$S16x_S7PB01_01 2 s I/O Font Output Format s99999 I/O I/O I/O I/O Flashing Apply on Full No I/O I/O I/O I/O Limits Clear on New Input Yes I/O I/O I/O I/O Hidden Input No I/O I/O I/O I/O I/O
6	Creation of four additional <i>UO</i> Fields for the diaplay of the remaining tags
0	Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen.
	In the sample project, the screen is saved under the name <i>com_S7PB_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.
	If the screen is in runtime, the PLC started and the network connection established, the current values of the PLC will be displayed in the I/O fields. They can be changed by entering values in the individual <i>I/O Fields</i> .
	🔎 WinCC-Runtime -
	Communication SIMATIC S7 Protocol Suite - PROFIBUS
	+56 Inc 1: +3056 + +34 Inc 2: +5641
	+90

Step	D: Creating the WinCC Screen
	If there is no connection to the PLC, the <i>I/O Fields</i> will be displayed grayed out. In this case an error is present at some point of the communication connection.
	+0./

6.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S7_PB* and the SIMATIC S7 station. A diagnosis of the sample according to this description makes only sense, if the checks listed below have been completed successfully. Startup of the Communication Processor CP 5412 A2

- E: Testing the Communication Processor
- Creation of the STEP7 Project S7_PB
- F: Testing the Hardware Configuration
- H: Testing the STEP7 Program

Setting the PG/PC Interface

Step	Setting the PG/PC Interface
1	Diagnosis of the communication connection via the program <i>Setting the PG/PC</i> <i>Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface <i>CP 5412 A2 (PROFIBUS)</i> . Make sure that the assignments between access points and the interfaces are not changed. The diagnosis of the communication connection is started by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PROFIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PR0FIBUS) <active> Properties</active>
	<none> CP5412A2(MPI) Diagnostics</none>
	CP5412A2(PR0FIBUS) <active> TCP/IP >> DEC PCI East Ethernet Copy</active>
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	<u>install</u>
	OK Cancel Help

Step	Setting the PG/PC Interface
Step 3	Setting the PG/PC Interface The dialog box Simatic NET Diagnostics will be displayed. From the PROFIBUS/MPI Network Diagnostics tab, the diagnosis of the communication connection is started by clicking on the Read button. This will display all stations accessible on the bus. For this sample, the address 2 of the communication processor CP 5412 A2 as well as the address 3 of the communication processor CP 443-5 BASIC must be marked as occupied. The dialog box can be exited by clicking on OK. SIMATIC NET diagnostics FMS Protocol FMS Trace FMS Protocol FMS Trace FMS Protocol FMS Trace Status Status I lest OK Status I lest Bus Nodes 0 1 2 3 4 5 6 7 8 9 1011 1213141516171819 0 I lest I lest 0 I lest
	40
	OK Cancel Apply Help

NCM S7 PROFIBUS Diagnosis

Step	NCM S7 PROFIBUS Diagnosis	
1	Diagnosis of the communication connection via the program <i>NCM S7 PROFIBUS Diagnosis</i> .	
	This program is started via $Start \rightarrow Simatic \rightarrow STEP7 \rightarrow NCM S7$ <i>PROFIBUS</i> \rightarrow <i>PROFIBUS Diagnosis.</i>	
	NCM Profibus Diagnose	
2	A dialog box for specifying the module to be accessed will be displayed.	
	In this sample, the communication processor <i>CP</i> 443-5 <i>BASIC</i> in slot 4 is being accessed. The target station is accessed via the MPI interface of the CPU module with the address 2. Your system might use different settings.	
	Exit the dialog box by clicking on the OK button.	
	🔣 NCM S7 PROFIBUS Diagnostics : Online Path	
	Which module do you want to access?	
	Position of the module	
	<u>Rack / Slot:</u> 0 4	
	Address of the destination station	
	MPI/PROFIBUS/AUTO	
	Node address: 2	
	Router: (None)	
	Ngde address:	
	S7 subnet [D of destination network:	
	Cancel Help	

Step	NCM S7 PROFIBUS Diagnosis		
3	The dialog box <i>NCM S7 PROFIBUS Diagnosis</i> will be displayed. The <i>CP Information</i> tab displays general information about the communication processor. Among other things, the <i>Network Address</i> configured with the STEP7 software is displayed.		
	NCM S7 PROFIBUS Diagnostics		
	PROFIBUS Nodes PROFIBUS Bus Parameters PROFIBUS Statistics Options CP Information Diagnostic Buffer Operating Mode FDL FMS		
	Unline Path Interface: MPI/PROFIBUS/AUTO Address of router:		
	S7 Subnet ID of the Address of destination destination network: station network attachment: 2		
	Rack: 0 Slot: 4		
	General Module Information CP Type: CP 443-5 Basic		
	CP Version: V2.01		
	Order Number: 6GK7 443-5FX00-0XE0		
	Network Type: PROFIBUS Network Address: 3		
	Status of the Module:		
	Operating mode. Full Cause. UN		
	CP Change Cyc. Upd. <u>O</u> n Update Help		

Step	NCM S7 PROFIBUS Diagnosis
4	The <i>PROFIBUS Station</i> tab lists all communication stations that can be accessed via the <i>PROFIBUS</i> .
	In this sample, these are the communication processors <i>CP 5412 A2</i> in the computer with the address 2 and the <i>CP 443-5 BASIC</i> in the PLC with the address 3.
	NCM S7 PROFIBUS Diagnostics
	CP Information Diagnostic Buffer Operating Mode FDL FMS PROFIBUS Nodes PROFIBUS Bus Parameters PROFIBUS Statistics Options
	PROFIBUS Addr. Response on PROFIBUS 2 active
	3 active
	<u>Close</u> CP Change Cyc. Upd. <u>U</u> pdate Help

WinCC Explorer

Step	WinCC Explorer	
1	Diagnosis of the communication connection from the WinCC Explorer.	
	Switch the project <i>WinCC_S7_PB</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.	
	Activate	
	The created WinCC screen <i>com_S7PB_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.	

Step	WinCC Explorer		
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime. <u>Tools</u>		
	Language Status of <u>Driver Connections</u> Status of Multi-User Operation		
3	The dialog box Status - Logical Connections will be displayed.		
	This dialog box lists all configured connections. For this sample, only the connection <i>S7_PB_01</i> will be displayed.		
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.		
	Status - Logical Connections		
	Tag ID Name Status Tag read Read requ Tag written Write requ 2 S7_PB_01 OK 3755 O O O 1 Update Update Help Open		
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> . The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.		
	Name Parameters		
	S7_PB_01 L2,3 0,.0,3,02		

Step	WinCC Explorer		
	The current process value of a certain tag as well as its status can be did a tooltip by pointing the mouse on it. This allows you to detect errors c an individual tag and not the entire connection.		its status can be displayed as ou to detect errors concerning
	Name	Туре	Parameters
	S16x_S7PB01_01	Signed 16-bit value	DB75,DW0
	<u>k</u>		
	Process value: Quality: c0 Last Change:7.	34 /1/99 2:50:18 PM	

Channel Diagnosis

Step	Channel Diagnosis	
1	Diagnosis of the communication connection via the program <i>WinCC Channel Diagnosis</i> .	
	Start this program via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Channel Diagnosis.$	
	Channel Diagnosis	
	The <i>Channels/Connections</i> tab displays detailed information about the status of each configured connection. By default, the display is updated every second. The update cycle can be changed in the input field located at the bottom.	
	Channels/Connections Configuration	
	B ✓ SIMATIC S7 PROTOCOL SUITE Counters Value State ready Error Code none Error Count 0 Unit PROFIBUS Device CP_L2_1: PDU Size 480 Request Counter 6 Response Counter 28 Own Cycles 0 AS Cycles 1 Max. AS Cycles 32 ConnectionState ready ForceConnectionAddress projected ProjectedConnectionAddress L2.3 0,,0.3.02	
	Cyclic Update:	

Step	Channel Diagnosis	
3	If a connection error is detected, the <i>Error Code</i> line in the right window half will display a value specifying the error cause. Detailed information about this	
	error code is displayed by ${}^{\circ}\mathbb{D}R$ on the <i>Error Code</i> entry and then selecting <i>Help</i> from the pop-up menu.	
	Counters Value State disconnected Error Code 4110 Error Cour Help 0	
4	This opens the Online Help to WinCC containing a description of the corresponding error code. Additionally, possible error causes are also listed.	
	WinCC Online Help File Edit Bookmark Options Help	
	<u>Contents</u> Index <u>Find</u> <u>Back</u> <u>Print</u> <u>≤</u> < ≥>	
	Error 4110 - L4_LOC_TIMEOUT	
	Configured wrong network address.	
	PLC turned off.	
	PLC not connected to bus or bus system error.	
	Maximum number of permissible connections in the PLC exceeded.	

7 Communication to the SIMATIC S5 via Industrial Ethernet

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder *C:\Communication_Manual*. You have the option to copy the following components to the hard drive:



The STEP5 project we will create including the database file of the communication processor CP 1430 TF.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S5 and WinCC. The communication connection is realized via the Industrial Ethernet. The communication card CP 1413 used in the computer has its own CPU onboard. This will free the CPU of the computer from communication tasks.

Overview of the Structure of the Sample



On the computer side, the connection to the *Industrial Ethernet* network is established via the communication processor *CP 1413*. To install this communication processor in the computer, the driver *IE TF-1413*, located on the *SIMATIC NET* CD-ROM, is needed. In the WinCC project, the communication driver *SIMATIC S5 Ethernet Layer 4* must be installed. This communication driver is used to configure the connection to the *SIMATIC S5*.

The PLC SIMATIC S5 115U is equipped with the CPU module CPU 944. The connection to the network is established via the communication processor CP 1430 TF. For the configuration of this communication processor, the communication package SINEC NCM for COMs is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 1413
- Creation of the STEP5 Project S5_IEHst
- Creation of the WinCC Project WinCC_S5_IEH
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>IE TF-1413</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 1413</i> .
STEP5	STEP5 software for the creation of the STEP5 project. Communication package <i>SINEC NCM for COMs</i> for the configuration of the communication processor <i>CP 1430</i> <i>TF</i> .
WinCC	WinCC with communication driver <i>SIMATIC S5 Ethernet</i> <i>Layer 4</i> for the creation of the WinCC project and for the configuration of the connection to the PLC.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 1413</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack CR 700-3.
Power Supply	Power supply PS 951.
CPU Module	CPU module CPU 944.
Communication Processor	Communication processor CP 1430 TF.

7.1 Startup of the Communication Processor CP 1413

The following description details the configuration steps necessary to successfully start up the communication processor *CP 1413*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 1413*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Assigning the Communication Processor
- E: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer



B: Installing the Communication Driver

Step	B: Installing the Communication Driver	
1	Installation of the communication driver <i>IE TF-1413</i> from the <i>SIMATIC NET</i> CD-ROM.	
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.	
	The installation of the software is started via the button displayed below.	
	SIMATIC NET Software Installieren	
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>IE TF-1413</i> to be installed must be selected. Finish the installation.	
	SIMATIC NET Software: Components	
	Please select the programs to be installed.	
	SIMATIC NET Industrial Ethernet TF-1413/W/indows NT Description Description SIMATIC NET Industrial Ethernet TF-1413/W/indows NT Version 5.1. Description De	
	Required on c: 17 MByte Available on c: 513 MByte	
	< <u>B</u> ack <u>N</u> ext > Cancel	

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 1413</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	C: Installing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the Install button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	<none> Eroperties</none>
	KNone> TCP/IP -> DEC PCI Fast Ethernet
	Сору
	Delete
	_ Interfaces
	Install
	OK Cancel Help
3	The dialog box Install/Remove Modules will be displayed. The Selection field
	lists all interfaces that can be installed. Among them will be the entry <i>CP 1413</i> , if
	From the Selection field, select the entry CP 1413. The installation of the
	communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1413 TCP/IP -> DEC PCI Fast Ethernet Bo
	CP5411 [256k DP-HAM] [Install ->
	CP5412A2 CP5511 K Bemaye
	MPI-ISA Card
	MPI-ISA on Board
	<u>H</u> esources
	CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
	<u>Close</u>

Step	C: Installing the Communication Processor
4	The dialog box Resources - CP 1413 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the Jumper Settings at the <i>CP</i> 1413.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can be obtained from the <i>Resources</i> tab accessed via <i>Start</i> \rightarrow <i>Programs</i> \rightarrow <i>Administrative Tools (Common)</i> \rightarrow <i>Windows NT Diagnostics.</i>
	Close the <i>Resources</i> tab by clicking on <i>OK</i> .
	Memory range: 000D0000-000DFFFF
	Input / output range: 03E0-03E7
	Interrupt request:
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 1413</i> .
	Exit the dialog box Install/Remove Modules via the Close button.
	Install / Remove Interfaces
	Selection: Installed: CP1413 CP1413 (256k DP-RAM) CP5411 CP5411 CP5412A2 CP5511 CP5611 < Remove CP5611
	MPI-ISA Card MPI-ISA on board
	CP1413: Communications Processor (Industrial Ethernet) for Programming Devices/PCs
	<u>Close</u> Help

D: Assigning the Communication Processor

Step	D: Assigning the Communication Processor
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_H1_1</i> : to the just installed interface.
	The access point CP_H1_1: is the default access point used by WinCC for the communication via the <i>Industrial Ethernet</i> . It has been created automatically during the installation of the communication driver <i>IE TF-1413</i> .
	In the field Access Point of the Application, set the entry CP_H1_1:. In the field
	below, select the entry $CP1413$. This completes the assignment between the access point and the communication processor.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1: -> CP1413
	(for CP1413 SIMATIC NET)
	Interface parameter set used:
	CP1413 Properties
	<pre></pre> <pre> CP1413 Diagnostics</pre>
	TCP/IP -> DEC PCI Fast Ethernet
	Delete
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)
	Interfaces
	<u>I</u> nstall
	OK Cancel Help
2	Setting the properties of the communication processor <i>CP 1413</i> .
	The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.
	The dialog box <i>Properties - CP 1413</i> will be displayed.
	In the <i>Ethernet (MAC) Address</i> tab, enter the <i>Ethernet Address</i> of the <i>CP 1413</i> . In this sample, the address is 08 00 06 01 00 01, which must be specified during
	the configuration of the Transport Connections for the communication processor <i>CP 1430</i> .

Step	D: Assigning the Communication Processor
	The <i>Ethernet Address</i> is six Bytes long and structured as follows for SIEMENS devices:
	• 08.00.06: The first six digits of the hexadecimal value correspond to the number for SIEMENS.
	• 01: The next two digits specify the range for SIEMENS.
	• 0: The next digit signifies the SIMATIC system.
	• 0.01: The last three digits correspond to the significant station address of a SIEMENS device.
	Properties - CP1413
	Ethernet(MAC)-Address S7 Protocol Mode
	Database
	☐ <u>A</u> ctivate TF
	TF <u>D</u> atabase
	Search
	Busparameter of Industrial Ethernet
	Ethernet-Address: 08.00.06.01.00.01
	Please build six groups with two hexadecimal characters, separated by points. Example "01.23.45.67.89.AB". To activate the TF database, please click checkbox 'Activate TF'.
	OKCancel <u>S</u> tandard Help

Step	D: Assigning the Communication Processor
3	Exit the program <i>Setting the PG/PC Interface</i> via the <i>OK</i> button.
	A dialog box will be displayed requesting the restart of the CP 1413.
	Acknowledge this dialog box by clicking on <i>OK</i> , which will result in the restart
	of the communication processor CP 1413.
	This completes the installation of the communication processor.
	Changed SIMATIC NET settings
	You changed your SIMATIC NET settings. To activate the changes, a restart of the parameter settings is necessary. Restart now?

E: Testing the Communication Processor

Step	E: Testing the Communication Processor
1	Check the proper installation of the communication processor <i>CP 1413</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface

Step	E: Testing the Communication Processor
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface to be checked. In this case, select the entry <i>CP 1413</i> . Make sure that the assignments between access points and the interfaces are not changed.
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_H1_1:> CP1413
	(for CP1413 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP1413 <active> Properties</active>
	(None) CP1413 (Active)
	TCP/IP -> DEC PCI Fast Ethernet <u>C</u> opy
	Delete
	(Configuration of your Communications Processor CP 1413 for an Industrial Ethernet Network)
	Interfaces
	Install
	OK Cancel Help

Step	E: Testing the Communication Processor
3	The dialog box Simatic NET Diagnostics will be displayed.
	In the <i>IE Network Diagnostics</i> tab, the diagnosis is started via the <i>Test</i> button.
	The result of the diagnosis will be displayed immediately following.
	be exited with OK. In this case, the program Setting the PG/PC Interface can also
	be closed by clicking on <i>OK</i> . The configuration of the communication to the S5
	via the <i>Industrial Ethernet</i> is continued in the following section.
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described in the section Is the Communication Module in the Computer operational?.
	SIMATIC NET diagnostics
	S7 Trace SB Protocol SB Trace DP.BAM
	IE Network Diagnostics S7 Protocol
	Status
	Iest OK
	Firmurse version: V1.81_13.07.1998_NDLS. Instactive
	Ethemat address: 108.00.06.01.00.01
	No. Size Total Free Max. Request Reject
	1 32 240 240 0 0 •
	Name Status Reason
	Cancel Apply Help

7.2 Creation of the STEP5 Project S5_IEHst

The following description details the configuration steps necessary to create and start up the STEP5 project *S5_IEHst*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP5 project S5_IEHst:

- A: Installing the Hardware and Software
- B: Creating the STEP5 Program
- C: Configuring the Communication Processor
- D: Starting up the PLC

A: Installing the Hardware and Software

Step	A: Installing the Hardware and Software
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 951</i> , the CPU module <i>CPU 944</i> and the communication processor <i>CP 1430</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 1413</i> in the computer to the communication processor <i>CP 1430</i> in the PLC.
2	Installing the communication package SINEC NCM for COMs from the corresponding installation disk. This communication package is required for the configuration of the communication processor <i>CP 1430</i> .
	The installation disk contains the program file <i>install.exe</i> . Start this program. Follow the instructions of the installation program and complete the installation.
	Install.exe

B: Creating the STEP5 Program

Step	B: Creating the STEP5 Program
1	Creation of a new project with the STEP5 software.
	Start the STEP5 software. From the <i>Object</i> \rightarrow <i>Project</i> \rightarrow <i>Settings</i> \rightarrow <i>Page1</i> and <i>Page2</i> menus, define the settings for the new project. In the <i>Program File</i> field, specify the name of the new program file to be created. In this sample, the name <i>S5_IEHST.S5D</i> is used. Only the first six characters of the file name can be changed by the user.
2	Creation of a data block.
	In STEP5, this is accomplished via the <i>Editor</i> \rightarrow <i>Data Block</i> \rightarrow <i>menus of the program file</i> .
	As the name of the data block, this sample uses DB5.

Step	B: Creating the STEP5 Program
	In this data block, two tags with a length of 16 Bits are created. Their sum is to be determined in $OB1$ and then be written to another tag with a length of 16 Bits. One additional tag with a length of 16 Bits is created, whose value is cyclically incremented in $OB1$.
	The tags created in the data block <i>DB5</i> are visualized in the WinCC project. To do so, WinCC tags with corresponding addresses are created there.
	The following graphic displays the programmed data block <i>DB5</i> .
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
3	Creation of a program block for the communication. The communication to WinCC via the communication processor CP 1430 is carried out by calling the data handling blocks SEND and RECEIVE. For the SIMATIC S5 115U PLC used in this sample, these are the blocks FB244 and FB245. These blocks must be called once every program cycle. As the request number A-NR, 0 is assigned to these blocks to allow execution of the Send All and Receive All functions. In this sample, the data handling block calls are carried out in a program block, which is called in the <i>OB1</i> . In STEP5, the creation of a new program block is carried out via the <i>Editor</i> \rightarrow <i>STEP5 Block</i> \rightarrow <i>menus of the program file</i> . As the name of the program block, this sample uses <i>PB5</i> .
	PB 5 NETZWERK 1 von 1 SPA FB 244 NAME :SEND SEND ALL SSNR : NY 000,000 SEND ALL A-NR : NY 000,000 SEND ALL ANZW : MW 100 OTYP : KC NN DENR : NY 000,000 RECEIVE ALL APFE : MB 104 RECEIVE ALL NAME :RECEIVE SSNR : NY 000,000 A-NR : NY 000,000 RECEIVE ALL NAME :RECEIVE SONR : NY 000,000 A-NR : NY 000,000 RECEIVE ALL NAME :RECEIVE SONR : NY 000,000 A-NR : NY 000,000 RECEIVE ALL ZANF : NY 000,000 RECEIVE ALL STYP : NC NN DBNR : NY 000,000 ZANF : NF 000,000 SONG ANZW : MW 105 ZTYP : NC NN DBNR : NF 000,000 ZANF : NF 0 RECEIVE ALL BE SEND

Step	B: Creating the STEP5 Program
4	Creation of a function block, which makes available the functionality of the sample program. Two values stored in the <i>DB5</i> are added and the sum again stored in the <i>DB5</i> . Additionally, a value stored in the <i>DB5</i> is incremented every program cycle. If this value reaches 10000, it is reset back to 0.
	In STEP5, the creation of a new function block is carried out via the <i>Editor</i> \rightarrow <i>STEP5 Block</i> \rightarrow <i>menus of the program file</i> . As the name of the program block, this sample uses <i>FB6</i> .
	FB 6 NETZWERK 1 von 1 Add and Increment NAME :ADD_INC :A DB 5 :L DW 0 -T DW 1
	- L DW 1 ++F :T DW 2 :L DW 3 :L KF +10000 : <f :SPB =M001</f
	:L KF +0 Set 0 if 10000 is reached :T DW 3 :BEA M001 :L DW 3 :L KF +1 :+F :T DW 3 :BE
5	Creation of the <i>OB1</i> . In the <i>OB1</i> the previously created blocks <i>PB5</i> and <i>FB6</i> are called
	OB 1 NETZWERK 1 von 1 Communication Manual SPA PB 5 SPA FB 6 NAME :ADDCNT BE
6	Creation of the startup blocks. During the startup of the PLC, the communication processor <i>CP 1430</i> must be synchronized. This is done by the data handling block <i>SYNCHRON</i> . For the <i>SIMATIC S5 115U</i> PLC used in this sample, this is the block <i>FB249</i> .
	OB 21 Synchronize CP 1430 TF SPA FB 249 Same Sa
7	Loading the STEP5 program into the PLC. In STEP5, this is done via the <i>Object</i> \rightarrow <i>Blocks</i> \rightarrow <i>Transfer</i> \rightarrow <i>PLC</i> <i>File</i> menus. In the Selection field, the option <i>All Blocks</i> must be selected to load all previously created blocks to the PLC.

Step	C: Configuring the Communication Processor
1	Start the communication package <i>SINEC NCM for COMs</i> to configure the communication processor <i>CP 1430</i> .
	From STEP5, start the communication package via the <i>Change</i> \rightarrow <i>Additional</i> \rightarrow <i>SINEC NCM for COMs</i> menus.
2	This will open the communication package SINEC NCM for COMs.
	If no database file is set, the <i>Basic Settings</i> entry mask will initially be displayed.
	This entry mask can also be opened via the <i>File</i> \rightarrow <i>Select</i> (or <i>Init.</i> \rightarrow <i>Edit</i>) menus.
	In the <i>CP Type</i> field, indicate the type of communication processor used. Via the F8 function key, one of the available communication processors can be set. Select the <i>CP 1430</i> . Set the <i>Status</i> field to <i>OFFLINE FD</i> via the F8 function key. This stores the configuration made in the program to a database file. In the <i>Database File</i> field, specify the name of this database file. This name has to start with the letter <i>A</i> . For this sample, the name <i>AS5_IEH.DAT</i> is used for the database file. The settings made in the <i>Basic Settings</i> entry mask are applied via the F7 function key.
	SINEC NCM (ENDE)
	Grunde instellungen
	Art des CP : CP1430 Status : OFFLINE FD
	Datenbasisdatei : H : ASS_IEH.DAT
	Dokumentation : Schriftfuss AUS Druckerausgabe AUS
	Druckerdatei : H : NONAMEDR.INI Schriftfussdatei : H : NONAMEPI.INI
	L 2 3 4 5 C 2 UEBERN. C AUSWAHL

C: Configuring the Communication Processor

Step	C: Configuring the Communication Processor
3	The settings for the basic initialization of the communication processor must be made.
	They are entered in the <i>Basic Initialization</i> entry mask. This entry mask is opened via the <i>Edit</i> \rightarrow <i>CP Init</i> . menus.
	In the <i>MAC Address (HEX)</i> field, the <i>Ethernet address</i> of the communication processor <i>CP 1430</i> is specified. In this sample, the address <i>080006010000</i> has been entered. This address is one of the parameters that have to be set during the creation of the connection in WinCC.
	The remaining settings can be seen in the following graphic. The settings made in the <i>Basic Initialization</i> entry mask are applied via the F7 function key.
	COM 1430 TF (ENDE) CP Grundinitialisierung Quelle: H:AS5_IEH.DAT (OFFLINE)
	MAC Adresse (HEX) : 080006010000 SIMATIC Spezifika :
	Basis-SSNR : 0 Schnittstellen- kommunikation (P//R) : P SSNR-Offset : 0 1 2 3
	Informative Parameter :
	Speicherart : Datenbasisgroesse : <mark>64</mark> KB Baugruppenkennung : CP1430TF
	Firmware-Version : <u>Erstellungsdatum</u> : 19.01.99 Anlagenbezeichnung : <mark>COMMUNICATIONMANUAL</mark>
	L 2 3 4 5 6 9 UEBERN. 8 AUSWAHL
4	Creation of the transport connections.
	This is done in the <i>Transport Connection</i> entry mask. This entry mask is opened via the <i>Edit</i> \rightarrow <i>Connections</i> \rightarrow <i>Transport Connections</i> menus.
	Two connections are needed: One processes the write requests of WinCC, the other one the read requests of WinCC. The PLC is set to passive for both connections by entering <i>P</i> in the <i>Active/Passive</i> field.
	For the connection used to process the read requests from WinCC, this sample keeps 1 as the value of the request number ANR. In the Request Type field, FETCH is specified. In the Transport Addresses area, TSAP with PLC_FETCH is set for the Local Parameter in ASCII-Code, and TSAP with CC_FETCH for the Remote Parameter. The remote parameter also requires the specification of the Ethernet address in the MAC Address field that has been entered for the communication processor CP 1413 in the computer. In this sample, the address 080006010001 has been set during the installation of the communication processor CP 1413. By hitting the F3 function key, the parameters for the next transport connection can be entered. This transport connection will process the write requests of WinCC. In this sample, the value 2 for the request number ANR is kept. In the Request Type field, RECEIVE is specified. In the Transport Addresses area, TSAP with PLC_RECVE is set for the Local Parameter in ASCII-Code, and TGAP with PLC_NECVE is set for the Local Parameter in ASCII-Code, and
	also enter the Ethernet address of the communication processor <i>CP 1413</i> from the computer.
Step	C: Configuring the Communication Processor
------	--
	 The connection parameters just defined must also be set during the creation of the connection in the WinCC project. For the TSAP values set, note that there is a difference between an entered blank space and no entered character. Always check the hexadecimal code. The settings made in the <i>Transport Connection</i> entry mask are applied via the F7 function key.
	COM 1430 TF (ENDE) Transportverbindung Quelle: H:AS5_IEH.DAT (OFFLINE)
	SSNR-Offset : Ø ANR : 1 Auftragsart : PETCH Aktiv/Passiv (A/P) : P
	Prioritaet : 2 Read/Write (J/N) : J Anzahl der Auftraege pro TSAP : 1 von 1
	Iransportadressen : ferne Parameter : Iokale Parameter : MAC-Adresse (HEX) : 080006010001 TSAP (ASC) : AG_FETCH TSAP (ASC) : CC_FETCH TSAP (HEX) : 41 47 5F 46 45 54 43 48 TSAP (HEX) : 43 43 5F 46 45 54 43 48 TSAP-Laenge: 8 TSAP-Laenge: 8
5	+ 1 - 1 EINGABE LOESCHEN C 7 UEBERN. AUSWAHL Loading the configuration data of the database file to the communication processor <i>CP 1430</i> . - 1 - - - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 1 - 1 - 1 - 1 1 1 - 1 - 1 - 1 - 1 - 1
	This is done via the <i>Transfer</i> \rightarrow <i>FD->CP</i> menus. The configuration data can only be uploaded while the communication processor is in the <i>STOP</i> operating mode.
	FD->CP CP->FD FD->Memory Card Memory Card->FD Memory Card Loeschen CP 143 Datenkonverter>

D: Starting up the PLC

Step	D: Starting up the PLC
1	Starting the individual modules of the PLC.
	Previously, the STEP5 program and the database file of the communication processor <i>CP 1430</i> must have been loaded to the PLC.
	First, the operating mode switch of the communication processor <i>CP 1430</i> is set to the RUN position. The status LEDs <i>RUN</i> and <i>STOP</i> will light up at the communication processor, indicating that the module has not be synchronized.
	Next, the operating mode switch of the CPU module is set to the <i>RN</i> position. During the startup of the CPU module, the communication processor is synchronized by the startup block. The communication processor's status LED <i>STOP</i> go out. At the CPU module, only the status LED <i>RN</i> will be illuminated.

7.3 Creation of the WinCC Project WinCC_S5_IEH

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S5_IEH*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S5_IEH*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project		
1	Creation of a new WinCC project in the WinCC Explorer.		
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$		
	WinCCExplorer		
2	This will display the WinCC Explorer.		
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.		
	For this sample project, a Single-User Project is created.		
	Exit the dialog box by clicking on <i>OK</i> .		
	WinCC Explorer		
	Create a New Project		
	Single-User Project		
	S Multi-User Project		
	C Multi-Client Project		
	C Open an Existing Project		
	Cancel		

Step	A: Creating the WinCC Project			
3	 Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S5_IEH</i>. In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button. 			
	Create a new project ? × Project Name: Project Path WinCC_S5_IEH Create WinCC_S5_IEH Cancel WinCC_S5_IEH Help You can use this dialog box to create a new WinCC project. Drive: Drive: C:			

B: Creating the Connection

Step	B: Creating the Connection	
1	The new project will be displayed in the WinCC Explorer.	
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.	
	⊡ <mark>IIII</mark> Tag Management ⊕∰ Internal tags Add <u>N</u> ew Driver	
	<u>F</u> ind	
	Properties	

Step	B: Creating the Connection		
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S5</i> via <i>Industrial Ethernet</i> , the driver <i>SIMATIC S5 Ethernet Layer 4</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .		
	Add new driver. ? × Look jn: Bin Image: Contract of the second seco		
3	The newly added driver SIMATIC S5 Ethernet Layer 4 will be displayed as a sub- entry to Tag Management. The driver contains two channel units. The second channel unit is needed if two CP 1413 communication processors are operated in the computer. A new connection for the S5-Transport (CP1413-1) channel unit is created by R on S5-Transport (CP1413-1) and then selecting New Driver Connection from the pop-up menu. SIMATIC S5 ETHERNET LAYER 4 S5-Transport (CP1413- S5-Transport (CP1413- S5-Transport (CP1413- System Parameter Find Paste Properties		

Step	B: Creating the Connection	
4	The properties dialog box of the connection will be displayed.	
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S5_IEH_01</i> .	
	Click on the <i>Properties</i> button to define the connection properties.	
	Connection properties	
	General	
	Name: S5_IEH_01	
	Unit: S5-Transport (CP1413-1)	
	Server List	
	OK Cancel Help	

Step	B: Creating the Connection
5	The dialog box Connection Properties will be displayed.
	In the <i>Transport Connection</i> tab, the parameters of the desired communication connection are defined.
	In the <i>PLC Ethernet Address</i> field, the Ethernet address specified for the PLC is entered. In this sample, the address <i>080006010000</i> has been defined during the configuration of the communication processor <i>CP 1430</i> .
	In the <i>READ Function</i> area, the connection settings for reading data from the PLC are made. In order for WinCC to request the data actively, the radio-button <i>Fetch Actively, Request Type of the Partner is READ-PASSIVE</i> must be selected. For the local and remote TSAPs, the values defined during the creation of the transport connections for the communication processor <i>CP 1430</i> are entered. In this sample, the value <i>CC_FETCH</i> is entered in the <i>Local TSAP</i> field and the value <i>PLC_FETCH</i> in the <i>Remote TSAP</i> field.
	In the <i>WRITE Function</i> area, the connection settings for writing data to the PLC are made. In this sample, the value <i>CC_RECVE</i> is entered in the <i>Local TSAP</i> field and the value <i>PLC_RECVE</i> in the <i>Remote TSAP</i> field.
	The parameters that have just been set were defined during the configuration of the transport connections for the communication processor <i>CP 1430</i> .
	Close the dialog box by clicking on <i>OK</i> . Also close the <i>Connection Properties</i> dialog box by clicking on <i>OK</i> .
	Connection parameters
	Transport Connection
	Ethernet Address Controller 080006010000
	READ Function
	● Fetch Active, Request Type of remote PLC is READ-PASSIVE
	Fetch Passive, Request type of remote PLC is WRITE-ACTIVE
	Own TSAP-ID CC_FETCH Hex 43.43.5F.46.45.54.43.48
	Ext. TSAP-ID AG_FETCH Hex 41.47.5F.46.45.54.43.48
	WRITE Function, Request type of remote PLC is WRITE-PASSIVE
	0wn TSAP-ID CC_RECVE Hex 43.43.5F.52.45.43.56.45
	Ext. TSAP-ID AG_RECVE Hex 41.47.5F.52.45.43.56.45
	OK Cancel Help

Step	B: Creating the Connection		
6	Setting the system parameters of the channel unit.		
	These settings are made in the System Parameters dialog box, which is acces		
	via a ${}^{\prime}\mathbb{O}\mathbb{R}$ on the S5-Transport (CP1413-1) entry and then selecting System Parameters from the pop-up menu.		
	In the displayed dialog box, the name of the access point, which is used by WinCC to access the PLC, can be changed. By default, the access point CP_H1_1 : is set. Previously, during the installation of the communication processor in the computer, the <i>CP</i> 1413 has been assigned to the access point CP_H1_1 :		
	System parameters		
	Device Names Transport Parameters		
	Change Names		
	SINEC-H1 devices /CP_H1_1:/SCP		
	You can change the device name that is shown in bold.		
	OK Cancel Help		

Step	B: Creating the Connection	
7	In the <i>Transport Parameters</i> tab, various settings affecting the communication can be edited. In this sample, all existing settings are kept.	
	Close the dialog box by clicking on OK.	
	System parameters	
	Device Names Transport Parameters	
	PDU Size 512 -	
	Setup Attempts Duration of Send Repetitions	
	Infinite Infinite	
	O <u>Q</u> uantity O <u>⊺</u> ime	
	Job Management Acknowledgement Time 30	
	Cancel Help	

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags		
1	Creation of the WinCC This is done via a \mathcal{O} R selecting <i>New Tag</i> from	tags required for the newly creat the pop-up menu.	e sample. ed connection <i>S5_IEH_01</i> and then
	S5-Transport (CP1413-1) New <u>G</u> roup <u>N</u> ew Tag	
		Eind Cuț Copy Paste	
		<u>D</u> elete Pr <u>o</u> perties	

Step	C: Creating the WinCC Tags	
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16x_S51EH01_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type. Click on the <i>Select</i> button to set the <i>Address</i> of the new tag.	
	Tag properties	
	General Limits/Reporting	
	Properties of Tags	
	Name: S16x_S5IEH01_01 Datatype : Signed 16-bit value	
	Length: 2	
	Address:	
	Adapt format: ShortToSignedWord ▼	
	C Project-wide update C Computer-local update	
	🗖 Linear scaling	
	Process Value Range Tag Value Range	
	From	
	То	
	OK Cancel Help	

Step	C: Creating the WinCC Tags
3	The dialog box Address Properties will be displayed.
	Set <i>DB</i> as the <i>Data Range</i> and the value 5 as the <i>DB No</i> Set <i>Word</i> in the Address field and the value 0 in the <i>DW</i> field. Close the dialog box by clicking
	on OK . The properties dialog box of the tag is also closed by clicking on OK .
	The just created WinCC tag is addressed in the range of the DB5, where the first
	of the two values to be added is located. The Address Properties and Tag Properties dialog boxes can be closed by
	clicking on the <i>OK</i> button.
	Address properties
	Address
	Description
	Data DB ▼ DB No. 5
	Address Word
	DW 0 Length 1
	OK Cancel Help
4	Creation of the remaining WinCC tags required.
	Follow steps 1 to 3 for the creation of the remaining tags. The names, data types
	and addresses of the tags used in this sample are listed in the following graphic.
	Name Type Parameters
	STEX_SSEH01_01 Signed 16-bit value DB5,DW0 Stex_SSEH01_02 Signed 16-bit value DB5,DW1
	S16x_S5IEH01_03 Signed 16-bit value DB5,DW2
	S16x_S5IEH01_04 Signed 16-bit value DB5,DW3

D: Creating the WinCC Screen

Step	D: Creating the WinCC Screen	
1	Creation of a WinCC screen in which the previously created tags are visualized.	
	Open the <i>Graphics Designer</i> editor via a ${}^{\frown}\mathbb{C}R$ and then selecting <i>Open</i> from the pop-up menu.	
	····∱r Graphics Designer Open New picture Graphic OLL Select ActiveX Control	
	Convert global library Convert project library	
	<u>E</u> ind	
	Properties	
2	This will open the <i>Graphics Designer</i> editor with a new (blank) screen. To display the first tag, configure a <i>Smart Object</i> → <i>L/O Field</i> . To do so, select the <i>L/O Field</i> object from the <i>Object Palette</i> and place it on the screen using the mouse. Objects Object Palette Standard Objects Standard Objects Standard Objects Standard Objects Smart Object Application Window Picture Window Control OLE Element Status Display Text List 3D-Bar Group Display Windows Objects	

Step	D: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed
	In the <i>Tag</i> field, set the tag $S16x_S7IEH01_01$ via the button displayed below.
	Leave the <i>Update</i> of the tag at 2 s. Keep the default settings for the remaining options. Close the dialog box by clicking on <i>OK</i> .
	1/O-Field Configuration
	Tag: \$16x_\$51EH01_01 Update: 2 s Type Output Input Both Format Font Size 12 Font Name Arial Color OK Cancel
4	Changing the output format of the <i>I/O Field</i> .
-	For this, open its properties dialog box via a BR on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	Щ <u>а</u> <u>C</u> opy Ctrl+C Duplicate
	Paste Ctrl+V
	Delete Del
	Customized object
	Linking
	Configuration Dialog

Step	D: Creating the WinCC Screen	
5	The dialog box Object Properties will be displayed.	
	On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a Do on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.	
	Here Constant in the second se	
	Properties Events	
	Image: Static	
6	Creation of three additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields	
7	Save the screen	
7	In the sample project, the screen is saved under the name <i>com_3_S5IEH_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.	



7.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S5_IEH* and the SIMATIC S5 station. A diagnosis of the sample according to this description makes only sense, if the checks listed below have been completed successfully. Startup of the Communication Processor CP 1413

- E: Testing the Communication Processor
- Creation of the STEP5 Project S5_IEHst
- D: Starting up the PLC

WinCC Explorer

Step	WinCC Explorer	
1	Diagnosis of the communication connection from the WinCC Explorer.	
	Switch the project <i>WinCC_S5_IEH</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.	
	The created WinCC screen <i>com_3_S5IEH_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.	
2	In the WinCC Explorer, a dialog box for monitoring all configured connections	
	can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.	
	Language	
	Status of <u>D</u> river Connections	
	Status of Multi-User Operation	

Step	WinCC Explorer
3	The dialog box <i>Status - Logical Connections</i> will be displayed. This dialog box lists all configured connections. For this sample, only the connection <i>S5_IEH_01</i> will be displayed. The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 7 S5_IEH_01 OK 8324 4 2 0
	Cyclic update (4 🔆 x 250 ms) Update Help
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> . The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.
	Name Parameters
	\$\$ \$5_IEH_01 080006010000,CC_FETCH,AG_FETCH, Status: OK
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type Parameters S16x_S5IEH01_01 Signed 16-bit value DB5,DW0
	Process value: 2 Quality: c0 Last Change:7/5/99 9:47:23 AM

Channel Diagnosis

Step	Channel Diagnosis		
1	Diagnosis of the communication connection via the program <i>WinCC Channel Diagnosis</i> .		am WinCC Channel
	Start this program via $Start \rightarrow Sim Diagnosis$.	$atic \rightarrow WinCC$	-> Channel
	Channel Diagnosis		
2	The program WinCC Channel Diagno	sis will be displayed	1.
	The <i>Channels/Connections</i> tab display each configured connection. By defau update cycle can be changed in the inp	ys detailed informati lt, the display is upd put field located at th	on about the status of ated every second. The ne bottom.
	📩 WinCC Channel Diagnosis		
	Channels/Connections Configuration		
	B✓ SIMATIC S5 ETHERNET LAYER 4 L-✓ S5_IEH_01 Em Em Em Em Em Em Em Em Em Em Em Em Em E	ounters ate or Code (Read) or Code (Write) or Request (Read) or Request (Write) or Count it renReference (Read) nenState (Read) nnState (Write) ad Type	Value ready none none none 0 S5-Transport (CP1413-1) 0004 0005 Up Up Up FetchActive
	Cyclic Update:		

8 Communication to the SIMATIC S5 via PROFIBUS FMS

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder C:\Communication_Manual. You have the option to copy the following components to the hard drive:



The database file of the communication processor CP 5412 A2 and the files generated during its creation.



The STEP5 project we will create including the database file of the communication processor CP 5431 FMS/DP.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S5 station and a WinCC station. The communication connection is implemented via the PROFIBUS, on which the FMS Protocol (Fieldbus Message Specification) is running.

Overview of the Structure of the Sample



On the computer side, the connection to the *PROFIBUS* network is established via the communication processor *CP 5412 A2*. To install this communication processor in the computer, the driver *PB FMS-5412*, located on the *SIMATIC NET* CD-ROM, is needed. In the WinCC project, the communication driver *PROFIBUS FMS* must be installed. This communication driver is used to configure the connection to the *SIMATIC S5*. The PLC *SIMATIC S5 115U* is equipped with the CPU module *CPU 944*. The connection to the network is established via the communication processor *CP 5431 FMS/DP*. For the configuration of this communication processor, the communication package *SINEC NCM for COMs* is required.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 5412 A2
- Creation of the STEP5 Project S5_FMSst
- Creation of the WinCC Project WinCC_S5_FMS
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>PB FMS-5412</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 5412 A2</i> .
STEP5	STEP5 software for the creation of the STEP5 project. Communication package <i>SINEC NCM for COMs</i> for the configuration of the communication processor <i>CP 5431</i> <i>FMS/DP</i> .
WinCC	WinCC with communication driver <i>PROFIBUS FMS</i> for the creation of the WinCC project and for the configuration of the connection to the PLC.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 5412 A2</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack CR 700-3.
Power Supply	Power supply PS 951.
CPU Module	CPU module CPU 944.
Communication Processor	Communication processor CP 5431 FMS/DP.

8.1 Startup of the Communication Processor CP 5412 A2

The following description details the configuration steps necessary to successfully start up the communication processor *CP 5412 A2*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 5412 A2*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Creating the Database File
- E: Assigning the Communication Processor
- F: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer



B: Installing the Communication Driver

Step	B: Installing the Communication Driver
1	Installation of the communication driver <i>PB FMS-5412</i> from the <i>SIMATIC NET</i> CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.
	SIMATIC NET Software Installieren
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>PB FMS-5412</i> to be installed must be selected. Finish the installation.
	SIMATIC NET Software: Components
	Please select the programs to be installed.
	SIMATIC □ PB DP-5412 V5.1 27 MB Software □ PB FMS-5412 V5.1 17 MB □ PB FMS-5412 V5.1 27 MB □ PB FMS-5412 V5.1 27 MB □ PB SOFTNET-DP V5.1 21 MB □ PB SOFTNET-S7 V5.1 14 MB □ PB SOFTNET DP Slave V1.01 10 MB
	SIMATIC NET PROFIBUS FMS-5412/Windows NT Version 5.1.
	Destination directory: c:\siemens\simatic.net <u>Browse</u>
	Required on C: 29 MByte Available on C: 502 MByte
	< <u>B</u> ack <u>N</u> ext > Cancel

C: Creating the Database File

Step	C: Creating the Database File
1	Creation of the database file for the communication via the FMS protocol PROFIBUS. This is done with the COM PROFIBUS program. This program has already been installed with the communication driver PB FMS-5412.
	Start the program via $Start \rightarrow Simatic \rightarrow SIMATIC NET \rightarrow COM PROFIBUS.$
2	The program COM PROFIBUS will be opened.
	A new file is created by clicking on the button displayed below.
3	The dialog box <i>New Master System</i> will be displayed. In this dialog box, the parameters of the WinCC station must be specified.
	In the Master Station Type field, select the entry CP 5412 (A2).
	The Bus Address <i>of the WinCC station is set</i> to 8. For the following installation of the communication processor <i>CP 5412 A2</i> in the computer, the address specified here must be used as the local station address.
	Close the New Master System dialog box by clicking on OK.
	New Master System
	Address Master/Host Selection 1
	13 14 ■ 6GK1541-2BA00 SIMATIC NET DP/FMS Master (PC/PG)
4	The Operating Mode of the Master dialog box will be displayed.
	In this dialog box, the check-box FMS Configuration is selected. Close the
	Operating Mode of the Master dialog box by clicking on OK.
	Configuration Mode
	The selected PROFIBUS Master supports DP and
	Please Select:
	DP Configuration
	EMS Configuration

Step	C: Creating the Database File
5	The FMS Master System dialog box will be displayed.
	It displays the current settings. At the moment, only the communication $PROFIRE CR 5412 A2$ is listed as a matter. This matter has a $PROFIRE S$
	Address of 8.
	E FMS Master System PROFIBUS Address 8
	Bus Description : PROFIBUS Station
	Host Description : CP 5412 (A2) Host system <1>
	Station Type: CP 5412 (A2)
	PROFIBUS Address: 8 PC
	ET 200
	SWITCHG
	Others
	Undefined
6	
0	Specifying the communication partner.
	If the mouse pointer is then moved over the <i>FMS Master System</i> window its
	appearance will change. The new station is inserted via a mouse click on this
	window.
	Station 🔀
	SIMATIC
	PC
	ET 200
	SWITCHG
	Others
	Undefined
7	The PROFIBUS Address dialog box will be displayed.
	In this sample, 9 is set as the PROFIBUS address for the new station.
	This PROFIBUS address must be set in the PLC during the configuration of the
	communication processor. Close the dialog box by clicking on <i>OK</i> .
	PROFIBUS Address

Step	C: Creating the Database File
8	The FMS Station Properties dialog box will be displayed.
	In this dialog box, the type of the communication partner is specified. In this
	sample, this is CP 5431 FMS. Close the dialog box by clicking on OK.
	FMS Station Properties
	Eamily: Station Type: Order Number:
	PC S7-400 CP443-5 FMS 66K7 443-5FX00-0XE0
	SWITCHG OTHER
	Configure
	Parameters
	<u>Connections</u>
	PROFIBUS Addr.: 9 <u>H</u> elp
9	In the FMS Master System dialog box, the newly inserted station will be
	displayed.
	For this station, a connection must be created which is used for the
	communication to the WinCC station. This is done by D on the icon of the
	newly inserted station.
	Station Type : CD 5/31 EMS
	PROFIBUS Address : 9
	Station Description :
10	The Edit FMS Connections dialog box will be displayed.
	A new connection is created by clicking on the New button.
	In the <i>CR</i> field, a unique communication reference is assigned to the new FMS
	connection, and a unique connection name is assigned in the <i>Name</i> field. In this
	sample, the value 3 is kept for the CR and the Name S5_CP5431_FMS is entered.
	to this FMS connection.

Step	C: Creating the Database File
	As the <i>Connection Profile</i> , the predefined <i>SIMATICNET_StandardA</i> profile is set
	Clicking on the <i>Parameters</i> button displays additional setting options for the new connection.
	Edit FMS Connections
	Connections (CP 5431 FMS)
	<u>CR:</u> Name:
	Select Interface Parameters
	CR: 3 VFD Number: 1
	Name: S5 CP 5431 FMS
	Connection Profile: SIMATICNET Standarda
11	The FMS Connection - Communication Parameters dialog box will be displayed.
	The local and remote $LSAP$ settings must be made. In this context, the local
	<i>LSAP</i> is the <i>LSAP (Local Service Access Point)</i> of the communication processor <i>CP 5412 A2</i> in the WinCC station and the remote LSAP is the one of the
	communication processor <i>CP 5431</i> in the SIMATIC S5 station. These LSAP values must also be used for the connection configuration of the communication
	processor <i>CP 5431</i> .
	In this sample, the value 4 is set in the <i>Local</i> field and the value 3 in the <i>Remote</i> field.
	The required services are specified via the <i>Client Services</i> button.
	FMS Connection - Communication Parameters
	Connection Type: MMAC
	Master Connection PROFIBUS Address: 8 9 Cancel
	C Master- <u>S</u> lave Connection for Cyclic Data Transfer LSAP: 4 3 Client Services
	Image: Second construction 0 0 0 0 Image: Second construction 0 0 0 0
	O Multicast Communication 4 4 Details 5 5
	Connection Attribute: D V 67 V 67 V Help

Step	C: Creating the Database File
12	The FMS Connection - Services (Client) will be displayed.
	In this dialog box, all available services (<i>Read</i> , <i>Write</i> and <i>InformationReport</i>) are selected.
	Close the dialog box by clicking on <i>OK</i> . The <i>FMS Connection - Communication</i> <i>Parameters</i> and the <i>Edit FMS Connections</i> dialog boxes are also closed with <i>OK</i> .
	FMS Connection - Services (Client)
	General Object Description
	□ <u>N</u> amedAddress □ <u>G</u> etOD (Long) □ <u>U</u> nsolicitedStatus □ Cancel
	<u>H</u> elp
	Variables X <u>M</u> ead Image: ReadWithType Image: WriteWithType Image: ReadWithType Image: WriteWithType
	Physhead PhysWrite InformationReport Delete-/DefineVariableList
	Other
13	Setting the Bus Parameters for the PROFIBUS network.
	<i>Parameters</i> menus. The <i>Bus Parameters</i> dialog box will be displayed. The following settings must also be used for the network parameters during the installation of the communication processor <i>CP 5412 A2</i> and for the network parameters during the configuration of the communication processor <i>CP 5431</i> in the PLC.
	As the <i>Bus Profile</i> , <i>Universal</i> is set. As the <i>Baud Rate</i> , this sample uses 187.5 <i>kBaud</i> .
	By clicking on the <i>Setting Parameters</i> button, an additional dialog box will be opened.
	Bus Parameters
	Bus <u>D</u> escription: PROFIBUS
	Bus Mode
	Bus <u>P</u> rofile: Universell <u>B</u> aud Rate: 187.5 kBaud
	Repeaters/OLMs
	OK Cancel <u>H</u> elp <u>Set Parameters</u>

Step	C: Creating the Database File
14	The <i>Bus Parameter Settings</i> dialog box will be opened. In this sample, the highest station address in the PROFIBUS network is set to <i>31</i> . This value is entered in the <i>HSA</i> field.
	Close this and the <i>Bus Parameters</i> dialog boxes by clicking on <i>OK</i> .
	Bus Parameter Settings
	Bus Profile: Universell Bus Profile: Universe
	Number of Repeaters: 0 Line Length CU: 0.000 [km] Cancel Number of OLMs: 0 Line Length FO: 0.000 [km]
	Input Parameters
	T_qui: 0 [t_bit] Tsdr_min: 80 [t_bit] T_set: 80 [t_bit] Tsdr_max: 360 [t_bit]
	T_slot_init: 400 [t_bit] Gap Factor: 20 Pater Limit: 1 HEA: 21
	Delta Ttr: 0 [t_bit] Correction Factor: 1.25
	Calculated Parameters and Data Cycle Times
	T_td: 0 [t_bit] Ttr: 7194 [t_bit]
	I_rdy: 80 [t_bit] T_id1: 195 [t_bit] Typical Data Cycle Time: 0,0383 [s]
	T_id2: 360 [t_bit] Maximum Data Cycle Time: 0,0383 [s] T_slot_eff: 400 [t_bit] Minimum Besponse Monitoring: 0.1438 [s]
15	Save the configuration.
	This is done via the toolbar button displayed below or the File \rightarrow Save As many In this sample, the file is saved under the name S5EMS ET2
16	Using the file just created, a database file for the communication via the <i>CP</i> 5412 $A2$ is generated.
	This is done via the $File \rightarrow Export \rightarrow NCM$ File menus. In this sample, the file has been saved under the name S5FMS.ldb.
	S5FMS.Idb

Step	D: Installing the Communication Processor
1	Install the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the <i>Install</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	<none> Properties</none>
	<none> TCP/IP -> DEC PCI Fast Ethernet</none>
	<u>С</u> ару
	Delete
	Interfaces
	OK Cancel Help

D: Installing the Communication Processor

Step	D: Installing the Communication Processor
3	The dialog box <i>Install/Remove Modules</i> will be displayed. The <i>Selection</i> field lists all interfaces that can be installed. Among them will be the entry for the <i>CP</i> 5412 A2, if the communication driver has been installed previously as outlined in step B.
	From the <i>Selection</i> field, select the entry <i>CP 5412 A2</i> . The installation of the communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installed: CP1411(AMD PCNET-Fa TCP/IP -> DEC PCI Fast Ethernet Bo. CP1413 CP1413 (256k DP-RAM) Install -> CP1511(Accton EN2216 CP5411 CP5411 << Remove Install -> CP1511(Accton EN2216 CP5411
	CP9412A2 CP5511 ▲ ▲ Besources
	CP5412A2: Communications Processor (MPI/PROFIBUS) for Programming Devices/PCs
	<u>C</u> lose Help
4	The dialog box <i>Resources</i> - <i>CP</i> 5412 A2 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the Jumper Settings at the <i>CP</i> 5412 A2.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can
	be obtained from the Resources tab accessed via $Start \rightarrow Programs \rightarrow$
	Close the Resources tab by clicking on OK.
	Resources - CP5412A2 <board 1=""></board>
	Memory range: 000C8000-000CBFFF
	Input / output range: 0240-0243
	Interrupt <u>r</u> equest:
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help

Step	D: Installing the Communication Processor
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 5412 A2</i> .
	Exit the dialog box Install/Remove Modules via the Close button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1411(AMD PCNET-Fa CP1413 CP1413 CP1413 (256k DP-RAM) CP1511(Accton EN2216 Instell -> CP5411 CP5412A2 CP5511 < Remove P5511 < E E
	CP5412A2: Communications Processor (MPI/PROFIBUS) for Programming Devices/PCs

E: Assigning the Communication Processor

Step	E: Assigning the Communication Processor
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_L2_1</i> : to the just installed interface.
	The access point CP_L2_1: is the default access point used by WinCC for the communication via the <i>PROFIBUS</i> . It has been created automatically during the installation of the communication driver <i>PB FMS-5412</i> .
	In the field <i>Access Point of the Application</i> , set the entry <i>CP_L2_1</i> :. In the field below, select the entry <i>CP 5412 A2 (PROFIBUS)</i> . This completes the assignment between the access point and the communication processor.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PROFIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PR0FIBUS)
	<none> Diagnostics Diagnostics</none>
	CP5412A2(PR0FIBUS) TCP/IP -> DEC PCI Fast Ethernet
	▼ <u>D</u> elete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	Install

Step	E: Assigning the Communication Processor
2	Setting the properties of the communication processor <i>CP 5412 A2</i> . The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.
	The dialog box Properties - CP 5412 (PROFIBUS) will be displayed.
	In the PROFIBUS tab, station and network related parameters are set.
	As the <i>Local Station Address</i> of the communication processor <i>CP 5412 A2</i> , this sample uses 8. This address has already been defined during the creation of the database file with the assignment of the bus address for the communication processor.
	For the <i>PROFIBUS Network</i> , a <i>Baud Rate</i> of <i>187.5 kBit/s</i> is selected. The <i>Highest Station Address</i> is set to the value of <i>31</i> . As the <i>Profile</i> , <i>Universal</i> (<i>DP/FMS</i>) is selected. The settings just made for the network parameters must agree with the settings for the bus parameters of the previously generated database file.
	Properties - CP5412A2(PR0FIBUS)
	PROFIBUS S7 Protocol FMS/DP-Protocol Mode
	Station Parameters
	Address: 8
	✓ PG/PC is the only master on bus
	PCS7 time synchronization
	Network Parameters
	Transmission <u>R</u> ate: 187.5 kbps
	Highest Station Address: 31
	Profile: DP Standard
	Bus Parameters Universal (DP/FMS) User-Defined
	Net Configuration
	Calculate with this <u>n</u> et configuration
	Master: 2 Slaves: 0
	OK Cancel <u>S</u> tandard Help

Step	E: Assigning the Communication Processor
3	Assigning the database file for the FMS Protocol.
	This is done in the <i>FMS/DP Protocol</i> tab of the <i>Properties - CP 5412</i>
	(PROFIBUS) dialog box.
	In here, specify the previously created database file S5FMS.ldb. Via the <i>Browse</i>
	button, the database file can easily be located and selected.
	Close the dialog box by clicking on <i>OK</i> .
	Properties - CP5412A2(PR0FIBUS)
	PROFIBUS S7 Protocol FMS/DP-Protocol Mode
	Database
	C Activate DP
	Activate EMS
	FMS/DP-Database
	C:\SINEC\ComPB.NT\ncm\S5FMS.kdb
	Sear <u>c</u> h
	FMS/DP'.
	OK Cancel <u>S</u> tandard Help

Step	E: Assigning the Communication Processor
4	Exit the program <i>Setting the PG/PC Interface</i> via the <i>OK</i> button. A dialog box will be displayed requesting the restart of the <i>CP 5412 A2</i> .
	Acknowledge this dialog box by clicking on <i>OK</i> , which will result in the restart of the communication processor <i>CP 5412 A2</i> .
	This completes the installation of the communication processor.
	Changed SIMATIC NET settings
	You changed your SIMATIC NET settings.
	To activate the changes, a restart of the parameter settings is necessary.
	Restart now?
	Cancel

F: Testing the Communication Processor

Step	F: Testing the Communication Processor
1	Test the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface to be checked. In this case, select the entry <i>CP 5412 A2</i> (<i>PROFIBUS</i>). Make sure that the assignments between access points and the interfaces are not changed.
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PR0FIBUS) <active> Properties</active>
	<pre><none> Diagnostics Diagnostics</none></pre>
	CP5412A2(PR0FIBUS) <active> TCP/IP > DEC PCLEast Ethernet Copy</active>
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	Install
	OK Cancel Help
Step	F: Testing the Communication Processor
------	---
3	The dialog box Simatic NET Diagnostics will be displayed.
	In the PROFIBUS/MPI Network Diagnostics tab, the diagnosis is started via the
	<i>Test</i> button. The result of the diagnosis will be displayed immediately following.
	If the result of the diagnosis is positive (correct installation), the dialog box can be evited with OK . In this case, the program Setting the PG/PC Interface can also
	be closed by clicking on <i>OK</i> . The configuration of the communication to the S5
	via PROFIBUS FMS is continued in the following section.
	However, if the result of the diagnosis is negative (incorrect installation), the
	error must be localized and corrected. Troubleshooting procedures are described
	in the section is the Communication Module in the Computer operational?.
	SIMATIC NET diagnostics
	FMS Protocol FMS Trace Read DP Databases DP-RAM
	PROFIBUS/MPI Network Diagnostics S7 Protocol S7 Trace
	Status
	Station address:
	Bus parameters:
	Baudrate: 187.50 Kbps
	Highest station address (HSA): 31
	Minimum station delay Time (Min Tsdr): 80 tBit Maximum station delay Time (Max Tsdr): 360 tBit
	Setup time (tset): 80 tBit
	Bus Nodes
	Station passive
	<u>R</u> ead ✓ Station active
	OK Cancel Apply Help

8.2 Creation of the STEP5 Project S5_FMSst

The following description details the configuration steps necessary to create and start up the STEP5 project *S5_FMSst*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP5 project *S5_FMSst*:

- A: Installing the Hardware and Software
- B: Creating the STEP5 Program
- C: Configuring the Communication Processor
- D: Starting up the PLC

A: Installing the Hardware and Software

Step	A: Installing the Hardware and Software
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 951</i> , the CPU module <i>CPU 944</i> and the communication processor <i>CP 5431</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 5412 A2</i> in the computer to the communication processor <i>CP 5431</i> in the PLC.
2	Installing the communication package SINEC NCM for COMs from the corresponding installation disk. This communication package is required for the configuration of the communication processor <i>CP 5431</i> .
	The installation disk contains the program file <i>install.exe</i> . Start this program. Follow the instructions of the installation program and complete the installation.
	Install.exe

B: Creating the STEP5 Program

Step	B: Creating the STEP5 Program
1	Creation of a new project with the STEP5 software.
	Start the STEP5 software. From the <i>Object</i> \rightarrow <i>Project</i> \rightarrow <i>Settings</i> \rightarrow <i>Page1</i> and <i>Page2</i> menus, define the settings for the new project. In the <i>Program File</i> field, specify the name of the new program file to be created. In this sample, the name <i>S5_FMSST.S5D</i> is used. Only the first six characters of the file name can be changed by the user.

Step	B: Creating the STEP5 Program
2	Creation of a data block.
	In STEP5, this is accomplished via the <i>Editor</i> \rightarrow <i>Data Block</i> \rightarrow <i>menus of the program file</i> . As the name of the data block, this sample uses <i>DB5</i> .
	In this data block, two tags with a length of 16 Bits are created. Their sum is to be determined in $OB1$ and then be written to another tag with a length of 16 Bits. One additional tag with a length of 16 Bits is created, whose value is cyclically incremented in $OB1$.
	The following graphic displays the programmed data block <i>DB5</i> . The data of the <i>DB5</i> is made visible to WinCC via FMS tags created during the configuration of the communication processor <i>CP 5431</i> .
	DB 5 0:KH 0000 1:KH 0000 2:KH 0000 3:KH 0000 4:KH 0000 5:KH 0000 5:KH 0000 5:KH 0000 6:KH 0000 8:KH 0000
3	Creation of a program block for the communication.
	The communication to WinCC via the communication processor <i>CP 5431</i> is carried out by calling the data handling blocks <i>SEND</i> and <i>RECEIVE</i> . For the <i>SIMATIC S5 115U</i> PLC used in this sample, these are the blocks <i>FB244</i> and <i>FB245</i> . These blocks must be called once every program cycle. As the request number <i>A</i> - <i>NR</i> , <i>0</i> is assigned to these blocks to allow execution of the Send All and Receive All functions.
	In this sample, the data handling block calls are carried out in a program block, which is called in the <i>OB1</i> .
	In STEP5, the creation of a new program block is carried out via the <i>Editor</i> \rightarrow <i>STEP5 Block</i> \rightarrow <i>menus of the program file.</i> As the name of the program block, this sample uses <i>PB5</i> .
	PB 5 CP5431 Communication SSNR :SPA FB 244 SEND ALL NAME :SEND SEND ALL SSNR :KY 000,000 SEND ALL ANZW: MW 100 GTYP : QTYP : KC NN DBNR : DBNR : KY 000,000 QANF : KF +0 QLAE : KF +0 PAFE : MB 104 :SPA FB 245 RECEIVE ALL NAME : RECEIVE SNR : KY 000,000 ANZW : MW 105 ZTYP : KC NN DBNR : KY 000,000 ANZW : MW 105 ZTYP : KC NN DBNR : KY 000,000 ZANF : KF +0 PAFE : MB 109 :BE :BE

Step	B: Creating the STEP5 Program
4	Creation of a function block, which makes available the functionality of the sample program. Two values stored in the <i>DB5</i> are added and the sum again stored in the <i>DB5</i> . Additionally, a value stored in the <i>DB5</i> is incremented every program cycle. If this value reaches 10000, it is reset back to 0.
	In STEP5, the creation of a new function block is carried out via the <i>Editor</i> \rightarrow <i>STEP5 Block</i> \rightarrow <i>menus of the program file</i> . As the name of the program block, this sample uses <i>FB6</i> .
	FB 6 NETZWERK 1 von 1 Add and Increment NAME :ADD_INC
	:H DB 5 Hdd Galdes :L DW 0 :L DW 1 :+F :T
	:L DW 3 Increment Value :L KF +10000 : <f :SPB =M001 :L KF +0 Set 0 if 10000 is reached</f
	Image: Definition of the second se
5	Creation of the <i>OB1</i> .
	In the <i>OB1</i> , the previously created blocks <i>PB5</i> and <i>FB6</i> are called.
	OB 1 NETZWERK 1 von 1 Communication Manual SPA PB 5 Communication SPA FB 6 Add and Increment NAME ADDCNT BE
6	Creation of the startup blocks.
	During the startup of the PLC, the communication processor <i>CP</i> 5431 must be synchronized. This is done by the data handling block <i>SYNCHRON</i> . For the <i>SIMATIC S5 115U</i> PLC used in this sample, this is the block <i>FB249</i> .
	OB 21 Synchronize GP 5431 SPA FB 249 Synchronize GP 5431 NAME SYNCHRON SSNR KY 000,000 BLCR H 900,000 PAFE MB 110 :BE :BE :BE
7	Loading the STEP5 program into the PLC.
	In STEP5, this is done via the <i>Object</i> \rightarrow <i>Blocks</i> \rightarrow <i>Transfer</i> \rightarrow <i>PLC</i> <i>File</i> menus. In the Selection field, the option <i>All Blocks</i> must be selected to load all previously created blocks to the PLC.

Step	C: Configuring the Communication Processor
1	Start the communication package <i>SINEC NCM for COMs</i> to configure the communication processor <i>CP 5431</i> .
	From STEP5, start the communication package via the <i>Change</i> \rightarrow <i>Additional</i> \rightarrow <i>SINEC NCM for COMs</i> menus.
2	This will open the communication package SINEC NCM for COMs.
	If no database file is set, the <i>Basic Settings</i> entry mask will initially be displayed.
	This entry mask can also be opened via the $File \rightarrow Select$ (or <i>Init.</i> $\rightarrow Edit$) menus.
	In the <i>CP Type</i> field, indicate the type of communication processor used. Via the F8 function key, one of the available communication processors can be set. Select the <i>CP 5431</i> . Set the <i>Status</i> field to <i>OFFLINE FD</i> via the F8 function key. This stores the configuration made in the program to a database file. In the <i>Database File</i> field, specify the name of this database file. This name has to start with the letter <i>Q</i> . For this sample, the name <i>QS5_FMS.DAT</i> is used for the database file.
	function key.
	Grundeinstellungen
	Art des CP : CP5431 Status : OPPLINE PD Datenbasisdatei : H : OS5_PMS.DAT
	Dokumentation : Schriftfuss AUS Druckerausgabe AUS
	Druckerdatei : D : NONAMEDR.INI Schriftfussdatei : D : NONAMEPT.INI
	UEBERN. AUSWAHL

C: Configuring the Communication Processor

Step	C: Configuring the Communication Processor
3	The settings for the basic initialization of the communication processor must be made.
	They are entered in the <i>Basic Initialization</i> entry mask. This entry mask is opened via the <i>Edit</i> \rightarrow <i>CP Init</i> . menus.
	In the <i>L2 Address</i> field, the <i>PROFIBUS Address</i> of the communication processor <i>CP 5431</i> is specified. In this sample, the value 9 has been entered. This is the PROFIBUS Address that has been specified during the database file creation of the communication processor <i>CP 5412 A2</i> for the <i>CP 5431</i> .
	The remaining settings can be seen in the following graphic. The settings made in the <i>Basic Initialization</i> entry mask are applied via the F7 function key.
	SINEC-NCM (ENDE) Editieren - CP Init Grundinitialisierung Quelle: H:QS5_FMS.DAT
	Urladedaten : SIMATIC Spezifika : L2 - Adresse : 2 Basis-SSNR : 0 Aktiv / Passiv : AKTIV Anzahl Schnittst. : 1 NetZdatei : NETZINCH.NET
	Informative Parameter : Modulart : EPROM Modulgroesse : 32 KB Baugruppenkennung : CP5431 Firmware-Version : Erstellungsdatum : 19.01.99 Onlagenbezeichnung : COMMUNICATIONMONNAL
4	Setting the global network parameters.
	This is done in the <i>Global Network Parameters</i> entry mask, which is opened via the <i>Edit</i> \rightarrow <i>Global Network Parameters</i> menus.
	Specify the <i>Network Parameters</i> . Use the bus parameters that have been defined during the database file creation of the communication processor <i>CP 5412 A2</i> for the <i>PROFIBUS</i> . Among other things, the <i>Baud Rate</i> is set to <i>18750 Baud</i> and the <i>Highest Station Address (HSA)</i> to <i>31</i> .
	The settings made in the <i>Global Network Parameters</i> entry mask are applied via the F7 function key.
	Editieren Netzparameter - Global Quelle: NETZINCM.BPB
	Hoechste aktive L2-Teilnehmeradresse in der Netzdatei : 9 additive Topologie Vorgaben : Anzahl fremder akt. Stationen : Hoechste Teilnehmeradr. (HSA) : 31
	Busparameter Vorgaben : Baudrate : 187500 Default SAP : 61 Anzahl Telegramm-Wiederholungen (Max. Retry Limit) : 1 Medium Redundanz : Keine Redundanz
	Busparameter Daten : Slot-Time (TSL) : 400 Bit Zeiten 2.1320 msec Setup-Time (TSET) : 80 Bit Zeiten .42640 msec Kleinste Station-Delay (min TSDR) : 80 Bit Zeiten .42640 msec Groesste Station-Delay (max TSDR) : 360 Bit Zeiten 1.9188 msec Target-Rotation-Time (TTR) : 30000 Bit Zeiten 159.90 msec GAP-Aktualisierungsfaktor (G) : 20
	BERECHNEN2 3 4 5 6 7 UEBERN. 9 AUSWAHL

Step	C: Configuring the Communication Processor
5	Creation of an FMS Connection. This is done in the <i>CP Connection Configuration</i> entry mask, which is opened via the <i>Edit</i> \rightarrow <i>Connections</i> \rightarrow <i>FMS Connections</i> menus. For the <i>Connection Configuration</i> , the same values must be specified that have been used for the connection in the database file of the communication processor <i>CP 5412 A2</i> . However, local and remote parameters (e.g. LSAP values) must be switched correspondingly. Among other things, in this sample, the value 3 is set for the <i>Local LSAP</i> and the value 4 for the <i>Remote LSAP</i> .
	The settings made in the CP Connection Configuration entry mask are applied via the F7 function key. CP Verbindungsprojektierung Quelle: H:QS5_FMS.DAT Kommunikationsreferenz: 2 Verbindungsart : MAZ Auftragsprojektierung Veberwachungsintervall: 506 * 10 ms SSNN: ANR : 2 08 5 12 unconfirmed Auftraege: UNCPLOW lokale Verbindungs Projektierung Lokaler LSAP : 3 max. PDU-Laenge : 211 entfernte Verbindungs Projektierung Frender LSAP : 5 Fremde L2-Adresse : 8 Zugriff auf Variablen (GET OU) REP VAR 5 5 VEBERN. AUSWAHL
6	Creation of the FMS tags. This is done in the <i>Creation of FMS Tags</i> entry mask, which is opened via the $Edit \rightarrow VFD Tag Editor$ menus. In this sample, 4 FMS tags of the <i>IN 16</i> (Integer 16 Bit) type are created. These FMS tags correspond to the tags previously created in the DB5. Each tag is marked with an Index, which is used by WinCC for addressing purposes. The settings made in the <i>Creation of FMS Tags</i> entry mask are applied via the F7 function key. SINEC-NCH (ENDE) Quelle: H:QS5_PHS_DAT
	Index Typ ZGRF Passw S5-Adresse ANZW SSNR 100 10 10 16 DB 5 0 DB 5 4 6 5 101 10 16 DB 5 1 DB 5 6 5

Step	C: Configuring the Communication Processor
7	Loading the configuration data of the database file to the communication processor <i>CP 5431</i> .
	This is done via the <i>Load</i> \rightarrow <i>CP Database Transfer</i> \rightarrow <i>FD->CP</i> menus. The configuration data can only be uploaded while the communication processor is in the <i>STOP</i> operating mode.
	Laden CP Start CP Stop CP Zustand CP Loeschen PD Loeschen CP Datenbasistransf FD->CP CP->FD FD->CP FD->CP FD->FD FD->FD FD->FD FD->FD FD->FD

D: Starting up the PLC

Step	D: Starting up the PLC
1	Starting the individual modules of the PLC.
	Previously, the STEP5 program and the database file of the communication processor <i>CP 5431</i> must have been loaded to the PLC.
	First, the operating mode switch of the communication processor <i>CP 5431</i> is set to the RUN position. The status LEDs <i>RUN</i> and <i>STOP</i> will light up at the communication processor, indicating that the module has not be synchronized.
	Next, the operating mode switch of the CPU module is set to the <i>RN</i> position. During the startup of the CPU module, the communication processor is synchronized by the startup block. The communication processor's status LED <i>STOP</i> go out. At the CPU module, only the status LED <i>RN</i> will be illuminated.

8.3 Creation of the WinCC Project WinCC_S5_FMS

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S5_FMS*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S5_FMS*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	This will display the WinCC Explorer.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	WinCC Explorer
	Create a New Project
	B A Multi-User Project
	C Multi-Client Project
	O Open an Existing Project
	OK Cancel

Step	A: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S5_FMS</i> . In the <i>Project Path</i> field, set the storage location of the new project.
	Introductory contractor of
	You can use this dialog box to create a new WinCC project.

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	<u>– Find</u>
	<u>P</u> roperties

Step	B: Creating the Connection
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the
	<i>FMS</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .
	Add new driver. ? X Look jn: 🔄 Bin
	Image: ccTlg Image: SIMATIC S5 PMC Ethernet.chn Image: PDLCache Image: SIMATIC S5 PMC Profibus.chn Image: PDLCache Image: PDLCachee Image: PDLCachee Image:
	▼ File name: Profibus FMS.chn pen Files of type: WinCC Communication Driver (*.chn) ▼ Cancel
3	The newly added driver <i>PROFIBUS FMS</i> will be displayed as a sub-entry to <i>Tag</i> <i>Management</i> . The driver contains a channel unit named <i>PROFIBUS FMS</i> . Create a new connection for this channel unit by R on <i>PROFIBUS FMS</i> and then selecting <i>New Driver Connection</i> from the pop-up menu
	PROFIBUS FMS PROFIBUS FMS New Driver Connection System Parameter Eind Easte Properties

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed. In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample,
	this is S5_FMS_01.
	Connection properties ×
	General FMS Connection
	Name: S5_FMS_01
	Unit: PROFIBUS FMS
	Server List
	ZIP-WS4
	Cancel Help

Step	B: Creating the Connection
5	In the <i>FMS Connection</i> tab, specify the desired communication connection. The <i>Connections List</i> shows all connections that have been created in the database file of the communication processor <i>CP 5412 A2</i> . The desired connection can be selected from this list. In this sample, only the FMS connection <i>S5_CP5431_FMS</i> with the index of <i>3</i> exists for the database. Select this connection. Close the dialog box by clicking on <i>OK</i> .
	Connection properties X General FMS Connection Connection Access Authorization Name/Index 3 List of the Connections (Communication Relationship List) 3-S5_CP5431_FMS © Select Index Select Name
	Cancel Help

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags
1	Creation of the WinCC tags required for the sample.
	This is done via a \bigcirc R on the newly created connection <i>S5_FMS_01</i> and then selecting <i>New Tag</i> from the pop-up menu.
	PROFIBUS FMS PROFIBUS FMS New Group New Tag Find Cut Dopy Paste
	Properties
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16x_S5FMS01_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type. Click on the <i>Select</i> button to set the <i>Address</i> of the new tag.
	Ceneral Limits/Reporting
	Properties of Tags
	Name: S16x_S5FMSU1_01
	Length: 2
	Adapt format: ShortToSignedWord
	O <u>Project-wide</u> update O <u>Computer-local</u> update
	Linear scaling
	Process Value Range Tag Value Range
	From From To To
	OK Cancel Help

Step	C: Creating the WinCC Tags
3	The dialog box Address Properties will be displayed.
	In the <i>Name/Index</i> field, the index of the desired FMS tag is entered. This will be the index that has been defined previously during the creation of the FMS tags in the communication processor <i>CP 5431</i> . If a connection to the communication processor <i>CP 5431</i> already exists, all FMS tags created for this connection will be shown in the <i>List of removed Tags</i> field. This allows for a convenient selection of the desired FMS tags. In this sample, the WinCC tag <i>S16x_S5FMS01_01</i> to be created is assigned the FMS tag with the index <i>100</i> . This is the tag representing the first of the two values to be added.
	The <i>Address Properties</i> and <i>Tag Properties</i> dialog boxes can be closed by clicking on the <i>OK</i> button.
	Address properties
	FMS Address Remote T ag Name/Index 100 Subindex List of the Bernote Tags 100 • 0 • Sint16 101 • 0 • Sint16 102 • 0 • Sint16 103 • 0 • Sint16 Select Index 103 • 0 • Sint16 Select Name
	OK Cancel Help
4	Creation of the remaining WinCC tags required. Follow steps 1 to 3 for the creation of the remaining tags. The names, data types and addresses of the tags used in this sample are listed in the following graphic.
	Name Type Parameters S16x_S5FMS01_01 Signed 16-bit value 100;0;0 S16x_S5FMS01_02 Signed 16-bit value 101;0;0 S16x_S5FMS01_03 Signed 16-bit value 102;0;0 S16x_S5FMS01_04 Signed 16-bit value 103;0;0

D: Creating the WinCC Screen



Step	D: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed
	In the <i>Tag</i> field, set the tag $S16x_S5FMS01_01$ via the button displayed below.
	options. Close the dialog box by clicking on <i>OK</i> .
	I/O-Field Configuration Tag: \$16x_\$5FM\$01_01 Update: 2 s Type Output Input Format Font Size 12 Font Name Arial Color OK
4	Changing the output format of the <i>I/O Field</i> .
	For this, open its properties dialog box via a $\mathcal{B}R$ on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	0.000 ★ Cut Ctrl+X ▲ © opy Ctrl+C Duplicate ● Paste Ctrl+V Delete Del Customized object ▶ Group object ▶ Linking Configuration Dialog Properties Properties

Step	D: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed. On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a \textcircled{DD} on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits. Close the dialog box by clicking on <i>OK</i> .
	Object Properties ? X I/O Field I/OField1 Properties Events
	□· I/0 Field Attribute Static Dynamic Curr I □ Geometry Field Type I/0 Field □ □ □ Colors Output Valu 0.000000e+000 \$S16x_S5FMS01_01 2 s □ □ Font Output Format [s93939] □ □ □ □ Flashing Apply on Full No □ □ □ Limits Clear on New Yes □ □ □ Dutput/Input Clear on Invali No □ □
6	Creation of three additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen. In the sample project, the screen is saved under the name <i>com_3_S5FMS_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.



8.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S5_FMS* and the SIMATIC S5 station. A diagnosis of the sample according to the following description makes only sense, if the checks listed below have been completed successfully.

Startup of the Communication Processor CP 5412 A2

• F: Testing the Communication Processor

Creation of the STEP5 Project S5_FMSst

• D: Starting up the PLC

Setting the PG/PC Interface

Step	Setting the PG/PC Interface
1	Diagnosis of the communication connection via the program <i>Setting the PG/PC</i> <i>Interface</i> .
	This program is accessed via $Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.$
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface <i>CP 5412 A2 (PROFIBUS)</i> . Make sure that the assignments between access points and the interfaces are not changed.
	The diagnosis of the communication connection is started by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PROFIBUS) <active> Properties</active>
	<pre><none> CP5412A2(MPI)</none></pre> Diagnostics
	CP5412A2(PR0FIBUS) <active> TCP/IP -> DEC PCI Fast Ethernet ⊑opy</active>
	Delete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	Install
	OK Cancel Help

Step	Setting the PG/PC Interface
3	The dialog box Simatic NET Diagnostics will be displayed.
	From the <i>PROFIBUS/MPI Network Diagnostics</i> tab, the diagnosis of the communication connection is started by clicking on the <i>Read</i> button. This will display all stations accessible on the bus. For this sample, the address 8 of the communication processor <i>CP 5412 A2</i> as well as the address 9 of the communication processor <i>CP 5431</i> must be marked as occupied.
	The dialog box can be exited by clicking on OK.
	SIMATIC NET diagnostics
	FMS Protocol FMS Trace Read DP Databases DP-RAM PROFIBUS/MPI Network Diagnostics S7 Protocol S7 Trace Status Iest OK Image: Status Iest OK Image: Status Bus parameters: Image: Status Bus Nodes 0 1 0 1 2 40 Image: Status 100 Image: Status Image: Status Image: Status
	OK Cancel Apply Help

WinCC Explorer

Step	WinCC Explorer
1	Diagnosis of the communication connection from the WinCC Explorer.
	Switch the project <i>WinCC_S5_FMS</i> into runtime. This is done from the <i>WinCC Explorer</i> via the toolbar button displayed below.
	Activate
	The created WinCC screen <i>com_3_S5FMS_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.

Step	WinCC Explorer
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime. <u>Tools</u>
	Language Status of Driver Connections Status of Multi-User Operation
3	The dialog box Status - Logical Connections will be displayed.
	This dialog box lists all configured connections. For this sample, only the connection <i>S5_FMS_01</i> will be displayed.
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 3 S5_FMS_01 OK 28 O O O 3 S5_FMS_01 OK 28 O O O Update
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> . The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.
	Name Parameters Last Change
	S5_FMS_01 4352,3,0,0,255 18.04.99 12:57:32

Step	WinCC Explorer
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type Parameters
	S16x_S5FMS01_01 Signed 16-bit value 100;0;0
	Process value: 78 Quality: c0 Last Change:7/5/99 11:52:13 AM

9 Communication to the SIMATIC S5 via PROFIBUS FDL

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder C:\Communication_Manual. You have the option to copy the following components to the hard drive:



The STEP5 project we will create including the database file of the communication processor CP 5431 FMS/DP.



The WinCC project we will create.

This chapter describes in detail the startup of a communication connection between a SIMATIC S5 and WinCC. The communication connection is implemented via the PROFIBUS, on which the FDL Protocol (Fieldbus Data Link) is running.

Overview of the Structure of the Sample



On the computer side, the connection to the *PROFIBUS* network is established via the communication processor *CP 5412 A2*. To install this communication processor in the computer, the driver *PB DP-5412*, located on the *SIMATIC NET* CD-ROM, is needed. However, it is also possible to use the *PB S7-5412* or *PB FMS-5412* drivers.

In the WinCC project, the communication driver *SIMATIC S5 PROFIBUS FDL* must be installed. This communication driver is used to configure the connection to the *SIMATIC S5*.

The PLC *SIMATIC S5 115U* is equipped with the CPU module *CPU 944*. The connection to the network is established via the communication processor *CP 5431 FMS/DP*. For the configuration of this communication processor, the communication package *SINEC NCM for COMs* is required.

The following lists all configuration steps necessary for the creation of the communication connection:

- Startup of the Communication Processor CP 5412 A2
- Creation of the STEP5 Project S5_FDLst
- Creation of the WinCC Project WinCC_S5_FDL
- Diagnosis of the Communication Connection

Required Software

Name	Description
SIMATIC NET	Driver <i>PB DP-5412</i> from the <i>SIMATIC NET</i> CD-ROM for the installation of the communication processor <i>CP 5412 A2</i> .
STEP5	STEP5 software for the creation of the STEP5 project. Communication package <i>SINEC NCM for COMs</i> for the configuration of the communication processor <i>CP 5431</i> <i>FMS/DP</i> .
WinCC	WinCC with communication driver <i>SIMATIC S5 PROFIBUS FDL</i> for the creation of the WinCC project and for the configuration of the connection to the PLC.

Required Computer Hardware

Name	Description
Communication Processor	Communication processor <i>CP 5412 A2</i> to establish the connection to the PLC's communication processor.

Required PLC Hardware

Name	Description
Rack	Rack CR 700-3.
Power Supply	Power supply PS 951.
CPU Module	CPU module CPU 944.
Communication Processor	Communication processor CP 5431 FMS/DP.

9.1 Startup of the Communication Processor CP 5412 A2

The following description details the configuration steps necessary to successfully start up the communication processor *CP 5412 A2*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to start up the communication processor *CP 5412 A2*:

- A: Mounting the Communication Processor in the Computer
- B: Installing the Communication Driver
- C: Installing the Communication Processor
- D: Assigning the Communication Processor
- E: Testing the Communication Processor

A: Mounting the Communication Processor in the Computer



B: Installing the Communication Driver

Step	B: Installing the Communication Driver
1	Installation of the communication driver <i>PB DP-5412</i> from the <i>SIMATIC NET</i> CD-ROM.
	After inserting the <i>SIMATIC NET</i> CD-ROM, the installation program is automatically started. If this is not the case, open the <i>Windows NT Explorer</i> and start the <i>setup.exe</i> program located on the CD-ROM.
	The installation of the software is started via the button displayed below.
	SIMATIC NET Software Installieren
	Follow the instructions of the installation program. On the <i>Components</i> page, the check-box of the driver <i>PB DP-5412</i> to be installed must be selected. Finish the installation.
	SIMATIC NET Software: Components
	Please select the programs to be installed.
	SIMATIC PB CP 5613/5614 (DP-Base V1.2) 5 MB □ PB DP-5613 V1.2 8 MB □ PB S7-5412 V5.1 17 MB □ PB PG-5412 V5.1 27 MB □ PB FMS-5412 V5.1 17 MB □ PB FMS-5412 V5.1 27 MB
	Version 5.1. <u>Read me</u> Destination directory: c:\siemens\simatic.net Browse
	Required on C: 29 MByte Available on C: 466 MByte

Step	C: Installing the Communication Processor
1	Install the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	The dialog box for installing a new interface is opened via the <i>Install</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	<none> Properties</none>
	<none> TCP/IP -> DEC PCI Fast Ethernet</none>
	Сору
	Delete
	Interfaces
	Install
	OK Cancel Help

C: Installing the Communication Processor

Step	C: Installing the Communication Processor
3	The dialog box <i>Install/Remove Modules</i> will be displayed. The <i>Selection</i> field lists all interfaces that can be installed. Among them will be the entry for the <i>CP</i> 5412 A2, if the communication driver has been installed previously as outlined in step B.
	From the <i>Selection</i> field, select the entry <i>CP 5412 A2</i> . The installation of the communication processor is started by clicking on the <i>Install</i> -> button.
	Install / Remove Interfaces
	Selection: Installed: CP1411(AMD PCNET-F& DEC PCI Fast Ethernet Bo. CP1413 (256k DP-RAM) CP1511(Accton EN2216 CP5411 < CP1413 (256k DP-RAM) CP1413 (256k DP-RAM) CP1511(Accton EN2216 CP5411
	<u>H</u> esources
	CP5412A2: Communications Processor (MPI/PR0FIBUS) for Programming Devices/PCs
	<u>Close</u>
4	The dialog box Resources - CP 5412 A2 will be displayed.
	The settings for the <i>Memory Range</i> , <i>I/O Range</i> and <i>Interrupt</i> have to be specified.
	The <i>I/O Range</i> has already been determined via the Jumper Settings at the <i>CP</i> 5412 A2.
	Make sure that the assigned resources have not already been taken by other modules in the computer. Information about already taken system resources can
	be obtained from the <i>Resources</i> tab accessed via <i>Start</i> \rightarrow <i>Programs</i> \rightarrow
	Administrative Tools (Common) Windows NT Diagnostics. Close the Resources tab by clicking on OK
	Resources - CP5412A2 <board 1=""></board>
	Memory range: 0000C8000-000CBFFF
	Input / output range: 0240-0243
	Interrupt request:
	Direct memory access:
	# - Current hardware setting * - Possible conflict with other hardware
	Cancel Help

Step	C: Installing the Communication Processor
5	In the dialog box <i>Install/Remove Modules</i> , the <i>Installed</i> field will now contain the entry for the <i>CP 5412 A2</i> .
	Exit the dialog box <i>Install/Remove Modules</i> via the <i>Close</i> button.
	Install / Remove Interfaces
	Selection: Installe <u>d</u> :
	CP1411(AMD PCNET-Fa CP5412A2 Board 1 CP1413 CP1413 TCP/IP → DEC PCI Fast Ethernet Bo CP1511(Accton EN2216 Install → CP5412A2 Board 1 CP5412A2 CP1511(Accton EN2216 CP5511 CP5511
	<u>R</u> esources
	CP5412A2: Communications Processor (MPI/PROFIBUS) for Programming Devices/PCs
	Help

D: Assigning the Communication Processor

Step	D: Assigning the Communication Processor
1	In the program <i>Setting the PG/PC Interface</i> , assign the access point <i>CP_L2_1</i> : to the just installed interface.
	The access point CP_L2_1: is the default access point used by WinCC for the communication via the <i>PROFIBUS</i> . It has been created automatically during the installation of the communication driver <i>PB DP-5412</i> .
	In the field <i>Access Point of the Application</i> , set the entry <i>CP_L2_1</i> :. In the field below, select the entry <i>CP 5412 A2 (PROFIBUS)</i> . This completes the assignment between the access point and the communication processor.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PR0FIBUS) Properties
	<none> Diagnostics Diagnostics</none>
	CP5412A2(PROFIBUS) TCP/IP -> DEC PCI Fast Ethernet Copy
	■ Delete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	Install
	OK Cancel Help

Step	D: Assigning the Communication Processor
2	Setting the properties of the communication processor <i>CP 5412 A2</i> . The dialog box for setting the properties is opened via the <i>Properties</i> button of the <i>Setting the PG/PC Interface</i> program.
	The dialog box <i>Properties - CP 5412 (PROFIBUS)</i> will be displayed.
	In the <i>PROFIBUS</i> tab, station and network related parameters are set.
	In this sample, the <i>Local Station Address</i> of the communication processor is set to 8.
	For the <i>PROFIBUS Network</i> , a <i>Baud Rate</i> of <i>187.5 kBit/s</i> is selected. The <i>Highest Station Address</i> is set to the value of <i>31</i> . As the <i>Profile</i> , <i>Universal</i> (<i>DP/FMS</i>) is selected.
	The network settings just made for all stations in the <i>PROFIBUS network</i> must be uniform. They must also be entered as the network parameters in the database file created for the communication processor <i>CP 5431</i> .
	Properties - CP5412A2(PR0FIBUS)
	PROFIBUS S7 Protocol FMS/DP-Protocol Mode
	Station Parameters
	Address:
	PG/PC is the only master on bus
	P <u>C</u> S7 time synchronization
	Network Parameters
	Transmission <u>R</u> ate: 187.5 kbps
	Highest Station Address: 31
	Profile: DP Standard
	Bus Parameters Universal (DP/FMS) User-Defined
	Net Configuration
	Calculate with this net configuration
	Master: 2 Slaves: 0
	OK Cancel <u>S</u> tandard Help

Step	D: Assigning the Communication Processor
3	Exit the program Setting the PG/PC Interface via the OK button.
	A dialog box will be displayed requesting the restart of the <i>CP 5412 A2</i> . Acknowledge this dialog box by clicking on <i>OK</i> , which will result in the restart of the communication processor <i>CP 5412 A2</i> .
	This completes the installation of the communication processor.
	Changed SIMATIC NET settings
	You changed your SIMATIC NET settings. To activate the changes, a restart of the parameter settings is necessary.
	Restart now?
	Cancel

Step	E: Testing the Communication Processor
1	Test the communication processor <i>CP 5412 A2</i> via the program <i>Setting the PG/PC Interface</i> .
	This program is accessed via $Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.$
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface to be checked. In this case, select the entry <i>CP 5412 A2</i> (<i>PROFIBUS</i>). Make sure that the assignments between access points and the interfaces are not changed.
	The check for a proper installation is activated by clicking on the <i>Diagnostics</i> button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set <u>u</u> sed:
	CP5412A2(PROFIBUS) <active> Properties</active>
	<pre><none> CP5412A2(MPI) Diagnostics</none></pre>
	CP5412A2(PR0FIBUS) <active> TCP/IP -> DEC PCI Fast Ethernet</active>
	Delete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	OK Cancel Help

E: Testing the Communication Processor

Step	E: Testing the Communication Processor
3	The dialog box Simatic NET Diagnostics will be displayed.
	In the <i>PROFIBUS/MPI Network Diagnostics</i> tab, the diagnosis is started via the <i>Test</i> button. The result of the diagnosis will be displayed immediately following.
	If the result of the diagnosis is positive (correct installation), the dialog box can be exited with <i>OK</i> . In this case, the program <i>Setting the PG/PC Interface</i> can also be closed by clicking on <i>OK</i> . The configuration of the communication to the S5 via <i>PROFIBUS FDL</i> is continued in the following section.
	However, if the result of the diagnosis is negative (incorrect installation), the error must be localized and corrected. Troubleshooting procedures are described in the section Is the Communication Module in the Computer operational?.
	SIMATIC NET diagnostics
	FMS Protocol FMS Trace Read DP Databases DP-RAM PROFIBUS/MPI Network Diagnostics S7 Protocol S7 Trace Status Image: Contract of the second sec
	Bus Nodes 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 0 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 1 1 1 12 13 14 15 16 17 18 19 20 1 1 1 1 12 1 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 11 12 13 14 15 16 17 18 19 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 13 15 16 17 10 10 10 10 10 10 <td< th=""></td<>
	OK Cancel Apply Help
9.2 Creation of the STEP5 Project S5_FDLst

The following description details the configuration steps necessary to create and start up the STEP5 project *S5_FDLst*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the STEP5 project *S5_FDLst*:

- A: Installing the Hardware and Software
- B: Creating the STEP5 Program
- C: Configuring the Communication Processor
- D: Starting up the PLC

A: Installing the Hardware and Software

Step	A: Installing the Hardware and Software
1	Rack-mounting of the modules used.
	In this sample, the modules to be installed are the power supply <i>PS 951</i> , the CPU module <i>CPU 944</i> and the communication processor <i>CP 5431</i> .
	Establishing the connection from the programming device to the programming interface of the CPU module.
	Establishing the connection from the communication processor <i>CP 5412 A2</i> in the computer to the communication processor <i>CP 5431</i> in the PLC.
2	Installing the communication package SINEC NCM for COMs from the corresponding installation disk. This communication package is required for the configuration of the communication processor <i>CP 5431</i> .
	The installation disk contains the program file <i>install.exe</i> . Start this program. Follow the instructions of the installation program and complete the installation.
	Install.exe

B: Creating the STEP5 Program

Step	B: Creating the STEP5 Program	
1	Creation of a new project with the STEP5 software.	
	Start the STEPS software. From the <i>Object Project Settings</i> Page1 and Page2 menus, define the settings for the new project. In the Program	
	<i>File</i> field, specify the name of the new program file to be created. In this sample, the name <i>S5_FDLST.S5D</i> is used. Only the first six characters of the file name	
	can be changed by the user.	
2	Creation of a data block.	
	In STEP5, this is accomplished via the <i>Editor</i> \rightarrow <i>Data Block</i> \rightarrow <i>menus of</i>	

Step	B: Creating the STEP5 Program
	<i>the program file</i> . As the name of the data block, this sample uses $DB5$. In this data block, two tags with a length of 16 Bits are created. Their sum is to be determined in $OB1$ and then be written to another tag with a length of 16 Bits. One additional tag with a length of 16 Bits is created, whose value is cyclically incremented in $OB1$.
	The tags created in the data block <i>DB5</i> are visualized in the WinCC project. To do so, WinCC tags with corresponding addresses are created there.
	The following graphic displays the programmed data block <i>DB5</i> .
	DB 5 0:KH = 0000 1:KH = 0000 2:KH = 0000 3:KH = 0000 4:KH = 0000 5:KH = 0000 5:KH = 0000 6:KH = 0000 8:KH = 0000
3	Creation of a function block, which makes available the functionality of the sample program.
	Two values stored in the <i>DB5</i> are added and the sum again stored in the <i>DB5</i> . Additionally, a value stored in the <i>DB5</i> is incremented every program cycle. If this value reaches 10000, it is reset back to 0. In STEP5, the creation of a new function block is carried out via the <i>Editor</i> \rightarrow <i>STEP5 Block</i> \rightarrow <i>menus of the</i> <i>program file</i> . As the name of the program block, this sample uses <i>FB6</i> .
	FB 6 NETZWERK 1 von 1 Add and Increment
	NHTE HDD_INC :A DB 5 Add Ualues :L DW 0 :L DW 1 :+F
	:T DW 2 :L DW 3 :L KF ± 10000 : $\leq F$
	:SPB = H001 :L KF +0 Set 0 if 10000 is reached :T DW 3 :BEA M001 :L DW 3 :L KF +1 :+F :T :BE
4	Transfer of the blocks required for the communication into STEP5. The blocks can be found on the WinCC CD-ROM or they can be copied from the supplied STEP5 project.
	These are the standard function blocks <i>FB9 L2STARTUP</i> and <i>FB10 L2SNDRCV</i> . They must be transferred into the STEP5 program. The blocks support 5 different FDL connection instruction types.
	For each of these instruction types, a predefined work-DB is available, which contains various message data. For this sample, only instructions for read and write request from WinCC are required. This requires the transfer of the work-DBs <i>DB11</i> and <i>DB12</i> into STEP5.
	In the PLC, the handling blocks <i>SEND</i> , <i>RECEIVE</i> , <i>SYNCHRON</i> and <i>CONTROL</i> must be available. For the <i>SIMATIC S5 115U</i> PLC used in this sample, these are the blocks <i>FB244</i> , <i>FB245</i> , <i>FB247</i> and <i>FB249</i> .

Step	B: Creating the STEP5 Program	
5	Creation of the startup blocks.	
	The startup blocks define the communication and synchronize the communication processo a call of the function block <i>FB9 L2STARTUP</i> .	parameters, register the work-DBs r. These steps are all performed by
	During the call of the function block, the inter is transferred as a parameter. As the <i>RADR</i> pa the communication processor <i>CP 5412 A2</i> in sample, this is 8.	face number <i>SSNR</i> of the <i>CP 5431</i> arameter, the PROFIBUS address of the computer is specified. In this
	In addition, the connection parameters of the instruction types used must be specified. On the one hand, these are the parameters $RVC4$ and $RVC5$, which indicate the Service Access Points of the WinCC station. These SAPs are specified in WinCC during the creation of the connection. On the other hand, these are the parameters $ANR4$ and $ANR5$. These are the instruction numbers, which have been set during the configuration of the FDL connections for the communication processor CP 5431. For both instructions, the numbers of the work-DBs must be indicated as well.	
	of this sample.	
	OB 21 NETZWERK 1 von 1 Synchronisieren	CP 5431
	SPA FB 9 NAME :L2ANLAUF SSNR : KF +0 TIM3 : KT 000.0 RADR : KF +0 RUC3 : KF +4 RUC4 : KF +4 RUC5 : KF +6 RUC7 : KF +0 RUC7 : KF +0 ANR3 : KF +134 ANR5 : KF +135 ANR6 : KF +0 DBX3 : KY 000.000 DBX4 : KY 000.011 DBX5 : KY 000.012 DBX6 : KY 000.000 S/R3 : KF +0 ::::::::::::::::::::::::::::::::::::	SSNR of CP 5431 nr PROFIBUS-Address WinCC Station nr SAP WRITE SAP READ nr ANR WRITE ANR WRITE ANR READ nr nr Nr Work-DB WRITE Work-DB READ nr nr

Step	B: Creating the STEP5 Program	
6	Creation of the <i>OB1</i> .	
	The communication to WinCC via the communication processor <i>CP 5431</i> is carried out by the function block <i>FB10 L2SNDRCV</i> . In this sample, WinCC is able to send and request data. For this purpose, only two transfer parameters are relevant during the call of the <i>FB10</i> . These are the parameters <i>DBX4</i> and <i>DBX5</i> , which indicate the numbers of both work-DBs of the instruction types used. In addition, the previously created block <i>FB6</i> is called in the <i>OB1</i> .	
	OB 1 NETZWERK 1 von 1 Communication Manual	
	SPA FB 10 NAME :L2SNDRCU STR3 : M 0.0 STR7 : M 0.0 RDY : MB 0 FAIL : MB 0 TUC3 : T 0 DEX3 : KY 000,000 DEX4 : KY 000,011 DBX5 : KY 000,012 DBX6 : KY 000,010 SPA FB 6 NAME :ADD_INC : BE	Communication nr nr nr nr nr Mork-DB WRITE Work-DB READ nr Add and Increment
7	Loading the STEP5 program into the PLC.	
	In STEP5, this is done via the <i>Object</i> \rightarrow <i>Blocks File</i> menus. In the Selection field, the option <i>All Blo</i> all previously created blocks to the PLC.	$\rightarrow Transfer \rightarrow PLC$ <i>cks</i> must be selected to load

Step	C: Configuring the Communication Processor	
1	Start the communication package <i>SINEC NCM for COMs</i> to configure the communication processor <i>CP 5431</i> .	
	From STEP5, start the communication package via the <i>Change</i> \rightarrow <i>Additional</i> \rightarrow <i>SINEC NCM for COMs</i> menus.	
2	This will open the communication package SINEC NCM for COMs.	
	If no database file is set, the <i>Basic Settings</i> entry mask will initially be displayed.	
	This entry mask can also be opened via the $File \rightarrow Select$ (or <i>Init.</i> $\rightarrow Edit$) menus.	
	In the <i>CP Type</i> field, indicate the type of communication processor used. Via the F8 function key, one of the available communication processors can be set. Select the <i>CP 5431</i> . Set the <i>Status</i> field to <i>OFFLINE FD</i> via the F8 function key. This stores the configuration made in the program to a database file. In the <i>Database File</i> field, specify the name of this database file. This name has to start with the letter <i>Q</i> . For this sample, the name <i>QS5_FDL.DAT</i> is used for the database file. The settings made in the <i>Basic Settings</i> entry mask are applied via the F7	
	function key.	
	Grundeinstellungen SINEC NCM (ENDE)	
	Art des CP : CP5431 Status : OFFLINE FD	
	Datenbasisdatei : 🛛 : QS5_PDL.DAT	
	Dokumentation : Schriftfuss 008 Druckerausgabe 708	
	Druckerdatei : D : NONAMEDR.INI Schriftfussdatei : D : NONAMEP1.INI	
	2 3 4 S 6 7 UEBERN. 8 AUSWAHL	

C: Configuring the Communication Processor

Step	C: Configuring the Communication Processor
3	The settings for the basic initialization of the communication processor must be made.
	They are entered in the <i>Basic Initialization</i> entry mask. This entry mask is opened via the <i>Edit</i> \rightarrow <i>CP Init</i> . menus.
	In the <i>L2 Address</i> field, the <i>PROFIBUS Address</i> of the communication processor <i>CP 5431</i> is specified. In this sample, the value 9 has been entered. This value is one of the parameters that have to be specified during the creation of the connection in WinCC.
	The remaining settings can be seen in the following graphic. The settings made in the <i>Basic Initialization</i> entry mask are applied via the F7 function key.
	SINEC-NCM (ENDE) Editieren - CP Init Grundinitialisierung Quelle: H:QS5_FDL.DAT
	Urladedaten : SIMATIC Spezifika :
	L2 - Adresse : ? Basis-SSNR : A Aktiv / Passiv : AKTU Anzahl Schnittst. : 1 Netzdatei : NETZINCH.NET
	Informative Parameter : Modulart : EPROM Modulgroesse : 32 KB Baugruppenkennung : CP5431 Pirmware-Uersion : Erstellungsdatum : 19101199
	Anlagenbezeichnung : COMMUNICATIONMANUAL
	L 2 3 4 5 6 7 UEBERN. 8 AUSWAHL
4	Setting the global network parameters.
	This is done in the <i>Global Network Parameters</i> entry mask, which is opened via the <i>Edit</i> \rightarrow <i>Global Network Parameters</i> menus.
	The same <i>network parameters</i> must be used that have been specified as the network parameters during the installation of the communication processor <i>CP</i> 5412 A2. Among other things, the <i>Baud Rate</i> is set to 18750 Baud and the <i>Highest Station Address (HSA)</i> to 31. The value for the <i>Default SAP</i> is set to 2.
	The settings made in the <i>Global Network Parameters</i> entry mask are applied via the F7 function key.
	SINEC-NCM (ENDE) Editieren Netzparameter - Global Quelle: NETZINCM.BPB
	Hoechste aktive L2-Teilnehmeradresse in der Netzdatei : 9 additive Topologie Vorgaben : Anzahl fremder akt. Stationen : Hoechste Teilnehmeradr. (HSA) : 31
	Busparameter Vorgaben : Baudrate : 187569 Baud Default SAP : 22 Anzahl Telegramm-Wiederholungen (Max. Retry Limit) : 1 Medium Redundanz : Keine Redundanz
	Busparameter Daten : Slot-Time (TSL) : 400 Bit Zeiten 2.1320 msec Setup-Time (TSET) : 80 Bit Zeiten .42640 msec Kleinste Station-Delay (min TSDR) : 80 Bit Zeiten .42640 msec Groesste Station-Delay (max TSDR) : 360 Bit Zeiten 1.9188 msec Target-Rotation-Time (TTR) : 3600 Bit Zeiten 159.90 msec GAP-Aktualisierungsfaktor (G) : 20
	BERECHNEN 2 3 4 5 6 7 UEBERN. 9 AUSWAHL

Step	C: Configuring the Communication Processor	
5	Creation of the FDL connections. This is done in the <i>Connection Editor</i> entry mask. This entry mask is opened via the <i>Edit</i> \rightarrow <i>Connections</i> \rightarrow <i>Free Layer2 Connections</i> menus.	
	Two connections are needed: One processes the write requests of WinCC, the other one the read requests of WinCC. The priority of both connections is set to <i>Low</i> . For the connection used to process the write requests of WinCC, this sample uses the value 3 for the Service Access Point <i>SSAP</i> and the value <i>134</i> for the instruction number <i>ANR</i> . By hitting the F4 function key, the parameters for the next FDL connection can be entered. This connection will be used to process the read requests of WinCC. This sample uses the value 5 for the <i>SSAP</i> and the value <i>135</i> for the <i>ANR</i> .	
	The instruction numbers used for the individual FDL connections were already specified in the startup blocks of STEP5. The SAP values are specified as remote parameters during the creation of the connection in WinCC. The settings made in the <i>Connection Editor</i> entry mask are applied via the F7 function key.	
	CP Typ: CP5431 (ENDE) Verbindungseditor freie Layer 2 - Verbindungen Quelle: H:QS5_FDL.DAT	
	Lokale L2 - Teilnehmeradresse : 9 PRIO (H/L) : Parameter Senden / Empfangen : SCOD :	
	SSHF : ANR : ANR : 1 + 1 - 1 - EINGABE LOESCHEN UEBERN. 1 AUSWAHL	
6	Loading the configuration data of the database file to the communication processor <i>CP 5431</i> .	
	This is done via the <i>Load</i> \rightarrow <i>CP Database Transfer</i> \rightarrow <i>FD->CP</i> menus. The configuration data can only be uploaded while the communication processor is in the <i>STOP</i> operating mode. Laden	
	CP Start CP Stop CP Zustand CP Loeschen CP Datenbasistransf FD->CP CP->FD FD->CP FD->CP FD->FD FD->FD FD->FD FD->FD	

D: Starting up the PLC

Step	D: Starting up the PLC
1	Starting the individual modules of the PLC.
	Previously, the STEP5 program and the database file of the communication processor <i>CP 5431</i> must have been loaded to the PLC.
	First, the operating mode switch of the communication processor <i>CP 5431</i> is set to the RUN position. The status LEDs <i>RUN</i> and <i>STOP</i> will light up at the communication processor, indicating that the module has not be synchronized.
	Next, the operating mode switch of the CPU module is set to the <i>RN</i> position. During the startup of the CPU module, the communication processor is synchronized by the startup block. The communication processor's status LED <i>STOP</i> go out. At the CPU module, only the status LED <i>RN</i> will be illuminated.

9.3 Creation of the WinCC Project WinCC_S5_FDL

The following description details the configuration steps necessary to create and start up the WinCC project *WinCC_S5_FDL*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_S5_FDL*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Tags
- D: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	This will display the WinCC Explorer.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	Create a New Project
	Single-User Project
	B Service Compared Service Se
	C Multi-Client Project
	Open an Existing Project
	OK Cancel

Step	A: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_S5_FDL</i> . In the <i>Project Path</i> field, set the storage location of the new project.
	The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.
	Project Name: Project Name: WinCC_S5_FDL New <u>Subfolder:</u> WinCC_S5_FDL You can use this dialog box to create a new WinCC project.

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	<u>P</u> roperties

Step	B: Creating the Connection
2	The dialog box <i>Add New Driver</i> will be displayed. This dialog box lists all communication drivers that can be installed. For the communication to the <i>SIMATIC S5</i> via <i>PROFIBUS FDL</i> , the driver <i>SIMATIC S5 PROFIBUS FDL</i> is required. Select this driver from the dialog box. Exit the dialog box by clicking on Open.
	Add new driver. ? × Look jn: Bin Image: Comparison of the second
	PDLCache SIMATIC S5 PMC Profibus.chn SIMATIC S5 PMC Profibus.chn SIMATIC S5 Profibus FDL.chn SIMATIC S5 Ethernet Layer 4.chn SIMATIC S5 Ethernet Layer 4.chn SIMATIC S5 Ethernet TF.CHN
	▼ Image: SIMATIC S5 Profibus FDL.chn Files of type: WinCC Communication Driver (*.chn) Cancel
3	The newly added driver <i>SIMATIC S5 PROFIBUS FDL</i> will be displayed as a sub-entry to <i>Tag Management</i> . The driver contains a channel unit named <i>FDL (CP5412/A2-1)</i> . Create a new
	connection for this channel unit by OR on <i>FDL</i> (<i>CP3412/A2-1</i>) and then selecting <i>New Driver Connection</i> from the pop-up menu.

Step	B: Creating the Connection
4	The properties dialog box of the connection will be displayed.
	In the <i>General</i> tab, the <i>Name</i> of the new connection is entered. In this sample, this is <i>S7_FDL_01</i> .
	Click on the <i>Properties</i> button to define the connection properties.
	Connection properties
	General
	Name: S5_FDL_01 Properties
	Unit: FDL (CP5412/A2-1)
	Server List
	ZIP-WS4
	OK Cancel Help

Step	B: Creating the Connection
5	The dialog box Connection Properties will be displayed.
	In the <i>Connection</i> tab, the parameters of the desired communication connection are defined.
	In the <i>Profibus</i> field, the PROFIBUS address of the PLC in entered. In this sample, the <i>PLC Station Address</i> has the value 9. The <i>Priority</i> is set to <i>Low</i> .
	In the <i>READ Function</i> area, the connection settings for reading data from the PLC are made. In order for WinCC to request the data actively, the radio-button <i>OS active, WinCC is the active Partner</i> must be selected. The values for the local Service Access Point and the remote Service Access Point must be defined. In this sample, the value 6 is entered in the <i>Local SAP</i> field and the value 5 in the <i>Remote SAP</i> field.
	In the <i>WRITE Function</i> area, the connection settings for writing data to the PLC are made. The values for the local Service Access Point and the remote Service Access Point must be defined. In this sample, the value 4 is entered in the <i>Local SAP</i> field and the value 3 in the <i>Remote SAP</i> field.
	The values entered in this dialog box for the remote SAP have been defined during the creation of the FDL connections for the communication processor <i>CP 5431</i> . The values for the local SAP were already entered in the startup blocks during the creation of the STEP5 program.
	Close the dialog box by clicking on <i>OK</i> .
	Connection Parameters ×
	- Profibue
	PLC Station Address 9 O High
	READ - Funktion OS active, WinCC is the active partn OS active, WinCC is the active partn
	Foreign SA 5
	WRITE - Function
	Foreign SA 3
	OK Cancel Help

Step	B: Creating the Connection
6	Setting the system parameters of the channel unit.
	These settings are made in the System Parameters dialog box, which is accessed
	via a $\sqrt[6]{CR}$ on the <i>FDL</i> (<i>CP5412/A2-1</i>) entry and then selecting <i>System</i>
	Parameters from the pop-up menu.
	In the displayed dialog box, the access point used by WinCC to access the PLC is defined in the <i>Device Name</i> field. By default, the access point <i>CP_L2_1</i> : is set. Previously, during the installation of the communication processor in the computer, the <i>CP 5412 A2</i> has been assigned to the access point CP_L2_1:.
	Close the dialog box by clicking on OK.
	System Parameter
	System Parameter
	Device Name /CP_L2_1:/SCP
	Monitoring Cycles
	Writing/reading of process values
	Maximum Waiting Time 30
	Cancel Apply

C: Creating the WinCC Tags

Step	C: Creating the WinCC Tags
1	Creation of the WinCC tags required for the sample.
	This is done via a UR on the newly created connection <i>S5_FDL_01</i> and then selecting <i>New Tag</i> from the pop-up menu. SIMATIC S5 PROFIBUS FDL FDL (CP5412/A2-1)
	New <u>G</u> roup <u>New Tag</u> <u>F</u> ind Cu <u>t</u>
	Copy Paste Delete Properties
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16x_S5FDL01_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type. Click on the <i>Select</i> button to set the <i>Address</i> of the new tag.
	Tag properties
	General Limits/Reporting
	Properties of Tags
	Name: S16x_S5FDL01_01
	Datatype : Signed 16-bit value
	Length: 2
	Address:
	Adapt romat. Short1 oSignedWord
	O Project-wide update O Computer-local update
	Linear scaling
	Process Value Range Tag Value Range
	From
	То

Step	C: Creating the WinCC Tags
3	The dialog box Address Properties will be displayed.
	Set <i>DB</i> as the <i>Data Range</i> and the value 5 as the <i>DB No</i> . Set <i>Word</i> in the Address field and the value 0 in the <i>DW</i> field. Close the dialog how by clicking
	on OK . The properties dialog box of the tag is also closed by clicking on OK .
	The just created WinCC tag is addressed in the range of the DB5, where the first
	of the two values to be added is located.
	clicking on the OK button.
	Address properties
	Address
	Description
	Data DB 💌 D <u>B</u> No. 5
	Address Word
	DW 0 Length 1
	OK Cancel Help
4	Creation of the remaining WinCC tags required.
	and addresses of the tags used in this sample are listed in the following graphic.
	Name Type Parameters
	S16x_S5FDL01_01 Signed 16-bit value DB5,DW0
	S16x_S5FDL01_02 Signed 16-bit value DB5,DW1
	S16x_S5FDL01_03 Signed 16-bit value DB5,DW2

D: Creating the WinCC Screen

Step	D: Creating the WinCC Screen
1	Creation of a WinCC screen in which the previously created tags are visualized.
	Open the <i>Graphics Designer</i> editor via a ${}^{\mathcal{O}}\mathbb{B}R$ and then selecting <i>Open</i> from the pop-up menu.
	Graphics Designer Open New picture Graphic OLL Select ActiveX Control Convert pictures Convert global library Convert project library <u>F</u> ind Properties
2	This will open the <i>Graphics Designer</i> editor with a new (blank) screen.
	To display the first tag, configure a <i>Smart Object</i> → <i>VO Field</i> . To do so, select the <i>I/O Field</i> object from the <i>Object Palette</i> and place it on the screen using the mouse. Objects Objects Object Palette Standard Objects Standard Objects Standard Objects Object Palette Objects Standard Objects Standard Objects Standard Objects Standard Objects Other Window OLE Element WO Field Status Display Text List Status Objects Standard Display Windows Objects Standard Econtrols
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed. In the <i>Tag</i> field, set the tag <i>S16x_S5FDL01_01</i> via the button displayed below.

Step	D: Creating the WinCC Screen
	Leave the <i>Update</i> of the tag at 2 s. Keep the default settings for the remaining options. Close the dialog box by clicking on <i>OK</i> .
	I/O-Field Configuration
	Tag: S16x_S5FDL01_01
	Update: 2 s
	Туре
	O Output O Input O Both
	Format
	Font Size 12
	Font Name Arial
	Color
	Cancel
4	Changing the output format of the <i>I/O Field</i> .
	For this, open its properties dialog box via a $\frac{1}{2}$ R on the <i>I/O Field</i> and then
	select <i>Properties</i> from the pop-up menu.
	K Cut Ctrl+X
	■ <u>Copy</u> Ctrl+C
	Paste Ctrl+V
	Delete Del
	Custo <u>m</u> ized object
	Linking
	Configuration Dialog
	Piopentes

Step	D: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed. On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a OD on the output format set, the field can be edited. Select the new format <i>s99999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits. Close the dialog box by clicking on <i>OK</i> .
	I/O Field Attribute Static Dynamic Curr I Geometry Field Type I/O Field
6	Creation of three additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields.
7	Save the screen. In the sample project, the screen is saved under the name <i>com_3_S5FDL_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.



9.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_S5_FDL* and the SIMATIC S5 station. A diagnosis of the sample according to this description makes only sense, if the checks listed below have been completed successfully. Startup of the Communication Processor CP 5412 A2

- E: Testing the Communication Processor
- Creation of the STEP5 Project S5FDLst
- D: Starting up the PLC

Setting the PG/PC Interface

Step	Setting the PG/PC Interface
1	Diagnosis of the communication connection via the program <i>Setting the PG/PC</i> <i>Interface</i> .
	This program is accessed via Start \rightarrow Settings \rightarrow Control Panel \rightarrow Setting the PG/PC Interface.
	Setting the PG/PC Interface
2	The program Setting the PG/PC Interface will be displayed.
	Select the interface <i>CP 5412 A2 (PROFIBUS)</i> . Make sure that the assignments
	between access points and the interfaces are not changed.
	Diagnostics button.
	Setting the PG/PC Interface (V5.0)
	Access Path
	Access point of application:
	CP_L2_1:> CP5412A2(PR0FIBUS)
	(for CP5412A2 SIMATIC NET)
	Interface parameter set used:
	CP5412A2(PROFIBUS) <active> Properties</active>
	CP5412A2(MPI)
	TCP/IP -> DEC PCI Fast Ethernet Copy
	Delete
	(Configuration of your Communications Processor CP 5412 (A2) for a PROFIBUS-Network)
	Interfaces
	Install
	OK Cancel Help

Step	Setting the PG/PC Interface
3	The dialog box <i>Simatic NET Diagnostics</i> will be displayed. From the <i>PROFIBUS/MPI Network Diagnostics</i> tab, the diagnosis of the communication connection is started by clicking on the <i>Read</i> button. This will display all stations accessible on the bus. For this sample, the address 8 of the communication processor <i>CP 5412 A2</i> as well as the address 9 of the communication processor <i>CP 5431</i> must be marked as occupied. The dialog box can be exited by clicking on <i>OK</i> .
	SIMATIC NET diagnostics Image: Constraint of the second secon
	OK Cancel Apply Help

WinCC Explorer

Step	WinCC Explorer
1	Diagnosis of the communication connection from the <i>WinCC Explorer</i> . Switch the project <i>WinCC_S5_FDL</i> into runtime. This is done from the <i>WinCC</i>
	Explorer via the toolbar button displayed below.
	The created WinCC screen <i>com_3_S5FDL_01.pdl</i> can also be switched directly from the <i>Graphics Designer</i> into runtime.
2	In the <i>WinCC Explorer</i> , a dialog box for monitoring all configured connections
	can be accessed via the <i>Tools Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.
	Tools
	Language
	Status of <u>D</u> river Connections
2	
3	The dialog box Status - Logical Connections will be displayed. This dialog box lists all configured connections. For this sample, only the
	connection S5_FDL_01 will be displayed.
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Undate</i> of the display
	can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 3 S5_FMS_01 OK 28 O O O
	Update Cyclic update (4 * x 250 ms) Update <u>H</u> elp <u>Close</u>

Step	WinCC Explorer
4	Another way to obtain information about the connection status in general and about the connection status of individual tags is provided by <i>Tag Management</i> .
	The status of a configured connection can be displayed as a tooltip by simply pointing the mouse on the connection in question.
	Name Parameters Last Change
	S5_FDL_01 9 ,6 ,5 ,4 ,3 , 0, 0 17.04.99 13:09:14
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type
	S16x_S5FDL01_01 Signed 16-bit value
	NS Process value: 76 Quality: c0 Last Change:7/5/99 12:46:41 PM

10 Communication WinCC-WinCC via OPC

The projects created in this chapter can also be copied directly from the online document to your hard drive. By default, they will be copied to the folder C:\Communication_Manual. You have the option to copy the following components to the hard drive:



The server WinCC project we will create.



The client WinCC project we will create.

This chapter describes in detail the startup of a communication connection between two *WinCC Stations* via *OPC*.

On the computer acting as the server, the *WinCC OPC Server* is installed, which makes the data of a WinCC project available to other applications on the same computer and to applications on computers that are accessible from the network.

Overview of the Structure of the Sample



On the computer designated as the server, the *WinCC OPC Server* from the *WinCC CD-ROM* must be installed. This can be done during the installation of WinCC. On the computer designated as the client, the *WinCC OPC Client* from the *WinCC CD-ROM* must be installed. This can be done during the installation of WinCC as well. Both WinCC stations can be connected to each other using any type of network connection.

Overview of the Configuration Steps

The following lists all configuration steps necessary for the creation of the communication connection:

- Configuration of the WinCC Stations
- Creation of the WinCC Project WinCC_OPC_SERVER
- Creation of the WinCC Project WinCC_OPC_CLIENT
- Diagnosis of the Communication Connection

Required Software

Name	Description
WinCC	WinCC with <i>OPC Server</i> and <i>OPC Client</i> for the creation of the WinCC projects.

Required Compute Hardware

Name	Description
Network Access	Any type of network access to establish a connection to the network.

10.1 Configuration of the WinCC Stations

The following description contains notes that should be observed during the configuration of the WinCC stations.

In general, three configurations for the access from a WinCC client station to an OPC server are possible. These configurations differ, depending on where both components are located:

- Server and client are located on the same computer
- Server and client are located on different computers of the same workgroup
- Server and client are located on different computers within the same domain or in different domains with trust setting

The first of the configurations mentioned is not practical for the communication between a WinCC OPC server and a WinCC OPC client. However, this configuration can be applied to other cases, e.g. for the communication to the S7 OPC Server.

For the steps described below, the conditions existing on site must be considered.

- A: Installing the Software Components
- B: Organization of the Network
- C: Organization of the User Structure
- D: Setting the DCOM Configuration

A: Installing the Software Components

Step	A: Installing the Software Components
1	The <i>OPC Server</i> and the <i>OPC Client</i> from WinCC are required. Both components are located on the WinCC installation CD-ROM.
	On the computer designated as the server, the <i>OPC Server</i> must be installed. This can be done during the installation of WinCC or at a later time.
	On the computer designated as the client, the <i>OPC Client</i> must be installed. This can also be done during the installation of WinCC.
	After these components have been installed on the respective computers, they must be restarted.
	Select Components
	Select the components that you want to install, and deselect the components that you want to remove.W Components WinCC 52263 K Help 80792 K Communication 6720 K Options 0 K
	Space Required: Available: 460096 K
	< <u>B</u> ack <u>N</u> ext > Cancel

B: Organization of the Network

Step	B: Organization of the Network
1	Organization of the network.
	The settings required on each computer for the organization of the network are made in the <i>Network</i> program of the Windows Control Panel. This program is accessed via <i>Start</i> \rightarrow <i>Settings</i> \rightarrow <i>Control Panel</i> \rightarrow <i>Network</i> .
	In the <i>Identification</i> tab, the assignment of the computer to either a workgroup or a domain can be changed via the <i>Change</i> button.
	Network
	Identification Services Protocols Adapters Bindings
	Windows uses the following information to identify your computer on the network. You may change the name for this computer and the workgroup or domain that it will appear in.
	Computer Name: CLIENT_PC
	Domain: OPC_WORKGROUP
	<u>C</u> hange
	Cancel

Step	C: Organization of the User Structure
1	Definition of the users on both computers.
	This is done for each computer in the User Manager program. This program is started via Start \rightarrow Programs \rightarrow Administrative Tools (Common) \rightarrow User Manager.
	If a workgroup is used, ensure that the user of the client station is known on the server station. Additionally, the user of the server station must also be known on the client station in order for the full functionality of <i>OPC</i> to be utilized.
	If the domain concept is used, this must not be remembered, because all users are known in the entire domain. However, for the access to a server station across domains, a mutual trust setting on both domains is required.

D: Setting the DCOM Configuration

Step	D: Setting the DCOM Configuration
1	Setting the DCOM configuration for the WinCC OPC Server.
	The DCOM configuration is set via the program DCOM Configuration
	<i>Properties.</i> This program is started via <i>Start</i> \rightarrow <i>Run</i> and then entering the program file name <i>dcomcnfg.exe</i> .
	Run ? 🗙
	Type the name of a program, folder, or document, and Windows will open it for you.
	Open: dcomcnfg.exe
	Run in Separate Memory Space
	OK Cancel <u>B</u> rowse

Step	D: Setting the DCOM Configuration
2	The program <i>DCOM Configuration Properties</i> will be displayed. In the <i>Applications</i> tab, select the entry of the <i>WinCC OPC Server</i> . This is the entry <i>OPCServer.WinCC</i> . Clicking on the <i>Properties</i> button will open its properties dialog box.
	Distributed COM Configuration Properties ? × Applications Default Properties Default Security Default Protocols Applications:
	Properties
	OK Cancel Apply

Step	D: Setting the DCOM Configuration
3	The dialog box OPCServer. WinCC Properties will be displayed.
	In the <i>Security</i> tab, specify who has access to the <i>WinCC OPC Server</i> . The radio- button <i>Use custom access permissions</i> is selected. By clicking on the now enabled <i>Edit</i> button, the access permissions can be set. Among other things, the <i>System</i> must be accessible.
	During the configuration phase it makes sense to give access permissions to everybody to rule out problems due to insufficient access rights. After the successful commissioning of the communication, you can still limit the access rights of certain users if necessary.
	OPCServer.WinCC Properties General Location Security Identity Identity Use default access permissions Image: Security Use custom access permissions
	You may Registry Value Permissions
	Registry Value: AccessPermission <u>D</u> wner: Manfred (Manfred Bader) O Use d Name:
	O Use c Erlauben Zugreifen You may Manfred (Manfred Bader) Erlauben Zugreifen SYSTEM Erlauben Zugreifen O Use d Use d
	Image: Second state Image: Second state You may applicatio Image: Second state Image: OK Cancel Add Image: OK Cancel Add
	OK Cancel Apply

Step	D: Setting the DCOM Configuration
4	In the <i>Identity</i> tab, the radio-button <i>The interactive user</i> is selected.
	The dialog box <i>OPCServer.WinCC Properties</i> can be closed by clicking on <i>OK</i> .
	General Location Security Identity
	Which user account do you want to use to run this application?
	The interactive user
	C The Jaunching user
	O This <u>u</u> ser:
	Usgr: Browse
	Password:
	Confirm Password:
	C The System Account (services only)
	OK Cancel Apply

Step	D: Setting the DCOM Configuration
5	In the <i>Default Properties</i> tab, the general properties of the DCOM communication are defined.
	DCOM must be activated on the computer. Via the <i>Default Authentication Level</i> list box, the desired security at the packet level can be defined. Via the <i>Default Impersonation Level</i> list box, you can specify if accessing clients can be identified.
	During the configuration phase it makes sense to choose the lowest security level for both settings. This rules out problems caused by these settings from the beginning.
	The program <i>DCOM Configuration Properties</i> can also be exited by clicking on <i>OK</i> .
	Distributed COM Configuration Properties
	Applications Default Properties Default Security
	☑ Enable Distributed COM on this computer
	Default Distributed COM communication properties
	The Authentication Level specifies security at the packet level.
	Default Authentication Level:
	[None]
	The Impersonation Level specifies whether applications can determine who is calling them, and whether the application can do operations using the client's identity.
	Default Impersonation Level:
	Anonymous
	Provide additional security for reference tracking
	OK Cancel Apply
10.2 Creation of the WinCC Project WinCC_OPC_SERVER

The following description details the configuration steps necessary to create and successfully start up the WinCC project *WinCC_OPC_SERVER*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_OPC_SERVER*:

- A: Creating the WinCC Project
- B: Creating the Internal Tags
- C: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via $Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.$
	WinCCExplorer
2	The WinCC Explorer will be displayed.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	WinCC Explorer ? × Create a New Project
	© Open an Existing Project

Step	A: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_OPC_SERVER</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.
	Create a new project ? × Project Name: Project Path WinCC_OPC_SERVER Create New Subfolder: Eolder WinCC_OPC_SERVER Help Vou can use this dialog box to create a new WinCC project. Trive: Drive: C:

B: Creating the Internal Tags

Step	B: Creating the Internal Tags
1	Creation of the internal tags required for the sample.
	This is done in <i>Tag Management</i> via a \mathcal{B} R on the <i>Internal Tags</i> entry and then selecting <i>New Tag</i> from the pop-up menu.
	□

Step	B: Creating the Internal Tags
2	The properties dialog box of the tag will be displayed. In the sample, the <i>Name</i> of the first tag is <i>S16i_OPCServer_01</i> . The tag is of the <i>Signed 16-Bit Value</i> data type.
	Tag properties
	General Limits/Reporting
	Properties of Tags
	Name: S16i_OPCServer_01
	Datatype : Signed 16-bit value
	Length: 2
	Address: Select
	Adapt format:
	Linear scaling
	Process Value Range
	From
	То
	OK Cancel Help
3	Creation of the remaining tags required.
	Follow steps 1 to 3 for the creation of the remaining tags. The names, data types
	S16_OPCServer_01 Signed 16-bit value Internal tag
	S16i_OPCServer_02 Signed 16-bit value Internal tag
	S16i_OPCServer_03 Signed 16-bit value Internal tag
	STOLOFCSEIVELU4 Signed to bit value Internatitag

C: Creating the WinCC Screen



Step	C: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed
	In the <i>Tag</i> field, set the tag <i>SERVER_PC_S16i_OPCServer_01</i> via the button displayed below.
	The <i>Update</i> of the tag is set to <i>Upon Change</i> . Keep the default settings for the remaining options. Close the dialog box by clicking on <i>OK</i>
	I/O-Field Configuration
	Tag: \$16i_OPCServer_0 Update: Bei Änderung Type Output Output Input Format Fort Size 12
	Font Name Arial
	Cancel
4	Changing the output format of the <i>I/O Field</i> .
	For this, open its properties dialog box via a ${}^{\bullet}\mathbb{C}R$ on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	0.000
	<u>D</u> elete Del
	Custo <u>m</u> ized object
	Linking
	Configuration Dialog
	Properties

Step	C: Creating the WinCC Screen
5	The dialog box <i>Object Properties</i> will be displayed. On the left side of the <i>Properties</i> tab, select the entry <i>Output/Input</i> . Via a OD on the output format set, the field can be edited. Select the new format <i>s999999</i> . This format enables the <i>I/O Field</i> to display signed values with a maximum of 5 digits.
	Hobject Properties ? × I/O Field I/O Field
	Image: Properties Events Image: Properties Events Image: Properties Attribute Image: Properties Attribute Image: Properties Field Type Image: Properties Properties <
6	Creation of three additional <i>I/O Fields</i> for the display of the remaining tags. Follow steps 2 to 5 to create the remaining I/O fields.
7	Creation of a simple tag simulation. The sum of the tags $S16i_OPCServer_01$ and $S16i_OPCServer_02$ is to be stored in the tag $S16i_OPCServer_03$. The value of the tag $S16i_OPCServer_04$ is to be incremented every 250ms. These tasks are performed by to <i>C</i> Actions. These actions are configured at the <i>Properties</i> \rightarrow <i>Geometry</i> \rightarrow <i>Position</i> X of the <i>I/O Fields</i> displaying the results. For a detailed description of the <i>C</i> Actions used, refer to section at the end.

Step	C: Creating the WinCC Screen
8	Save the screen.
	In the sample project, the screen is saved under the name <i>com_3_OPCServer_01.pdl</i> . The screen can be switched directly to runtime from the <i>Graphics Designer</i> via the button displayed below.
	Runtime
	By entering values in the individual <i>I/O Fields</i> , the tag values can be changed.
	WinCC-Runtime -
	Communication OPC WinCC Server Station
	+5 Inc: +155
	+ + + 23
	+28

C Action for Generating the Sum

```
#include "apdefap.h"
long _main(char* lpszPictureName, char* lpszObjectName, char* lpszPropertyName)
{
//get tag values
int iValue_01 = GetTagSDWord("S16i_OPCServer_01");
int iValue_02 = GetTagSDWord("S16i_OPCServer_02");
//calculate sum and set tag value
SetTagSDWord("S16i_OPCServer_03",(iValue_01 + iValue_02));
//return constant property value
return GetLeft(lpszPictureName,lpszObjectName);
}
```

- The *C* Action displayed above is configured for the *I/O* Field3 object at Properties → Geometry → Position X. The *C* Action is triggered upon the change of the tags *S16i_OPCServer_01* and *S16i_OPCServer_02*.
- The values of the tags *S16i_OPCServer_01* and *S16i_OPCServer_02* are read and their sum written into the tag *S16i_OPCServer_03*.
- The *C Action* is configured at an object property, which only serves for providing a trigger. The current value of the property is returned back to it.

C Action to Increment

```
#include "apdefap.h"
long _main(char* lpszPictureName, char* lpszObjectName, char* lpszPropertyName)
{
//get tag value
int iValue = GetTagSDWord("S16i_OPCServer_04");
if (iValue < 10000)
{
    //increment and set tag value
    SetTagSDWord("S16i_OPCServer_04", ++iValue);
}
else
{
    //reset tag value
    SetTagSDWord("S16i_OPCServer_04", 0);
}
//return constant property value
return GetLeft(lpszPictureName, lpszObjectName);
}
• The C Action displayed above is configured for the I/O Field4 object at Properties</pre>
```

- \rightarrow Geometry \rightarrow Position X. The C Action is triggered every 250ms.
- The value of the tag *S16i_OPCServer_04* is read. If this value has not reached 10000, it will be incremented and written back to the tag. Otherwise the tag value is set to zero.
- The *C Action* is configured at an object property, which only serves for providing a trigger. The current value of the property is returned back to it.

10.3 Creation of the WinCC Project WinCC_OPC_CLIENT

The following description details the configuration steps necessary to create and successfully start up the WinCC project *WinCC_OPC_CLIENT*.

Overview of the Configuration Steps

The following lists the configuration steps necessary to create the WinCC project *WinCC_OPC_CLIENT*:

- A: Creating the WinCC Project
- B: Creating the Connection
- C: Creating the WinCC Screen

A: Creating the WinCC Project

Step	A: Creating the WinCC Project
1	Creation of a new WinCC project in the WinCC Explorer.
	The WinCC Explorer is started via Start \rightarrow Simatic \rightarrow WinCC \rightarrow Windows Control Center.
	WinCCExplorer
2	The WinCC Explorer will be displayed.
	Via the menus $File \rightarrow New$, the dialog box for specifying the properties of a new WinCC project will be opened.
	For this sample project, a Single-User Project is created.
	Exit the dialog box by clicking on OK.
	WinCC Explorer ? × Create a New Project
	Open an Existing Project OK Cancel

Step	A: Creating the WinCC Project
3	The dialog box <i>Create a new Project</i> will be displayed. Specify a <i>Project Name</i> for the new project. The names of the WinCC projects created within the framework of this manual all start with <i>WinCC</i> and also include a reference to the communication partner and communication type used. The project of this sample has the name <i>WinCC_OPC_CLIENT</i> . In the <i>Project Path</i> field, set the storage location of the new project. The dialog box <i>Create a new Project</i> is concluded by clicking on the <i>Create</i> button.
	Create a new project ? × Project Name: Project Path WinCC_OPC_CLIENT Eolder WinCC_OPC_CLIENT Image: Display the second secon

B: Creating the Connection

Step	B: Creating the Connection
1	The new project will be displayed in the WinCC Explorer.
	Installation of the required communication driver. This is performed via a OR on <i>Tag Management</i> and selecting <i>Add New Driver</i> from the pop-up menu.
	🗄 📑 Internal tags 🔤 Add <u>N</u> ew Driver
	<u>F</u> ind
	<u>P</u> roperties

Step	B: Creating the Connection
2	The dialog box Add New Driver will be displayed.
	This dialog box lists all communication drivers that can be installed. This sample requires the communication driver <i>OPC</i> . Select this driver from the dialog box. Exit the dialog box by clicking on <i>Open</i> .
	Add new driver.
	Look in: 🔄 Bin 💌 🖭 💼 🏢
	CcTlg SIMATIC S5 PMC Profibus.chn PDLCache SIMATIC S5 Profibus FDL.chn OPC.chn SIMATIC S7 Protocol Suite.CHN SIMATIC S5 Ethernet Layer 4.chn TIEth.chn
	SIMATIC S5 Ethernet TF.CHN
	File <u>n</u> ame: OPC <u>Open</u>
	Files of type: WinCC Communication Driver (*.chn)
3	The newly added communication driver <i>OPC</i> will be displayed as a sub-entry to <i>Tag Management</i> .
	The communication driver OPC contains one channel unit.
	The creation of a connection to a certain OPC server and the selection of the items required by this server can be carried out via the <i>OPC Item Manager</i> . The
	OPC Item Manager is started via ${}^{f}\mathbb{O}R$ on the channel unit <i>OPC Groups</i> (<i>OPCHN Unit #1</i>) and then selecting <i>System Parameters</i> from the pop-up menu.
	OPC OPC Groups (OPCHN New Driver Connection
	System Parameter
	Eind Easte
	Pr <u>o</u> perties

Step	B: Creating the Connection
4	The OPC Item Manager will be displayed.
	The desired OPC server can be selected from here. This server can be located on the local computer or on another computer accessible by the network. As illustrated below, the desired OPC server of this sample is located on the <i>SERVER_PC</i> computer in the <i>OPC_WORKGROUP</i> workgroup.
	Via a OD on the entry of a workgroup or domain, all available computers
	OPC servers configured on it will be listed.
	From the desired server station, select the entry <i>OPCServer.WinCC</i> of the <i>WinCC OPC Server</i> . Via the <i>Browse Server</i> button, a listing of all items made available by this <i>WinCC OPC Server</i> can be displayed. However, this will only be the case if the WinCC project has been opened on the server station.
	🐢 OPC Item Manager 📃 🖂 🗙
	<u>File View Options H</u> elp
	Image: Microsoft Windows-Netzwerk Image: Computer Image: OPC_WORKGROUP Image:
	<u>▼</u> <u>E</u> xit
	Select the desired OPS server from the list.
5	The dialog box <i>Filter Criteria</i> will be displayed.
	Using this dialog box, the type of the desired items can be specified more exactly. If you want to display all available items, no settings are required. The dialog box can be closed by clicking on <i>Continue-></i> .
	Filter Criteria
	Filter:
	Type: All Types
	Access Authorization ☐ <u>R</u> ead access ☐ <u>W</u> rite access
	<- Back

Step	B: Creating the Connection
6	A dialog box for selecting the desired items will be displayed.
	The four internal tags previously created in the server project will be offered for selection as items of the <i>WinCC OPC Server</i> . However, this will only be the case if the WinCC project on the server station is in runtime.
	Select these four items from the right window. By clicking on the button <i>Add Items</i> , they will be inserted into the WinCC project.
	OPCServer.WinCC - (SERVER_PC)
	Items Data Type Internal tags Signed 16-bit value Sifi_OPCServer_01 Signed 16-bit value Sifi_OPCServer_02 Signed 16-bit value Sifi_OPCServer_03 Signed 16-bit value Sifi_OPCServer_03 Signed 16-bit value Sifi_OPCServer_04 Signed 16-bit value
	<- Back Item Properties
7	This requires the creation of a new connection into which these items can be inserted as WinCC tags. This connection can be created automatically by the <i>OPC Item Manager</i> . The dialog box <i>New Connection</i> will be displayed. In this dialog box, only the name of the new connection must be entered. In this sample, the name <i>WinCC_OPC_01</i> is used. Close the dialog box by clicking on <i>OK</i> .
	New Connection × Please enter a name for the new connection: WinCC_OPC_01
	OK Cancel

Step	B: Creating the Connection
8	The dialog box Add Tags will be displayed.
	In this dialog box, the connection is defined to which the tags are added. In this sample, the tags are added to the connection <i>WinCC_OPC_01</i> created previously. This connection is selected from the field <i>Add Here</i> at the bottom.
	Optionally, a <i>Prefix</i> and a <i>Suffix</i> can be added to the tag names used by the <i>OPC Item Manager</i> . In this sample, the <i>prefix SERVER_PC_</i> is placed in front of the tag names.
	Clicking on the Finish button creates the WinCC tags.
	The dialog box for the selection of the desired items can be exited via the <i><-Back</i> button. The <i>OPC Item Manager</i> can be exited via the <i>Close</i> button.
	Add Tags
	Tags to be added:
	Tag names shall be completed by : Prefix Name Suffix
	SERVER_PC_ ExampleTag
	Example: SERVER_PC_ExampleTag
	Add here:
	WinCC_OPC_CLIENT.MCP
	<- Back [Finish]
9	The following graphic lists the WinCC tags created by the OPC Item Manager.
	Name Type Parameters SERVER_PC_S16i_0PCServer_01 Signed 16-bit value "S16i_0PCServer_01", "", 2 SERVER_PC_S16i_0PCServer_02 Signed 16-bit value "S16i_0PCServer_02", "", 2 SERVER_PC_S16i_0PCServer_02 Signed 16-bit value "S16i_0PCServer_02", "", 2
	SERVER_PC_S16i_OPCServer_03 Signed 16-bit value "S16i_OPCServer_03", "", 2 SERVER_PC_S16i_OPCServer_04 Signed 16-bit value "S16i_OPCServer_04", "", 2

C: Creating the WinCC Screen

Step	C: Creating the WinCC Screen
1	Creation of a WinCC screen in which the previously created tags are visualized.
	Open the <i>Graphics Designer</i> editor via a \mathcal{P} R and then selecting <i>Open</i> from the pop-up menu.
	Graphics Designer Open New picture Graphic OLL Select ActiveX Control Convert pictures Convert global library Convert project library <u>Find</u> Properties
2	This will open the <i>Graphics Designer</i> editor with a new (blank) screen. To display the first tag, configure a <i>Smart Object</i> \rightarrow <i>I/O Field</i> . To do so, select the <i>I/O Field</i> object from the <i>Object Palette</i> and place it on the screen using the mouse
	Objects Image: Control status Object Palette Standard Objects Smart Objects Smart Objects Application Window Picture Window Picture Window Picture Window OLE Element Image: OLE Element Image: OLE Element Image: OLE Element

Step	C: Creating the WinCC Screen
3	After placing the <i>I/O Field</i> on the screen, its <i>Configuration</i> dialog box will be displayed.
	In the <i>Tag</i> field, set the tag <i>SERVER_PC_S16i_OPCServer_01</i> via the button displayed below.
	Leave the <i>Update</i> of the tag at 2 s. Keep the default settings for the remaining
	I/O-Field Configuration
	Tag: SERVER_PC_S16i Update: 2 s Type Output Output Input Format Font Size 12 Font Name Arial Color
	OK Cancel
4	Changing the output format of the <i>I/O Field</i> .
	For this, open its properties dialog box via a $\mathcal{T}R$ on the <i>I/O Field</i> and then select <i>Properties</i> from the pop-up menu.
	Image: Cut Cut Ctrl+X Image: Copy Ctrl+C Duplicate Duplicate Image: Cut-Duplicate Ctrl+V Delete Del Customized object Image: Cut-Duplicate Group object Image: Cut-Duplicate
	Linking
	Configuration Dialog Properties



Step	C: Creating the WinCC Screen
	If there is no connection, the <i>I/O Fields</i> will be displayed grayed out. In this case an error is present at some point of the communication connection.
	* 0

10.4 Diagnosis of the Communication Connection

The following describes the options available for diagnosing the communication connection between the WinCC project *WinCC_OPC_SERVER* and the WinCC project *WinCC_OPC_CLIENT*.

Depending on the transport protocol used (e.g. TCP/IP), timeout times of up to 6 minutes can occur. Because of this, corrections may only show effects after several minutes.

WinCC Explorer

Step	WinCC Explorer
1	Diagnosis of the communication connection from the WinCC Explorer.
	Switch the project <i>WinCC_OPC_CLIENT</i> into runtime. This is done from the
	WinCC Explorer via the toolbar button displayed below. The project
	WinCC_OPC_SERVER must also be in runtime.
	Activate
2	In the WinCC Explorer, a dialog box for monitoring all configured connections
	can be accessed via the <i>Tools</i> \rightarrow <i>Status of Driver Connections</i> menu. This menu point is only accessible if the project is in runtime.
	Tools
	Language
	Status of <u>D</u> river Connections
	Status of Multi-User Operation

Step	WinCC Explorer
3	The dialog box <i>Status - Logical Connections</i> will be displayed. This dialog box lists all configured connections. For this sample, only the connection <i>WinCC_OPC_01</i> will be displayed.
	The displayed values correspond to the status at the moment the dialog box was opened. By selecting the appropriate check-box, a <i>Cyclic Update</i> of the display can be achieved.
	Status - Logical Connections
	Tag ID Name Status Tag read Read requ Tag written Write requ 5 WinCC_OPC_01 OK 89 0 4 0
	Update
	Cyclic update (4 ÷ x 250 ms) Update Help
4	Another way to obtain information about the connection status in general and
	about the connection status of individual tags is provided by <i>Tag Management</i> . The status of a configured connection can be displayed as a tooltip by simply
	pointing the mouse on the connection in question.
	Name Parameters
	WINCL_UPL_UT UPCServer.WINCL; SERVER PC; 0,00; 0; 1; 1
	The current process value of a certain tag as well as its status can be displayed as a tooltip by pointing the mouse on it. This allows you to detect errors concerning an individual tag and not the entire connection.
	Name Type
	内 Process value: 12 Quality: c0 List Change: 7/5/09 2:15:55 PM
	Last Change, 770786 2, 10,00 FM

Channel Diagnosis

Step	Channel Diagnosis
1	Diagnosis of the communication connection via the program <i>WinCC Channel</i> Diagnosis. Start this program via Start → Simatic → WinCC → Channel Diagnosis.
	Channel Diagnosis
2	The program <i>WinCC Channel Diagnosis</i> will be displayed. The <i>Channels/Connections</i> tab displays detailed information about the status of each configured connection. By default, the display is updated every second. The update cycle can be changed in the input field located at the bottom.
	Counters Value Requested Tags 16 Additem failures 0 OPC Groups 1 Items added 4 Server uses DataAccess V1.0(A) Server status RUNNING Last Error 0x00000000 Last Error Name S_OK Server Info WinCC OPC-Server

Index

A

Access Point 2-8 Industrial Ethernet 2-8, 2-38 PROFIBUS 6-7 Access Rights 5-36 Addressing 2-40

В

Bindings 3-11

С

Central Processor Module 3-22 COM PROFIBUS 8-5 COML S7 5-29 Communication Processor 3-3 CP 1411 3-3 CP 1413 2-3 CP 5412 A2 6-1 Restart 2-10 Configuration Dialog Box 2-42 Connection Parameters 2-36 Industrial Ethernet 2-36 PROFIBUS 6-35 TCP/IP 4-39

D

Data Block 2-27 Database File 5-30 DCOM 5-34 Diagnosis 2-12 IE Network Diagnosis 2-12 Industrial Ethernet 2-26 Diagnosis Buffer 2-24

Ε

ESD 2-3 Ethernet Address 2-9, 2-20

F

FDL 9-1 FMS 8-1

Η

Handling Block 7-13 RECEIVE 7-13 SEND 7-13 Hardnet Industrial Ethernet 2-1 Hardware Catalog 2-18 HWConfig 2-17

I

I/O Field 2-41 Identity 5-37 Interactive User 5-37 IP Address 4-13, 4-23 ISA Slot 2-3

J

Jumper Setting 2-3 CP 1413 2-3 CP 5412 A2 6-3

L

LAD/STL/SCF 2-27 Load 2-28

Μ

MAC Address 2-9, 2-20 Module State 2-25 Central Module 2-24 Communication Processor 2-25

Ν

NCM S7 2-14 Industrial Ethernet 2-14 PROFIBUS 6-12

0

OPC 5-41 Group 5-41 Item 5-41 OPC Item Manager 5-47 OPC Scout 5-40 S7 OPC Server 5-1 WinCC OPC Server 10-1 Operation Block 2-27

Ρ

Power Supply Unit 3-23 PROFIBUS PROFIBUS FDL 9-1 PROFIBUS FMS 8-1 Protocol Installation 3-9

R

Rack 3-22 Rack Number 2-19 Read Cyclically 2-37 Runtime 2-43

S

S7 Protocol 5-32 Setting the PG/PC Interface 2-4 SIMATIC Manager 3-18 SIMATIC S5 Industrial Ethernet 7-1 PROFIBUS FDL 9-1 PROFIBUS FMS 8-1 SIMATIC S7 Industrial Ethernet 2-1, 3-1 OPC 5-1 PROFIBUS 6-1 TCP/IP 4-1, 4-37 SINEC NCM 7-2 Single Station Project 2-32 Slot Number 2-19 Softnet Industrial Ethernet 3-1 State LED 2-23 Subnet 3-23 Subnet Mask 4-13, 4-23 System Parameters 2-37

Т

Tag Table 2-30, 2-31 Control Value 2-31 State Value 2-31 TCP/IP 4-1 TSAP 5-30

U

Update Cycle 2-42

W

WinCC Explorer 2-32