## SIMATIC PCS 7 PowerControl – Integration of Medium Voltage Switchgear according to IEC 61850

SIMATIC PCS 7 PowerControl

**Application Description • February 2013** 



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1.1 Overview

## 1 Automation Task

#### 1.1 Overview

#### Background

Users of station control systems (SAS, Station Automation System) increasingly demand the application of standardized communication protocols to enable combining various devices and systems independent of the manufacturer. In power generation and supply in particular, but also in many process automation applications of medium voltage switchgear, standard IEC 61850 has established itself. Standardized communication and engineering is the key to interoperability here.

The technology component SIMATIC PCS 7 PowerControl supports precisely this standard - IEC 61850 (Using the IEC 61850 protocol).

#### Integration of protective gear

Protective gear is used for controlling, switching, measuring and automating of electrical installations and networks. This refers to intelligent devices, so-called "Intelligent Electronic Devices" (IED), which record abnormal operating states and errors and automatically react accordingly.

In the case of an error, only the affected plant sections are switched off. This is achieved by safe, fast and selective switching-off, diagnosing and reporting of failed plant sections.





This protection technology is generally used in supply networks > 1 kV. The relevant variables are recorded indirectly with current and voltage transformers. The active elements used are circuit-breakers and protective gear.

In low voltage networks, the plant protection is generally realized by means of fuses and circuit-breakers.

#### Task of the protective gear

The task of protective gear is to allow operational over-current yet prevent undue loads on lines and devices. Due to hazardous effects in the case of a short-circuit, the affected equipment must be switched off within the shortest of time.

Otherwise, an error should only disrupt the supply for as few consumers as possible. Therefore, the protective devices within the network must detect the error, switch off by themselves or send trigger commands to the respective switches. The protective devices should be set in such a way as to allow for selective switch-off.

#### 1.2 Requirements

Apart from the high requirements for local automation, many SIMATIC PCS 7 projects also have the option to integrate and monitor the medium voltage switchgear, which supplies the power, into a total automation solution. In order to fulfill this requirement, the new technology component SIMATIC PCS 7 PowerControl was developed. It enables integrating switchgear for the power supply using the IEC 61850 communication protocol in the familiar look&feel of SIMATIC PCS 7.

In an electrical switchgear, the electrical power is distributed or transformed. Loads/consumers are bundled in load groups. The network nodes designed as busbars use switchgear to connect incoming and outgoing lines, the so-called branches. When designing such a switchgear, the change of the network topology for failures, such as enabling and grounding of operating tools for maintenance works must also be considered. 2.1 Automation of electrical switchgear with PowerControl

## 2 Solution

#### 2.1 Automation of electrical switchgear with PowerControl

Systems for automating electrical switchgear for the power supply of the process were in the past strictly separated from systems for process automation. SIMATIC PCS 7 PowerControl now enables combining the process automation and the automation of electronic switchgear for medium voltage in the range of 4 to 30 kV in a control system.



Figure 2-1: Combination of control system and power management

For switchgear automation, i.e. for protection, control measuring and monitoring tasks in the electronic power transmission and distribution, "Intelligent Electronic Devices" (IEDs) are used, e.g. SIPROTEC switchgear or interoperable "third-party" devices. These can also be integrated homogenously into the SIMATIC PCS 7 process control system via the Ethernet TCP/IP communication protocol IEC 61850.

2.1 Automation of electrical switchgear with PowerControl

#### 2.1.1 Application of the SIPORTEC 7SJ80 protective device

The SIPROTEC Compact 7SJ80 can, for the line protection of high and medium voltage networks, be used with grounded, low-resistance grounded, isolated or compensated starpoint design. As a supplement for transformer differential protection, the IED fulfils all tasks of a reserve protection.

SIPROTEC Compact 7SJ80 offers flexible protection functions. For fulfilling individual requirements, up to 20 additional protection functions can be added to the already existing protection functions. This enables realizing, for example, a frequency change protection or a reverse power protection.

Figure 2-2: SIPROTEC protection device 7SJ80



The protection device supports the control of the circuit-breaker as well as further switchgear and automation functions. The integrated programmable logic (CFC) enables the user to add own functions for automating his switchgear (interlocking). Users can furthermore create user-definable messages.

LEDs to be assigned by the user and a six-line display provide for a unique and clear display of the process states. The up to 9 function keys enable quickly and safely reacting in each situation which guarantees high operational safety.

**Note** Further information is available via the Siemens internet page:

Protection device SIPROTEC 7SJ80

#### 2.2 Advantages of PCS 7 PowerControl

#### 2.1.2 Using the IEC 61850 protocol

The **IEC 61850** standard of the International Electrotechnical Commission (IEC) describes an Ethernet-based substation automation protocol (transmission protocol) for the protection and process control of electrical switchgear of medium and high voltage technology (station automation).

The IEC 61850 protocol contains more comprehensive definitions than other protocols and is aimed at:

- interoperability between devices from different manufacturers
- long-term investment security
- efficient exchange of object-oriented data models between engineering systems

The standard has been defined in collaboration with manufacturers and users to provide a uniform, future-proof basis for protection technology, communication and control of switchgear. IEC 61850 has established itself as the worldwide communication standard on the automation of switchgear marked.

Note More information is available via the <u>IEC 61850</u> website.

#### 2.2 Advantages of PCS 7 PowerControl

The automation based on SIMATIC PCS 7 PowerControl has decisive advantages compared with previous automation solutions.

The homogenous user interface for process automation and station automation simplifies the operation and at the same time reduces the risk of operating errors in the overall system.

#### **Cost reduction**

- Only one system for automation and switchgear
- No cabling between automation and switchgear necessary
- Investment security through standardization

#### **Reduction of operational costs**

- Fewer operating staff due to one system for the process and energy sections of the plant
- Simplified maintenance through a uniform General view
- Higher availability due to fewer components Lower life cycle costs

## 2.3 Typical fields of application

Table 2-1

l able 2-1	dustry	Task
Chemical industry		<ul> <li>Reliable and operationally safe power supply</li> <li>Load shedding at power cuts</li> <li>Preventing peak loads</li> <li>High energy consumption → Energy saving</li> <li>Electrical energy = Raw material, management</li> </ul>
Food & Beverages		<ul><li>of energy</li><li>Optimizing the production</li></ul>
Water		
Glass / Solar		
Pharmaceutical industry		
Oil & Gas		
Cement		

#### 2.4 Hardware and software components used

#### 2.4 Hardware and software components used

The document on hand was generated using the following components:

#### Hardware components

Table 2-2

Component	MLFB/order number
IPC 547D	6ES7660-3AC11-2CA0
SIPROTEC 7SJ80x	7SJ8031-1EA96-3FB3
Power supply	

#### Software components

Table 2-3

Component	MLFB/order number	Note
SIMATIC PCS 7 V8.0 SP1	6ES7658-5AX08-0YA5	
SIMATIC PCS 7 PowerControl OS Engineering V8.0 SP1	6ES7658-7LX08-0YA5	Engineering expansion
SIMATIC PCS 7 PowerControl OS Runtime V8.0 SP1	6ES7658-7MX08-0YA0	OS expansion

# **Note** For configuring the SIPROTEC 7SJ80 protection device the DIGSI software is used in addition. In our text example, DIGSI is operated on one computer together with SIMATIC PCS 7.

Generally, however, we recommend installing both software components on a separate PC each.

#### 2.5 Objective of this documentation

#### 2.5 Objective of this documentation

This document describes the simple application of PCS 7 PowerControl and the integration of the SIPROTEC 7SJ80 protection device in the SIMATIC PCS 7 process control system.

Furthermore, changes in the application are explained to you using the PC\_FEEDER example project.

#### Main contents of this document

This document deals with the following main points on the topic of PCS 7 PowerControl:

- Configuration and settings
- Commissioning
- Changes in the application

#### Validity

SIMATIC PCS 7 V8.0 Upd1 or higher and SIMATIC PCS 7 PowerControl V8.0 SP1

#### Assumed knowledge

Basic knowledge of SIMATIC PCS 7 and DBA engineering is assumed.

3.1 Hardware installation

## 3 Installation

This chapter describes which hardware and software components have to be installed. It is also important to read the descriptions, manuals and any delivery information supplied with the products.

#### **3.1 Hardware installation**

#### Hardware installation

The figure below shows the hardware setup of the application.

Figure 3-1: IPC 547D and SIPROTEC 7SJ80 protection device



**NOTICE** The setup guidelines for SIPROTEC protection devices must generally be followed. For respective information see manual: <u>7SJ80xx Manual V4.6 A4</u>

#### 3.2 Installation of the PCS 7 PowerControl software

#### Hardware requirements

The PowerControl software is a technology component for the SIMATIC PCS 7 process control system and can therefore only be operated on devices which meet the hardware requirements of PCS 7.

The requirements are described in the readme file of the PCS 7 software. In contrast to the PCS 7 readme file, however, a storage capacity of 4 GB is required for large projects with more than 7500 process objects for the ES station. The virtual main memory should at least have 4GB.

#### Software requirements

A SIMATIC PCS 7 V8.0 Upd.1 installed and licensed according to the respective station type is required.

#### **Runtime environment**

Running PCS 7 PowerControl V8.0 SP1 requires, apart from PCS 7 V8.0 Upd.1, one of the following operating systems:

- Microsoft Windows XP Professional SP3 (32Bit)
- Microsoft Windows Server 2003 SP 2 Standard Edition (32Bit)
- Mircosoft Windows Server 2003 R2 SP2 Standard Edition (32Bit)
- Microsoft Windows 7 Ultimate SP1 (32Bit)
- Microsoft Windows 7 Ultimate SP1 (64Bit)
- Microsoft Windows Server 2008 SP2 Standard Edition (32Bit)
- Microsoft Windows Server 2008 R2 SP1 Standard Edition (64 Bit)

#### Communication

For the communication, the object oriented IEC 61850 protocol is used. "TCP/IP" is used as basic transmission protocol and the client - server communication is based on the "MMS" standard (Manufacturing Messaging Specification). Furthermore, two "Peer-to-Peer" services are used for the real-time communication, which are based on the Ethernet protocol. 3.2 Installation of the PCS 7 PowerControl software

#### Installation

The following table shows the installation steps to be performed.

Table 3-1: PCS 7 TeleControl installation steps

Step	Action
1.	Installation of the operating system
2.	Installation of "third party" software
3.	Installation of SIMATIC PCS 7
4.	Installation of SIMATIC PCS 7 PowerControl
5.	Installation of the authorizations and licenses

The following figure shows the package selection of the PCS 7 PowerControl setup.

Figure 3-2: PCS 7 PowerControl installation dialog

rogram packages Select the package that best suits your needs.	
Engineering PowerControl DS IEC 61850 Runtime Server PowerControl OS Server Single Station PowerControl Single Station Client OS Client	Description Select a package to obtain more information.
	Back Next> Cancel

**Note** The "PowerControl Setup Guide" documentation is referred to for a detailed description.

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#### 3.3 Functional expansion through PowerControl

SIMATIC PCS 7 PowerControl expands the familiar engineering and the process management functions of the control system.

Specific function and performance characteristics of PCS 7 PowerControl are:

#### Engineering

- Object library with function blocks, symbols and faceplates
- Object-oriented type/instances concept
- Automatic generation of the objects for the operator station
- Integration of new IEDs through the import of the IEC 61850 device description (ICD)

#### **Process management**

- Faceplates for SIPROTEC protection devices in SIMATIC PCS 7 APL style
- Uniform behavior for alarms, messages, operator control and monitoring
- Diagnostics functionality for each IED

## 4 Configuration and Settings

#### 4.1 Configuring the ES/OS station

#### 4.1.1 Creating a SIMATIC PCS 7 project

A new project is created in the SIMATIC Manager. A PC station is configured in this project.

#### **SIMATIC Manager**

- 1. Create a new project in the SIMATIC Manager via "File > New...".
- 2. Assign a project name and specify the storage path for the project.

Name	Storage path	<b></b>			
A 75J801	D:\Schnur\7sj801				
AS1	D:\ICB Saudi Arabien\Projec	x\Messe MP\As1			
AS2	D:\ICB Saudi Arabien\Project\Messe_MP\As2				
AS3_S7mEC	D:\ICB Saudi Arabien\Project	-			
AS4_IL	D:\ICB Saudi Arabien\Projec	-			
AS5 SC					
AS5_SC D:\ICB Saudi Arabien\Project\Messe_MP\AS5_S(					
	D-VICR Saudi Arabien/Projec				
ASV6dnored	D-VICR Saudi Arabien/Projec				
	D-VICR Saudi Arabien/Projec				
ASVEdopred	D-VICR Saudi Arabien/Projec	HVASV/Ednor			
ASVEdnored Add to current m	D-VICR Saudi Arabien/Projec	Ivpe:			
Add to current m Add to current m Name: PowCon_01	D-VICR Saudi Arabien/Proiac	HVASV/Ednor			
Add to current m Add to current m Name: PowCon_01	n-UCR Saudi Arabian/Broiar ultiproject th):	Iype: Project			
Add to current m Add to current m Name: PowCon_01	n-UCR Saudi Arabian/Broiar ultiproject th):	Ivpe:			

3. Configure a SIMATIC PC station in the project via context menu command "Insert New Object > SIMATIC PC Station".

Figure 4-1: SIMATIC PCS 7 project with PC station

SIMATIC Manager - [PowCon_	01 (Component view)	D:\PowerControl\O5_Kh	e\PowCon_0]				<u>- 0 ×</u>	
Eile Edit Insert PLC View								
🗋 D 😂 🔡 📾 👗 🖬 💼	💼 🖸 💁 🕒 🕻	- 🟥 🏢 🕅 < No Filter	·> 💽 🔽	뫦 🛞   🔁 🗖 [	<b>□</b>   <b>N</b> ?			
E-A PowCon_01	Object name	Symbolic name	Туре	Size Author	Last modified	Comment		
🗄 🚔 ES	😫 ES		SIMATIC PC Station		11/07/2012 01:17:13 PM			
Devices	Devices		Devices		11/07/2012 01:13:29 PM			
	8 MPI(1)		MPI	2984	11/07/2012 01:13:29 PM			
	🔀 Global labeling field		Global labeling field		11/07/2012 01:13:29 PM			
م میں بحد محصر غرمی مردو مردو مردو مردو مردو م					بدريم والمريح فالمستحجين والمحاف فا	·····	المحسمحصم	

4. Configure the SIMATIC PC station via HW Config, as familiar with PCS 7, using a WinCC application.

	Insert PLC View Options Window Help
<b>_</b>	
🖳 (0) PC	
1	WinCC Appl.
2	
3	
4	
5	
6	
8	
9	
10	
11	
12	
13	-
1.4.4	

5. Assign meaningful names for the OS application, for example, "OS\_PowCon\_01".



 In the Component view of the project you go to the Plant View. Here you call the Plant Hierarchy of the folder structure via "Options > Plant Hierarchy > Settings".

7. Make your selections regarding the representation of the Plant Hierarchy. The checkbox "Derive picture hierarchy from the plant hierarchy" must remain active in order to display the picture of the PH on the OS.

.evel Setti	-			
Level	Max. number of characters	Included in HID	With separator	OS area
<u>1</u> :	24 💼	<b>V</b>		۲
<u>2</u> :	24 📫	$\checkmark$		C
<u>3</u> :	24 🛨		2	0
<u>4</u> :	24 🗧		$\overline{\nabla}$	
<u>5</u> :	24 🔹		1	
<u>6</u> :	24 🗧		<u>I</u> √	
	Law last	_	2	
<u>Z</u> :	24 📫		197	
<u>8</u> : Preview:	24	I [] 1111111111111111111111111111111111		222222222222
<u>8</u> : Preview: Z Derive (	24 🛨	om the plant hier	 .√2222222222222222222222222222222	222222222222
<u>8</u> : Preview: Derive	24 🚆 111111111111 picture <u>h</u> ierarchy fr	om the plant hier ens from the plan	V2222222222222222222222222222222222222	22222222222
B: Preview:	24 ittittittittittittittittittittittittitt	om the plant hier ens from the plan n Standard (licens n Basic (overview	C2222222222 archy t hierarchy re required) screens only)	22222222222
B: Preview:	24 2 11111111111 sicture hierarchy fr ve diagnostic screa aintenance Station	om the plant hier ens from the plan n Standard (licens n Basic (overview	C2222222222 archy t hierarchy re required) screens only)	22222222222
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B: Preview: Derive j Derive j C M C M C M	24	om the plant hier ens from the plan n Standard (licens n Basic (overview n EDM (no AS dia n EDM (no AS dia om the names of 1	C22222222222 archy t hierarchy e required) screens only ignostics) he hardware co	mponents

#### WinCC Explorer

8. For a more consistent later configuration, it is recommended to open the OS application and creating at least one process archive value in the Tag Logging configuration.



9. The process value archive can be simply and quickly created with the "Archive wizard".



10. Subsequently, you open the OS project editor in the WinCC Project Editor. It is used to make the basic configuration of the OS. Simply confirm the basic settings by pressing the "OK" button.



This completes the configuration of the SIMATIC PCS 7 project.

#### 4.2 Configuration of the SIPROTEC protection device

The individual configuration and settings of the SIPROTEC devices are performed with the DISGI 4 software. The configuration is performed **offline**. The created data are subsequently loaded via the respective **interfaces of the** SIPROTEC protection device.

#### 4.2.1 Creating a project

An individual project must be created in the SIMATIC Manager for the SIPROTEC protection device.

The protection device cannot be integrated into the already created PCS 7 project.

- 1. Create a new project in the SIMATIC Manager via "File > New...".
- 2. Assign a project name and specify the storage path for the project.

Name	Storage path	
🞒 7SJ801	D:\Schnur\7sj801	
AS1	D:\ICB Saudi Arabien\Project\	Messe_MP\As1
AS2 🖓	D:\ICB Saudi Arabien\Project\	Messe_MP\As2
AS3_S7mEC	D:\ICB Saudi Arabien\Project\	Messe_MP\S7mEC
🞒 AS4_IL	D:\ICB Saudi Arabien\Project\	Messe_MP\II
AS5_SC	D:\ICB Saudi Arabien\Project\	
	D:\ICR.Saudi Arabian\Proiact\	ASV6door
Add to current m		ASV/6depr
Add to current m Add to current m Ame: SIPROTEC_01		<u> </u>
▲dd to current m ame:		Ivpe:
▲dd to current m ame:	ultiproject	Iype: Project

Figure 4-2: PCS 7 project for the protection device

-								
SIMA	ATIC	Manager - SIPROTEC_01						
<u>File</u> Edi	it <u>I</u>	nsert PLC <u>V</u> iew <u>O</u> ptions <u>W</u> indow	Help					
D 🚅	:   1	1 🛲   X 🖻 🖻 🕍 🔍 º		No Filter >	💽 🏹 🔡 🗑 👼			
				- 1)		2 — m   •		
	Þ	PowCon_01 (Component view)	D:\PowerControl\05_K	he\PowCon_0				
	Γ	SIPROTEC_01 (Component vie	w) D:\PowerControl	\05_Khe\Siprotec				1
		SIPROTEC_01	Object name	Symbolic name	Туре	Size Author	Last modified	
			Devices		Devices		11/07/2012 01:55:48 PM	
			MPI(1)		MPI	2984	11/07/2012 01:55:48 PM	
			🗒 Global labeling field		Global labeling field		11/07/2012 01:55:48 PM	
					-			
					· · · · · · · · · · · · · · · · · · ·	and the second second second		

Note

#### 4.2.2 Creating and managing the protection device

SIPROTEC protection devices are added to the project structure from the device catalog.

- 1. In the project structure you select the "Devices" folder.
- The device catalog is called up via the context menu "Add new project > SIPROTEC device".
- 3. Select protection device "7SJ801" from the catalog.

Device catalog	×
庄 💼 7SJ682	
🕀 💼 7SJ689	
🛱 🖓 🔁 7SJ801	
👔 V4.6	
庄 🧰 7SJ802	
Ē <b>ĒĒ7</b> SJ804	
😟 🧰 7SJ811	
🗄 💼 7SJ812	
TSK motor protection	-
Parameter set version:V4.62	A
Digital overcurrent protection with (local) control. housing 1/6 19"; 4xl, 3BI, 5BO, 1life contact	?

- 4. Drag the IED to the "Devices" folder in the project tree via drag&drop.
- 5. In the following dialog you need to set the device parameters according to the MLFB ordering number.

Properties - SIPROTEC device		×
MLFB		
Order number (MLFB):           [75J80111EA901FA0           +J           +K	+L [0R] +M [+N [+P [+Q [+R [	
Z. Nominal Current	1 : lph=1A/5A, IE=1A/5A	
8. Power Supply	1 : DC 24V / 48V	
9. Housing	E : Flush Mounting Case Ring Lugs	
10. Language/Regional Functions	A : Reg. DE,IEC,German chg.,Front Std.	
11. Port B (bottom of device, rear)	9 : additional Protocols, see MLFB Ext. L	
12. Port A (bottom of device, ahead)	0 : NO	
13. Osc. Fault Recording / Metering	1 : Oscillographic Fault Recording	
14. Overcurrent /	F : Standard	
15. Directional Overcurrent / Voltage	A : none 💌 💷	
1 <u>6</u> . Auto Reclose / Fault locator	0 : none	
ОК	Cancel Help	

6. For the "Port B" parameter settings you press the "L..." button on the right. For "Port B" you need to select the IEC61850 protocol.

Order number (MLFB): 75J80111EA9 +K	+L [0R +M - +N - +P - +Q - +R -
7. Nomir HLFB extension 8. Powe 9. Housi 1. Port B (bottom of device, rear) 1. torse 2. Port B (bottom of device, rear)	0 : Protocol
10. Langu     2. Port B (Bolton on Gevice, real)     11. Port B     12. Port A     0K	Cancel Help Mi.
13. Osc. Fault Recording / Metering     14. Overcurrent /      15. Directional Overcurrent / Voltage     16. Auto Reclose / Fault locator	

7. Within the IEC 61850 network each station requires a unique name. This name is assigned by you in the properties dialog of the SIPROTEC device.

General			
VD address:	10001 Mirror VD:	10002 red. Mirror VD:	0
Channel switch: [No	channel switch]	Port number:	
System interface [Ethernet	]		
IP address:	192 . 168 . 1 . 150	Important: There is no consistency	check here for
Subnet mask:	255 . 255 . 255 . 0	manually entered setting:	si
Standard gateway:	192 . 168 . 1 . 1	1	
UDP port:	50 000		
IED name:	IED_SJ80_1	1	

In the SIMATIC Manager, the created SIPROTEC device is now shown in the Component view.

Figure 4-3: Configured protection device in the Component View

SIMATIC Manager - [SIPROTEC	C_01 (Component view	) D:\PowerControl\05_K	he\Siprotec]				<u>- 🗆 ×</u>
🗃 Eile Edit Insert PLC View 🤅	Options <u>W</u> indow <u>H</u> elp						_ 8 ×
] D 🛩   🎛 🛲   🕹 🖻 🕄	🕍 🔍 🖳 🖕 📜	- 🔡 🏢 🗈 🛛 🕬 Filter	> 🔽 🏹	쁂 🛞   🐂 🗖 🗍	] <b>№</b> 2		
E-A SIPROTEC_01	Object name	Symbolic name	Туре	Size Author	Last modified	Comment	
Devices	🔋 7SJ801 V4.6		SIPROTEC device		11/07/2012 02:15:44 PM		
	المربح معرضا معالم		~~~~		· · · · · · · · · · · · · · · · · · ·		

#### 4.2.3 Create IEC station

All SIPROTEC devices created in a project are combined in a so-called IEC61850 station.

1. In the SIMATIC Manager you create a IEC61850 station:



2. The protection device must now be assigned to the IEC61850 station. To do this, open the Properties dialog of the station.

	5 01 (C	D. D		terel.					- 🗆 ×
SIMATIC Manager - [SIPROTEC			OS_Kne\Sipro	tecj					
By File Edit Insert PLC View									_ 8 ×
🗋 🗅 🥔 🔡 🛲 🕹 🖧 🕒 💼		🔄 🔠 🛗 🚺 < N	o Filter >	- 7	<b>12</b> 🗐		] <u>k</u> ?		
E-A SIPROTEC_01	Object name	Symbolic name	Туре		Size	Author	Last modified	Comment	
Devices	🔋 7SJ801 V4.6			EC device			11/07/2012 02:21:01 PM		
	1EC61850 station			i station			11/07/2012 02:30:21 PM		
		Open Object	Ctrl+Alt+O						
		Cut	Ctrl+X						
		Сору	Ctrl+C						
		Paste	Ctrl+V						
		Delete	Del						
		Insert New Object	•						
		Print	•						
		Export IEC61850 station Import IEC61850 station							
		Rename	F2						
		Object Properties	Alt+Return						
Hanna manager a new commencement	ha manana and		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		سميميد	an management	Aurilan 194 - 194 - 1944 - 1940 - 1970 - 1970 - 1980	· · · · · · · · · · · · · · · · · · ·	

3. In the upper part, all pending stations are displayed. These must now be adopted in the list of actual stations. Mark the protection device 7SJ801 and press the "Add" button.

IED Name	S Pro	operties - IEC6185	50 station
BIED_SJ80_1	S	General Information	Communicator Update
		Available EC61850	devices:
		ED Name	System herarchy
EC61850 atation col			
	mm <u>u</u> rik		
EC61850 atation col IED Name			Add Eemove
	5	IEC61850 station co	ommunicator:
	5	IED Name	ommunicator: System hierarchy
	5		ormuun cator: System hierarchy
	5	IED Name	ommyn cator: System hierarchy SIPFOTCC 01 / Standard level / 75/001 V4.6
	5	IED Name	ommyn cator: System hierarchy SIPFOTCC 01 / Standard level / 75/001 V4.6
	5	IED Name	ommyn cator: System hierarchy SIPFOTCC 01 / Standard level / 75/001 V4.6
	5	IED Name	ommyn cator: System hierarchy SIPFOTCC 01 / Standard level / 75/001 V4.6
	5	IED Name	ommyn cator: System hierarchy SIPFOTCC 01 / Standard level / 75/001 V4.6

4. Acknowledge your selection with the "OK" button.

- In the next step the network address for the protection device must be assigned. Open the IEC61850 station. Double-clicking the station opens the "DIGSI system configurator".
- 6. The network is established here and the IP address for the SIPROTEC protection device is set.

DIGSI system configurator					_ 0
<u>S</u> tation <u>E</u> dit <u>I</u> nsert <u>V</u> iew	<u>H</u> elp				
Network					
🖬 🔒 🗠 a 🕺 🖵 🗎	i 🗙 🔤 🖬				
ubnets			F	Properties	
lame 🖌	Name in DIGSI	IP address		Identification	
- 🔒 IEC61850 station				Name	IED_SJ80_1
- 🔛 New devices				Name in DIGSI	7SJ801 V4.6
⊡- 👪 Subnet1				Comment	
IED_SJ80_1	753801 V4.6	192.168.1.150		Туре	Device
	/20021100	1321200121200		Device type	Siprotec-7SX8xx
				Device version	1.0
				Manufacturer	SIEMENS
				Parameter	
				IP address	192.168.1.150
				Subnet mask	255.255.255.0
				Standard Gateway	192.168.1.1
				Device-device communicat	Possible
				Vertical communication	Only possible as sender
				Router function	No
				Timer function	No
				Parameter for SIPROTE	C
				Use as a timer	Function not available
				Memory division formessa	Dynamic and static reporti
				Name	
				Name of device (access point	:)

7. Close the configuration.

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8. Open the Properties dialog of the IEC61850 station again. Select the "Update" tab.

Properties - IEC61850 station	×
General Information Communicator Update	
IEC61850 station communicator:	
T P D IED Name	System hierarchy
IED_SJ80_1	SIPROTEC_01 / Standard
<ul> <li>[T]: Device type; [P]: Parameter set updated; [D]: Device updated (er</li> </ul>	
Print list	Update all parameter sets
ОК	Cancel Help

9. Press the "Update all parameter sets" button to map data to the IEC object.

operties - IE	C61850 station	×
	nation Communicator Update	
TPC		System hierarchy
<u></u> • E	IED_SJ80_1	SIPROTEC_01 / Standard
•		
	pe; [P]: Parameter set updated; [D]: Device upda	
Print list.		Update all parameter sets
	<u> </u>	
ок		Cancel Help

#### 4.2.4 Loading the configuration to the protection device

The configured settings are now transferred to the protection device. SIPROTEC 7SJ80 must be initialized for this.

The initialization gives the protection device its own identity. This transfers the parameter settings and assigns the TCP/IP a unique address. The initialization is performed via the appropriate USB interface of the protection device.

- 1. Select the protection device in the SIMATIC Manager.
- 2. Call the "Initialize device..." command via the context menu.

Initialize device	x
Connection type C Offine Direct USB Modem connection PROFIBUS FMS Ethemet	Connection properties Selected device: No device selected. Select a device
OK.	Cancel Help

- 3. A new protection device is not automatically detected. Therefore, you need to select the IED via the "Select a device..." button.
- 4. Select your respective protection device by means of the MLFB number.



5. Press the "OK" button to initialize the SIPROTEC 7SJ80.

Initialize device	X
Connection type C Diffine Direct Modem connection C DROFIBUS FMS Ethernet	Connection properties Selected device: MLFB: 75J80111EA901FA00R Name: System: PS version: V04 62:04 BF number: 1203105645 Select a device
ОК	Cancel Help

#### 4.2.5 Testing the operability

After transferring the parameters, the protection device is accessible via the set IP address in the network.

The diagnostic functions can be used during commissioning via the website which provides the Ethernet EN100 module.

- 1. For calling the website, you enter the IP address into the address line of the Internet Explorer. At the end of the IP address you enter the suffix "/home". In this example, the entry reads: "http:192.168.1.150/home"
- 2. Confirm your input with "Enter" key.

🖉 EN100 - Windows Internet Explorer				
G S + Attp://192.168.1.150/home			🗾 🐓 🗙 Live Search	<b>P</b> •
😭 🏟 🏀 EN 100			🟠 👻 🖶 👻 📴 Bage 🕶 🎯 To	ols • »
SIEMENS			EN100 module HOME	4
Statistics firmware update status System log Connection / Security log Startup log Error log SNTP Diagnostics Web-Monitor	Parameter bank active Parameter Module time : W	)_1 / SIP0 1 IEC618 2 IEC618 3 bank 1 IE 7e 7.11.20	50 07.11.12 14:20:59.677 Version: 8010000H CRC: 16D76A12H 20263 Bytes 50 02.07.12 11:46:27.983 Version: 8010000H CRC: 4DE1FCE9H 25886 Bytes iC61850 07.11.12 14:20:59.677 Version: 8010000H CRC: 16D76A12H 20263 Bytes 12 15:13:03:282 Last update: Jul 12 2011 12:56:55	
http://192.168.1.150/diag			🐘 🗸 Trusted sites   Protected Mode: Off 🔍 100%	• //

Figure 4-4: Website of SIPROTEC 7SJ80

A wide range of information on protective devices can be called up via the left hand navigation.

#### 4.2.6 Exporting the protection device description

For the OS configuration described in the following chapter, the so-called device description ICD (IED Configuration Description) of the SIPROTEC device is required.

It is created with DIGSI and stored in an XML file. The basis is the "Substation Configuration Description Language" (SCL).

# Note It is recommended to save the device description file in a sub-directory of the SIMATIC PCS 7 project (e.g. SIPROTEC). DBA in particular always requires access to the data (next chapter). Furthermore, this archives the data consistently.

- 1. Select the protection device in the SIMATIC Manager.
- 2. Select the "Export device..." command via the context menu.
- 3. Create the storage location and assign a meaningful file name. Select "\*.icd" as the file name.

Export						×
Save in: 🚺	SIPROTEC		-	🗈 💣 🎟 -		
Name 🔺	-	Date modified	- Type	▼ Size	-	
			This folder is em	pty.		
File name:	7SJ801 V4.6	:				ОК
rile ridille.	1/53001 V4.0	ica				
Save as type:	IEC 61850 tra	ansferfile (*.icd)			•	Cancel
						Help
						////

- 4. Click "OK" to generate the device description.
- 5. The following query once more points out the storage path of the device description.



4.3 Configuring the PCS 7 PowerControl functions via the DBA tool

# 4.3 Configuring the PCS 7 PowerControl functions via the DBA tool

The Data Base Automation (DBA) engineering software generates, in conjunction with a library (OS symbols, OS faceplates, OS diagnostic view), the OS database with picture hierarchy, tags, alarms, alarm messages as well as the specific faceplates and block symbols.

The desktop of the DBA tool is divided into 4 areas:

- Plant View Generating the Plant Hierarchy (PH) and assigning the AS instances
- Object Editor: configuring the OS instances
- Physical objects (IED)
  - AS Object Editor: configuring the IED instances

#### Figure 4-5: DBA tool

🕐 Siemens DBA AS to 05 Compilation Utility - D:\PowerCon	trol\05_Khe\DBA\PowCon.dba			
<u>Eile Edit R</u> un <u>T</u> ools <u>H</u> elp				
□         □         □         □         ∞         ×         !         □           Plant View         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞         ×         !         □         □         ∞ <td< th=""><th>Objects: 3 Attributes: 4</th><th></th><th></th><th></th></td<>	Objects: 3 Attributes: 4			
□-1N PowCon □-1 2 PowerControl	Name	Value	Category	Description
PowerControl	Mathor 4		Standard	Name and/or department
ED_SJ80_1	Second Comment		Standard	Additional documentation.
ED_SJ80_1_IED	Name Tree Name		Standard	Use Folder name if blank
	MargetAssignment 3 TargetAssignment	OS_PowCon_01	Target	
1				2
AS View PC Station View Validation Results	Name	Value	Category	Description
📄 🖻 🖳 ES	MAPL.	ves	OS	APL Project
	Author	,00	Standard	Name and/or department
	Comment		Standard	Additional documentation.
	Context Number	0	OS	Context Number
	Section 2010 Number	1	EDC	EDCNumber
	VIEC850IED	2	AssignedPerExtension_St	Number of Assigned ASO
	IED_SJ80_1	2	AssignedPerAS_Statistics	Number of Assigned ASO
	V LAN 1 Address		EDC	LAN1 TCP/IPAddress
	GAN 1 Port	20000	DNP	LAN1 Listen Port I
(3)	LAN 2 Address		EDC	LAN2 TCP/IPAdd
	V LAN 2 Port	20000	DNP	LAN2 Listen Port
	LAN Address	192.168.1.1	IEC850	LAN TCP/IPAddress
1	. J <b>e</b> ≓ren kin	i	DND	

#### 4.3.1 Creating the DBA project

- Start DBA configuration tool via "START > Programs > Siemens Automation > SIMATIC > DBA > PCS 7 DBA".
- 2. Select "File > New Project...".



- 3. Save your newly created DBA project via "File > Save Project As...".
- **Note** Saving should be repeated from time to time, since the DBA changes in the project are not saved automatically.

#### Add PC station

- 4. Go to the "PC Station View" tab.
- 5. There you enter a PC station into the project. Call the context menu of the project and select "Add PC Station".



6. Assign a computer name for the PC station.

Name	Value	Category	Description
✓Author		Standard	Name and/or depar
🚰 Comment		Standard	Additional documen
Gomputer Name	ES	Standard	Name of the Compu
·			

#### Add OS application

7. Add a PCS 7 OS application to the PC station. Call the context menu of the station and select "Add Application".

E-N Powl	Con	
÷.	Add Application	
	Delete	
	Rename	
	Expand Node	
		1

8. In the dialog window which opens, you select the "PCS 7 OS" application of type Server/Single Station.

Select an Applicat	ion Type
Select the type of Applic	ation to create:
Application	Application Object Type
PCS7 OS	PCS 7 OS (Server/Single Station)
PCS7 OS	PCS 7 OS (Standby)
PCS7 OS	PCS 7 OS (Client)
SINAUT	Sinaut Access Point
	OK Cancel

- 9. Acknowledge your selection with the "OK" button.
- 10. The OS application can also be renamed.
- 11. In the Value field of the "Offline MCP File" you enter the mcp-project file including the path (connection with the configured OS project) of the respective project.

PowCon	Name	Value	Category	Description
🖻 💂 ES	<b>∛</b> APL	yes	OS	APL Project
S_PowCon_01	Not Author		Standard	Name and/or department of t
	Second Se		Standard	Additional documentation.
	Context Number	0	OS	Context Number
	Second Se	1	EDC	EDC Number
	💁 LAN 1 Address		EDC	LAN1 TCP/IPAddress
	M LAN 1 Port	20000	DNP	LAN1 Listen Port Number
	💁 LAN 2 Address		EDC	LAN2 TCP/IPAddress
	M LAN 2 Port	20000	DNP	LAN2 Listen Port Number
	💁 LAN Address		IEC850	LAN TCP/IPAddress
	Link Address		DNP	DNP3 Link Address of the OS
	Contract Sector	D:\PowerControl\OS_Khe\PowCon_0\wincpro	OS	Engineering OS Project File I
	Second Se		OS	Target OS Project File Path
		0	150	- 1000 A AND

- 4.3 Configuring the PCS 7 PowerControl functions via the DBA tool
  - 12. In the next step you trigger reading the OS project. Select the OS application in the DBA tool and select the "Refresh OS Cache" command from the context menu.

PowCon	Name	Value	Category	Description
- 🖳 ES	Second Se	1	EDC	EDC Number
OS_PowCon_01	LAN 1 Address		EDC	LAN1 TCP/IPAddress
Edit Object Properties	LAN 1 Port	20000	DNP	LAN1 Listen Port Number
Delete	LAN 2 Address		EDC	LAN2 TCP/IPAddress
Rename	LAN 2 Port	20000	DNP	LAN2 Listen Port Number
	LAN Address		IEC850	LAN TCP/IPAddress
Refresh OS Cache	Link Address		DNP	DNP3 Link Address of the O
Compile	Offline MCP File	D:\PowerControl\OS_Khe\PowCon_0\wincpro	OS	Engineering OS Project File
	Soline MCP File		OS	Target OS Project File Path
	Sector Address	0	IEC	Originator Address
	STIME Master	ves	SINAUT	OS Time Master
	Standby OS	<none></none>	OS	Name of the Standby OS
	Subscriber Number	2001	SINAUT	ST7 Subscriber Number
	A REAL PROPERTY AND A REAL		00	

- 13. Confirm the following dialog box with "Yes".
- 14. After reading the OS project, the process value archive created in the PCS 7 project must be selected in the Value field of the "Tag Logging Archive". To do so, open the drop-down menu:

PowCon	Name	Value	Category	Description
ES ES	V LAN 1 Address		EDC	LAN1 TCP/IPAddress
S_PowCon_01	Market LAN 1 Port	20000	DNP	LAN1 Listen Port Number
	💁 LAN 2 Address		EDC	LAN2 TCP/IPAddress
	Marca LAN 2 Port	20000	DNP	LAN2 Listen Port Number
	💁 LAN Address		IEC850	LAN TCP/IPAddress
	My Link Address	192.168.1.1	DNP	DNP3 Link Address of the OS
	Month Strategy Comparison of the Market Strategy Comparison of the Strategy	D:\PowerControl\OS_Khe\PowCon_0\wincpro	OS	Engineering OS Project File P
	💁 Online MCP File		OS	Target OS Project File Path
	Sector Address 34 Originator Address	0	IEC	Originator Address
	S Time Master	yes	SINAUT	OS Time Master
	Standby OS	< none >	OS	Name of the Standby OS
	Subscriber Number	2001	SINAUT	ST7 Subscriber Number
	🋂 Tag Logging Archive	ProcessValueArchive	os	Archive for Tag Logging

#### Set PH

- 15. The project-specific settings of the Plant Hierarchy are made via the Properties of the DBA project. Select "File > Properties...".
- 16. In the "Properties" dialog box you select the "Hierarchy" tab.

Max Level	Max Characters	Include In Name	With Separator	OS Area
Level 1		<b>V</b>	<b>V</b>	•
Level 2	24		V	0
O Level 3	24 ÷	V		0
<ul> <li>Level 4</li> </ul>	24 ÷		Г	
<ul> <li>Level 5</li> </ul>	24 ÷		Г	
C Level 6	24 ÷		Г	
C Level 7	24 🛨		Г	
Evel 8	24 ÷		Г	
Preview	1111111	111111111111	111111/222222222	222222222222222/333333333333333
Short 9	Symbol Name	s		

**Note** The settings for the PH must match those of the configuration in the Plant Hierarchy view of the SIMATIC Manager (see page 20).

#### 4.3.2 Creating a technology object

#### **Creating IED in DBA**

To create a new protection device, the "AS View" tab must be selected.

- 1. In the window for physical objects you call up the context menu.
- 2. Select the "Add AS Source Node..." command.

Name	Туре	AS Address	Assignment

3. In the "AS Node Name" field you enter the name of the protection device 7SJ80. The fields for identification are filled by the .icd file, which you select via the "..." button, and must not be changed.

General Node Name:	IED SJ80 1	
	JED_0000_1	
Identification		
ICD File	D:\PowerControl\OS_Khe\PowCon_0\wincproj\	SIPROTEC
IED Name	IED_SJ80_1	•
Access Point:	P1	•
IED Type	SIEMENS/Siprotec-7SX8xx_1.0	
Restore ICD De	aults Configure Connection Config	jure Parameters

**Note** Select the .icd file, which you have created at 4.2.6 Exporting the protection device description.
4. Acknowledge the "Configure Connection" button to enter the TCP/IP address of the SIPROTEC 7SJ80.

Configure IEC-618	50 IED Connection
192.168.1.150	
🔽 Can Connect To	Multiple OS Servers
051	
AP TITLE	1,3,9999,23
AE QUALIFIER	23
PSEL	00000001
SSEL	0001
TSEL	0001
- Master OS	
OS_PowCon_01	
	<u>D</u> K <u>C</u> ancel

- 5. Confirm you entry with the "OK" button.
- **Note** The parameter settings (via the "Configure Parameters" button) can be retained without changes.
  - 6. The ICD files are read after pressing the "OK" button. This may take some time depending on scope and size.

## Creating a technology object (instance)

The technology object is created in the DBA using the "Create New AS Object". When reading the .icd file, the DBA checks which technology objects can be applied to the IED and offers them in a selection.

7. Mark the protection device (AS View) and select the "Create New AS Object..." command via the context menu.

omponents		AS Objects: 1			
IED_SJ80_1		Name	Туре	AS Address	Assignment
	Add AS Source Node	37 IED_SJ80_1	IEC850IED	IED_SJ80_1	
	Edit Object Properties Update Controller Objects Update All Controller Objects				
	Delete				
	Reset Attributes to AS Default				
	Create New AS Object				
	Export Instances to CSV Import Instances from CSV				
Include All Resources Include Assigned	Edit AS Object Types				
Include Only Changes	Auto-Assign Resource to Plant View				

8. Select instance editor of the protection device from the tree structure. This maps the whole IED in an object. As instance type you select "PC\_FEEDER" from the selection list. Then complete with the "Execute" button.

FIEC 61850 IED Instance Editor		
📽 Instances 🏘 Filters	Log	
IEO_SK0_1PC_FEEDER]           PR01           Hod [StatusDisplay_V1]           Heath [StatusDisplay_V1] <td>SCL Type Instance Name [ED_SJ80_1_IED Instance Type PC_FEEDER - ED_SJ80_1 - Ucb8 - Ucb8 - Ucb6 - Ucb6 - Ucb6 - Ucb6 - Ucb6 - Ucb8 - Uc</td> <td>AS Instance Editor</td>	SCL Type Instance Name [ED_SJ80_1_IED Instance Type PC_FEEDER - ED_SJ80_1 - Ucb8 - Ucb8 - Ucb6 - Ucb6 - Ucb6 - Ucb6 - Ucb6 - Ucb8 - Uc	AS Instance Editor
		🕅 Not Filtered

### 9. The created IED instance has now been created in the AS Object Editor.

Components	AS Objects: 2			
ED_SJ80_1 (changed)	Name	Туре	AS Address	Assignment
	V IED_SJ80_1	IEC850IED	IED_SJ80_1	
	WIED_SJ80_1_IED	PC_FEEDER	IED_SJ80_1	
Include All Resources				
Include Assigned				
Include Only Changes				

## 4.3.3 Creating a Plant Hierarchy

For the PCS 7 OS the picture hierarchies are automatically created on the basis of the Plant Hierarchy created in DBA.

The folders of the hierarchy are assigned to an existing OS. DBA creates a picture for each folder.

### Plant area

Below, the plant area to be output later in the OS is created first.

- 1. Mark the DBA project in the "Plant View".
- 2. Call up the "Add Folder" command via the context menu to create an appropriate folder structure for the plant areas.

🔗 Siemens DBA AS to OS Compilation Utility - D:\PowerCom	trol\05_Khe\DBA\Pow(	Con.dba*		_	
File Edit Run Tools Help					
Plant View	Objects: 0 Attributes:	0			
Add Folder	Name	OS Tag Name	Status	AS	
Add Folder					
Export Instances to CSV					
Import Instances from CSV					
Upgrade Instances to New Versions of Types					
Edit Attributes					
Export Attributes					
Import Attributes					
Export Plant View					
Import Plant View					
Readback Parameters from OS					
AS View PC Synchronize Plant View					

#### 3. The system automatically generates the respective area picture.

Siemens DBA AS to OS Compilation Utility - D:\PowerContr	ol\OS_Khe\DBA\PowCor	1.dba*			
Eile Edit Run Tools Help					
Plant View	Objects: 1 Attributes: 3				
PowCon     PowerControl     PowerControl     PowerControl	Name	OS Taq Name	Status	AS	
PowerControl	PowerControl	100 ragitano	Changed	110	
AS View PC Station View Validation Results	L				

#### **Object assignment**

The AS objects from the AS Objects view are assigned to the plant area in the OS area object view.

4. Drag the AS objects to the respective folder in the PH via drag&drop.

Siemens DBA AS to OS Compilation Utility - D:\PowerContr	ol\OS_Khe\DBA\PowCon.dba*			
<u>File Edit Run Tools Help</u>				
🗋 😂 🛃 🔰 ڬ 🗀 📾 🗙 🔗 🗒				
Plant View	Objects: 3 Attributes: 3			
⊡-1N PowCon		007 N		
E-12 PowerControl	Name	OS Tag Name	Status	AS
- A PowerControl	ED_SJ80_1	PowerControl/IED_SJ80_1	Changed	IED_SJ80_1
	PowerControl	PowerCo trol/IED_SJ80	Changed	IED_SJ80_1
	PowerControl		Changed	
AS View PC Station View Validation Results				
Components	AS Objects: 2			
ED_SJ80_1	Name	Туре	AS Address	Assignment
	₩FIED_SJ80_1	IEC850IED	IED_SJ80_1	\PowerControl
	WIED_SJ80_1_IED	PC_FEEDER	IED_SJ80_1	\PowerControl
I Include All Resources				
Include Assigned				
Include Only Changes				
	1		1	

#### Note

e Objects marked green and areas point to changes in the project. These must still be compiled and adopted in the OS project.

## **OS** assignment

The created plant areas of the PH must be assigned to the OS.

- 5. Select the new plant area in the "Plant View".
- 6. Select the "Edit Folder Properties..." command from the context menu.

Siemens DBA AS to OS Compilation Utility - D:\PowerCor	trol\OS_Khe\DBA\PowCon.db	a*			_ 🗆 ×
File Edit Run Tools Help					
🗋 🗁 🛃 🛃 🕨 💷 🚘 🗙 😭 🗄					
Plant View	Objects: 3 Attributes: 3				
E N PowCon	Name	OS Tag Name	Status	AS	
🖻 😥 PowerControl					
Power Add Folder	ED_SJ80_1	PowerControl/IED_SJ80_1	Changed	IED_SJ80_1	
Edit Folder Properties	ED_SJ80_1_IED	PowerControl/IED_SJ80	Changed	IED_SJ80_1	
Edit Folder Properties	PowerControl		Changed		
Enable All Picture Changes					
Disable All Picture Changes					
Delete					
Rename					
- IN 1					
Expand Node					
Create New AS Object					
Edit Attributes					
AS View PC Station Export Attributes					

7. Select the OS in the subsequent dialog.

🚔 Folder Properti	es		<u>_ 0 ×</u>
Name PowerContr	ol		
Assigned Componen	ts		
Name	Туре	Machine Name	Assignable
OS_PowC	PCS 7 OS (Server/Si		Yes
* Only 1 of each type			
🔲 Show Only Availa	able Components		
	<u>0</u> K	<u>C</u> ancel	

### Compiling the DBA project

Now, the project can be compiled and be used for a preliminary test in Runtime. This writes the DBA configuration to the OS.

8. Select "Run > Start Compilation" via the menu.

Siemens DBA AS to 05 Compilation Utility - D:\PowerCont	rol\05_Khe\DBA\PowCon.dba				
File Edit Run Tools Help					
🗋 🗁 💡 Update Controller Objects 🇧 📰					
Plant View Start Compilation F5	Objects: 3 Attributes: 4				
E PowerControl	Name	OS Tag Name	Status	AS	
PowerControl	ED_SJ80_1	PowerControl/IED_SJ80_1	Changed	IED_SJ80_1	
	E IED_SJ80_1_IED	PowerControl/IED_SJ80	Changed	IED_SJ80_1	
ED_SJ80_1_IED	A PowerControl		Changed		
AS View PC Station View Validation Results					

9. In the compilation dialog, the options can be adopted without changes. Press the "Compile" button.

Compile Targets	Туре	OS_PowCon_01
☑OS_PowCon	PCS 7 OS (Server	Compile Options
		Entire OS
		🔿 Changes
		🔽 Tags and Messages
		Create/Update Block Icons
		Create Archive Tags
		I Picture Tree

Note

The protocol of the compilation can be saved after completion. Click the button "Save" button.

10. If the compilation was completed without errors, the OS can be adopted to Runtime.

# 5 Starting the Application

After the project was compiled in the DBA, the configured symbols are available in the respective process image and are generally functional.

- 1. Open the OS in the SIMATIC Manager.
- 2. Press the "Run" button in the WinCC Editor.
- 3. Open the existing faceplates.

Figure 5-1: OS Runtime

PowerCon	trol	Ū I I I I I I I I I I I I I I I I I I I			U.	SIEMENS
	<u> </u>					
Etter Inter 1	A Berhie         Image: A Berhie           CK         Image: A Berhie           C	-t-				
PowerCon	E 🔀 🗊		\$ \$ C	•	Automotical Instation	P3 112 012 15 08 20 SIEMENS
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	🗈 🔀 🛄	1 4 4 <del>4</del>	* ± ±	• >	2 0	* *

SIMATIC PCS 7 PowerControl V 1.0, Entry ID: 67688155



The PC\_FEEDER object is used for all inputs or outputs of a busbar. It can also be configured as individual circuit-breaker, ground electrode or isolator. Furthermore, it is used for switchable machine contactors.

6.1 Power direction display

# 6 Changes in the Application

For project-specific adjustment of symbols and faceplates, there are some attributes which should be checked and, if necessary, be adjusted. The process picture must be opened in "WinCC Graphics Designer" and the properties of the respective symbols be displayed.

# 6.1 Power direction display

There is the option of displaying the power direction in the switchgear by means of a direction arrow. It is configured with the attributes "DirectionUp" (power direction up) and "DirectionDown" (power direction down).



## 6.1 Power direction display

No	Action
3	the power direction display in OS Runtime will point up as well as down.
	وسو موسامی است مجرب محمد سامن محملی برسوسی اسی زمان با معرف می این مراجع می این مراجع این از این است این این م
4	For a downward current flow display, the "DirectionDown" attribute is assigned with "Yes" and "DirectionUp" with "No".
5	PowerControl U SIEMENS

Note

If both attributes are configured to "No", the power direction arrow is hidden.

6.2 Hiding non-existent values

# 6.2 Hiding non-existent values

All technology objects have the option of hiding certain values. This functionality is controlled via the internal WinCC tag "Status5", whose start value can be configured in the DBA.

Each hidden value in the faceplate is assigned a bit in the "Status5 tag". If the respective bit is set to 0, the value is hidden in the faceplate.

The default value of "Status5" is 0xFFFFFFF. This means, that all values assigned to "Status5", are shown in the faceplate.

The assignment of the values to the bits of the "Status5 tags" is available in the Appendix (7.2 Assigning the "Status5" tag).

Figure 6-1: Status5 in the DBA Project Editor

Siemens DBA AS to OS Compilation Utility - D:\PowerCo	ntrol\05_Khe\DBA\PowC	on.dba*		
Ele Edit Run Iools Help				
🗋 🗁 🛃 💽 🕨 💷 📾 🗙 😤 🗒				
Plant View	Objects: 0 Attributes: 8	3 Graphics: 4 Alarm Messages A	ddresses Operation: 2	
⊡ PowCon	Name	Value		Description
E 📴 PowerControl			Category	Description
- PowerControl	Status5	4294967295	Operation	Status Value
ED_SJ80_1	Market Strategy Timeout	10	Operation	
ED_SJ80_1_IED				
Insettion and a setting of the setti	مموري حمالهما	and and a second s	many and a second secon	ويحاصي والمعصم فستحصص مستعر ويقصل فتترو والمنا

#### Table 6-2

	Action	
In the faceplate, various power, current and voltage value fields are displayed. These connected with the "Status5" tag.		
PowerControl		
	with the "Status5" tag.	In the faceplate, various power, current and voltage values with the "Status5" tag.

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**Note** In the DBA tool, an input of the hexadecimal values is not possible. These must be converted into the appropriate decimal value and be entered as such.

#### 6.2 Hiding non-existent values



Note

Each change in the DBA tool must be transferred to the OS via a "Compile".

## 6.3 PC\_FEEDER switch representation

# 6.3 PC\_FEEDER switch representation

The PC\_FEEDER faceplate offers a flexible representation of the switches (e.g. circuit-breaker, ground electrode, isolator). Up to 5 switches can be represented dynamically in 6 fields.

The representation occurs using randomly combinable symbols (see Appendix), which are aligned in 6 fields (field 1-6).

Additionally, there are 4 fields (field 7-10), which form the connection between fields 1-6.

### **Configuration fields**

The figure below shows the arrangement of the fields in relation to the switch representation.



Figure 6-2: Configurations fields for PC\_FEEDER

The "Field\_XX\_Code" symbol attributes are used for configuring the fields in which the symbols are displayed. Only the two-digit symbol codes are entered (7.1 Symbols/Codes).

#### Configuration of the switches

The following switches can be configured in PC\_FEEDER:

- Q0 (e.g. circuit breaker)
- Q1 (e.g. isolator)
- Q2 (e.g. additional isolator)
- Q8 (e.g. ground electrode)
- Q9 (e.g. additional ground electrode)

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#### 6.3 PC\_FEEDER switch representation

Switches can only be represented in the fields 1-6. In the fields it is possible to display and configure up to two switches (Figure 6-2: Configurations fields for PC\_FEEDER: Feld\_03 – Circuit-breaker/isolator combination).



# 6.3 PC\_FEEDER switch representation

Action
If attribute "QX_Field" is configured to 0, this switch is not displayed in the faceplate (no display of the position and no control).
PowerControl  SIEMENS
<ul> <li>"QX_SubField" represents one of both "sub-fields" of "QX_Fields". This is required in order to represent two switches in one field.</li> <li>"QX_SubField" can ONLY take on value 1 or 2. If, for example, the circuit-breaker (Q0) and the isolator (Q1) are displayed in field 3, the configuration must be as follows:</li> <li>Q0_Field 3</li> <li>Q0_SubField 1</li> <li>Q1_Field 3</li> <li>Q1_SubField 2</li> </ul>
Object Properties         I         I           Image: Control And Cont
Properties         Events
Styles Field_02_code 04 🚫
- Font Préd 0.3.Code 01 C - Configurations Préd 0.5.Code 11 C - System Préd 0.5.Code 00 C - System Préd 0.5.Code 01 C - RC_TO_Config Préd 0.5.Code 02 C - Reid 0.5.Code 04 C - Reid 0.5.Code 04 C - Reid 0.5.Code 04 C - Reid 0.5.Code 00 C - Reid 0.5.Code 04
Op/Field
Q2_Medi         1         Q           Q2_SARedi         1         Q           Q2_SARedi         5         Q           Q2_SARedi         1         Q
Cutori receptate GPU P C C Cutori receptate GPU P C C Cutori receptate GPU P C C C Cutori receptate GPU P C C C C C C C C C C C C C C C C C C
Imiddlescote_05       Imiddlescote_05         Q0_Fidd       3         Q0_Fidd       1         Q1_Fiddlescote_05       Imiddlescote_05         Q1_Fiddlescote_05       Imiddlescote_05         Q1_Fiddlescote_05       Imiddlescote_05         Q1_Fiddlescote_05       Imiddlescote_05         Q1_Fiddlescote_05       Imiddlescote_05         Q2_Fiddlescote_05       Imiddlescote_05         Q3_Fiddlescote_05       Imiddlescote_05         Q4_Fiddlescote_05       Imiddlescote_05         Q5_Fiddlescote_05       Imiddlescote_05         Q4_Fiddlescote_05       Imiddlescote_05         Q5_Fiddlescote_05       Imiddlescote_05         Q4_Fiddlescote_05       Imiddlescote_05         Q5_Fiddlescote_05       Imiddlescote_05         Q5_Fiddlescote_05       Imiddlescote_05

## 6 Changes in the Application

6.3 PC\_FEEDER switch representation



6.4 Labeling the fields and switches of PC\_FEEDER

# 6.4 Labeling the fields and switches of PC\_FEEDER

Table	ble 6-4			
No		Action		
1	Open the project screen in	the "WinCC Graphics Designer". Select the Properties dialog o		
	A Contrast Designers (Prover Contrast All) A file Lin mar Array Task Verder Hell コカンゴトX地画のペムのグームのの「本のの」			
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		Or And Control		
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2	PowerControl/IED_5380_1_1			
	IED_SJ80_1_IED	🔥 🐑 🇊 🥜 C 🛒		
		CB Offen		
		DS Geschlossen		
		Q2		
		ES Offen		
		Q9		
	Ť.			
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	Remote			



6.4 Labeling the fields and switches of PC\_FEEDER

# 7 Appendix

# 7.1 Symbols/Codes

# Symbol codes for PC\_FEEDER

Table 7-1

Symbol	Code	Remark
	00	Empty field
ê	01	Circuit-breaker with isolator and carriage (2 switches)
*	02	Circuit-breaker
⊥¦‡	03	Isolator and ground electrode (2 switches)
	04	Isolator
	05	Simple connection
÷	06	Isolator
	07	Isolator
ٹہہ	08	Ground
$\varphi$	09	
¢ ¢	10	Isolator (with carriage)

Symbol	Code	Remark
<u>♀</u> -1	11	Ground
4 0	12	Isolator with carriage and ground (2 switches!)
G	13	Generator
M	14	Motor

# Symbol codes for connections

## Table 7-2

Symbol	Code	Remark
	00	Empty field
	01	1 connection under field 5 (for field 10)
	02	Connection between 2 rows (for field 8,9,10)
	03	Connection via field 1 and 2 (for field 7)
	04	Connection between 2 rows (for field 8,9)
	05	Connection via field 1 (for field 7)
	06	Connection via field 1 (for field 7)
	07	Connection (for field 8,9,10)
	08	Connection between 2 rows (for field 8,9)
	09	Connection between 2 rows (for field 8,9)
	10	Connection via field 1 and 2 (for field 7)

# 7.2 Assigning the "Status5" tag

# PC\_FEEDER

Table 7-3

Bit	Feature	Remark
0	I_A	Current phase 1
1	I_B	Current phase 2
2	I_C	Current phase 3
3	U_A	Voltage phase 1 – Ground
4	U_B	Voltage phase 2 – Ground
5	U_C	Voltage phase 3 – Ground
6	U_AB	Voltage phase 1 – Phase 2
7	U_BC	Voltage phase 2 – Phase 3
8	U_CA	Voltage phase 3 – Phase 1
9	U	Voltage
10	Р	Power
11	Q	Wattless power
12	S	Apparent power
13	F	Frequency
14	PF	Cosinus Phi
15	WpForw	Power counter P Forward

# 8 Glossary

D	BA

ICD

IEC

DataBase Automation – Engineering Tool for integrating different protocols in PCS 7

IEC 61850 Device Description – Standardized device descriptions which are
integrated for the engineering of switchgear automation in the system.

International Electrotechnical Commission – Commission based in Geneva for standards in the field of electrical engineering and electronics.

# IED

Intelligent Electronic Device – For switchgear automation, i.e. for protection, control, measuring and monitoring tasks in electronic power transmission and distribution, Intelligent Electronic Devices (IEDs) are used.

## WinCC

Windows Control Center – PC-based process visualization system of Siemens. WinCC is used as Human Machine Interface (HMI) in the process control system SIMATIC PCS 7.

# 9 Related Literature

The following list is by no means complete and only provides a selection of appropriate information.

Table 9-1

	Торіс	Title
\1\	Link to this document	http://support.automation.siemens.com/WW/view/en/67688155
\2\	Industry Online Support	http://support.automation.siemens.com
\3\	IEC 61850	http://www.tissues.iec61850.com/default.mspx
\4\	SIMATIC PCS 7 PowerControl	www.siemens.com/simatic-pcs7/powercontrol
\5\	Protection technology	http://www.energy.siemens.com/hq/en/automation/power- transmission-distribution/protection/siprotec-compact/overcurrent- protection/7sj80.htm

# 10 History

Table 10-1

Version:	Date:	Revisions
V1.0	02/2013	First release